

**\*NOTICE\***

**THIS CONTRACT CANNOT BE UTILIZED AS A  
COOPERATIVE CONTRACT**



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**CONTRACT NO. 200744**  
**(RFP 306664)**  
**ELECTRIC BUSES AND CHARGERS**

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**CONTRACTOR:** Proterra Operating Company, Inc.  
1815 Rollins Road  
Burlingame, CA 94010  
864-438-0000  
[jwalsh@proterra.com](mailto:jwalsh@proterra.com)

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**AWARD DATE:** September 30, 2021

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**CONTRACT TERM:** Five (5) Years from Notice to Proceed

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**PRICE:** Not-to-Exceed \$23,724,246.00

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**LIQUIDATED DAMAGES:** \$312.77 Per Unit, Per Day

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**PROJECT MANAGER:** Andrew Murphy  
512-389-7566  
[andrew.murphy@capmetro.org](mailto:andrew.murphy@capmetro.org)

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**CONTRACTS ADMINISTRATOR:** Tracee Metterle  
512-369-6525  
[tracee.metterle@capmetro.org](mailto:tracee.metterle@capmetro.org)

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PROCUREMENT DEPARTMENT  
CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY  
2910 E. 5<sup>th</sup> STREET  
AUSTIN, TEXAS 78702

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(RFP 306664)****ELECTRIC BUSES AND CHARGERS****TABLE OF CONTENTS**

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22	EXHIBIT F-3 - TRAINING AND MANUALS
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CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

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24	EXHIBIT G-1A - REVISED-2 - DELIVERY SCHEDULE – 40-FOOT BUSES
25	EXHIBIT G-2A - VEHICLE TECHNICAL INFORMATION – 40-FOOT BUSES
26	EXHIBIT G-3A - REQUIRED DOCUMENTATION – 40-FOOT BUSES
27	EXHIBIT G-4A - IT SECURITY VENDOR ASSESSMENT FORM – 40-FOOT BUSES
28	CONTRACTOR'S FINAL PROPOSAL REVISION, AUGUST 12, 2021
29	CONTRACTOR'S INITIAL PROPOSAL, JUNE 11, 2021
30	PRE-AWARD BUY AMERICA AUDIT REPORT
31	ALTOONA TEST REPORT
32	DELIVERY SCHEDULE ASSURANCE LETTER, DATED SEPTEMBER 24, 2021
33	AMENDMENT 7, DATED AUGUST 6, 2021
34	AMENDMENT 6, DATED JULY 30, 2021
35	AMENDMENT 5, DATED MAY 27, 2021
36	AMENDMENT 4, DATED MAY 21, 2021
37	AMENDMENT 3, DATED MAY 10, 2021
38	AMENDMENT 2, DATED APRIL 29, 2021
39	AMENDMENT 1, DATED APRIL 22, 2021

**CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY**

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**CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY  
AUSTIN, TEXAS**

**AWARD/CONTRACT FORM**

**1. SOLICITATION NO:** RFP 306664      **2. CONTRACT NO:** 200744      **3. EFFECTIVE DATE:** Upon Execution

**4. CONTRACTS ADMINISTRATOR:** Tracee Metterle      **PHONE:** 512-369-6525

**5. SHIP TO ADDRESS:**

Capital Metro  
2910 East 5<sup>th</sup> Street  
Austin, Texas 78702

**6. DELIVERY TERMS:**

F.O.B. Destination

**7. DISCOUNTS FOR PROMPT PAYMENT:** N/A

**8. CONTRACTOR NAME & ADDRESS:**

Proterra Operating Company, Inc.  
1815 Rollins Road  
Burlingame, CA 94010

**9. REMITTANCE ADDRESS:**

(If different from Item 8)

**PHONE:** 864-438-0000

**EMAIL:** [jwalsh@proterra.com](mailto:jwalsh@proterra.com)

**10. DBE GOAL:** TVM CERTIFICATION

**CONTRACT EXECUTION**

**CAUTION:** A false statement in any bid or proposal submitted to CMTA may be a criminal offense in violation of Section 37.10 of the Texas Penal Code.

**X** **NEGOTIATED AGREEMENT:** (Contractor is required to sign below and return to the Contracting Officer within three (3) calendar days of receipt.)

Contractor agrees to perform, furnish and deliver all the services set forth or otherwise identified in the following items and all relevant attachments and addenda for the base and option years. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this Award/Contract, (b) the solicitation, as amended, and (c), such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein.

- Contractor's Final Proposal Revision dated August 12, 2021
- Contractor's Initial Proposal dated June 11, 2021
- Delivery Schedule Assurance Letter, Dated September 24, 2021
- Pre-Award Buy America Audit Report
- Altoona Test Report
- Exhibit A - Revised-2, Exhibit A-1, Exhibit A-2, Exhibit A-3, Exhibit A-4, Exhibit A-5, Exhibit A-6 - Revised-1, Exhibit A-7
- Exhibit B, Exhibit B-1 - Revised-1
- Exhibit E - Revised-1, Exhibit E-1, Exhibit E-2, Exhibit E-3, Exhibit E-4
- Exhibit F-1 - Revised-3, Exhibit F-1A, Exhibit F-1B - Revised-1, Exhibit F-1C, Exhibit F-2, Exhibit F-3, Exhibit F-4 - Revised-1
- Exhibit G-1A - Revised-2, Exhibit G-1B - Revised-2, Exhibit G-2A, Exhibit G-2B, Exhibit G-3A, Exhibit G-B, Exhibit G-4A, Exhibit G-4B

**SIGNATURE OF CONTRACTOR:**

E-SIGNED by John Walsh  
on 2021-09-28 22:36:19 GMT

Name/Title: John Walsh, SVP

Signature: \_\_\_\_\_

Date: September 28, 2021

**X** **AWARD:** Items listed below are changes from the original offer and solicitation as submitted.

This Award/Contract Form may be executed in multiple originals, and an executed facsimile or email copy shall have the same force and effect as an original document.

**ALTERATIONS IN CONTRACT:** Changes are as follows:

In accordance with Sections 11.2 and 11.3 of Exhibit F-1-Revised-3 of this Contract and the Bus Testing Certification submitted by Contractor (Exhibit A-6-Revised-1 of the Contract), Capital Metro's acceptance of the first bus under this Contract is contingent upon the structure of the bus having undergone appropriate structural testing and/or analysis, including FTA-required Altoona testing. The Parties acknowledge and agree that, if Contractor fails to deliver any buses within the time specified in this Contract due to a failure to obtain a passing score for Altoona testing, such failure will be considered a default for which Capital Metro may, at its sole discretion, terminate all or a portion of this Contract pursuant to Section 20 of Exhibit E-Revised-1 of this Contract. If Capital Metro elects to terminate this Contract as to the purchase of one or more buses, Capital Metro will have no obligation to pay Contractor for any costs or expenses related to such buses. Capital Metro's exercise of such termination rights is not exclusive and is in addition to any other rights and remedies provided by law or this Contract.

**11. ACCEPTED AS TO:** Exhibit A - Revised-2 (Pricing Schedule), Section 7. Pricing: Base Period, Item 2A for a Quantity of 26 40-foot electric buses at \$912,471 each for a Not-to-Exceed Total Amount of \$23,724,246.

**SIGNATURE OF CONTRACTING OFFICER:**

Muhammad Abdullah, C.P.M., CTCM,  
Sr. Director & Chief Contracting Officer

E-SIGNED by Muhammad Abdullah  
on 2021-10-27 17:51:16 GMT

Signature: \_\_\_\_\_ Date: October 27, 2021



**PROTERRA**

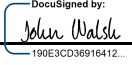
## Capital Metro RFP

### A - Pricing Schedule

VOLUME 1 - COST PROPOSAL

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

**EXHIBIT A - REVISED-2  
FPR****PRICING SCHEDULE****RFP 306664****THE OFFEROR IS REQUIRED TO SIGN AND DATE EACH PAGE OF THIS SCHEDULE****1. IDENTIFICATION OF OFFEROR AND SIGNATURE OF AUTHORIZED AGENT**

<b>Company Name (Printed)</b>	Proterra Operating Company, Inc.		
<b>Address</b>	1815 Rollins Road		
<b>City, State, Zip</b>	Burlingame, CA 94010		
<b>Phone, Fax, Email</b>	864-438-0000		www.proterra.com
The undersigned agrees, if this offer is accepted within the period specified, to furnish any or all supplies and/or services specified in the Schedule at the prices offered therein.			
<b>Authorized Agent Name and Title (Printed)</b>	John Walsh, Sr. VP Sales		
<b>Signature and Date</b>	 <small>190E3CD36916412...</small>		8/12/2021

**2. ACKNOWLEDGEMENT OF AMENDMENTS**

The offeror must acknowledge amendment(s) to this solicitation.

**3. PROMPT PAYMENT DISCOUNT**

# of Days	0	Percentage	0.00%
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Note, payment terms are specified in Exhibit E, Contractual Terms and Conditions.

**4. DBE GOAL (TO BE COMPLETED UPON AWARD BY CAPITAL METRO)**

The DBE participation commitment for this contract is the following percentage of the total contract:

TVM CERTIFICATION

**5. AUTHORITY'S ACCEPTANCE (TO BE COMPLETED UPON AWARD BY CAPITAL METRO)**

The Authority hereby accepts this offer.

<b>Authorized Agent Name and Title (Printed)</b>	
<b>Signature and Date</b>	
<b>Accepted as to:</b>	

# **The remainder of Exhibit A – Pricing Schedule has been redacted.**

**For further information regarding Exhibit A, you may:**

- Reach out to the Contractor directly via the Contractor contact details provided on the cover page of this contract.

**OR**

- Submit a public information request directly to [PIR@capmetro.org](mailto:PIR@capmetro.org).

For more information regarding the Public Information Act and submitting public information requests, follow this link to our website: <https://www.capmetro.org/legal/>

## REQUIRED SUBMITTAL

### CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

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## EXHIBIT A-1 REQUIRED PRICING PROPOSAL SUBMITTAL

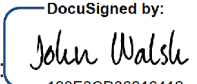
FAILURE OF OFFEROR TO FURNISH THIS EXECUTED DOCUMENT MAY BE CONSTRUED BY CAPITAL METRO AS A NEGATIVE RESPONSE

### LIQUIDATED DAMAGES PER UNIT, PER DAY

Realistic and dependable delivery dates are crucial to Capital Metro's program. Offerors are encouraged to propose accordingly. Unless the Offeror can prove force majeure, as defined in Exhibit E, Section 1(o) and referenced in Exhibit E, Section 48(c), Capital Metro reserves the right to assess liquidated damages and deduct same from the invoices, in the specified amount of \$312.77 per bus or charging equipment for each calendar day of delay the Contractor fails to deliver the buses or charging equipment within the time specified in this Contract, or any extension. The required delivery as specified shall be based on the issuance of an order by specified date. If such notice is delayed beyond this date, the required delivery date will be adjusted forward in time by the number of days of this delay.

The offeror by signature affixed below accepts the above terms and conditions.

Name of Authorized Person: John Walsh

Signature of Authorized Person: 190E3CD36916412...

Name of Company: Proterra, Inc.

Date: 6/11/2021

**REQUIRED SUBMITTAL**

**CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY**

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**EXHIBIT A-2  
REQUIRED PRICING PROPOSAL SUBMITTAL**

FAILURE OF OFFEROR TO FURNISH THIS EXECUTED DOCUMENT MAY BE CONSTRUED BY  
CAPITAL METRO AS A NEGATIVE RESPONSE

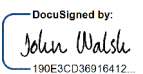
**CERTIFICATION FOR MOTOR VEHICLE EMISSION REQUIREMENTS  
FOR NEW MOTOR VEHICLES**

The proposed bus and bus engine must comply with all applicable Federal, state and local motor  
vehicle emission regulations for new motor vehicles.

Proterra Inc hereby certifies that manufacturer of the vehicle to be supplied by (Proterra Inc ) has complied  
(Name of Firm)

with above-referenced requirement.

Date 6/11/2021

Signature  \_\_\_\_\_  
DocuSigned by:  
190E3CD36916412...

Title John Walsh - Sr. Vice President

Firm Proterra Inc



**REQUIRED SUBMITTAL****CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY****EXHIBIT A-3  
REQUIRED PRICING PROPOSAL SUBMITTAL**

FAILURE OF OFFEROR TO FURNISH THIS EXECUTED DOCUMENT MAY BE CONSTRUED BY CAPITAL METRO AS A NEGATIVE RESPONSE

**TRANSIT VEHICLE MANUFACTURER (TVM) CERTIFICATION****DISADVANTAGED, MINORITY OR WOMAN-OWNED BUSINESS ENTERPRISE PROVISIONS,  
TRANSIT VEHICLE MANUFACTURERS COMPLIANCE WITH SUBPART D, 49 CFR PART 26**

This procurement is subject to the provisions of Section 26.49 of 49 CFR Part 26. Accordingly, as a condition of permission to submit a bid or offer, the following certification must be completed and submitted with the bid or offer. A bid or offer which does not include the certification may not be considered for award. The Authority will verify that your firm is TVM certified in accordance with FTA's requirement and will verify your firm's TVM validity by checking at <https://www.transit.dot.gov/TVM>. If your firm is not listed on this website, your proposal may be deemed non-responsive and may not be considered for an award.

**TRANSIT VEHICLE MANUFACTURER CERTIFICATION**

Proterra, Inc., a TVM, hereby certifies that it has complied with the requirements of  
(Name of Firm)

Section 26.49 of 49 CFR Part 26 by submitting a current annual DBE goal to FTA. The goals apply to

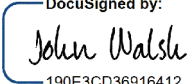
Federal Fiscal Year 2021 (October 1, 2020 to September 30, 2021) and have been approved or not

disapproved by FTA. Proterra, Inc., hereby certifies that the manufacturer of  
(Name of Firm)

the transit vehicle to be supplied ZX5 MAX, has complied with the above referenced  
(Name of Manufacturer)

requirement of Section 26.49 of 49 CFR Part 26. In addition, Contractor shall submit a copy of

Certificate of approval of TVM goals.

DocuSigned by:  
Signature:  \_\_\_\_\_  
190E3CD36916412...

Date: 6/11/2021

Title: Senior VP Sales

Firm: Proterra, Inc.

REQUIRED SUBMITTAL

CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

EXHIBIT A-4  
REQUIRED PRICING PROPOSAL SUBMITTAL

FAILURE OF OFFEROR TO FURNISH THIS EXECUTED DOCUMENT MAY BE CONSTRUED BY  
CAPITAL METRO AS A NEGATIVE RESPONSE

NON-COLLUSION AFFIDAVIT

AFFIDAVIT OF NON-COLLUSION AND INFORMATION REQUIRED OF OFFERORS

I hereby swear (or affirm) under the penalty for perjury:

1. That I am the OFFEROR (if the OFFEROR is an individual), a partner in the proposal (if the OFFEROR is a partnership), or an officer or employee of the proposing corporation having authority to sign on its behalf (if the OFFEROR is a corporation);
2. That the attached proposal or proposals have been arrived at by the OFFEROR independently and have been submitted without collusion and without any agreement, understanding, or planned common course of action with any other vendor of materials, supplies, equipment, or service described in the Request for Proposal, designed to limit independent proposing or competition;
3. That the contents of the proposal or proposals have not been communicated by the OFFEROR or its employees or agents to any person not an employee or agent of the OFFEROR or its surety on any bond furnished with the proposal or proposals, and will not be communicated to any such person prior to the official closing of the proposal or proposals; and
4. That I have fully informed myself regarding the accuracy of the statements made in the affidavit.

SIGNED: 

FIRM NAME: Proterra Inc

Subscribed and sworn to before me this 10<sup>th</sup> day of June, 2021.

  
Notary Public

My Commission Expires June 30, 2025

Lesley M. Fonokalafi  
Notary Public, State of South Carolina  
My Commission Expires June 30, 2025

OFFEROR'S Employee Identification No.: 27-1878459  
(Number used on employee's Quarterly Federal Tax Return)

## REQUIRED SUBMITTAL

### CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

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## EXHIBIT A-5 REQUIRED PRICING PROPOSAL SUBMITTAL

FAILURE OF OFFEROR TO FURNISH THIS EXECUTED DOCUMENT MAY BE CONSTRUED BY  
CAPITAL METRO AS A NEGATIVE RESPONSE

### CERTIFICATION OF COMPLIANCE WITH FEDERAL MOTOR VEHICLE SAFETY STANDARDS

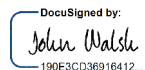
The Proterra Inc hereby certifies  
(Name of Offeror)

that the vehicles offered in this proposal comply with the Motor Vehicle Safety Standard as established by  
the Department of Transportation and with requirements of the laws of the State of Texas, all as are in  
effect at the time of delivery of the vehicles, as to lighting equipment and all warnings, operating and  
safety devices.

Proterra Inc  
Name of Firm

1815 Rollins Rd.  
Address

Burlingame, CA 94010  
City, State Zip

DocuSigned by:  
  
190E3C036916412  
Authorized Signature

6/11/2021  
Date

## REQUIRED SUBMITTAL

### CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

#### **EXHIBIT A-6 – Revised-1**

### REQUIRED PRICING PROPOSAL SUBMITTAL

FAILURE OF OFFEROR TO FURNISH THIS EXECUTED DOCUMENT MAY BE CONSTRUED BY CAPITAL METRO AS A NEGATIVE RESPONSE


### BUS TESTING CERTIFICATION

John Walsh  
I, \_\_\_\_\_, representing the  
Representative's Name

Proterra, Inc. hereby certify  
Offeror's Name

that the vehicles offered in response to this solicitation are, by the definition set forth in 49 CFR Part 665, "New Buses" and are therefore subject to the "Bus Testing Procedures" set forth in 49 CFR Part 665. Should my firm be the successful offeror and receive award of a Contract, I further certify that the vehicles offered in response to this solicitation have been ~~or will be~~ tested pursuant to 49 CFR Part 665 and **have received a minimum passing score of 60 points** and that the test results will be furnished to CAPITAL METRO as specified in the Contract.

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 Capital Metro.

DocuSigned by:  
  
190E3CD36916412...  
Representative's Signature

6/11/2021

Date

## REQUIRED SUBMITTAL

### CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

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## EXHIBIT A-7 REQUIRED PRICING PROPOSAL SUBMITTAL

FAILURE OF OFFEROR TO FURNISH THIS EXECUTED DOCUMENT MAY BE CONSTRUED BY CAPITAL METRO AS A NEGATIVE RESPONSE

### SERVICE AND PARTS

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

Location of nearest Technical Service Representative to Capital Metro.

Name: Phillip Chapa

Address: 8506 Hillrock Dr. Round Rock, TX 78681

Telephone: (864) 373-4575

Daniel Brogan - Sr. Field Service Representative , and John Woody - Field Service Representative will serve as a backup, and is located in the Dallas area if additional assistance is needed.

Location of nearest Parts Distribution Center to Capital Metro:

Name: Proterra Inc

Address: 1 Whitlee Ct. Greenville, SC 29607

Note: For this proposal, we are planning to offer parts on consignment in Austin, TX to support this considerable fleet size. The details will be worked out between Proterra and CapMetro during contract discussions.

Telephone: (864) 438-0000

Policy for delivery of parts and components to be purchased for service and maintenance:

Regular Method of Shipment: For non-consignment item, Proterra will use UPS/FedEx, ground under normal circumstances. Parts can be hand carried in urgent cases.

Cost to Capital Metro: During the warranty period, all shipping is covered by Proterra. After the warranty period, the cost depends on part size, weight, and how fast the part is needed. In urgent circumstances parts can be hand carried immediately.

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

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**EXHIBIT B**  
**REPRESENTATIONS AND CERTIFICATIONS**  
**(FEDERALLY ASSISTED SUPPLY/SERVICE/CONSTRUCTION CONTRACTS)**  
**MUST BE RETURNED WITH THE OFFER**

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**1. TYPE OF BUSINESS**

(a) The offeror operates as (mark one):

- ☐ An individual  
☐ A partnership  
☐ A sole proprietor  
☒ A corporation  
☐ Another entity \_\_\_\_\_

(b) If incorporated, under the laws of the State of:

Delaware

**2. PARENT COMPANY AND IDENTIFYING DATA**

(a) The offeror (mark one):

- ☐ is  
☒ is not

owned or controlled by a parent company. A parent company is one that owns or controls the activities and basic business policies of the offeror. To own the offering company means that the parent company must own more than fifty percent (50%) of the voting rights in that company.

(b) A company may control an offeror as a parent even though not meeting the requirements for such ownership if the company is able to formulate, determine, or veto basic policy decisions of the offeror through the use of dominate minority voting rights, use of proxy voting, or otherwise.

(c) If not owned or controlled by a parent company, the offeror shall insert its own EIN (Employer's Identification Number) below:

(d) If the offeror is owned or controlled by a parent company, it shall enter the name, main office and EIN number of the parent company, below:

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

**3. CERTIFICATION OF INDEPENDENT PRICE DETERMINATION**

(a) The offeror (and all joint venture members, if the offer is submitted by a joint venture) certifies that in connection with this solicitation:

(1) the prices offered have been arrived at independently, without consultation, communication, or agreement for the purpose of restricting competition, with any other offeror or with any other competitor;

(2) unless otherwise required by law, the prices offered have not been knowingly disclosed by the offeror and will not knowingly be disclosed by the offeror prior to opening of bids in the case of an invitation for bids, or prior to contract award in the case of a request for proposals, directly or indirectly to any other offeror or to any competitor; and

(3) no attempt has been made or will be made by the offeror to induce any other person or firm to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory:

(1) Is the person in the offeror's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to paragraphs (a)(1) through (a)(3) of this provision; or

(i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to paragraphs (a)(1) through (a)(3) of this provision John Walsh [insert full name of person(s) in the offeror's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the offeror's organization];

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(1)(i) of this provision have not participated, and will not participate, in any action contrary to paragraphs (a)(1) through (a)(3) of this provision; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to paragraphs (a)(1) through (a)(3) of this provision.

(c) If the offeror deletes or modifies paragraph (a)(2) of this provision, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

**4. DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION**

(a) In accordance with the provisions of 2 C.F.R. (Code of Federal Regulations), part 180, the offeror certifies to the best of the offeror's knowledge and belief, that it and its principals:

(1) are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(2) have not within a three (3) year period preceding this offer been convicted of or had a civil judgment rendered against them for the commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes, or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in (a)(2) above; and

(4) have not within a three (3) year period preceding this offer had one or more public transactions (Federal, State, or local) terminated for cause or default.



**CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY**

(b) Where the offeror is unable to certify to any of the statements above, the offeror shall attach a full explanation to this offer.

(c) For any subcontract at any tier expected to equal or exceed \$25,000:

(1) In accordance with the provisions of 2 C.F.R. part 180, the prospective lower tier subcontractor certifies, by submission of this offer, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to the statement, above, an explanation shall be attached to the offer.

(3) This certification (specified in paragraphs (c)(1) and (c)(2), above, shall be included in all applicable subcontracts and a copy kept on file by the Prime Contractor. The Prime Contractor shall be required to furnish copies of the certifications to the Authority upon request.

**5. COMMUNICATIONS**

(a) All oral and written communications with the Authority regarding this solicitation shall be exclusively with, or on the subjects and with the persons approved by, the persons identified in this solicitation. Discussions with any other person not specified could result in disclosure of proprietary or other competitive sensitive information or otherwise create the appearance of impropriety or unfair competition and, thereby, compromise the integrity of the Authority's procurement system. If competition cannot be resolved through normal communication channels, the Authority's protest procedures shall be used for actual or prospective competitors claiming any impropriety in connection with this solicitation.

(b) By submission of this offer, the offeror certifies that it has not, and will not prior to contract award, communicate orally or in writing with any Authority employee or other representative of the Authority (including Board Members, the Authority's contractors or consultants) regarding this solicitation, except as described below:

Individual's Name	Date/Subject of Communication

(Attach continuation form, if necessary.)

**6. CONTINGENT FEE**

(a) Except for full-time, bona fide employees working solely for the offeror, the offeror represents as part of its offer that it (mark one):

☐ has  
☒ has not

employed or retained any company or persons to solicit or obtain this contract, and (mark one):

☐ has  
☒ has not

paid or agreed to pay any person or company employed or retained to solicit or obtain this contract any commission, percentage, brokerage, or other fee contingent upon or resulting from the award of this contract.

(b) The offeror agrees to provide information relating to (a) above, when any item is answered affirmatively.



## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

**7. CODE OF ETHICS****(a) Statement of Purpose**

The brand and reputation of Capital Metro is determined in large part by the actions or ethics of representatives of the agency. Capital Metro is committed to a strong ethical culture and to ethical behavior by all individuals serving Capital Metro as employees, members of the Board of Directors or volunteers. Individuals serving Capital Metro will conduct business with honesty and integrity. We will make decisions and take actions that are in the best interest of the people we serve and that are consistent with our mission, vision and this policy. The Code of Ethics (the "Code") documents Capital Metro's Standards of Ethical Conduct and policies for Ethical Business Transactions. Compliance with the Code will help protect Capital Metro's reputation for honesty and integrity. The Code attempts to provide clear principles for Capital Metro's expectations for behavior in conducting Capital Metro business. We have a duty to read, understand and comply with the letter and spirit of the Code and Capital Metro policies. You are encouraged to inquire if any aspect of the Code needs clarification.

**(b) Applicability**

The Code applies to Capital Metro employees, contractors, potential contractors, Board Members and citizen advisory committee members. Violation of the Code of Ethics may result in discipline up to and including termination or removal from the Board of Directors.

**(c) Standards of Ethical Conduct**

The public must have confidence in our integrity as a public agency and we will act at all times to preserve the trust of the community and protect Capital Metro's reputation. To demonstrate our integrity and commitment to ethical conduct we will:

- (1) Continuously exhibit a desire to serve the public and display a helpful, respectful manner.
- (2) Exhibit and embody a culture of safety in our operations.
- (3) Understand, respect and obey all applicable laws, regulations and Capital Metro policies and procedures both in letter and spirit.
- (4) Exercise sound judgment to determine when to seek advice from legal counsel, the Ethics Officer or others.
- (5) Treat each other with honesty, dignity and respect and will not discriminate in our actions toward others.
- (6) Continuously strive for improvement in our work and be accountable for our actions.
- (7) Transact Capital Metro business effectively and efficiently and act in good faith to protect the Authority's assets from waste, abuse, theft or damage.
- (8) Be good stewards of Capital Metro's reputation and will not make any representation in public or private, orally or in writing, that states, or appears to state, an official position of Capital Metro unless authorized to do so.
- (9) Report all material facts known when reporting on work projects, which if not revealed, could either conceal unlawful or improper practices or prevent informed decisions from being made.
- (10) Be fair, impartial and ethical in our business dealings and will not use our authority to unfairly or illegally influence the decisions of other employees or Board members.
- (11) Ensure that our personal or business activities, relationships and other interests do not conflict or appear to conflict with the interests of Capital Metro and disclose any potential conflicts.
- (12) Encourage ethical behavior and report all known unethical or wrongful conduct to the Capital Metro Ethics Officer or the Board Ethics Officer.

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

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### (d) Roles and Responsibilities

It is everyone's responsibility to understand and comply with the Code of Ethics and the law. Lack of knowledge or understanding of the Code will not be considered. If you have a question about the Code of Ethics, ask.

It is the responsibility of Capital Metro management to model appropriate conduct at all times and promote an ethical culture. Seek guidance if you are uncertain what to do.

It is Capital Metro's responsibility to provide a system of reporting and access to guidance when an employee wishes to report a suspected violation and to seek counseling, and the normal chain of command cannot, for whatever reason, be utilized. If you need to report something or seek guidance outside the normal chain of command, Capital Metro provides the following resources:

- (1) Anonymous Fraud Hotline – Internal Audit
- (2) Anonymous Online Ethics Reporting System
- (3) Contact the Capital Metro Ethics Officer, Vice-President of Internal Audit, the EEO Officer or Director of Human Resources
- (4) Safety Hotline

The Capital Metro Ethics Officer is the Chief Counsel. The Ethics Officer is responsible for the interpretation and implementation of the Code and any questions about the interpretation of the Code should be directed to the Ethics Officer.

### (e) Ethical Business Transactions

#### Section 1. Impartiality and Official Position

- (1) A Substantial Interest is defined by Tex. Loc. Govt. Code, § 171.002. An official or a person related to the official in the first degree by consanguinity or affinity has a Substantial Interest in:
  - (i) A business entity if the person owns ten percent (10%) or more of the voting stock or shares of the business entity or owns either 10% or more or \$15,000 or more of the fair market value of the business entity OR funds received by the person from the business entity exceed 10% of the person's gross income for the previous year; or
  - (ii) Real property if the interest is an equitable or legal ownership with a fair market value of \$2,500 or more.

Capital Metro will not enter into a contract with a business in which a Board Member or employee or a Family Member of a Board Member or employee as defined in Section 8 has a Substantial Interest except in case of emergency as defined in the Acquisition Policy PRC-100 or the business is the only available source for essential goods and services or property.

- (2) No Board Member or employee shall:
  - (i) Act as a surety for a business that has work, business or a contract with Capital Metro or act as a surety on any official bond required of an officer of Capital Metro.
  - (ii) Represent for compensation, advise or appear on behalf of any person or firm concerning any contract or transaction or in any proceeding involving Capital Metro's interests.
  - (iii) Use his or her official position or employment, or Capital Metro's facilities, equipment or supplies to obtain or attempt to obtain private gain or advantage.

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

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(iv) Use his or her official position or employment to unfairly influence other Board members or employees to perform illegal, immoral, or discreditable acts or do anything that would violate Capital Metro policies.

(v) Use Capital Metro's resources, including employees, facilities, equipment, and supplies in political campaign activities.

(vi) Participate in a contract for a contractor or first-tier subcontractor with Capital Metro for a period of one (1) year after leaving employment on any contract with Capital Metro.

(vii) Participate for the life of the contract in a contract for a contractor or first-tier subcontractor with Capital Metro if the Board Member or employee participated in the recommendation, bid, proposal or solicitation of the Capital Metro contract or procurement.

### Section 2. Employment and Representation

A Board Member or employee must disclose to his or her supervisor, appropriate Capital Metro staff or the Board Chair any discussions of future employment with any business which has, or the Board Member or employee should reasonably foresee is likely to have, any interest in a transaction upon which the Board Member or employee may or must act or make a recommendation subsequent to such discussion. The Board Member or employee shall take no further action on matters regarding the potential future employer.

A Board Member or employee shall not solicit or accept other employment to be performed or compensation to be received while still a Board Member or employee, if the employment or compensation could reasonably be expected to impair independence in judgment or performance of their duties.

A Board Member or employee with authority to appoint or hire employees shall not exercise such authority in favor of an individual who is related within the first degree, within the second degree by affinity or within the third degree by consanguinity as defined by the Capital Metro Nepotism Policy in accordance with Tex. Govt. Code, Ch. 573.

### Section 3. Gifts

It is critical to keep an arms-length relationship with the entities and vendors Capital Metro does business with in order to prevent the appearance of impropriety, undue influence or favoritism.

No Board Member or employee shall:

(1) Solicit, accept or agree to accept any benefit or item of monetary value as consideration for the Board Member's or employee's decision, vote, opinion, recommendation or other exercise of discretion as a public servant. [Tex. Penal Code §36.02(c)]

(2) Solicit, accept or agree to accept any benefit or item of monetary value as consideration for a violation of any law or duty. [Tex. Penal Code §36.02(a)(1)]

(3) Solicit, accept or agree to accept any benefit or item of monetary value from a person the Board Member or employee knows is interested in or likely to become interested in any Capital Metro contract or transaction if the benefit or item of monetary value could reasonably be inferred as intended to influence the Board Member or employee. [Tex. Penal Code §36.08(d)]

(4) Receive or accept any gift, favor or item of monetary value from a contractor or potential contractor of Capital Metro or from any individual or entity that could reasonably be inferred as intended to influence the Board Member or employee.

Exception: Consistent with state law governing public servants, a gift does not include a benefit or item of monetary value with a value of less than \$50, excluding cash or negotiable instruments, unless it can reasonably be inferred that the item was intended to influence the Board Member or employee. A department may adopt more restrictive provisions if there is a demonstrated and documented business need. [Tex. Penal Code § 36.10(a)(6)]

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

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Exception: A gift or other benefit conferred, independent of the Board Member's or employee's relationship with Capital Metro, that is not given or received with the intent to influence the Board Member or employee in the performance of his or her official duties is not a violation of this policy. The Capital Metro Ethics Officer or Board Ethics Officer must be consulted for a determination as to whether a potential gift falls within this exception.

Exception: Food, lodging, or transportation that is provided as consideration for legitimate services rendered by the Board Member or employee related to his or her official duties is not a violation of this policy.

If you are uncertain about a gift, seek guidance from the Ethics Officer.

### Section 4. Business Meals and Functions

Board Members and employees may accept invitations for free, reasonable meals in the course of conducting Capital Metro's business or while attending a seminar or conference in connection with Capital Metro business as long as there is not an active or impending solicitation in which the inviting contractor or party may participate and attendance at the event or meal does not create an appearance that the invitation was intended to influence the Board Member or employee.

When attending such events, it is important to remember that you are representing Capital Metro and if you chose to drink alcohol, you must do so responsibly. Drinking irresponsibly may lead to poor judgment and actions that may violate the Code or other Capital Metro policies and may damage the reputation of Capital Metro in the community and the industry.

### Section 5. Confidential Information

It is everyone's responsibility to safeguard Capital Metro's nonpublic and confidential information.

No Board Member or employee shall:

- (1) Disclose, use or allow others to use nonpublic or confidential information that Capital Metro has not made public unless it is necessary and part of their job duties and then only pursuant to a nondisclosure agreement approved by legal counsel or with consultation and permission of legal counsel.

- (2) Communicate details of any active Capital Metro procurement or solicitation or other contract opportunity to any contractor, potential contractor or individual not authorized to receive information regarding the active procurement or contract opportunity.

### Section 6. Financial Accountability and Record Keeping

Capital Metro's financial records and reports should be accurate, timely, and in accordance with applicable laws and accounting rules and principles. Our records must reflect all components of a transaction in an honest and forthright manner. These records reflect the results of Capital Metro's operations and our stewardship of public funds.

A Board Member or employee shall:

- (1) Not falsify a document or distort the true nature of a transaction.
- (2) Properly disclose risks and potential liabilities to appropriate Capital Metro staff.
- (3) Cooperate with audits of financial records.
- (4) Ensure that all transactions are supported by accurate documentation.
- (5) Ensure that all reports made to government authorities are full, fair, accurate and timely.
- (6) Ensure all accruals and estimates are based on documentation and good faith judgment.

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

## Section 7. Conflict of Interest

Employees and Board Members are expected to deal at arms-length in any transaction on behalf of Capital Metro and avoid and disclose actual conflicts of interest under the law and the Code and any circumstance which could impart the appearance of a conflict of interest. A conflict of interest exists when a Board Member or employee is in a position in which any official act or action taken by them is, may be, or appears to be influenced by considerations of personal gain rather than the general public trust.

Conflict of Interest [Tex. Loc. Govt. Code, Ch. 171 & 176, § 2252.908]

No Board Member or employee shall participate in a matter involving a business, contract or real property transaction in which the Board Member or employee has a Substantial Interest if it is reasonably foreseeable that an action on the matter would confer a special economic benefit on the business, contract or real property that is distinguishable from its effect on the public. [Tex. Loc. Govt. Code, § 171.004]

## Disclosure

A Board Member or employee must disclose a Substantial Interest in a business, contract, or real property that would confer a benefit by their vote or decision. The Board Member or employee may not participate in the consideration of the matter subject to the vote or decision. Prior to the vote or decision, a Board Member shall file an affidavit citing the nature and extent of his or her interest with the Board Vice Chair or Ethics Officer. [Tex. Loc. Govt. Code, § 171.004]

A Board Member or employee may choose not to participate in a vote or decision based on an appearance of a conflict of interest and may file an affidavit documenting their recusal.

## Section 8. Disclosure of Certain Relationships [Tex. Loc. Govt. Code, Ch. 176]

## Definitions

(1) A Local Government Officer is defined by Tex. Loc. Govt. Code § 176.001(4). A Local Government Officer is:

(i) A member of the Board of Directors;

(ii) The President/CEO; or

(iii) A third party agent of Capital Metro, including an employee, who exercises discretion in the planning, recommending, selecting or contracting of a vendor.

(2) A Family Member is a person related within the first degree by consanguinity or the second degree by affinity as defined by Tex. Govt. Code, Ch. 573.

(3) A Family Relationship is a relationship between a person and another person within the third degree by consanguinity or the second degree by affinity as defined by Tex. Govt. Code, Ch. 573.

(4) A Local Government Officer must file a Conflicts Disclosure Statement (FORM CIS) if:

(i) The person or certain Family Members received at least \$2,500 in taxable income (other than investment income) from a vendor or potential vendor in the last twelve (12) months through an employment or other business relationship;

(ii) The person or certain Family Members received gifts from a vendor or potential vendor with an aggregate value greater than \$100 in the last 12 months; or

(iii) The vendor (or an employee of the vendor) has a Family Relationship with the Local Government Officer.

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

- (5) A vendor doing business with Capital Metro or seeking to do business with Capital Metro is required to file a completed questionnaire (FORM CIQ) disclosing the vendor's affiliations or business relationship with any Board Member or local government officer or his or her Family Member.

## Section 9. Duty to Report and Prohibition on Retaliation

Board Members and employees have a duty to promptly report any violation or possible violation of this Code of Ethics, as well as any actual or potential violation of laws, regulations, or policies and procedures to the hotline, the Capital Metro Ethics Officer or the Board Ethics Officer.

Any employee who reports a violation will be treated with dignity and respect and will not be subjected to any form of retaliation for reporting truthfully and in good faith. Any retaliation is a violation of the Code of Ethics and may also be a violation of the law, and as such, could subject both the individual offender and Capital Metro to legal liability.

## Section 10. Penalties for Violation of the Code of Ethics

In addition to turning over evidence of misconduct to the proper law enforcement agency when appropriate, the following penalties may be enforced:

(1) If a Board Member does not comply with the requirements of this policy, the Board member may be subject to censure or removal from the Board in accordance with Section 451.511 of the Texas Transportation Code.

(2) If an employee does not comply with the requirements of this policy, the employee shall be subject to appropriate disciplinary action up to and including termination.

(3) Any individual or business entity contracting or attempting to contract with Capital Metro which offers, confers or agrees to confer any benefit as consideration for a Board Member's or employee's decision, opinion, recommendation, vote or other exercise of discretion as a public servant in exchange for the Board Member's or employee's having exercised his official powers or performed his official duties, or which attempts to communicate with a Board Member or Capital Metro employee regarding details of a procurement or other contract opportunity in violation of Section 5, or which participates in the violation of any provision of this Policy may have its existing Capital Metro contracts terminated and may be excluded from future business with Capital Metro for a period of time as determined appropriate by the President/CEO.

(4) Any individual who makes a false statement in a complaint or during an investigation of a complaint with regard to a matter that is a subject of this policy is in violation of this Code of Ethics and is subject to its penalties. In addition, Capital Metro may pursue any and all available legal and equitable remedies against the person making the false statement or complaint.

## Section 11. Miscellaneous Provisions

(1) This Policy shall be construed liberally to effectuate its purposes and policies and to supplement such existing laws as they may relate to the conduct of Board Members and employees.

(2) Within sixty (60) days of the effective date for the adoption of this Code each Board Member and employee of Capital Metro will receive a copy of the Code and sign a statement acknowledging that they have read, understand and will comply with Capital Metro's Code of Ethics. New Board Members and employees will receive a copy of the Code and are required to sign this statement when they begin office or at the time of initial employment.

(3) Board Members and employees shall participate in regular training related to ethical conduct, this Code of Ethics and related laws and policies.



## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

**8. PREVIOUS CONTRACTS AND COMPLIANCE REPORTS**

(a) The offeror represents as part of its offer that it (mark one):

☒ has  
☐ has not

participated in a previous contract or subcontract subject either to the Equal Opportunity clause of this solicitation, the clause originally contained in Section 301, Part 2 of Executive Order Number 11114;

and it (mark one):

☒ has  
☐ has not

filed all required compliance reports.

**9. AFFIRMATIVE ACTION COMPLIANCE**

(a) The offeror represents as part of its offer that it has a workforce of (indicate below the number of employees including temporary, full-time, or part-time employees):

769

(b) The offeror:

☒ **has** developed an Affirmative Action Plan at each establish as required by the rules and regulations of the Secretary of Labor (41 C.F.R. parts 60-1 and 60-2) and **has on file**. The offeror will submit the Affirmative Action Plan to the Authority within ten (10) days of the date of the Notice of Award (NOA).

☐ **has not** developed an Affirmative Action Plan at each establish as required by the rules and regulations of the Secretary of Labor (41 C.F.R. parts 60-1 and 60-2) and **does not have on file**. The offeror will submit the Affirmative Action Plan to the Authority within one hundred and twenty (120) days of the date of the Notice to Proceed (NTP).

(c) The offeror:

☒ has  
☐ has not

previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

**10. DISADVANTAGED BUSINESS ENTERPRISE (DBE) GOALS**

This procurement is subject to the provisions of Section 26.49 of 49 CFR Part 26. Accordingly, as a condition of permission to submit a bid or offer, the following certification must be completed and submitted with the bid or offer. A bid or offer which does not include the certification may not be considered for award. The Authority will verify that your firm is TVM certified in accordance with FTA's requirement and will verify your firm's TVM validity by checking at [http://www.fta.dot.gov/12326\\_5626.html](http://www.fta.dot.gov/12326_5626.html). If your firm is not listed on this website, your proposal may be deemed non-responsive and may not be considered for an award.

**11. CLEAN AIR AND WATER CERTIFICATION**

Applicable if the offer exceeds \$150,000, or the Authority believes that orders under an indefinite contract in any year will exceed \$150,000 or a facility to be used has been the subject of a conviction under the Air Act [42 U.S.C. § 7413(c)(1)] or the Water Act [33 U.S.C. § 1319(c)] and is listed by the Environmental Protection Agency (EPA) as a violating facility, and the acquisition is not otherwise exempt.

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

By submission of this offer, the offeror certifies that:

(a) any facility to be used in the performance of this proposed contract (mark one):

☐ is  
☒ is not

listed on the EPA List of Violating Facilities;

(b) it will immediately notify the Authority, before award, of the receipt of any communication from the EPA Administrator, or a designee of the EPA, indicating that any facility which it proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and

(c) it will include a certification substantially the same as this certification, including this paragraph (c), in every subcontract not otherwise exempt by law.

## 12. CERTIFICATION OF NON-SEGREGATED FACILITIES

(a) By the submission of this offer, the offeror certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control, where segregated facilities are maintained.

(b) The offeror agrees that a breach of this certification is a violation of the Equal Opportunity Clause in Exhibit E of the contract.

(c) Definitions: For the purpose of this Certification of Non-Segregated Facilities, the following definitions shall apply:

(1) "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, sexual orientation, gender identity or national origin, because of written or oral policies or employee custom. The term does not include separate or single-user restrooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.

(2) "gender identity" refers to one's internal sense of one's own gender; it may or may not correspond to the sex assigned to a person at birth, and may or may not be made visible to others.

(3) "sexual orientation" refers to an individual's physical, romantic, and/or emotional attraction to people of the same and/or opposite gender; examples of sexual orientations include "straight" (or heterosexual), lesbian, gay, and bisexual.

(d) It further certifies that (except where it has obtained identical certifications from proposed subcontracts for specific time periods) it will:

(1) obtain identical certifications from proposed subcontractors before the award of subcontracts under which the subcontractor will be subject to the Equal Opportunity provision in Exhibit E of the contract; and

(2) retain such certifications in its files.

## 13. CERTIFICATION OF RESTRICTIONS ON LOBBYING

This Certification is applicable if the offer exceeds \$100,000.

(a) By submission of this offer, the offeror certifies to the best of the offeror's knowledge or belief that no Federal appropriated funds have been paid, or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the



## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(c) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

(d) This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S.C. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 or not more than \$100,000 for each such failure.

#### **14. TEXAS ETHICS COMMISSION CERTIFICATION**

In accordance with Section 2252.908, Texas Government Code, upon request of the Authority, the selected contractor may be required to electronically submit a "Certificate of Interested Parties" with the Texas Ethics Commission in the form required by the Texas Ethics Commission, and furnish the Authority with the original signed and notarized document prior to the time the Authority signs the contract. The form can be found at [www.ethics.state.tx.us](http://www.ethics.state.tx.us). Questions regarding the form should be directed to the Texas Ethics Commission.

#### **15. CERTIFICATION REGARDING ISRAEL**

As applicable and in accordance with Section 2270.002 of the Texas Government Code, the Contractor certifies that it does not boycott Israel and will not boycott Israel during the term of this Contract.

#### **16. CERTIFICATION REGARDING FOREIGN TERRORIST ORGANIZATIONS**

Contractor certifies and warrants that it is not engaged in business with Iran, Sudan, or a foreign terrorist organization, as prohibited by Section 2252.152 of the Texas Government Code.

#### **17. CERTIFICATION OF PRIME CONTRACTOR PARTICIPATION**

(a) The Prime Contractor shall perform no less than thirty percent (**30%**) of the work with his or her own organization. The on-site production of materials produced by other than the Prime Contractor's forces shall be considered as being subcontracted.

(b) The organization of the specifications into divisions, sections, and articles, and the arrangement and titles of project drawings shall not control the Prime Contractor in dividing the work among subcontractors or in establishing the extent of work to be performed by any trade.

(c) The offeror hereby certifies that the **Schedule C of Subcontractor Participation** form submitted with the Exhibit D, Disadvantaged Business Enterprise (DBE) portion of this offer represents no more than seventy percent (**70%**) of the work will be done by subcontractors.

#### **18. SIGNATURE BLOCK FOR ALL REPRESENTATIONS AND CERTIFICATIONS**

(a) These representations and certifications concern a material representation of fact upon which reliance will be placed in awarding a contract. If it is later determined that the offeror knowingly rendered an erroneous or false certification, in addition to all other remedies the Authority may have, the Authority may terminate the contract for default and/or recommend that the offeror be debarred or suspended from doing business with the Authority in the future.

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

- (b) The offeror shall provide immediate written notice to the Authority if, at any time prior to contract award, the offeror learns that the offeror's certification was, or a subsequent communication makes, the certification erroneous.
- (c) Offerors must set forth full, accurate and complete information as required by this solicitation (including this attachment). Failure of an offeror to do so may render the offer nonresponsive.
- (d) I understand that a false statement on this certification may be grounds for rejection of this submittal or termination of the awarded contract.
- (e) A false statement in any offer submitted to the Authority may be a criminal offense in violation of Section 37.10 of the Texas Penal Code. In addition, under 18 U.S.C. §. 1001, a false statement may result in a fine of up to \$10,000 or imprisonment for up to five (5) years, or both.

Name of Offeror:

Proterra Inc

Type/Print Name of Signatory:

John Walsh - Sr. Vice President of Sales

Signature:

DocuSigned by:  
John Walsh  
190E3CD36916412...

Date:

6/11/2021

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

**EXHIBIT B-1 – REVISED-1****BUY AMERICA CERTIFICATION**

The Buy America regulations require that all manufactured products used in FTA-funded projects be produced in the United States. A manufactured product is considered domestic if all of the manufacturing processes for the product take place in the United States and all of the components of the product are of U.S. origin as set forth in 49 C.F.R. § 661.5(d)(1). A component of a manufactured product "is considered of U.S. origin if it is manufactured in the United States, regardless of the origin of its subcomponents." 49 C.F.R. § 661.5(d)(2).

The contractor agrees to comply with 49 U.S.C. § 5323(j) and 49 C.F.R. part 661, which provide that Federal funds may not be obligated unless all steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. § 661.7. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. § 661.11.

The offeror must submit the appropriate Buy America certification with its offer. Offers that are not accompanied by a completed Buy America certification may be rejected as nonresponsive.

When procuring rolling stock, which includes train control, communication, traction power equipment, and rolling stock prototypes, the cost of the components and subcomponents produced in the U.S. must be:

- more than 70 percent for FY2020 and beyond

Final assembly for rolling stock also must occur in the U.S. Additionally, rolling stock procurements are subject to the pre-award and post-delivery Buy America audit provisions set forth in 49 U.S.C. § 5323(m) and 49 CFR part 663.

In accordance with 49 C.F.R. § 661.12, for the procurement of buses, other rolling stock and associated equipment, use the certification below.

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## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

**BUY AMERICA CERTIFICATION – ROLLING STOCK  
REQUIRED PRICING PROPOSAL SUBMITTAL**

FAILURE OF OFFEROR / BIDDER TO FURNISH THIS EXECUTED DOCUMENT WITH ITS PROPOSAL/ BID MAY BE CONSTRUED BY CAPITAL METRO AS A NEGATIVE RESPONSE AND THE OFFER WILL NOT BE CONSIDERED.

**CERTIFICATE OF COMPLIANCE WITH BUY AMERICA ROLLING STOCK  
REQUIREMENTS FOR PROCUREMENTS OVER \$150,000.00 INCLUDING  
BUSES, ROLLING STOCK, AND ASSOCIATED EQUIPMENT, TRAIN CONTROL,  
COMMUNICATION, TRACTION POWER EQUIPMENT  
(as required by 49 C.F.R. § 661.13(b))**

This procurement is subject to the Federal Transit Administration (FTA) Buy America Requirements in 49 C.F.R. § 661.12, for the procurement of buses, other rolling stock (including train control, communication, and traction power equipment), and associated equipment use the following certifications below:

- 1) A waiver from the Buy America Provision may be sought by Capital Metro if grounds for the waiver exist.
- 2) The Bidder or Offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323(j), and the applicable regulations of 49 C.F.R. § 661.11.

Date: 6/11/2021

Signature: DocuSigned by:  
  
190E3CD36918412...

Title: SVP

Company: Proterra, Inc.

**OR**

The Bidder or Offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. § 5323(j), but may qualify for an exception to the requirement consistent with 49 U.S.C. § 5323(j)(2)(C), and the applicable regulations in 49 C.F.R. § 661.7.

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

## CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

In accordance with 49 C.F.R. § 661.6, for the procurement of steel, iron, or manufactured products, use the certifications below:

**BUY AMERICA CERTIFICATION – PRODUCTS/CONSTRUCTION****REQUIRED PRICING PROPOSAL SUBMITTAL**

FAILURE OF OFFEROR / BIDDER TO FURNISH THIS EXECUTED DOCUMENT WITH ITS PROPOSAL/ BID MAY BE CONSTRUED BY CAPITAL METRO AS A NEGATIVE RESPONSE AND THE OFFER WILL NOT BE CONSIDERED.

**BUY AMERICA CERTIFICATE FOR PROCUREMENTS OF  
STEEL AND MANUFACTURED PRODUCTS OVER \$150,000.00**

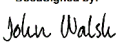
This procurement is subject to the Federal Transit Administration (FTA) Buy America Requirements in 49 C.F.R. § 661.5.

Section 165(a) of the Surface Transportation Act of 1982 permits FTA participation on this contract only if all iron, steel, cement, and manufactured products used in the contract are produced in the United States.

A waiver from the Buy America Provision may be sought by Capital Metro if grounds for the waiver exist.

The bidder or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. § 5323(j)(1), and the applicable regulations in 49 C.F.R. part 661.

Date: 6/11/2021

Signature: DocuSigned by:  
  
190E3CD36916412...

Title: SVP

Company: Proterra, Inc.

**OR**

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. § 5323(j), but it may qualify for an exception to the requirement pursuant to 49 U.S.C. § 5323(j)(2), as amended, and the applicable regulations in 49 C.F.R. § 661.7.

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

**EXHIBIT E – REVISED-1**  
**CONTRACTUAL TERMS AND CONDITIONS**  
**(SUPPLY CONTRACT)**

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**1. DEFINITIONS**

As used throughout this Contract, the following terms shall have the meaning set forth below:

- (a) “Applicable Anti-Corruption and Bribery Laws” means international, federal, state, provincial and local laws, rules, regulations, directives and governmental requirements currently in effect and as they become effective relating in any way to the Contractor’s provision of goods to the Authority, including without limitation “FCPA” or any applicable laws and regulations, including in the jurisdiction in which the Contractor operates and/or manufactures goods for the Authority, relating to anti-corruption and bribery.
- (b) “Authority,” “Capital Metro,” “Cap Metro,” “CMTA” means Capital Metropolitan Transportation Authority.
- (c) “Bid” means the offer of the bidder, submitted on the prescribed form, stating prices for performing the supplies.
- (d) “Change Order” means a written order to the Contractor signed by the Contracting Officer, issued after execution of the Contract, authorizing a change in the term or scope of the Contract.
- (e) “Contract” or “Contract Documents” means this written agreement between the parties comprised of all the documents listed in the Table of Contents, Change Orders and/or Contract Modifications that may be entered into by the parties.
- (f) “Contract Award Date” means the date of the Contract award notice, which may take the form of a purchase order, signed Contract or Notice of Award, issued by the Authority.
- (g) “Contract Modification” means any changes in the terms or provisions of the Contract which are reduced to writing and fully executed by both parties.
- (h) “Contract Sum” means the total compensation payable to the Contractor under this Contract as originally contracted for or as subsequently adjusted by Contract Modification.
- (i) “Contract Term” means period of performance set forth in the paragraph entitled “Term” contained in Exhibit E.
- (j) “Contracting Officer” means a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and finding on behalf of the Authority. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.
- (k) “Contractor” means the entity that has assumed the legal obligation to deliver the supplies as identified in the Contract.
- (l) “Days” means calendar days. In computing any period of time established under this Contract, the day of the event from which the designated period of time begins to run shall not be included, but the last day shall be included unless it is a Saturday, Sunday, or Federal or State of Texas holiday, in which event the period shall run to the end of the next business day.
- (m) “FAR” means the Federal Acquisition Regulations codified in 48 C.F.R. Title 48.
- (n) “FCPA” means the United States Foreign Corrupt Practices Act, 15 U.S.C. §§ 78dd-1, et seq., as amended.
- (o) “Force Majeure Event” means strikes, lockouts, or other industrial disputes; explosions, epidemics, civil disturbances, acts of domestic or foreign terrorism, wars within the continental United States, riots or insurrections; embargos, natural disasters, including but not limited to landslides, earthquakes, floods or washouts; interruptions by government or court orders; declarations of emergencies by applicable federal, state or local authorities; and present or future orders of any regulatory body having proper jurisdiction.

(p) "FTA" means the Federal Transit Administration.

(q) "Intellectual Property Rights" means the worldwide legal rights or interests evidenced by or embodied in: (i) any idea, design, concept, personality right, method, process, technique, apparatus, invention, discovery, or improvement, including any patents, trade secrets, and know-how; (ii) any work of authorship, including any copyrights, moral rights or neighboring rights, and any derivative works thereto; (iii) any trademark, service mark, trade dress, trade name, or other indicia of source or origin; (iv) domain name registrations; and (v) any other proprietary or similar rights. The Intellectual Property Rights of a party include all worldwide legal rights or interests that the party may have acquired by assignment or license with the right to grant sublicenses.

(r) "Manufacturing Materials" mean any completed or partially completed supplies and materials, parts, dies, jigs, fixtures, plans, drawings, information, and contract rights specifically produced or specially acquired by the Contractor for the performance of the Contract.

(s) "Notice of Award" means formal notice of award of the Contract to the Contractor issued by the Contracting Officer.

(t) "Notice to Proceed" means written authorization for the Contractor to start the performance of the Contract.

(u) "Project Manager" means the designated individual to act on behalf of Capital Metro, to monitor and certify the technical progress of the Contractor's performance under the terms of this Contract.

(v) "Subcontract" means the contract between the Contractor and its Subcontractors.

(w) "Subcontractor" means Subcontractors of any tier.

(x) "Works" means any tangible or intangible items or things that have been or will be specifically, generated, prepared, created, or developed by the Contractor (or such third parties as the Contractor may be permitted to engage) at any time following the effective date of the Contract, for the exclusive use of, and ownership by, Authority under the Contract, including but not limited to any (i) works of authorship (such as literary works, musical works, dramatic works, choreographic works, pictorial, graphic and sculptural works, motion pictures and other audiovisual works, sound recordings and architectural works, which includes but is not limited to manuals, instructions, printed material, graphics, artwork, images, illustrations, photographs, computer software, scripts, object code, source code or other programming code, HTML code, data, information, multimedia files, text web pages or web sites, other written or machine readable expression of such works fixed in any tangible media, and all other copyrightable works), (ii) trademarks, service marks, trade dress, trade names, logos, or other indicia of source or origin, (iii) ideas, designs, concepts, personality rights, methods, processes, techniques, apparatuses, inventions, formulas, discoveries, or improvements, including any patents, trade secrets and know-how, (iv) domain names, (v) any copies, and similar or derivative works to any of the foregoing, and (vi) all documentation and materials related to any of the foregoing.

## **2. TYPE OF CONTRACT**

This is a fixed price Contract for the supplies or services specified and stated elsewhere in the Contract.

## **3. TERM**

The total term of the Contract shall be five (5) years from the Contract Notice to Proceed, subject to Section 4, OPTION TO PURCHASE ADDITIONAL BUSES. A separate Notice to Proceed shall be required for the purchase of additional buses. No services shall be performed under this Contract prior to issuance of a Notice to Proceed.

## **4. OPTION TO PURCHASE ADDITIONAL BUSES**

(a) There are no extension options, the total term of this contract shall not exceed five (5) years.

(b) A separate written Notice to Proceed (fully executed Contract Modification) will be issued for the options in Exhibit A, Pricing Schedule, Sections 8 through 13, and Optional Items in Section 15. These bus options and optional items can be exercised at any time during the sixty (60) month contract period.

(c) Bus Options will be subject to prices determined by using the most current U.S. Department of Labor, Bureau of Labor Statistics Producer Price Index ("PPI") Table 6, Commodity Code 1413, "Truck and bus bodies".

(d) Unit prices for buses purchased under each option shall be determined by dividing the above referenced PPI at the time of the option award by the above referenced PPI at the time of the base award (contract date) and multiplying the percent change in PPI by the base award price.

(e) The unit prices shall remain fixed, as proposed, for the first delivery under this contract. Prices for orders of buses or equipment ordered after the base award shall be the base order price plus any escalation calculated using the US Department of Labor/Bureau of Labor Statistics Producer Price Index ("PPI") Category 1413, "Truck and bus bodies."

#### FORMULA EXAMPLE:

##### Index Point Change Calculation

PPI Index:	
Future order month:	141.1
Less PPI Index:	
Base order month:	<u>137.6</u>
Index Point Change:	3.5

##### Index Percentage Change Calculation

Index Point Change:	3.5
Divided by PPI Index:	
Base Order Month:	<u>137.6</u>
Change:	.0254

Percent Change	
(Multiplied by 100):	2.54%
Price Increase Calculation	

Base Order Price	
(example only):	\$250,000
Plus Percentage Change	
(\$250,000 x 2.54%) :	<u>\$ 6,350</u>
Revised Order Price:	\$256,350

(f) Notwithstanding anything else to the contrary herein contained, in the event that a price adjustment is required in respect of changes that are mandatory as a result of legislation or regulations that become effective after the date of the submission of the Contractor's proposal, such price adjustment shall be negotiated in good faith by the Authority and the Contractor and shall be made in accordance with Section 12 entitled Changes.

## 5. ORDERING

(a) Any supplies to be furnished under this Contract shall be ordered by issuance of written Notice to Proceed.

(b) All delivery orders are subject to the terms and conditions of this Contract. In the event of a conflict between an order and this Contract, the Contract shall control.

(c) Any order issued during the effective period of this Contract and not completed within that period shall be completed by the Contractor within the time specified in the order. The Contract shall govern the Contractor's and the Authority's rights and obligations with respect to that order to the same extent as if the order was completed during the Contract's effective period.



## 6. DELIVERY

- (a) Delivery shall be made to 9315 McNeil Road, Austin, TX 78758.
- (b) Delivery hours are limited to Monday through Friday excluding holidays, from 8:00 a.m. – 3:00 p.m., prevailing local time.
- (c) All deliveries shall be made F.O.B. destination. This term means free of expense to the Authority delivered and laid down in the area indicated by the Authority. The Contractor shall:
  - (1) pack and mark the shipment to comply with specifications; or if the specifications do not contain specific packing or marking instructions, pack and mark the shipment in accordance with prevailing commercial practices and in such a manner to assure delivery in good condition and as required by this Contract;
  - (2) prepare and distribute commercial bills of lading;
  - (3) deliver the shipment in good order and condition to the point of delivery specified in the Contract;
  - (4) be responsible for any loss of and/or damage to the goods occurring before receipt of the shipment by the Authority at the delivery point specified in the Contract;
  - (5) furnish a delivery schedule and designate the mode of delivering carrier; and
  - (6) pay and bear all charges to the specified point of delivery.
- (7) All buses and chargers are to be delivered in ideal condition, complete, ready for operation or use, and in compliance with the scope and specifications and terms and conditions of the Contract. Each bus must be delivered clean and the interior free of trash. Contractor's delivery drivers must report any and all vehicle related incidents while on route. Delivery of buses shall be determined by signed receipt of the Authority's designated agent at the point of delivery and may be preceded by a cursory inspection of the bus. Delivery shall be completed within the time specified in notice to proceed and the contract, after delivery of the executed contract documents.

## 7. RETAINAGE

In lieu of a performance bond and to ensure proper performance of the standard warranty of the Contract, the Authority will retain three percent (3%) of the amount of each approved invoice for vehicles until the end of standard warranties **warranty** for e**C**omplete b**B**us as defined in **Exhibit F-4 – Revised-1**, Warranty Provisions, **Section 1.1.1**, Sections 1.1.1 and 1.1.2.

## 8. INVOICING AND PAYMENT

- (a) Invoices may be submitted once per month for work completed and accepted by the Authority, and marked "Original" to:

Accounts Payable  
Capital Metropolitan Transportation Authority  
P.O. Box 6308  
Austin, Texas 78762-6308

Or via e-mail to: [ap\\_invoices@capmetro.org](mailto:ap_invoices@capmetro.org) (ap\_invoices@capmetro.org)

and shall conform to policies or regulations adopted from time to time by the Authority. Invoices shall be legible and shall contain, as a minimum, the following information:

- (1) the Contract and purchase order number (if any);
- (2) a complete itemization of all costs including quantities ordered and delivery order numbers (if any);
- (3) any discounts offered to the Authority under the terms of the Contract;

- (4) evidence of the acceptance of the buses, commissioning of chargers, supplies, and services by the Authority, including all post award Buy America requirements prior to delivery of the first bus of each model ordered;
- (5) Vehicle Identification Number (VIN) and Capital Metro Unit Identification Number (Unit #); and
- (6) any other information necessary to demonstrate entitlement to payment under the terms of the Contract.

(b) All undisputed invoices shall be paid within the time period allowed by law through the Texas Prompt Payment Act, Tex. Gov't. Code § 2251.021(b).

(c) The Contractor shall be responsible for all costs/expenses not otherwise specified in this Contract, including by way of example, all costs of equipment provided by the Contractor or Subcontractor(s), all fees, fines, licenses, bonds, or taxes required or imposed against the Contractor and Subcontractor(s), travel related expenses, and all other Contractor's costs of doing business.

(d) In the event an overpayment is made to the Contractor under this Contract or the Authority discovers that the Authority has paid any invoices or charges not authorized under this Contract, the Authority may offset the amount of such overpayment or unauthorized charges against any indebtedness owed by the Authority to the Contractor, whether arising under this Contract or otherwise, including withholding payment of an invoice, in whole or in part, or the Authority may deduct such amounts from future invoices. If an overpayment is made to the Contractor under this Contract which cannot be offset under this Contract, the Contractor shall remit the full overpayment amount to the Authority within thirty (30) calendar days of the date of the written notice of such overpayment or such other period as the Authority may agree. The Authority reserves the right to withhold payment of an invoice, in whole or in part, or deduct the overpayment from future invoices to recoup the overpayment.

## 9. INSURANCE

(a) The Contractor shall furnish proof of Capital Metro-stipulated insurance requirements specified below. All insurance policies shall be primary and non-contributing with any other valid and collectible insurance or self-insurance available to the Authority and shall contain a contract waiver of subrogation in favor of the Authority. The Contractor shall furnish to the Authority certificate(s) of insurance evidencing the required coverage and endorsement(s) and, upon request, a certified duplicate original of any of those policies. Prior to the expiration of a certificate of insurance, a new certificate of insurance shall be furnished to the Authority showing continued coverage. Each policy shall be endorsed to provide thirty (30) days written notice of cancellation or non-renewal to the Authority and the Authority shall be named as an Additional Insured under each policy except Professional Liability insurance if required by this Contract **(not applicable to Workmen's Compensation coverage)**. All insurance policies shall be written by reputable insurance company or companies acceptable to the Authority with a current Best's Insurance Guide Rating of **A+ and Class XIII A- and Class VII** or better. All insurance companies shall be authorized to transact business in the State of Texas. The Contractor shall notify the Authority in writing of any material alteration of such policies, including any change in the retroactive date in any "claims-made" policy or substantial reduction of aggregate limits, if such limits apply or cancellation thereof at least thirty (30) days prior thereto. The below requirements only represent the minimum coverage acceptable to the Authority and these requirements are not intended to represent the maximum risk or the maximum liability of the Contractor. The Contractor shall be responsible for setting its own insurance requirements, if any, for the kind and amounts of insurance to be carried by its Subcontractors in excess of the insurance required by the Authority.

The Contractor shall carry and pay the premiums for insurance of the types and in the amounts stated below.

### CAPITAL METRO MINIMUM COVERAGE REQUIREMENTS

#### Comprehensive General Liability Insurance:

(1) **Commercial General Liability Insurance Coverage** with limits of not less than One Million and No/100 Dollars (\$1,000,000) and Two Million and No/100 (\$2,000,000) Annual Aggregate. Combined Single Limit of Liability for Bodily Injury and Property Damage. Such coverage as herein provided shall be extended for and endorsements included as follows:

(i) Extended Coverages.

- a. Contractual Liability covering the Contractor's obligations herein.
- b. Personal Injury Liability extended to claims arising from employees of the Contractor and the Authority.

(ii) Endorsements Included. **The Authority named as ADDITIONAL INSURED.**

(2) Workers' Compensation Insurance: **Statutory Workers' Compensation** coverage in the State of Texas. Employers Liability Insurance with minimum limits of liability of One Million and No/100 Dollars (\$1,000,000). The Contractor shall cause its insurer for Worker's Compensation Insurance to endorse the Contractor's policy to **waive subrogation** against Capital Metropolitan Transportation Authority, its directors, officers, employees, agents, successors and assigns for any and all claims incurred by the Contractor's employees which arise out of the work under this contract.

(3) Automobile Liability Insurance for vehicles covering all owned, hired and non-owned automobiles used in connection with work with limits not less than One Million and No/100 Dollars (\$1,000,000) Combined Single Limit of Liability for Bodily Injury and Property Damage. If the Contractor uses the delivery services of a common carrier, then the Automobile Liability insurance will not be required. If the Contractor uses personnel and vehicles provided by the Contractor, then Automobile Liability will be required. Such coverage as herein provided shall include **the Authority as an ADDITIONAL INSURED.**

(4) Umbrella Liability Insurance with limits of not less than Five Million and No/100 Dollars (\$5,000,000).

**(5) All policies will contain Terrorism coverage.**

(b) The limits of liability as required above may be provided by a single policy of insurance or by a combination of primary, excess or umbrella policies but in no event shall the total limits of liability available for any one occurrence or accident be less than the amount required above.

(c) The Contractor, and all of its insurers shall, in regard to the above stated insurance, agree to waive all rights of recovery or subrogation against the Authority, its directors, officers, employees, agents, successors and assigns, and the Authority's insurance companies arising out of any claims for injury(ies) or damages resulting from the work performed by or on behalf of the Contractor under this Contract and/or use of any Authority premises or equipment under this Contract.

(d) Each insurance policy shall contain the following endorsements: PRIMARY AND NON-CONTRIBUTORY INSURANCE and WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS, which shall be evidenced on the Certificate of Insurance. The General Liability insurance shall include contractual endorsement(s) which acknowledge all indemnification requirements under the Agreement. All required endorsements shall be evidenced on the Certificate of Insurance. Proof that insurance coverage exists shall be furnished to The Authority by way of a Certificate of Insurance before any part of the Contract work is started.

(e) If any insurance coverage required to be provided by the Contractor is canceled, terminated, or modified so that the required insurance coverages are no longer in full force and effect, the Authority may terminate this Contract or obtain insurance coverages equal to the required coverage, the full cost of which will be the responsibility of the Contractor and shall be deducted from any payment due the Contractor.

(f) If any part of the Contract is sublet, the Contractor shall be liable for its Subcontractor's insurance coverages of the types and in the amounts stated above, and shall furnish the Authority with copies of such Certificates of Insurance. No delay in the work caused by the Contractor's enforcement of its Subcontractor's insurance requirements shall be excusable delay in the Contract. In the event a Subcontractor is unable to furnish insurance in the limits required under the Contract, the Contractor shall endorse the Subcontractor as an ADDITIONAL INSURED on the Contractor's policies.

(g) All insurance required to be maintained or provided by the Contractor shall be with companies and through policies approved by The Authority. The Authority reserves the right to inspect in person, prior to the commencement of the Contract work, all of the Contractor's insurance policy required under this Contract.

(h) The Contractor must furnish proof of the required insurance within five (5) days of the award of the Contract. Certificate of Insurance must indicate the Contract number and description. The insurance certificate should be furnished to the attention of the Contracting Officer.

(i) The Contractor and its lower tier Subcontractors are required to cooperate with the Authority and report all potential claims (workers' compensation, general liability and automobile liability) pertaining to this Contract to the Authority's Risk Management Department at (512) 389-7549 within two (2) days of the incident.

#### **10. INDEPENDENT CONTRACTOR**

The Contractor's relationship to the Authority in the performance of this Contract is that of an independent contractor. The personnel performing services under this Contract shall at all times be under the Contractor's exclusive direction and control and shall be employees of the Contractor and not employees of the Authority. The Contractor shall be fully liable for all acts and omissions of its employees, Subcontractors, and their suppliers and shall be specifically responsible for sufficient supervision and inspection to assure compliance in every respect with Contract requirements. There shall be no contractual relationship between any Subcontractor or supplier of the Contractor and the Authority by virtue of this Contract. The Contractor shall pay wages, salaries and other amounts due its employees in connection with this Contract and shall be responsible for all reports and obligations respecting them, such as Social Security, income tax withholding, unemployment compensation, workers' compensation and similar matters.

#### **11. COMPOSITION OF CONTRACTOR**

If the Contractor hereunder is comprised of more than one legal entity, each such entity shall be jointly and severally liable hereunder.

#### **12. CHANGES**

(a) The Authority may at any time, by a written order, make changes within the general scope of this Contract in any one or more of the following:

(1) drawings, designs, or specifications, where the supplies to be furnished are to be specially manufactured for the Authority in accordance therewith;

(2) method of shipment or packing; and

(1) place of delivery.

(b) If any such change causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this Contract, whether changed or not changed by the order, an equitable adjustment shall be made in the Contract price or delivery schedule, or both, and the Contract shall be modified in writing accordingly.

(c) Any notice of intent to assert a claim for adjustment under this paragraph must be asserted by the Contractor within thirty (30) days from the date of receipt of the Authority's written order; provided, however, that later notice shall not bar the Contractor's claim if the Contractor can demonstrate that the Authority was not prejudiced by the delay in notification. In no event shall any claim be asserted after final payment.

(d) Failure to agree to any adjustment under this paragraph shall be a dispute concerning a question of fact within the meaning of the disputes paragraph of this Contract. However, nothing in this paragraph shall excuse the Contractor from proceeding with the Contract as changed pending resolution of the dispute.

#### **13. EXTRAS**

Except as otherwise provided in this Contract, no payment for extras shall be made unless such extras and the prices therefor have been authorized in writing by the Authority.

**14. RESERVED**

**15. EQUITABLE ADJUSTMENTS**

Any requests for equitable adjustments under any provision shall be governed by the following provisions:

(a) Upon written request, the Contractor shall submit a proposal, in accordance with the requirements and limitations set forth in this paragraph, for work involving contemplated changes covered by the request. The proposal shall be submitted within the time limit indicated in the request for any extension of such time limit as may be subsequently granted. The Contractor's written statement of the monetary extent of a claim for equitable adjustment shall be submitted in the following form:

(1) Proposals totaling \$5,000 or less shall be submitted in the form of a lump sum proposal with supporting information to clearly relate elements of cost with specific items of work involved to the satisfaction of the Contracting Officer, or his/her authorized representative.

(2) For proposals in excess of \$5,000, the claim for equitable adjustment shall be submitted in the form of a lump sum proposal supported with an itemized breakdown of all increases and decreases in the Contract.

(b) No proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this Contract.

**16. INSPECTION**

(a) All supplies (which term throughout this paragraph includes without limitation raw materials, components, intermediate assemblies, and end products) shall be subject to inspection and test by the Authority or its authorized representative, to the extent practicable, at all times (including the period of manufacture) and places and, in any event, prior to acceptance.

(b) In the event any supplies or lots of supplies are defective in material or workmanship or otherwise not in conformity with the requirements of this Contract, the Authority shall have the right either to reject those supplies (with or without instructions as to their disposition) or to require their correction. Supplies or lots of supplies which have been rejected or required to be corrected shall be removed or, if permitted or required by the Authority, corrected in place by and at the expense of the Contractor promptly after notice and shall not thereafter be tendered for acceptance unless the former rejection or requirement of correction is disclosed. If the Contractor fails promptly to remove such supplies or lots of supplies which are required to be removed, or promptly to replace or correct such supplies or lots of supplies, the Authority either (i) may by contract or otherwise replace or correct such supplies and charge to the Contractor the cost occasioned the Authority thereby, or (ii) may terminate this Contract for default as provided in the termination paragraph of this Contract. Unless the Contractor corrects or replaces such supplies within the delivery schedule, the Authority may require the delivery of such supplies at a reduction in price that is equitable under the circumstances. Failure to agree to such reduction of price shall be a dispute concerning a question of fact within the meaning of the Disputes paragraph of this Contract.

(c) If any inspection or test is made by the Authority or its authorized representative on the premises of the Authority or a Subcontractor, the Contractor without additional charge shall provide all reasonable facilities and assistance for the safety and convenience of the Authority's inspectors in the performance of their duties. If the Authority's inspection or test is made at a point other than the premises of the Contractor or a Subcontractor, it shall be at the expense of the Authority, except as otherwise provided in this Contract; provided, that in case of rejection, the Authority shall not be liable for any reduction in value of samples used in connection with such inspection or test. All inspections and tests by the Authority shall be performed in such a manner as not to unduly delay the work. The Authority reserves the right to charge to the Contractor any additional cost of the Authority's inspection and test when supplies are not ready at the time such inspection and test is required by the Contract or when re-inspection or retest is necessitated by prior rejection. Acceptance or rejection of the supplies shall be made as promptly as practicable after delivery, except as otherwise provided in this Contract; but failure to inspect and accept or reject supplies shall neither relieve the Contractor from responsibility for such supplies as are not in accordance with the Contract requirements nor impose liability on the Authority therefor.

(d) The inspection and test by the Authority of any supplies or lots thereof does not relieve the Contractor from any responsibility regarding defects or other failures to meet the Contract requirements that may be discovered prior to acceptance. Except as otherwise provided in this Contract, acceptance shall be conclusive except for latent defects, fraud, or such gross mistakes as amount to fraud.

## **17. MATERIALS**

All equipment, material, and articles incorporated into the supplies covered by this Contract shall be new and of the most suitable grade for the purpose intended unless otherwise specifically provided in this Contract. If applicable, references in the specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of the Contracting Officer is equal to that named in the specifications, unless otherwise specifically provided in this Contract.

## **18. SUSPENSION OF WORK**

(a) The Contracting Officer may order the Contractor in writing to suspend all or any part of the Contract for such period of time as it may determine to be appropriate for the convenience of the Authority.

(b) If the performance of all or any part of the Contract is, for an unreasonable period of time, suspended or delayed by an act of the Contracting Officer in the administration of this Contract, or by its failure to act within the time specified in this Contract (or, if no time is specified, within a reasonable time), an adjustment shall be made for any increase in cost of performance of this Contract (excluding profit) necessarily caused by such unreasonable suspension or delay, and the Contract modified in writing accordingly. Any adjustment shall be made in accordance with the paragraph entitled "Equitable Adjustments." However, no adjustment shall be made under this paragraph for any suspension or delay to the extent (1) that performance would have been suspended or delayed by any other cause, including the fault or negligence of the Contractor, or (2) for which an equitable adjustment is provided for or excluded under any other provision of this Contract.

(c) No claim under this paragraph shall be allowed (1) for any costs incurred more than twenty (20) days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply to a claim resulting from a suspension order), and (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of such suspension or delay, but not later than the date of final payment. No part of any claim based on the provisions of this subparagraph shall be allowed if not supported by adequate evidence showing that the cost would not have been incurred but for a delay within the provisions of this paragraph.

## **19. RISK OF LOSS OR DAMAGE**

Except as otherwise provided in this Contract, the Contractor shall be responsible for the supplies covered by this Contract until they are delivered at the designated delivery point, regardless of the point of inspection. After delivery to the Authority at the designated point and prior to acceptance by the Authority or rejection and giving notice thereof by the Authority, the Authority shall be responsible for the loss, destruction of, or damage to the supplies only if such loss, destruction, or damage results from the negligence of officers, agents, or employees of the Authority acting within the scope of their employment. The Contractor shall bear all risks as to rejected supplies after notice of rejection, except that the Authority shall be responsible for the loss, destruction of, or damage to the supplies only if such loss, destruction, or damage results from the gross negligence of officers, agents, or employees of the Authority acting within the scope of their employment.

## **20. TERMINATION FOR DEFAULT**

(a) The Authority may, subject to the provisions of subparagraph (c) below, by written notice of default to the Contractor, terminate the whole or any part of this Contract in either one of the following circumstances:

(1) if the Contractor fails to make delivery of the supplies within the time specified herein or any extension thereof; or



(2) if the Contractor fails to perform any of the other provisions of this Contract and does not cure such failure within a period of ten (10) days (or such longer period as the Authority may authorize in writing) after receipt of notice from the Authority specifying such failure.

(b) In the event the Authority terminates this Contract in whole or in part as provided in paragraph (a) of this paragraph, the Authority may procure, upon such terms and in such manner as the Authority may deem appropriate, supplies similar to those so terminated, and the Contractor shall be liable to the Authority for any excess costs for such similar supplies; provided, that the Contractor shall continue the performance of this Contract to the extent, if any, it has not been terminated under the provisions of this paragraph.

(c) Except with respect to the defaults of Subcontractors, the Contractor shall not be liable for any excess costs if the failure to perform the Contract arises out of causes beyond the control and without the fault or negligence of the Contractor. Such causes may include, but are not restricted to Force Majeure Events; provided, however, in every case the failure to must be beyond the control and without the fault or negligence of the Contractor. If the failure to perform is caused by the default of a Subcontractor and if such default arises out of causes beyond the control of both the Contractor and Subcontractor and without the fault or negligence of either of them, the Contractor shall not be liable for any excess costs for failure to perform, unless the supplies to be furnished by the Subcontractor were obtainable from other sources in sufficient time to permit the Contractor to meet the required delivery schedule.

(d) If this Contract is terminated as provided in subparagraph (a), the Authority, in addition to any other rights provided in this subparagraph, may require the Contractor to transfer title and deliver to the Authority in the manner and to the extent directed by the Authority any Manufacturing Materials as the Contractor has specifically produced or specifically acquired for the performance of such part of this Contract as has been terminated; and the Contractor shall, upon direction of the Authority, protect and preserve property in possession of the Contractor in which the Authority has an interest. Payment for completed Manufacturing Materials delivered to and accepted by the Authority shall be at the Contract price. The Authority may withhold from amounts otherwise due the Contractor for such completed Manufacturing Materials such sum as the Authority determines to be necessary to protect the Authority against loss because of outstanding liens or claims of former lien holders.

(e) If, after notice of termination of this Contract under the provisions of this paragraph, it is determined by the Authority that the Contractor was not in default or that the default was excusable under the provisions of this paragraph, the rights and obligations of the parties shall be those provided in the paragraph entitled "Termination for Convenience" contained in this Exhibit E.

(f) The rights and remedies of the Authority provided in this paragraph shall not be exclusive and are in addition to any other rights and remedies provided by law or under this Contract.

## **21. TERMINATION FOR CONVENIENCE**

(a) The Authority may, whenever the interests of the Authority so require, terminate this Contract, in whole or in part, for the convenience of the Authority. The Authority shall give written notice of the termination to the Contractor specifying the part of the Contract terminated and when termination becomes effective.

(b) The Contractor shall incur no further obligations in connection with the terminated orders, and, on the date set forth in the notice of termination, the Contractor will stop work to the extent specified. The Contractor also shall terminate outstanding orders and Subcontracts as they relate to the terminated order. The Contractor shall settle the liabilities and claims arising out of the termination of Subcontracts and orders connected with the terminated orders. The Authority may direct the Contractor to assign the Contractor's right, title, and interest under terminated orders or Subcontracts to the Authority. The Contractor must still complete any orders not terminated by the notice of termination and may incur such obligations as are necessary to do so.

(c) The Authority may require the Contractor to transfer title and deliver to the Authority in the manner and to the extent directed by the Authority: (1) any completed supplies; and (2) such partially completed supplies and materials, parts, tools, dies, jigs, fixtures, plans, drawings, information and contract rights (hereinafter called "Manufacturing Materials") as the Contractor has specifically produced or specially acquired for the performance of the terminated part of this Contract. The Contractor shall, upon direction of the Authority, protect and preserve property in the possession of the Contractor in which the Authority has an interest. If the Authority does not exercise this right, the Contractor shall use its best efforts to sell such supplies and Manufacturing Materials.

(d) The Authority shall pay the Contractor the following amounts:

(1) Contract prices for supplies accepted under the Contract;

(2) costs incurred in preparing to perform and performing the terminated portion of the work plus a fair and reasonable profit on such portion of the work (such profit shall not include anticipatory profit or consequential damages), less amounts paid or to be paid for accepted supplies; provided, however, that if it appears that the Contractor would have sustained a loss if the entire Contract would have been completed, no profit shall be allowed or included, and the amount of compensation shall be reduced to reflect the anticipated rate of loss;

(3) costs of settling and paying claims arising out of the termination of Subcontracts (these costs must not include costs paid in accordance with subparagraph (2) of this paragraph); and

(4) the reasonable settlement costs of the Contractor and other expenses reasonably necessary for the preparation of settlement claims and supporting data with respect to the terminated portion of the Contract and for the termination and settlement of Subcontracts thereunder, together with reasonable storage, transportation, and other costs incurred in connection with the protection or disposition of property allocable to the terminated portion of this Contract.

(5) The total sum to be paid the Contractor under this paragraph shall not exceed the total Contract price plus the reasonable settlement costs of the Contractor reduced by the amount of payments otherwise made, the proceeds of any sales of supplies and Manufacturing Materials under this paragraph, and the Contract price of orders not terminated.

## **22. PAYMENT TO SUBCONTRACTORS**

(a) Payments by contractors to subcontractors associated with Authority contracts are subject to the time periods established in the Texas Prompt Payment Act, Tex. Gov't Code § 2251.

(b) A false certification to the Authority under the provisions of the paragraph entitled "Invoicing and Payment" hereof may be a criminal offense in violation of Tex. Penal Code § 10.

## **23. CONTRACTOR CERTIFICATION**

The Contractor certifies that the fees in this Contract have been arrived at independently without consultation, communication, or agreement for the purpose of restricting competition, as to any matter relating to such fees with any other firm or with any competitor.

## **24. INTELLECTUAL; DATA PRIVACY PROPERTY PROVISIONS**

(a) As between the Contractor and the Authority, the Works and Intellectual Property Rights therein are and shall be owned exclusively by Capital Metro, and not the Contractor. The Contractor specifically agrees that all Works shall be considered "works made for hire" and that the Works shall, upon creation, be owned exclusively by the Authority. To the extent that the Works, under applicable law, may not be considered works made for hire, the Contractor hereby effectively transfers, grants, conveys, assigns, and relinquishes exclusively to the Authority all right, title and interest in and to all worldwide ownership rights in the Works, and all Intellectual Property Rights in the Works, without the necessity of any further consideration, and the Authority shall be entitled to obtain and hold in its own name all Intellectual Property Rights in and to the Works. Further, the Contractor agrees that any and all Authority data or compilations thereof produced under this Contract shall be and remain the sole property of the Authority. Upon the request of the Authority, but in any event upon termination of this Contract, the Contractor shall surrender to the Authority all such data and compilations.

(1) For the avoidance of doubt, it is understood that, in performing its obligations under the Contract, Contractor may use its own previously developed data, documentation, software, ideas, concepts, materials, or information, in whatever form, or develop new and unique products that will aide Contractor in performing its services to Authority as it relates solely to this Contract but are not created for the exclusive use, or ownership by, the Authority (collectively, "Contractor Works"). All Contractor Preexisting Works shall remain the sole, exclusive and unrestricted property of Contractor. Contractor shall supply to the Authority a non-exclusive, non-transferable license to the extent required for the use by the Authority of the Services provided pursuant to this Contract for the time that the Services are provided solely for the purposes of the Contract.



(b) The Contractor, upon request and without further consideration, shall perform any acts that may be deemed necessary or desirable by the Authority to evidence more fully the transfer of ownership of all Works to the Authority to the fullest extent possible, including but not limited to the execution, acknowledgement and delivery of such further documents in a form determined by the Authority. In the event the Authority shall be unable for any reason to obtain the Contractor's signature on any document necessary for any purpose set forth in the foregoing sentence, the Contractor hereby irrevocably designates and appoints the Authority and its duly authorized officers and agents as the Contractor's agent and the Contractor's attorney-in-fact to act for and in the Contractor's behalf and stead to execute and file any such document and to do all other lawfully permitted acts to further any such purpose with the same force and effect as if executed and delivered by the Contractor.

(c) To the extent that any Contractor Works and/or third-party rights or limitations are embodied, contained, reserved or reflected in the Works, the Contractor shall either:

(1) grant to the Authority the irrevocable, perpetual, non-exclusive, worldwide, royalty-free right and license to:

(i) use, execute, reproduce, display, perform, distribute copies of, and prepare derivative works based upon such pre-existing rights and any derivative works thereof in connection with the sale, offering for sale, marketing, advertising, and promotion of the Authority's goods and services, and in all forms of media, media channels and/or publicity that may now exist or hereafter be created or developed, including but not limited to television, radio, print, Internet, and social media (e.g., Facebook, Twitter, YouTube, etc.) and

(ii) authorize others to do any or all of the foregoing, or

(2) where the obtaining of worldwide rights is not reasonably practical or feasible, provide written notice to the Authority of such pre-existing or third party rights or limitations, request the Authority's approval of such pre-existing or third party rights, obtain a limited right and license to use such pre-existing or third party rights on such terms as may be reasonably negotiated, and obtain the Authority's written approval of such pre-existing or third party rights and the limited use of same. The Contractor shall provide the Authority with documentation indicating a third party's written approval for the Contractor to use any pre-existing or third-party rights that may be embodied, contained, reserved or reflected in the Works. **THE CONTRACTOR SHALL INDEMNIFY, DEFEND AND HOLD THE AUTHORITY HARMLESS FROM AND AGAINST ANY AND ALL CLAIMS, DEMANDS, REGULATORY PROCEEDINGS AND/OR CAUSES OF ACTION, AND ALL LOSSES, DAMAGES, AND COSTS (INCLUDING ATTORNEYS' FEES AND SETTLEMENT COSTS) ARISING FROM OR RELATING TO, DIRECTLY OR INDIRECTLY, ANY CLAIM OR ASSERTION BY ANY THIRD PARTY THAT THE WORKS INFRINGE ANY THIRD-PARTY RIGHTS.** The foregoing indemnity obligation shall not apply to instances in which the Authority either:

(i) exceeded the scope of the limited license that was previously obtained by the Contractor and agreed to by the Authority, or

(ii) obtained information or materials, independent of the Contractor's involvement or creation, and provided such information or materials to the Contractor for inclusion in the Works, and such information or materials were included by the Contractor, in an unaltered and unmodified fashion, in the Works.

(d) The Contractor hereby warrants and represents to the Authority that individuals or characters appearing or depicted in any advertisement, marketing, promotion, publicity or media, of any type or form that may now exist or hereafter be created or developed by or on behalf of the Contractor for the use by or benefit of the Authority, have provided their written consent for the use, reproduction, display, performance, and distribution of, and/or preparation of derivative works to, their persona or personality rights, including name, biographical information, picture, portrait, likeness, performance, voice and/or identity ("Personality Rights"), and have been compensated for such Personality Rights, if appropriate. If such permission has been obtained for a limited time, the Contractor shall be responsible for any costs associated with claims resulting from such use, etc., of the Personality Rights after the expiration of those time limits. **THE CONTRACTOR AGREES TO DEFEND, INDEMNIFY AND HOLD THE AUTHORITY HARMLESS FROM ANY CLAIMS, INCLUDING BUT NOT LIMITED TO CLAIMS FOR INVASION OF PRIVACY, INFRINGEMENT OF THE RIGHT OF PUBLICITY, LIBEL, UNFAIR COMPETITION, FALSE ADVERTISING, INTENTIONAL OR NEGLIGENT INFLICTION OF EMOTIONAL DISTRESS, COPYRIGHT OR TRADEMARK INFRINGEMENT, AND/OR CLAIMS FOR ATTORNEY'S FEES, RESULTING FROM SUCH USE, ETC., OF THE PERSONALITY RIGHTS.**

(e) The Contractor hereby irrevocably and forever waives, and agrees never to assert, any Moral Rights in or to the Works which the Contractor may now have or which may accrue to the Contractor's benefit under U.S. or foreign copyright laws and any and all other residual rights and benefits which arise under any other applicable law now in force or hereafter enacted. The term "Moral Rights" shall mean any and all rights of paternity or integrity of the Works and the right to object to any modification, translation or use of the Works, and any similar rights existing under the judicial or statutory law of any country in the world or under any treaty, regardless of whether or not such right is denominated or referred to as a Moral Right.

(f) The Contract is intended to protect the Authority's proprietary rights pertaining to the Works, and the Intellectual Property Rights therein, and any misuse of such rights would cause substantial and irreparable harm to the Authority's business. Therefore, the Contractor acknowledges and stipulates that a court of competent jurisdiction should immediately enjoin any material breach of the intellectual property and confidentiality provisions of this Contract, upon a request by the Authority, without requiring proof of irreparable injury as same should be presumed.

(g) Upon the request of the Authority, but in any event upon termination of this Contract, the Contractor shall surrender to the Authority all documents and things pertaining to the Works, including but not limited to drafts, memoranda, notes, records, drawings, manuals, computer software, reports, data, and all other documents or materials (and copies of same) generated or developed by the Contractor or furnished by the Authority to the Contractor, including all materials embodying the Works, any Authority confidential information, or Intellectual Property Rights, regardless of whether complete or incomplete. This subparagraph is intended to apply to all Works made or compiled by the Contractor, as well as to all documents and things furnished to the Contractor by the Authority or by anyone else that pertains to the Works.

(h) The Contractor may have access to personally identifiable information ("PII") in connection with the performance of the Contract. PII shall be any information that identifies or describes a person or can be directly linked to a specific individual, including ridership and usage data. Examples of PII include, but are not limited to, name, address, phone or fax number, signature, date of birth, e-mail address, method of payment, ridership and travel pattern data. Customer Personally Identifiable Information, or Customer PII, means any PII relating to the Authority's customers. The Contractor shall take reasonable steps maintain the confidentiality, security, safety, and integrity of all Customer PII. Unless otherwise agreed to by the Authority in writing, Contractor will adhere to the following requirements concerning Customer PII:

(1) The Contractor shall take reasonable steps to maintain the confidentiality of and will not reveal or divulge to any person or entity any Customer PII that becomes known to it during the term of this Agreement.

(2) The Contractor must maintain policies and programs that prohibit unauthorized disclosure of Customer PII by its employees and subcontractors and promote training and awareness of information security policies and practices. The Contractor must comply, and must cause its employees, representatives, agents, and sub-Contractors to comply, with such commercially and operationally reasonable directions as the Authority may make to promote the safeguarding or confidentiality of Customer PII.

(3) The Contractor must conduct background checks for employees or sub-Contractors that have access to Customer PII or systems hosting Customer PII.

(4) The Contractor must limit access to computers and networks that host Customer PII, including without limitation through user credentials and strong passwords, data encryption both during transmission and at rest, fire-wall rules, and network-based intrusion detection systems

Notwithstanding the above, the Parties hereby expressly acknowledge and agree that:

(1) Contractor may disclose, divulge, or reveal PII and Customer PII in a manner approved by the Authority to the extent necessary to fulfill the requirements of this Contract or as otherwise approved in writing by the Authority; and

(2) Unless provided otherwise in the Contract, Contractor shall not be responsible for any security for the transmission of data over the internet, payment processing or credit or debit card transactions or the data security or data privacy associated with the services of third-party vendors performing payment processing, hosting, or cloud vendor services.

This Section 24(h) will survive termination or expiration of this Agreement.

**25. FEDERAL, STATE, AND LOCAL TAXES**

The Contract Sum includes all applicable federal, state, and local taxes and duties. The Authority is exempt from taxes imposed by the State of Texas and local sales and use taxes under Texas Tax Code § 151.309, and any such taxes included on any invoice received by the Authority shall be deducted from the amount of the invoice for purposes of payment. The Contractor may claim exemption from payment of applicable State taxes by complying with such procedures as may be prescribed by the State Comptroller of Public Accounts. The Contractor bears sole and total responsibility for obtaining information pertaining to such exemption.

**26. EQUAL OPPORTUNITY**

During the performance of this Contract, the Contractor agrees that it will, in good faith, afford equal opportunity required by applicable federal, state, or local law to all employees and applicants for employment without regard to race, color, religion, sex, national origin, disability or any other characteristic protected by federal, state or local law.

**27. CONFLICT OF INTEREST**

(a) Reference is made to Exhibit B, Representations and Certifications, Code of Ethics, which is incorporated herein and made a part of this Contract. Capitalized terms used in this paragraph and not otherwise defined shall have the meanings as described to them in the Code of Ethics.

(b) The Contractor represents that no Employee has a Substantial Interest in the Contractor or this Contract, which Substantial Interest would create or give rise to a Conflict of Interest. The Contractor further represents that no person who has a Substantial Interest in the Contractor and is or has been employed by the Authority for a period of two (2) years prior to the date of this Contract has or will (1) participate, for the Contractor, in a recommendation, bid, proposal or solicitation on any Authority contract, procurement or personnel administration matter, or (2) receive any pecuniary benefit from the award of this Contract through an ownership of a Substantial Interest (as that term is defined in Paragraph II, subparagraphs (1) and (3) of the Code of Ethics) in a business entity or real property.

(c) The Contractor agrees to ensure that the Code of Ethics is not violated as a result of the Contractor's activities in connection with this Contract. The Contractor agrees to immediately inform the Authority if it becomes aware of the existence of any such Substantial Interest or Conflict of Interest, or the existence of any violation of the Code of Ethics arising out of or in connection with this Contract.

(d) The Authority may, in its sole discretion, require the Contractor to cause an immediate divestiture of such Substantial Interest or elimination of such Conflict of Interest, and failure of the Contractor to so comply shall render this Contract voidable by the Authority. Any willful violation of these provisions, creation of a Substantial Interest or existence of a Conflict of Interest with the express or implied knowledge of the Contractor shall render this Contract voidable by the Authority.

(e) In accordance with paragraph 176.006, Texas Local Government Code, "vendor" is required to file a conflict of interest questionnaire within seven business days of becoming aware of a conflict of interest under Texas law. The conflict of interest questionnaire can be obtained from the Texas Ethics Commission at [www.ethics.state.tx.us](http://www.ethics.state.tx.us). The questionnaire shall be sent to the Authority's Contract Administrator.

**28. GRATUITIES**

The Authority may cancel this Contract, without liability to the Contractor, if it is found that gratuities in the form of entertainment, gifts, or otherwise were offered or given by the Contractor or any agent or representative to any Authority official or employee with a view toward securing favorable treatment with respect to the performance of this Contract. In the event this Contract is canceled by the Authority pursuant to this provision, the Authority shall be entitled, in addition to any other rights and remedies, to recover from the Contractor a sum equal in amount to the cost incurred by the Contractor in providing such gratuities.

**29. REQUEST FOR INFORMATION**

(a) The Contractor shall not provide information generated or otherwise obtained in the performance of its responsibilities under this Contract to any party other than the Authority and its authorized agents except as otherwise provided by this Contract or after obtaining the prior written permission of the Authority.

(b) This Contract, all data and other information developed pursuant to this Contract shall be subject to the Texas Public Information Act. The Authority shall comply with all aspects of the Texas Public Information Act.

(c) The Contractor is instructed that any requests for information regarding this Contract and any deliverables shall be referred to the Authority.

(d) The requirements of Subchapter J, Chapter 552, Government Code, may apply to this Contract and the contractor or vendor agrees that the contract can be terminated if the contractor or vendor knowingly or intentionally fails to comply with a requirement of that subchapter.

(1) The requirement of Subchapter J, Chapter 552, Government Code as amended currently applies to expenditures of at least \$1 million in public funds for the purchase of goods or services.

**30. LIMITATION OF LIABILITY**

In no event shall the Authority or its officers, directors, agents or employees be liable in contract or tort, to the Contractor or its Subcontractors for special, indirect, incidental or consequential damages, resulting from the Authority's performance, nonperformance, or delay in performance of its obligations under this Contract, or the Authority's termination of the Contract with or without cause, or the Authority's suspension of the Services. This limitation of liability shall not apply to intentional tort or fraud. The Contractor shall include similar liability provisions in all its Subcontracts.

**31. LAWS, STATUTES AND OTHER GOVERNMENTAL REQUIREMENTS**

The Contractor agrees that it shall be in compliance with all laws, statutes, and other governmental requirements, regulations or standards prevailing during the term of this Contract.

**32. CLAIMS**

In the event that any claim, demand, suit, or other action is made or brought by any person, firm, corporation, or other entity against the Contractor, the Contractor shall give written notice thereof, to the Authority within three (3) working days after being notified of such claim, demand, suit, or action. Such notice shall state the date and hour of notification of any such claim, demand, suit, or other action; the name and address of the person, firm, corporation, or other entity making such claim or instituting or threatening to institute any type of action or proceeding; the basis of such claim, action, or proceeding; and the name of any person against whom such claim is being made or threatened. Such written notice shall be delivered either personally or by mail and shall be directly sent to the attention of the President/CEO, Capital Metropolitan Transportation Authority, 2910 E. 5<sup>th</sup> Street, Austin, Texas 78702.

**33. CONTRACTOR CONTACT/AUTHORITY DESIGNEE**

The Contractor shall provide the Authority with a telephone number to ensure immediate communication with a person (not a recording) anytime during Contract performance. Similarly, the Authority shall designate an Authority representative who shall be similarly available to the Contractor.

**34. LICENSES AND PERMITS**

The Contractor shall, without additional expense to the Authority, be responsible for obtaining any necessary licenses, permits, and approvals for complying with any federal, state, county, municipal, and other laws, codes, and regulations applicable to the performance of work or to the products to be provided under this Contract including, but not limited to, any laws or regulations requiring the use of licensed Subcontractors to perform parts of the work.

**35. INDEMNIFICATION**

(a) THE CONTRACTOR WILL INDEMNIFY, DEFEND AND HOLD THE AUTHORITY AND ITS OFFICERS, DIRECTORS, EMPLOYEES, AGENTS AND REPRESENTATIVES (THE AUTHORITY AND EACH SUCH PERSON OR ENTITY IS AN "INDEMNIFIED PARTY") HARMLESS FROM AND AGAINST AND PAY ANY AND ALL DAMAGES (AS DEFINED HEREIN) DIRECTLY OR INDIRECTLY RESULTING FROM, RELATING TO, ARISING OUT OF OR ATTRIBUTABLE TO ANY OF THE FOLLOWING:

(1) ANY BREACH OF ANY REPRESENTATION OR WARRANTY THAT THE CONTRACTOR HAS MADE IN THIS CONTRACT;

(2) ANY BREACH, VIOLATION OR DEFAULT BY OR THROUGH THE CONTRACTOR OR ANY OF ITS SUBCONTRACTORS OF ANY OBLIGATION OF THE CONTRACTOR IN THIS CONTRACT OR ANY OTHER AGREEMENT BETWEEN THE CONTRACTOR AND THE AUTHORITY;

(3) THE USE, CONDITION, OPERATION OR MAINTENANCE OF ANY PROPERTY, VEHICLE, FACILITY OR OTHER ASSET OF THE AUTHORITY TO WHICH THE CONTRACTOR HAS ACCESS OR AS TO WHICH THE CONTRACTOR PROVIDES SERVICES; OR

(4) ANY ACT OR OMISSION OF THE CONTRACTOR OR ANY OF ITS SUBCONTRACTORS OR ANY OF THEIR OFFICERS, DIRECTORS, EMPLOYEES, AGENTS, CUSTOMERS, INVITEES, REPRESENTATIVES OR VENDORS.

(b) "ACTION" MEANS ANY ACTION, APPEAL, PETITION, PLEA, CHARGE, COMPLAINT, CLAIM, SUIT, DEMAND, LITIGATION, MEDIATION, HEARING, INQUIRY, INVESTIGATION OR SIMILAR EVENT, OCCURRENCE OR PROCEEDING.

(c) "DAMAGES" MEANS ALL DIRECT OR INDIRECT DAMAGES, LOSSES, LIABILITIES, DEFICIENCIES, SETTLEMENTS, CLAIMS, AWARDS, INTEREST, PENALTIES, JUDGMENTS, FINES, OR OTHER COSTS OR EXPENSES OF ANY KIND OR NATURE WHATSOEVER, WHETHER KNOWN OR UNKNOWN, CONTINGENT OR VESTED, MATURED OR UNMATURED, AND WHETHER OR NOT RESULTING FROM THIRD-PARTY CLAIMS, INCLUDING COSTS (INCLUDING, WITHOUT LIMITATION, REASONABLE FEES AND EXPENSES OF ATTORNEYS, OTHER PROFESSIONAL ADVISORS AND EXPERT WITNESSES) RELATED TO ANY INVESTIGATION, ACTION, SUIT, ARBITRATION, APPEAL, CLAIM, DEMAND, INQUIRY, COMPLAINT, MEDIATION, INVESTIGATION OR SIMILAR EVENT, OCCURRENCE OR PROCEEDING.

(d) "THREATENED" MEANS A DEMAND OR STATEMENT HAS BEEN MADE (ORALLY OR IN WRITING) OR A NOTICE HAS BEEN GIVEN (ORALLY OR IN WRITING), OR ANY OTHER EVENT HAS OCCURRED OR ANY OTHER CIRCUMSTANCES EXIST THAT WOULD LEAD A PRUDENT PERSON OR ENTITY TO CONCLUDE THAT AN ACTION OR OTHER MATTER IS LIKELY TO BE ASSERTED, COMMENCED, TAKEN OR OTHERWISE PURSUED IN THE FUTURE.

(e) IF ANY ACTION IS COMMENCED OR THREATENED THAT MAY GIVE RISE TO A CLAIM FOR INDEMNIFICATION (A "CLAIM") BY ANY INDEMNIFIED PARTY AGAINST THE CONTRACTOR, THEN SUCH INDEMNIFIED PARTY WILL PROMPTLY GIVE NOTICE TO THE CONTRACTOR AFTER SUCH INDEMNIFIED PARTY BECOMES AWARE OF SUCH CLAIM. FAILURE TO NOTIFY THE CONTRACTOR WILL NOT RELIEVE THE CONTRACTOR OF ANY LIABILITY THAT IT MAY HAVE TO THE INDEMNIFIED PARTY, EXCEPT TO THE EXTENT THAT THE DEFENSE OF SUCH ACTION IS MATERIALLY AND IRREVOCABLY PREJUDICED BY THE INDEMNIFIED PARTY'S FAILURE TO GIVE SUCH NOTICE. THE CONTRACTOR WILL ASSUME AND THEREAFTER DILIGENTLY AND CONTINUOUSLY CONDUCT THE DEFENSE OF A CLAIM WITH COUNSEL THAT IS SATISFACTORY TO THE INDEMNIFIED PARTY. THE INDEMNIFIED PARTY WILL HAVE THE RIGHT, AT ITS OWN EXPENSE, TO PARTICIPATE IN THE DEFENSE OF A CLAIM WITHOUT RELIEVING THE CONTRACTOR OF ANY OBLIGATION DESCRIBED ABOVE. IN NO EVENT WILL THE CONTRACTOR APPROVE THE ENTRY OF ANY JUDGMENT OR ENTER INTO ANY SETTLEMENT WITH RESPECT TO ANY CLAIM WITHOUT THE INDEMNIFIED PARTY'S PRIOR WRITTEN APPROVAL, WHICH WILL NOT BE UNREASONABLY WITHHELD. UNTIL THE CONTRACTOR ASSUMES THE DILIGENT DEFENSE OF A CLAIM, THE INDEMNIFIED PARTY MAY DEFEND AGAINST A CLAIM IN ANY MANNER THE INDEMNIFIED PARTY REASONABLY DEEMS APPROPRIATE. THE CONTRACTOR WILL REIMBURSE THE INDEMNIFIED PARTY PROMPTLY AND PERIODICALLY



FOR THE DAMAGES RELATING TO DEFENDING AGAINST A CLAIM AND WILL PAY PROMPTLY THE INDEMNIFIED PARTY FOR ANY DAMAGES THE INDEMNIFIED PARTY MAY SUFFER RELATING TO A CLAIM.

(f) THE INDEMNIFICATION OBLIGATIONS AND RIGHTS PROVIDED FOR IN THIS CONTRACT DO NOT REQUIRE (AND SHALL NOT BE CONSTRUED AS REQUIRING) THE CONTRACTOR TO INDEMNIFY, HOLD HARMLESS, OR DEFEND ANY INDEMNIFIED PARTY (OR ANY THIRD PARTY) AGAINST ANY ACTION OR CLAIM (OR THREATENED ACTION OR CLAIM) CAUSED BY THE NEGLIGENCE OR FAULT, THE BREACH OR VIOLATION OF A STATUTE, ORDINANCE, GOVERNMENTAL REGULATION, STANDARD, OR RULE, OR THE BREACH OF CONTRACT OF ANY INDEMNIFIED PARTY, ITS AGENTS OR EMPLOYEES, OR ANY THIRD PARTY UNDER THE CONTROL OR SUPERVISION OF ANY INDEMNIFIED PARTY, OTHER THAN THE CONTRACTOR OR ITS AGENTS, EMPLOYEES, OR SUBCONTRACTORS OF ANY TIER.

(g) THIS PARAGRAPH WILL SURVIVE ANY TERMINATION OR EXPIRATION OF THIS CONTRACT.

### **36. NOTICE OF LABOR DISPUTES**

(a) If the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this Contract, the Contractor immediately shall give notice, including all relevant information, to the Authority.

(b) The Contractor agrees to insert the substance of this paragraph, including this subparagraph (b), in any Subcontract under which a labor dispute may delay the timely performance of this Contract; except that each Subcontract shall provide that in the event its timely performance is delayed or threatened by delay by any actual or potential labor dispute, the Subcontractor shall immediately notify the next higher tier Subcontractor or the Contractor, as the case may be, of all relevant information concerning the dispute.

### **37. PUBLICITY RELEASES**

All publicity releases or releases of reports, papers, articles, maps, or other documents in any way concerning this Contract or the work hereunder which the Contractor or any of its Subcontractors desires to make for purposes of publication in whole or in part, shall be subject to written approval by the Contracting Officer prior to release.

### **38. INTEREST OF PUBLIC OFFICIALS**

The Contractor represents and warrants that no employee, official, or member of the Board of the Authority is or will be pecuniarily interested or benefited directly or indirectly in this Contract. The Contractor further represents and warrants that it has not offered or given gratuities (in the form of entertainment, gifts or otherwise) to any employee, official, or member of the Board of the Authority with a view toward securing favorable treatment in the awarding, amending, or evaluating the performance of this Contract. For breach of any representation or warranty in this paragraph, the Authority shall have the right to terminate this Contract without liability and/or have recourse to any other remedy it may have at law or in equity.

### **39. MANUFACTURER'S WARRANTY**

Any and all standard manufacturer's warranties shall accrue to the benefit of the Authority. The manufacturer's warranties referenced herein shall be in addition to the contractual remedies set forth in this Contract and in addition to any and all other statutory remedies or warranties imposed on the Contractor for the benefit of the Authority.

### **40. RECORD RETENTION; ACCESS TO RECORDS AND REPORTS**

(a) The Contractor will retain, and will require its Subcontractors of all tiers to retain, complete and readily accessible records related in whole or in part to the Contract, including, but not limited to, data, documents, reports, statistics, sub-agreements, leases, Subcontracts, arrangements, other third-party agreements of any type, and supporting materials related to those records.

(b) If this is a cost-reimbursement, incentive, time and materials, labor hour, or price determinable Contract, or any combination thereof, the Contractor shall maintain, and the Authority and its representatives shall have the right to examine, all books, records, documents, and other evidence and accounting procedures and practices sufficient to

reflect properly all direct and indirect costs of whatever nature claimed to have been incurred and anticipated to be incurred for the performance of this Contract.

(c) If the Contractor submitted certified cost or pricing data in connection with the pricing of this Contract or if the Contractor's cost of performance is relevant to any change or modification to this Contract, the Authority and its representatives shall have the right to examine all books, records, documents, and other data of the Contractor related to the negotiation, pricing, or performance of such Contract, change, or modification for the purpose of evaluating the costs incurred and the accuracy, completeness, and currency of the cost or pricing data submitted. The right of examination shall extend to all documents necessary to permit adequate evaluation of the costs incurred and the cost or pricing data submitted, along with the computations and projections used therein.

(d) The Contractor shall maintain all books, records, accounts and reports required under this paragraph for a period of at not less than three (3) years after the date of termination or expiration of this Contract, except in the event of litigation or settlement of claims arising from the performance of this Contract, in which case records shall be maintained until the disposition of all such litigation, appeals, claims or exceptions related thereto.

(e) The Contractor agrees to provide sufficient access to the Authority and its contractors to inspect and audit records and information related to performance of this Contract as reasonably may be required.

(f) The Contractor agrees to permit the Authority and its contractors access to the sites of performance under this Contract as reasonably may be required.

(g) If an audit pursuant to this paragraph reveals that the Authority has paid any invoices or charges not authorized under this Contract, the Authority may offset or recoup such amounts against any indebtedness owed by it to Contractor, whether arising under this Contract or otherwise, over a period of time equivalent to the time period over which such invoices or charges accrued.

(h) This paragraph will survive any termination or expiration of this Contract.

#### **41. EXCUSABLE DELAYS**

(a) Except for defaults of Subcontractors at any tier, the Contractor shall not be in default because of any failure to perform this Contract under its terms if the failure arises from Force Majeure Events. In each instance, the failure to perform must be beyond the control and without the fault or negligence of the Contractor. "Default" includes failure to make progress in the work.

(b) If the failure to perform is caused by the failure of a Subcontractor at any tier to perform or make progress, and if the cause of the failure was beyond the control of both the Contractor and Subcontractor and without the fault or negligence of either, the Contractor shall not be deemed to be in default, unless:

- (1) the subcontracted supplies were obtainable from other sources;
- (2) the Authority ordered the Contractor in writing to purchase these supplies from the other source; and
- (3) the Contractor failed to comply reasonably with this order.

(c) Upon the request of the Contractor, the Authority shall ascertain the facts and extent of the failure. If the Authority determines that any failure to perform results from one or more of the causes above, the delivery schedule or period of performance shall be revised, subject to the rights of the Authority under this Contract.

#### **42. INTERPRETATION OF CONTRACT – DISPUTES**

All questions concerning interpretation or clarification of this Contract or the acceptable fulfillment of this Contract by the Contractor shall be immediately submitted in writing to the Authority's Contracting Officer for determination. All determinations, instructions, and clarifications of the Contracting Officer shall be final and conclusive unless the Contractor files with the Capital Metro President/CEO within two (2) weeks after the Authority notifies the Contractor of any such determination, instruction or clarification, a written protest, stating in detail the basis of the protest. The President/CEO shall consider the protest and notify the Contractor within two (2) weeks of the protest filing of his or

her final decision. The President/CEO's decisions shall be conclusive subject to judicial review. Notwithstanding any disagreement the Contractor may have with the decisions of the President/CEO, the Contractor shall proceed with the Work in accordance with the determinations, instructions, and clarifications of the President/CEO. The Contractor shall be solely responsible for requesting instructions or interpretations and liable for any cost or expenses arising from its failure to do so. The Contractor's failure to protest the Contracting Officer's determinations, instructions, or clarifications within the two-week period shall constitute a waiver by the Contractor of all of its rights to further protest.

#### **43. TOBACCO-FREE WORKPLACE**

- (a) Tobacco products include cigarettes, cigars, pipes, snuff, snus, chewing tobacco, smokeless tobacco, dipping tobacco and any other non-FDA approved nicotine delivery device.
- (b) The tobacco-free workplace policy refers to all Capital Metro owned or leased property. Note that this includes all buildings, facilities, work areas, maintenance facilities, parking areas and all Authority owned vehicles.
- (c) Tobacco use is not permitted at any time on Capital Metro owned or leased property, including personal vehicles parked in Capital Metro parking lots.
- (d) Littering of tobacco-related products on the grounds or parking lots is also prohibited.

#### **44. ORDER OF PRECEDENCE**

In the event of any inconsistency between the provisions of this Contract, the inconsistency shall be resolved by giving precedence in the following order:

- 1. Exhibit A – Pricing Schedule
- 2. Exhibit E – Contractual Terms and Conditions
- 3. Exhibit E-1 – Addendum to Contractual Terms and Conditions, Federally Assisted
- 4. Exhibit F-1 – Capital Metro Battery Electric Bus Technical Specifications
- 5. Exhibit F-1B – Technical Specifications for Chargers for Battery Electric Buses
- 6. Exhibit B – Representations and Certifications
- 7. Exhibit B-1 – Buy America Certification
- 8. Exhibit E-2 – Proprietary Rights and Data Security Addendum
- 9. Exhibit E-3 – IT Terms and Conditions - Services
- 10. Exhibit E-4 – IT Terms and Conditions - Hosted Solutions
- 11. Other provisions or attachments to the Contract

#### **45. ANTI-CORRUPTION AND BRIBERY LAWS**

The Contractor shall comply with all Applicable Anti-Corruption and Bribery Laws. The Contractor represents and warrants that it has not and shall not violate or cause the Authority to violate any such Anti-Corruption and Bribery Laws. The Contractor further represents and warrants that, in connection with supplies or services provided to the Authority or with any other business transaction involving the Authority, it shall not pay, offer, promise, or authorize the payment or transfer of anything of value, directly or indirectly to: (a) any government official or employee (including employees of government owned or controlled companies or public international organizations) or to any political party, party official, or candidate for public office or (b) any other person or entity if such payments or transfers would violate applicable laws, including Applicable Anti-Corruption and Bribery Laws. Notwithstanding anything to the contrary herein contained, the Authority may withhold payments under this Contract, and terminate this Contract immediately by way of written notice to the Contractor, if it believes, in good faith, that the Contractor has violated or caused the Authority to violate the Applicable Anti-Corruption and Bribery Laws. The Authority shall not be liable to the Contractor for any claim, losses, or damages related to its decision to exercise its rights under this provision.

#### **46. MISCELLANEOUS**

- (a) This Contract does not intend to, and nothing contained in this Contract shall create any partnership, joint venture or other equity type agreement between the Authority and the Contractor.



(b) All notices, statements, demands, requests, consents or approvals required under this Contract or by law by either party to the other shall be in writing and may be given or served by depositing same in the United States mail, postage paid, registered or certified and addressed to the party to be notified, with return receipt requested; by personally delivering same to such party; an agent of such party; or by overnight courier service, postage paid and addressed to the party to be notified; or by e-mail with delivery confirmation. Notice deposited in the U.S. mail in the manner hereinabove described shall be effective upon such deposit. Notice given in any other manner shall be effective only if and when received by the party to be notified.

**If to the Contractor:** As set forth in Exhibit B to this Contract

**If to the Authority:** Capital Metropolitan Transportation Authority  
**Attn:** Sr. Director/Chief Contracting Officer  
2910 E. 5th Street  
Austin, Texas 78702

Address for notice can be changed by written notice to the other party.

(c) In the event the Authority finds it necessary to employ legal counsel to enforce its rights under this Contract, or to bring an action at law, or other proceeding against the Contractor to enforce any of the terms, covenants or conditions herein, the Contractor shall pay to the Authority its reasonable attorneys' fees and expenses, regardless of whether suit is filed.

(d) If any term or provision of this Contract or any portion of a term or provision hereof or the application thereof to any person or circumstance shall, to any extent, be void, invalid or unenforceable, the remainder of this Contract will remain in full force and effect unless removal of such invalid terms or provisions destroys the legitimate purpose of the Contract in which event the Contract will be terminated.

(e) This Contract represents the entire agreement between the parties concerning the subject matter of this Contract and supersedes any and all prior or contemporaneous oral or written statements, agreements, correspondence, quotations and negotiations. In executing this Contract, the parties do not rely upon any statement, promise, or representation not expressed herein. This Contract may not be changed except by the mutual written agreement of the parties.

(f) A facsimile signature shall be deemed an original signature for all purposes. For purposes of this paragraph, the phrase "facsimile signature" includes without limitation, an image of an original signature.

(g) Whenever used herein, the term "including" shall be deemed to be followed by the words "without limitation." Words used in the singular number shall include the plural, and vice-versa, and any gender shall be deemed to include each other gender. All Exhibits attached to this Contract are incorporated herein by reference.

(h) All rights and remedies provided in this Contract are cumulative and not exclusive of any other rights or remedies that may be available to the Authority, whether provided by law, equity, statute, or otherwise. The election of any one or more remedies the Authority will not constitute a waiver of the right to pursue other available remedies.

(i) The Contractor shall not assign the whole or any part of this Contract or any monies due hereunder without the prior written consent of the Contracting Officer. No assignment shall relieve the Contractor from any of its obligations hereunder. Any attempted assignment, transfer or other conveyance in violation of the foregoing shall be null and void.

(j) The failure of the Authority to insist upon strict adherence to any term of this Contract on any occasion shall not be considered a waiver or deprive the Authority thereafter to insist upon strict adherence to that term or other terms of this Contract. Furthermore, the Authority is a governmental entity and nothing contained in this Contract shall be deemed a waiver of any rights, remedies or privileges available by law.

(k) This Contract shall be governed by and construed in accordance with the laws of the State of Texas. Any dispute arising with respect to this Contract shall be resolved in the state or federal courts of the State of Texas, sitting in Travis County, Texas and the Contractor expressly consents to the personal jurisdiction of these courts.

- (l) This Contract is subject to the Texas Public Information Act, Tex. Gov't Code, Chapter 552.
- (m) The Contractor represents, warrants and covenants that: (a) it has the requisite power and authority to execute, deliver and perform its obligations under this Contract; and (b) it is in compliance with all applicable laws related to such performance.
- (n) The person signing on behalf of the Contractor represents for himself or herself and the Contractor that he or she is duly authorized to execute this Contract.
- (o) No term or provision of this Contract is intended to be, or shall be, for the benefit of any person, firm, organization, or corporation for a party hereto, and no such other person, firm, organization or corporation shall have any right or cause of action hereunder.
- (p) Capital Metro is a governmental entity and nothing in this Contract shall be deemed a waiver of any rights or privileges under the law.
- (q) Funding for this Contract after the current fiscal year is subject to revenue availability and appropriation of funds in the annual budget approved by the Authority's Board of Directors.
- (r) Time is of the essence for all delivery, performance, submittal, and completion dates in this Contract.

#### **47. FUNDING AVAILABILITY**

Funding after the current fiscal year of any contract resulting from this solicitation is subject to revenue availability and appropriation of funds in the annual budget approved by the Authority's Board of Directors.

#### **48. LIQUIDATED DAMAGES**

- (a) If the Contractor fails to deliver the buses or charging equipment within the time specified in this Contract, or any extension, the Contractor shall in place of actual damages, pay to the Authority the sum of \$312.77 per bus or charging equipment for each calendar day of delay as liquidated damages and not as a penalty. It is agreed that such liquidated damages represent an estimate of actual damages and are not intended as a penalty; and that such delay will cause the Authority to incur substantial economic damage in amounts which are difficult or impossible to ascertain with certainty. Liquidated damages do not limit the Authority's right to terminate this Contract for default or pursue other remedies available to the Authority elsewhere in this Contract. Liquidated damages may be deducted from any amounts due and owing Contractor under this Contract.
- (b) In the event the Authority terminates this Contract for Default under Exhibit E, Paragraph entitled "Termination for Default", Contractor shall be liable for liquidated damages accruing until such time as the Authority may reasonable obtain deliver of performance of similar services. The liquidated damages shall be in addition to excess cost under Exhibit E, Paragraph entitled "Termination for Default".
- (c) Contractor may not be charged with liquidated damages when the delay in performance is caused by a Force Majeure Event.
- (d) The Contractor shall insert the substance of this paragraph, including this subparagraph (d), altered to reflect the proper identification of the contracting parties in all Subcontracts issued pursuant to this Contract.

#### **49. BUS PRE-DELIVERY TESTS AND INSPECTIONS**

The pre-delivery tests and inspections shall be performed at or near the Contractor's plant; and they may be witnessed by the resident inspector. When the bus passes these tests and inspections, the resident inspector may authorize release of the bus.

The Contractor shall provide and maintain an inspection system acceptable to the Authority covering Material and/or Equipment under the Contract and shall tender to the Authority for acceptance only Materials and/or Equipment that has been inspected in accordance with the inspection system and has been found by the Contractor in conformity with Contract requirements. As part of the system, the Contractor shall prepare records evidencing all inspections

made under the system and the outcome. The Authority has the right to inspect and test all Material and/or Equipment call for by the Contract, to the extent practicable, at all places and times, including the period of manufacture, and in any event before acceptance. The Authority shall not be obligated to perform any inspection and test for the benefit of the Contractor unless specifically set forth elsewhere in the Contract. When Material and/or Equipment is not ready at the time specified by the Contractor for inspection or test, the Authority may charge the Contractor for the additional cost of inspection or test. Additionally, the Authority may charge the Contractor for any additional cost of inspection or test when prior rejection makes re-inspection or retest necessary. The Authority has the right either to reject or to require correction of nonconforming Material and/or Equipment when it is defective in material or workmanship or is otherwise not in conformity with Contract requirements. Inspection and tests by the Authority do not relieve the Contractor of responsibility for defects or other failures to meet Contract requirements discovered before acceptance.

#### **50. ACCEPTANCE OF BUS**

(a) Within 15 (fifteen) calendar days after arrival at the designated point of delivery, the Manufacturer shall demonstrate full integration and functionality of all add-on systems, such as but not limited to CAD/AVL and surveillance cameras (Reference Exhibit F1-C) and the bus shall undergo the Authority's inspection process. If the bus passes these tests, acceptance of the bus by the Authority occurs. Acceptance may occur earlier if the Authority notifies the Contractor of early acceptance or places the bus in revenue service. If the bus fails these tests, it shall not be accepted until the repair procedures defined in "Repairs After Non-Acceptance" have been carried out and the bus is re-tested until it passes.

(b) If during inspection process Capital Metro determines that a Vehicle is suitable for operation in revenue service, but that it is not totally responsive to the Technical Specifications such that substantial delay might be incurred in implementing required corrective action(s), Capital Metro may at its sole discretion, issue a "Certificate of Conditional Acceptance" for the Vehicle for mutual execution by Capital Metro and the contractor. Such conditionally accepted Vehicle will then be available to Capital Metro for use in revenue service until such time as the contractor is able to initiate and execute the necessary corrective action(s). Capital Metro will withhold a corresponding amount from the invoice for any such issues until corrective measures are taken by the contractor and fully accepted by Capital Metro.

#### **51. REPAIRS AFTER NON-ACCEPTANCE**

The Contractor, or its designated representative, shall perform the repairs after non-acceptance. If the Contractor fails or refuses to make the repairs within 5 (five) calendar days, then the Authority may contract the work out to a repair shop with reimbursement by the Contractor.

#### **52. REPAIRS BY CONTRACTOR**

After non-acceptance of the bus, the Contractor must begin work within 5 (five) calendar days after receiving notification from the Authority of failure of acceptance tests. Authority shall make the bus available to complete repairs timely with the Contractor repair schedule. The Contractors shall provide, at its own expense, all spare parts, tools, and space required to complete the repairs. At the Authority's discretion, the Contractor may be required to remove the bus from the Authority's property while repairs are being fixed. If the bus is removed from the Authority's property, repair procedures must be diligently pursued by the Contractor's representatives, and the Contractor shall assume risk of loss while the bus is under its control.

#### **53. REPAIRS BY THE AUTHORITY**

(a) **Parts Used.** If the Authority performs the repairs after non-acceptance of the bus, it shall correct or repair the defect and any related defects using Contractor-specified parts available from its own stock or those supplied by the Contractor specifically for this repair. Monthly, reports of all repairs covered by this procedure should be submitted by the Authority to the Contractor for reimbursement or replacement of parts. The Contractor shall provide forms for these reports.

(b) **Contractor Supplied Parts.** If the Contractor supplies parts for repairs that are being performed by the Authority after non-acceptance of the bus, these parts shall be shipped prepaid to the Authority from any source selected by the Contractor within five (5) calendar days after receipt of the request for said parts.

- (c) Return of Defective Components. The Contractor may request that parts covered by this provision be returned to the manufacturing plant. The total costs for this action shall be paid by the Contractor.
- (d) Reimbursement for Labor. The Authority shall be reimbursed by the Contractor for labor.
- (e) Reimbursement for Parts. The Authority shall be reimbursed by the Contractor for defective parts that must be replaced to correct the defect.

**54. PARTS AVAILABILITY GUARANTY**

Contractor shall guarantee the availability of replacement parts for each vehicle supplied under the contract for a period of at least twelve (12) years from the date of Final Payment. Contractor shall not make exclusive agreements with Sub-suppliers that would preclude the Authority from purchasing components directly from Sub-suppliers. All spare parts supplied shall be interchangeable with original equipment without any modifications. Contractor must maintain an inventory list of body and structural parts available for delivery to the Authority within 48 hours of placement of an order during the warranty phase and seven (7) calendar days for all other parts. The inventory should consist of but not limited to skirt panels, front and rear body panels, front cap glazing, trim stripes, high voltage batteries, pedestrian deflectors, and all windows and windshields.

**55. ASSIGNABILITY**

The Authority reserves the right to assign any or all part of specified deliverables to another entity at its sole discretion, it being understood that, should the Authority choose to assign any or all of the specified deliverables to another entity, the Assignee shall comply with the piggybacking requirements set forth in 2 CFR Part 200 and FTA Circular 4220.1F Chapter V 7(2), Assignment of Contract Rights.

**56. PRE-AWARD AUDIT, INTERMEDIATE AND POST-DELIVERY AUDIT**

Capital Metro is required by the Federal Transit Administration (FTA) to perform a pre-award and post-delivery audit of rolling stock purchases according to the Federal Register dated October 1, 2001, Title 49, CFR Chapter VI, Part 663. Capital Metro will also perform an Intermediate Audit which will occur at the midpoint of production of the first bus and will be conducted in the same manner as the Post Delivery Audit. Successful completion of the audit is a prerequisite for acceptance and delivery of any vehicles. The contractor will be notified throughout the audit process as to the status and progress.

**57. RESERVED**

**58. AUSTIN TRANSIT PARTNERSHIP**

At the direction of Capital Metro, the services provided under the Contract may be performed on behalf of or in connection with Austin Transit Partnership (ATP) and ATP's projects, initiatives, and proposals.

**EXHIBIT E-1**  
**ADDENDUM TO CONTRACTUAL TERMS AND CONDITIONS**  
**FEDERALLY-ASSISTED SUPPLY OR SERVICE CONTRACT**

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The Contractor clauses and provisions of this Exhibit apply to all Federally assisted supply and service contracts. These provisions supersede and take precedence over any other clause or provision contained within this contract which may be in conflict therewith.

**1. EQUAL EMPLOYMENT OPPORTUNITY**

This clause applies to all contracts, except contracts for standard commercial supplies or raw materials and construction. During the performance of this contract, the Contractor agrees as follows:

- (a) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, creed, sex, disability, age or national origin.
- (b) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, sex, disability, age, or national origin. This shall include, but not be limited to: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.
- (c) The Contractor shall include the provisions of paragraphs (a) and (b) of this clause in every Subcontract or purchase order except for standard commercial supplies or raw materials and construction.

**2. DISADVANTAGED BUSINESS ENTERPRISE (DBE)**

- (a) It is the policy of the Authority and the Department of Transportation that Disadvantaged Business Enterprises (DBEs) as defined in 49 C.F.R. Part 26 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds under this Contract. Consequently, the DBE requirements of 49 C.F.R Part 26 applies to this Contract.
- (b) The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. The requirements of 49 C.F.R. Part 26, and the Authority's DOT approved Disadvantaged Business Enterprise (DBE) program are incorporated in this Contract by reference. Failure by the Contractor to carry out these requirements is a material breach of the Contract, which may result in the termination of this Contract or such other remedy, as the Authority deems appropriate.

**3. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT – OVERTIME COMPENSATION**

- (a) Overtime Requirements. No Contractor or Subcontractor contracting for any part of the Contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborers or mechanics in any workweek in which the individual is employed on such work to work in excess for forty (40) hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half (1-1/2) times the basic rate of pay for all hours worked in excess of forty (40) hours in such workweek.
- (b) Violation, Liability for Unpaid Wages, Liquidated Damages. In the event of any violation of the provisions set forth in paragraph (a) above, the Contractor and any Subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States (in the case of work done under the Contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the provisions set forth in paragraph (a) above, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty (40) hours without payment of the overtime wages required by the provisions set forth in paragraph (a) above.

(c) Withholding for Unpaid and Liquidated Damages. The Authority shall upon the Authority's own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or Subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or Subcontractor for unpaid wages and liquidated damages as provided in the provisions set forth in paragraph (b) of this clause.

(d) Payroll and Basic Records.

(1) The Contractor or Subcontractor shall maintain payroll records during the course of Contract work and shall preserve them for a period of three (3) years from the completion of the Contract for all laborers and mechanics working on the Contract. Such records shall contain the name and address of each such employee, social security number, correct classification, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Nothing in this paragraph shall require the duplication of records required to be maintained for construction work by Department of Labor regulations at 209 C.F.R. 5.5(a)(3) implementing the Davis-Bacon Act.

(2) The records to be maintained under paragraph (d)(1) of this clause shall be made available by the Contractor or Subcontractor for inspection, copying, or transcription by authorized representatives of the Authority or the Department of Labor. The Contractor or Subcontractor shall permit such representatives to interview employees during working hours on the job.

(e) Subcontracts. The Contractor or Subcontractor shall insert in any Subcontracts the provisions set forth in paragraphs (a) through (d) above, and also a provision requiring the Subcontractors to include these clauses in any lower tier Subcontracts. The Contractor shall be responsible for compliance by any Subcontractor or lower tier Subcontractor with the provisions set forth in paragraphs (a) through (d) above.

#### **4. TITLE VI CIVIL RIGHTS ACT OF 1964**

During the performance of this Contract, the Contractor for itself, its assignees and successors in interest (hereinafter referred to as the "Contractor"), agrees as follows:

(a) Compliance with Regulations. The Contractor shall comply with the Regulations relative to nondiscrimination in Federally-assisted programs of the Department of Transportation (hereinafter referred to as "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations)), which are herein incorporated by reference and made a part of this Contract.

(b) Nondiscrimination. The Contractor, with regard to the work performed by it during the Contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of Subcontractors, including procurement of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the Contract covers a program set forth in Appendix B of the Regulations.

(c) Solicitations for Subcontracts, Including Procurement of Materials and Equipment. In all solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a Subcontract, including procurements of materials or leases of equipment, each potential Subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this Contract and the Regulations relative to nondiscrimination on the grounds of race, religion, color, sex, age, or national origin.

(d) Information and Reports. The Contractor shall provide all information and reports required by the Regulations or directive issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Authority or the Federal Transit Administration (FTA) to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information is required or a Contractor is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the Authority, or FTA, as appropriate, and shall set forth what efforts it has made to obtain the information.

(e) Sanctions for Noncompliance. In the event of the Contractor's noncompliance with the nondiscrimination provisions of this Contract, the Authority shall impose such Contract sanctions as it or the FTA may determine to be appropriate, including, but not limited to:

- (1) withholding of payments to the Contractor under the Contract until the Contractor complies; and/or
- (2) cancellation, termination or suspension of the Contract, in whole or in part.

(f) Incorporation of Provisions. The Contractor shall include the provisions of paragraph (1) through (f) above in every Subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The Contractor shall take such action with respect to any Subcontract or procurement as the Authority or FTA may direct as a means of enforcing such revisions including sanctions for non-compliance: provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a Subcontractor or supplier as a result of such direction, the Contractor may request the Authority, and, in addition, the United States to enter into such litigation to protect the interests of the Authority and the United States.

## **5. CLEAN AIR AND WATER ACT**

(a) Definitions:

(1) "Air Act," as used in this clause, means the Clean Air Act (42 U.S.C. § 7401 et seq.).

(2) "Clean air standards," as used in this clause means:

(i) any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, work practices, or other requirements contained in, issued under, or otherwise adopted under the Air Act or Executive Order 11738.

(ii) an applicable implementation plan as described in Section 110(d) of the Air Act [42 U.S.C. § 7410(d)]; or

(iii) an approved implementation procedure under Section 112(d) of the Air Act [42 U.S.C. § 7412(d)].

(3) "Clean water standards," as used in this clause, means any enforceable limitation, control, condition, prohibition, standard, or other requirement promulgated under the Water Act or contained in a permit issued to a discharger by the Environmental Protection Agency or by a State under an approved program, as authorized by Section 402 of the Water Act (33 U.S.C. § 1342), or by local government to ensure compliance with pre-treatment regulations as required by Section 307 of the Water Act (33 U.S.C. § 1317).

(4) "Compliance," as used in this clause, means compliance with:

(i) clean air or water standards; or

(ii) a schedule or plan ordered or approved by a court of competent jurisdiction, the Environmental Protection Agency, or an air or water pollution control agency under the requirements of the Air Act or Water Act and related regulations.

(5) "Facility," as used in this clause, means any building, plant, installation, structure, mine, vessel or other floating craft, location, or site of operations, owned, leased, or supervised, by a Contractor or Subcontractor, sued in the performance of a contract or subcontract. When a location or site of operations includes more than one building, plant, installation, or structure, the entire location or site shall be deemed a facility except when the Administrator, or a designee of the Environmental Protection Agency, determines that independent facilities are co-located in one geographical area.

(6) "Water Act," as used in this clause, means Clean Water Act (33 U.S.C. § 1251 et seq.).

(b) The Contractor agrees:

(1) to comply with all the requirements of Section 114 of the Clean Air Act (42 U.S.C. § 7414) and Section 308 of the Clean Water Act (33 U.S.C. § 1318) relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in Section 114 and Section 308 of the Air Act and the Water Act, and all regulations and guidelines issued to implement those acts before the award of this Contract.

(2) that no portion of the work required by the prime Contract will be performed in a facility listed on the Environmental Protection Agency List of Violating Facilities on the date when this Contract was awarded unless and until the EPA eliminates the name of the facility from the listing;

(3) to use best efforts to comply with clean air standards and clean water standards at the facility in which the Contract is being performed; and

(4) to insert the substance of this clause into any nonexempt Subcontract, including this paragraph (b)(4).

## **6. ENERGY POLICY AND CONSERVATION ACT**

The Contractor shall recognize mandatory standards and policies relating to energy efficiency contained in the State Energy Conservation Plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. § 6321 et seq.).

## **7. OFFICIALS NOT TO BENEFIT**

No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this Contract or to any benefit arising from it. However, this clause does not apply to this Contract to the extent that this Contract is made with a corporation for the corporation's general benefit.

## **8. BUY AMERICA PROVISION**

This Contract is subject to the Buy America provisions of the Surface Transportation Assistance Act of 1982, as amended, and the Federal Transit Administration's implementing regulations found at 49 C.F.R. Part 661. The provisions of that Act and its implementing regulations are hereby incorporated by reference into this Contract.

## **9. CARGO PREFERENCE - USE OF UNITED STATES FLAG VESSELS**

This clause only applies to contracts in which materials, equipment, or commodities may be transported by ocean vessel in carrying out the terms of the contract. As required by 46 C.F.R. Part 381, the Contractor agrees:

(a) to utilize privately owned United States flag commercial vessels to ship at least fifty percent (50%) of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners and tankers) involved, whenever shipping any equipment, materials, or commodities pursuant to this section, to the extent such vessels are available at fair and reasonable rates of United States flag commercial vessels; and

(b) to furnish within thirty (30) days following the date of loading for shipments originating with the United States, or within thirty (30) working days following the date of loading for shipments originating outside of the United States, a legible copy of a rated, "on-board" commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (a) above to the Authority, (through the prime Contractor in the case of a Subcontractor's bills-of-lading) and to Inter-Agency Liaison, Division of National Cargo, Office of Market Development, Maritime Administration, 400 7th Street, S.W., Washington, D.C. 20590, marked with appropriate identification of the project; and

(c) to insert the substance of the provisions of this clause in all Subcontracts issued pursuant to this Contract.

## **10. FLY AMERICA**

The Contractor agrees that international air transportation of any persons involved in or property acquired for the Contract must be provided by U.S. flag air carriers to the extent service by these carriers is available, as required by



the International Air Transportation Fair Competitive Practices Act of 1974, as amended, 49 U.S.C. 40118, in accordance with U.S. GAO regulations, "Uniform Standards and Procedures for Transportation Transactions," 4 C.F.R. Part 52, and U.S. GAO Guidelines for Implementation of the "Fly America Act" B-138942, 1981 U.S. Comp. Gen. LEXIS 2166. March 31, 1981.

#### **11. AUDIT AND INSPECTION OF RECORDS**

(a) This clause is applicable if this Contract was entered into by means of negotiation and shall become operative with respect to any modification to this Contract whether this Contract was initially entered into by means of negotiation or by means of formal advertising.

(b) The Contractor shall maintain records, and the Authority, the U.S. Department of Transportation, and the Comptroller General of the United States or any of their duly authorized representatives shall, until the expiration of three (3) years after final payment under this Contract, have access to and the right to examine any directly pertinent books, documents, papers, and records of such Contractor, involving transactions related to the Contract, for the purpose of making audit, examination, excerpts and transcriptions.

(c) The Contractor further agrees to include in all Subcontracts hereunder a provision to the effect that the Subcontractor agrees that the Authority, the U.S. Department of Transportation, and the Comptroller General of the United States or any of their duly authorized representatives shall, until the expiration of three (3) years after final payment under this Contract, have access to and the right to examine any directly pertinent books, documents, papers and records of such Subcontractor, involving transactions related to the Subcontract, for the purpose of making audit, examination, excerpts and transactions.

#### **12. RESTRICTIONS ON LOBBYING**

(a) The Contractor shall timely comply with the requirements of the lobbying restrictions set forth in Section 319 of Public Law 101-121, as implemented by the Department of Transportation in 49 C.F.R. Part 20, and as those authorities may be hereafter amended.

(b) If a Standard Form LLL, "Disclosure Form to Report Lobbying," is required to be completed by the Contractor or Subcontractor at any tier, such disclosure form shall be furnished to the Authority.

#### **13. ACCESS REQUIREMENTS TO INDIVIDUALS WITH DISABILITIES**

The Contractor shall comply with all applicable requirements of the Americans with Disabilities Act of 1990 (ADA), 42 U.S.C. 12101 et seq. and 49 U.S.C. § 322; Section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. § 794; Section 16 of the Federal Transit Act, as amended, 49 U.S.C. app. 1612; and the following regulations and any amendments thereto:

(a) U.S. DOT regulations, "Transportation Services for Individuals with Disabilities (ADA)," 49 C.F.R. Part 37;

(b) U.S. DOT regulations, "Nondiscrimination on the Basis of Handicap in Programs and Activities Receiving or Benefiting from Federal Financial Assistance," 49 C.F.R. Part 27;

(c) U.S. DOT regulations, "Americans With Disabilities (ADA) Accessibility Specifications for Transportation Vehicles," 49 C.F.R. Part 39;

(d) Department of Justice (DOJ) regulations, "Nondiscrimination on the Basis of Disability in State and Local Government Services," 28 C.F.R. Part 36;

(e) DOJ Regulations, "Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities," 28 C.F.R. Part 36;

(f) General Services Administration regulations, "Construction and Alteration of Public Buildings," "Accommodations for the Physically Handicapped," 41 C.F.R. Parts 101-10;

- (g) Equal Employment Opportunity Commission (EEOC) "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630;
- (h) Federal Communications Commission regulations, "Telecommunications Relay Services and Related Customer Premises Equipment for the Hearing and Speech Disabled," 47 C.F.R. Part 64, Subpart F; and
- (i) FTA regulations, "Transportation for Elderly and Handicapped Persons", 49 C.F.R. Part 609.

#### **14. CHARTER SERVICE OPERATIONS**

If this is an operational service contract:

- (a) The Contractor agrees to comply with 49 U.S.C. § 5323(d) and 49 C.F.R. Part 604. The Contractor is prohibited from providing charter service using federally funded equipment or facilities if there is at least one (1) private charter operator willing and able to provide the service, except under one of the exceptions at 49 C.F.R. § 604.9. Any charter service provided under one of the exceptions must be "incidental," i.e., it must not interfere with or detract from the provision of mass transportation; and

##### School Bus Operators

- (b) Pursuant to 49 U.S.C. § 5323(f) and 49 C.F.R. Part 605, the Contractor may not engage in school bus operations exclusively for the transportation of students and school personnel in competition with private school bus operators unless qualified under specified exemptions. When operating exclusive school bus service under an allowable exemption, the Contractor may not use federally funded equipment, vehicles, or facilities.

#### **15. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS**

- (a) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. §§ 3801 et seq. and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to this Contract. The Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the Contract or the FTA assisted project for which this Contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

- (b) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

- (c) The Contractor agrees to include the above two clauses in each Subcontract associated with this Contract. It is further agreed that the clauses shall not be modified, except to identify the Subcontractor who will be subject to the provisions.

#### **16. PRIVACY ACT**

- (a) The Contractor agrees to comply with, and assures the compliance of its employees with, the information restriction and other applicable requirements of the Privacy Act of 1974, 5 U.S.C. § 552a. Among other things, the Contractor agrees to obtain the express consent of the Federal Government before the Contractor or its employees operate a system of records on behalf of the Federal Government. The Contractor understands that the requirements of the Privacy Act, including the civil and criminal penalties for violation of that Act, apply to those individuals involved, and that failure to comply with the terms of the Privacy Act may result in termination of the Contract.

(b) The Contractor agrees to include the above clause in each Subcontract associated with this Contract. It is further agreed that the clauses shall not be modified, except to identify the Subcontractor who will be subject to the provisions.

**17. NO OBLIGATION BY THE FEDERAL GOVERNMENT**

(a) Notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the Contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this Contract and shall not be subject to any obligations or liabilities to the Contractor, or any other party (whether or not a party to that Contract) pertaining to any matter resulting from the underlying Contract.

The Contractor agrees to include the above clause in each Subcontract associated with this Contract. The clause shall not be modified, except to identify the Subcontractor who will be subject to its provisions.

**18. NOTICE OF FEDERAL REQUIREMENTS**

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

(b) The Contractor is advised that Federal requirements applicable to this Contract as set forth in federal law, regulations, policies, and related administrative practices may change during the performance of this Contract. Any such changes shall also apply to this Contract.

**19. INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION (FTA) TERMS – FTA CIRCULAR 4220.1F**

The preceding provisions include, in part, certain Standard Terms and Conditions required by the Department of Transportation (DOT), whether or not expressly set forth in the preceding Contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1F, dated November 1, 2008, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Contract. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any Capital Metropolitan Transportation Authority (Capital Metro) requests, which would cause Capital Metro to be in violation of the FTA terms and conditions.

**20. SEISMIC SAFETY REGULATIONS**

The Contractor agrees that any new building or addition to an existing building will be designed and constructed in accordance with the standards for Seismic Safety required in Department of Transportation Seismic Safety Regulations 49 C.F.R. Part 41 and will certify to compliance to the extent required by the regulation. The Contractor also agrees to ensure that all work performed under this Contract including work performed by a Subcontractor is in compliance with the standards required by the Seismic Safety Regulations and the certification of compliance issued on the project.

**21. DRUG-FREE WORKPLACE PROGRAM**

(a) As used in this clause:

(1) "Alcohol" means ethyl alcohol and any beverage containing ethyl alcohol.

(2) "Controlled substance(s)" means a substance, including a drug and an immediate precursor listed in Schedules I through V of Subchapter A of the Texas Controlled Substances Act, Tex. Rev. Civ. Stat. Ann. Articles 481.032 - 481.036. These substances include, but are not limited to, marijuana, heroin, LSD, concentrated cannabis or cannabinoids, hashish or hash oil, morphine or its derivatives, mescaline, peyote, phencyclidine (PCP, Angel Dust), opium, opiates, methadone, cocaine, Quaaludes, amphetamines, "exotic/designer" drugs, benzodiazepines, Seconal, codeine, barbiturates, Phenobarbital, or Valium.

(3) "Safety sensitive task" means each category of work performed at a construction workplace which, if performed by a person impaired by the effects of alcohol or a controlled substance:

- (i) would pose a serious risk of death or personal injury to the employee or others in the vicinity; or
- (ii) could compromise the quality of the construction in such manner as would impose a significant public safety risk in the operation of the Authority's public transportation system.

(4) "Drug-free workplace" means a site for the performance of work done in connection with the Authority's construction contract at which employees are prohibited from using alcohol or from engaging in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance.

(5) "Employee" means an employee of a Contractor or Subcontractor who may be directly engaged in the performance of work under the Authority's construction contract.

(6) "Reasonable suspicion" means the presence or absence of specific criteria identified in the Contractor's drug-free workplace program (indicating the possibility that a person is under the influence of alcohol or a controlled substance) as observed by the Contractor's supervisory personnel with reasonable training in the identification of such criteria.

(b) The program shall provide for mandatory drug testing of employees who are to perform safety sensitive tasks under the following circumstances:

(1) All employees will be tested prior to assignment to the Authority's construction project to ascertain the use of controlled substances if the employee will be performing safety sensitive tasks; and

(2) When there is a reasonable suspicion that an employee is under the influence of alcohol or a controlled substance at the workplace; and

(3) When an employee has been involved in an accident or unsafe practice (as defined in the Contractor's safety program) at the workplace.

(c) The program may, at the Contractor's discretion, include mandatory employee drug testing under the following circumstances:

(1) As part of or as a follow-up to counseling or rehabilitation for controlled substance use; or

(2) As part of a voluntary employee drug testing program.

(d) A random testing procedure to detect the use of alcohol or a controlled substance by employees performing safety sensitive tasks is required as part of the Contractor's program for the purpose of preventing or deterring hazardous performance. The procedure shall require that, at a minimum, five percent (5%) of the Contractor's employees will be randomly tested within the Contract period or within each year of the Contract period, whichever period is shorter.

(e) All testing by or on behalf of the Contractor because of a requirement in the Authority's Contract shall be conducted only for employees engaged (or to be engaged) in safety sensitive tasks and only for use of alcohol or a controlled substance and shall be conducted in a manner and under written policies that minimize the intrusion on the employee's privacy and personal dignity. This provision shall not preclude the Contractor from adding its own additional testing requirements.

(f) The Contractor shall publish a statement notifying employees that the use of alcohol at the workplace or the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance by employees at any time is prohibited and specifying the actions that will be taken against employees for violations of such prohibition.

(g) The program must require each employee who will perform a safety sensitive task, prior to working under the Authority's Contract to:

(1) Acknowledge in writing the Contractor's drug-free workplace program; and

(2) Give advance written consent to any drug testing that may be conducted under the Contractor's program and the use of test results for decisions related to employment, disciplinary action, or continued employment. The Contractor will agree, in connection with the employee's consent that the results of testing for alcohol and controlled substances will not be voluntarily referred to any law enforcement agency. If the Contractor is subject to a collective bargaining agreement:

- (i) the procedure for obtaining the individual employee's acknowledgment and consent must be consistent with the Contractor's obligations under the collective bargaining agreement; and
- (ii) employees shall have the right to be accompanied by a union representative when any specimen is obtained for testing.
- (h) The Contractor will establish a drug-free awareness program to inform its employees about:
  - (1) The dangers of drug abuse in the workplace;
  - (2) The Contractor's policy of maintaining a drug-free workplace;
  - (3) Any available drug counseling, rehabilitation, and employee assistance programs; and
  - (4) The penalties that may be imposed upon employees who refuse to submit to required testing and for other violations of the drug-free workplace program including, but not limited to, being unable to remain employed at the workplace until approval to return is obtained from the Authority.
- (i) The Contractor's drug-free workplace program shall, at a minimum, include:
  - (1) Policies and procedures for specimen collection, chain of custody for specimens, laboratory qualification standards, laboratory analysis procedures, quality control requirements, and test result reporting procedures which substantially conform to the material requirements of the Mandatory Guidelines for Federal Workplace Drug Testing Programs promulgated by the U.S. Department of Health and Human Services in effect on the date of award of the Authority's construction contract.
  - (2) Procedures for the Contractor's employees to report their use of prescription drugs used in the course of medical treatment or which have been prescribed and authorized for use by a licensed medical practitioner.
  - (3) The criteria the Contractor will use for "reasonable suspicion" testing.
  - (4) The levels of alcohol or controlled substances which will be used in conjunction with a determination that an employee is "under the influence" or is "impaired by the effects of" alcohol or controlled substance(s).
- (j) The Contractor shall display a notice, prominently placed near each entrance to the workplace, stating that, by entering the premises, persons are consenting to an inspection of themselves and their property including, but not limited to, their clothing, vehicles, briefcases, lunch boxes, tool boxes, purses, and packages.
- (k) The Contractor agrees to use its best efforts to establish and maintain a work environment free of use by employees of alcohol or controlled substances through implementation of paragraph (b) through (j) of this clause. The Contractor shall prepare and maintain records in sufficient detail to demonstrate compliance with the requirements of this clause including, but not limited to, certifications from Subcontractors and records of drug or alcohol tests conducted during performance of the Contract. Such records shall be subject to inspection and audit by the Authority, and the Contractor's noncompliance may authorize the Authority to withhold all or any portion of any payments due the Contractor until the Contractor demonstrates compliance.
- (l) A Drug-Free Workplace Program clause identical to this clause (except for changes appropriate for designation of the parties), including this subparagraph (l) will be included in every Subcontract entered into in connection with this Contract.

## **22. RECYCLED PRODUCTS; 42 U.S.C. § 6962, 40 C.F.R. Part 247, Executive Order 12873**

### **(a) Applicability to Contracts**

The Recycled Products requirements apply to all contracts for items designated by the EPA, when the purchaser or Contractor procures \$10,000 or more of one of these items during the fiscal year, or has procured \$10,000 or more of such items in the previous fiscal year, using Federal funds. New requirements for "recovered materials" will become effective May 1, 1996. These new regulations apply to all procurement actions involving items designated by the EPA, where the procuring agency purchases \$10,000 or more of one of these items in a fiscal year, or when the cost of such items purchased during the previous fiscal year was \$10,000.

(b) Flow Down

These requirements flow down to all contractor and Subcontractor tiers.

(c) Recovered Materials

The Contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 C.F.R. Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 C.F.R. Part 247.

**23. TRANSIT EMPLOYEE PROTECTIVE AGREEMENTS; 49 U.S.C. § 5310, § 5311, and § 5333, 29 C.F.R. Part 215**

(a) Applicability to Contracts

The Transit Employee Protective Provisions apply to each contract for transit operations performed by employees of a Contractor recognized by FTA to be a transit operator. (Because transit operations involve many activities apart from directly driving or operating transit vehicles, FTA determines which activities constitute transit "operations" for purposes of this clause.)

(b) Flow Down

These provisions are applicable to all contracts and Subcontracts at every tier.

(c) Transit Employee Protective Provisions

(1) The Contractor agrees to comply with applicable transit employee protective requirements as follows:

(i) General Transit Employee Protective Requirements - To the extent that FTA determines that transit operations are involved, the Contractor agrees to carry out the transit operations work on the underlying Contract in compliance with terms and conditions determined by the U.S. Secretary of Labor to be fair and equitable to protect the interests of employees employed under this Contract and to meet the employee protective requirements of 49 U.S.C. A 5333(b), and U.S. DOL guidelines at 29 C.F.R. Part 215, and any amendments thereto. These terms and conditions are identified in the letter of certification from the U.S. DOL to FTA applicable to the FTA Recipient's project from which Federal assistance is provided to support work on the underlying Contract. The Contractor agrees to carry out that work in compliance with the conditions stated in that U.S. DOL letter. The requirements of this subsection (1), however, do not apply to any contract financed with Federal assistance provided by FTA either for projects for elderly individuals and individuals with disabilities authorized by 49 U.S.C. § 5310(a)(2), or for projects for nonurbanized areas authorized by 49 U.S.C. § 5311. Alternate provisions for those projects are set forth in subsections (b) and (c) of this clause.

(ii) Transit Employee Protective Requirements for Projects Authorized by 49 U.S.C. § 5310(a)(2) for Elderly Individuals and Individuals with Disabilities - If the contract involves transit operations financed in whole or in part with Federal assistance authorized by 49 U.S.C. § 5310(a)(2), and if the U.S. Secretary of Transportation has determined or determines in the future that the employee protective requirements of 49 U.S.C. § 5333(b) are necessary or appropriate for the state and the public body subrecipient for which work is performed on the underlying Contract, the Contractor agrees to carry out the Project in compliance with the terms and conditions determined by the U.S. Secretary of Labor to meet the requirements of 49 U.S.C. § 5333(b), U.S. DOL guidelines at 29 C.F.R. Part 215, and any amendments thereto. These terms and conditions are identified in the U.S. DOL's letter of certification to FTA, the date of which is set forth Grant Agreement or Cooperative Agreement with the state. The Contractor agrees to perform transit operations in connection with the underlying Contract in compliance with the conditions stated in that U.S. DOL letter.

(iii) Transit Employee Protective Requirements for Projects Authorized by 49 U.S.C. § 5311 in Nonurbanized Areas - If the contract involves transit operations financed in whole or in part with Federal assistance authorized by 49 U.S.C. § 5311, the Contractor agrees to comply with the terms and conditions of the Special Warranty for the Nonurbanized Area Program agreed to by the U.S. Secretaries of Transportation and Labor, dated May 31, 1979, and the procedures implemented by U.S. DOL or any revision thereto.

(2) The Contractor also agrees to include the any applicable requirements in each Subcontract involving transit operations financed in whole or in part with Federal assistance provided by FTA.

(d) The Authority encourages the Contractor, to adopt and enforce workplace safety policies to decrease crashes caused by distracted drivers, including policies that bar text messaging while driving company-owned or –rented vehicles, or government-owned, leased, or rented vehicles or privately-owned vehicles when on official Authority business or when performing any work for or on behalf of the Authority. See Executive Order 13513 “Federal Leadership on Reducing Text Messaging While Driving”, Oct. 1, 2009 (available at <http://edocket.access.gpo.gov/2009/E9-24203.htm> ) and DOT Order 3902.10 “Text Messaging While Driving”, Dec. 30, 2009, as implemented by Financial Assistance Policy Letter (No. FAP-2010-01, February 2, 2010, available at [https://www.transportation.gov/sites/dot.dev/files/docs/FAPL\\_2010-01.pdf](https://www.transportation.gov/sites/dot.dev/files/docs/FAPL_2010-01.pdf)). This includes, but is not limited to:

(1) Considering new rules and programs or re-evaluating existing programs to prohibit text messaging while driving;

(2) Conducting education, awareness, and other outreach for employees about the safety risks associated with texting while driving; and

(3) Encouraging voluntary compliance with the agency’s text messaging policy while off duty.

(e) The Contractor is encouraged to insert the substance of this clause in all tier Subcontract awards.

#### **24. DISTRACTED DRIVING, INCLUDING TEXT MESSAGING WHILE DRIVING**

(a) The Contractor agrees to comply with:

(1) Executive Order No. 13513, “Federal Leadership on Reducing Text Messaging While Driving,” October 1, 2009, 23 U.S.C. § 402 note, (74 Fed. Reg. 51225);

(2) U.S. DOT Order 3902.10, “Text Messaging While Driving,” December 30, 2009; and:

(i) Adopt and enforce policies that ban text messaging while driving in Contractor-owned or rented vehicles or, if applicable, Authority-owned vehicles; or while driving privately-owned vehicles when performing any Work for or on behalf of the Authority.

(ii) Conduct initiatives in a manner commensurate with the size of the business, such as,

(A) Establishment of new rules and programs or re-evaluation of existing programs to prohibit text messaging while driving; and

(B) Education, awareness, and other outreach to employees about the safety risks associated with texting while driving.

(3) The following U.S. DOT Special Provision pertaining to Distracted Driving:

(i) *Safety.* The Contractor agrees to adopt and enforce workplace safety policies to decrease crashes caused by distracted drivers, including policies to ban text messaging while using an electronic device supplied by an employer, and driving a vehicle the driver owns or rents, a vehicle Contractor owns, leases, or rents, or a privately-owned vehicle when on official business in connection with the Contract, or when performing any work for or on behalf of the Contract;

(ii) *Contractor Size.* The Contractor agrees to conduct workplace safety initiatives in a manner commensurate with its size, such as establishing new rules and programs to prohibit text messaging while driving, re-evaluating the existing programs to prohibit text messaging while driving, and providing education, awareness, and other outreach to employees about the safety risks associated with texting while driving; and

(iii) *Extension of Provision.* The Contractor agrees to include these Special Provisions of this Contract in its sub-contract agreements, and encourage its sub-contractors to comply with this Special Provision.

For purposes of this paragraph, the phrase "text messaging" means reading from or entering data into any handheld or other electronic device, including for the purpose of short message service texting, e-mailing, instant messaging, obtaining navigational information, or engaging in any other form of electronic data retrieval or electronic data communication operating a motor vehicle on an active roadway with the motor running, including while temporarily stationary because of traffic, a traffic light, stop sign, or otherwise; it does not include operating a motor vehicle with or without the motor running when one has pulled over to the side of, or off, an active roadway and has halted in a location where one can safely remain stationary.

## **25. VETERANS EMPLOYMENT**

Capital Metro is a recipient of Federal financial assistance on this Contract. The Contractor shall give a hiring preference, to the extent practicable, to veterans (as defined in Section 2108 of Title 5 C.F.R.) who have the requisite skills and abilities to perform the construction work required under the Contract. This subsection shall not be understood, construed or enforced in any manner that would require an employer to give a preference to any veteran over any equally qualified applicant who is a member of any racial or ethnic minority, female, an individual with a disability, or a former employee.

## **26. SEAT BELT**

Seat Belt Use. The Contractor agrees to implement Executive Order No. 13043, "Increasing Seat Belt Use in the United States," April 16, 1997, 23 U.S.C. § 402 note, (62 Fed. Reg. 19217), by:

- (a) Adopting and promoting on-the-job seat belt use policies and programs for its employees and other personnel that operate company-owned vehicles, company-rented vehicles, or personally operated vehicles; and
- (b) Including a "Seat Belt Use" provision in each of its sub-contractor agreements related to the Contract.



## EXHIBIT E-2

### PROPRIETARY RIGHTS AND DATA SECURITY ADDENDUM

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Capital Metro Transportation Authority (“the Authority”) has invested extensive time, money and specialized resources into developing, collecting and establishing its tangible and intangible proprietary assets. This Proprietary Rights and Data Security Addendum (this “Addendum”) identifies and acknowledges the Authority’s proprietary rights, establishes baseline commitments regarding data security and represents a set of standard terms applicable to service providers and business partners when they enter into contracts with the Authority. Capitalized terms used in this Addendum have the meanings set forth in the Agreement, unless differently defined in this Addendum. The Contractor is responsible for ensuring compliance with the terms of this Addendum by the Contractor’s employees, agents and contractors and all of the restrictions and obligations in this Addendum that apply to the Contractor also apply to the Contractor’s employees, agents and contractors. The term “including” or “includes” means including without limiting the generality of any description to which such term relates.

1. Definitions. The following terms will have the meanings described below in this Addendum.

**“Authority Data”** means all data, content or information, in any form or format, including interim, Processed, compiled, summarized, or derivative versions of such data, content or information, and any insights that may be learned from such data, content or information, that may exist in any system, database, or record that is either (i) provided by or on behalf of the Authority or its customers to the Contractor, or (ii) is obtained, developed, produced or Processed by the Contractor or its systems, in each of (i) and (ii) in connection with the relationship or arrangements established by the Agreement, but excluding any data or information that is expressly defined as owned by the Contractor in the Agreement.

**“Authority Electronic Property”** means (i) any websites controlled by the Authority, (ii) any Authority mobile device apps, (iii) any other kiosks, devices or properties for consumer interaction that are created, owned, or controlled by the Authority, and (iv) versions and successors of the foregoing, any form or format now known or later developed, that may be used by the Authority’s customers.

**“Data Law”** means, as in effect from time to time, any law, rule, regulation, declaration, decree, directive, statute or other enactment, order, mandate or resolution, which is applicable to either the Contractor or the Authority, issued or enacted by any national, state, county, municipal, local, or other government or bureau, court, commission, board, authority, or agency, relating to data security, data protection and/or privacy. Data Laws also include ISO 27001 and ISO 27002, the most current Payment Card Industry Data Security Standard (the **“PCI DSS”**); and other industry standard practices.

**“Personal Identifying Information”** means any data that identifies or could be used to identify a natural person, including name, mailing address, phone number, fax number, email address, Social Security number, credit card or other payment data, date of birth, driver’s license number, account number or user ID, PIN, or password.

**“Process”** or **“Processing”** means, with respect to Authority Data, to collect, access, use, process, modify, copy, analyze, disclose, transmit, transfer, sell, rent, store, or retain or destroy such data in any form. For the avoidance of doubt, “Process” includes the compilation or correlation of Authority Data with information from other sources and the application of algorithmic analysis to create new or derivative data sets from Authority Data.

**“Remediation Efforts”** means, with respect to any Security Incident, activities designed to remedy a Security Incident which may be required by a Data Law or by the Authority’s or the Contractor’s policies or procedures, or which may otherwise be necessary, reasonable or appropriate under the circumstances, commensurate with the nature of such Security Incident. Remediation Efforts may include: (i) development and delivery of legal notices to affected individuals or other third parties; (ii) establishment and operation of toll-free telephone numbers for affected individuals to receive specific information and assistance; (iii)

procurement of credit monitoring, credit or identity repair services and identity theft insurance from third parties that provide such services for affected individuals; (iv) provision of identity theft insurance for affected individuals; (v) cooperation with and response to regulatory, government and/or law enforcement inquiries and other similar actions; (vi) undertaking of investigations (internal or in cooperation with a governmental body) of such Security Incident, including forensics; (vii) public relations and other crisis management services; and (viii) cooperation with and response to litigation with respect to such Security Incident (including, but not limited to, class action suits or similar proceedings); and in each case of examples (i) through (viii), payment of legal costs, disbursements, fines, settlements and damages.

**“Security Policies”** means statements of direction for Security Requirements and mandating compliance with applicable Data Laws. Typically, Security Policies are high level instructions to management on how an organization is to be run with respect to Security Requirements.

**“Security Procedures”** means statements of the step-by-step actions taken to achieve and maintain compliance with Security Requirements.

**“Security Requirements”** means the security requirements set forth below in Section 7 of this Addendum.

**“Security Technical Controls”** means any specific hardware, software or administrative mechanisms necessary to implement, maintain, comply with and enforce the Security Requirements. Security Technical Controls specify technologies, methodologies, implementation procedures, and other detailed factors or other processes to be used to implement and maintain Security Policies and Procedures relevant to specific groups, individuals, or technologies.

2. Authority Marks, Patents and Copyrights. The Contractor will not: (i) use or register any domain name that is identical to or confusingly similar to any of trademarks, service marks, logos or other source identifiers owned or used by the Authority (the “Authority Marks”); or (ii) create, acquire, license, or support any internet keyword or search term that contains any Authority Marks or other intellectual property rights owned or licensed by the Authority.

3. Authority Data. As between the Contractor and the Authority (*i.e.*, without addressing rights of third parties), the Authority is the sole owner of all rights, title and interest in and to Authority Data. Except as expressly authorized in the Agreement, the Contractor may not use, edit, modify, create derivatives, combinations or compilations of, combine, associate, synthesize, re-identify, reverse engineer, reproduce, display, distribute, disclose, sell or Process any Authority Data. The Contractor will not use Authority Data in a manner that is harmful to the Authority.

4. Personal Identifying Information. The Contractor will comply with any Data Laws relating to the use, safeguarding, or Processing of any Personal Identifying Information, including any requirement to give notice to or obtain consent of the individual. In Processing any Personal Identifying Information, the Contractor will at all times comply with any posted privacy policy or other representations made to the person to whom the information is identifiable, and to communicate any limitations required thereby to any authorized receiving party (including any modifications thereto) in compliance with all Data Laws. The Contractor will ensure that any such receiving party abides by any such limitations, in addition to the requirements of the Agreement. Notwithstanding the foregoing, the Contractor represents and warrants that Personal Identifying Information will not be Processed, transmitted, or stored outside of the U.S.

5. No Implied Rights. No right, license, permission, or ownership or other interest of any kind in or to any Authority Data or other intellectual property rights owned or licensed by the Authority is or is intended to be given or transferred to or acquired by the Contractor except as expressly stated in writing in the Agreement.

6. Prohibited Internet Practices. The Contractor will not, and will not authorize or encourage any third party to, directly or indirectly: (i) use any automated, deceptive or fraudulent means to generate impressions, click-throughs, or any other actions in relation to advertisements or Internet promotions on

Authority Electronic Property or in relation to advertisements or Internet promotions of the Authority (or its products or services) on third party websites; or (ii) collect or Process data from an Authority Electronic Property other than as has been expressly authorized by the Authority in the Agreement or another written agreement with the Authority. Except as expressly allowed in the Agreement, the Contractor will not "screen-scrape" Authority Electronic Property or conduct any automated extraction of data from Authority Electronic Property or tracking of activity on Authority Electronic Property.

7. Security Requirements. The Contractor will apply reasonable physical, technical and administrative safeguards for Authority Data that is in the Contractor's possession or control in order to protect the same from unauthorized Processing, destruction, modification, or use that would violate the Agreement or any Data Law. The Contractor represents and warrants that the Security Policies, Security Procedures and Security Technical Controls as they pertain to the services being rendered to the Authority by the Contractor or its subcontractors and any Processing of Authority Data by the Contractor or its subcontractors will at all times be in material compliance with all Data Laws. In addition, the Contractor will require any of its employees, agents or contractors with access to Authority Data to adhere to any applicable Data Laws, and the Contractor represents and warrants that such employees, agents and contractors have not been involved in any violation of applicable Data Laws in the twenty-four months before the Effective Date. The Contractor will take into account the sensitivity of any Authority Data in the Contractor's possession in determining reasonable controls used to safeguard such Authority Data.

8. Data Segregation and Access. The Contractor will physically or logically segregate stored Authority Data from other data and will ensure that access to Authority Data is restricted to only authorized personnel through security measures. The Contractor will establish and maintain appropriate internal policies, procedures and systems that are reasonably designed to prevent the inappropriate use or disclosure of Authority Data.

9. PCI Compliance. If the Contractor Processes payment card data, cardholder data, or sensitive authentication data on behalf of the Authority or if the Contractor otherwise can impact the security of said data belonging to the Authority, the Contractor is responsible for the security of said data. The Contractor represents and warrants that it has performed an assessment to confirm that the material aspects of the Contractor's Security Policies, Security Procedures and Security Technical Controls (as they pertain to the services being rendered to the Authority by the Contractor or its subcontractors and any Processing of Authority Data by the Contractor or its subcontractors) comply with the PCI DSS and the Contractor will repeat this assessment each year during the Term. The Contractor will provide certification of compliance with this requirement upon request from the Authority.

10. Security Reviews and Audits. The Contractor will, upon request, provide the Authority with reports of any audits performed on the Contractor's Security Policies, Security Procedures or Security Technical Controls. At a minimum, such reports will include any certifications of the Contractor's agents and contractors. Additionally, the Contractor will respond within a reasonable time period to any inquiries from the Authority relating to the Contractor's and its agents' and contractors' Security Policies, Security Procedures and Security Technical Controls. The Contractor will, upon the Authority's request, provide the Authority or its representatives access to the Contractor's and its agents' and contractors' systems, records, processes and practices that involve Processing of Authority Data so that an audit may be conducted. the Authority will not exercise such audit right more frequently than once per twelve (12) month period and the Authority will bear the full cost and expense of any such audit, unless such audit discloses a Security Incident or a breach of this Addendum or the Agreement, in which case the Contractor will bear the full cost and expense of such audit and a further audit may be conducted by the Authority or its representatives within the current twelve (12) month period.

11. Security Incidents. The Contractor will promptly notify the Authority upon discovering or otherwise learning of a Security Incident. Following any Security Incident, the Contractor will consult in good faith with the Authority regarding Remediation Efforts that may be necessary and reasonable. The Contractor will (i) at the Authority's direction undertake Remediation Efforts at the Contractor's sole expense and reimburse the Authority for its reasonable costs and expenses in connection with any Remediation Efforts

it elects to undertake, (ii) ensure that such Remediation Efforts provide for, without limitation, prevention of the recurrence of the same type of Security Incident, and (iii) reasonably cooperate with any Remediation Efforts undertaken by the Authority.

12. Liability for Security Incidents and/or Data Misuse. The Contractor will indemnify, defend and hold harmless the Authority and its officers, directors, employees, agents and contractors (each an "Authority Indemnitee") from and against any Losses incurred by such Authority Indemnitee as a result of any claim, demand, suit, action, investigation, allegation or any other proceeding (collectively, "**Claims**") arising out of or relating to: (i) any Security Incident and/or (ii) the Contractor's or its employees', agents' or contractors' breach of any of the terms, conditions or obligations relating to data security, privacy, or Authority Data set forth in the Agreement or this Addendum. However, if the Contractor can demonstrate through clear and convincing evidence that the Authority was the sole cause of a Security Incident and the Contractor was fully compliant with its obligations, then this Section will not apply to such Security Incident. For the purposes of this Section, Losses will include, without limitation, the cost of Remediation Efforts. The Contractor's obligations in this Section are in addition to any indemnification or similar obligations that the Contractor may have under the Agreement. The rights and remedies of the Authority under this Addendum will not be subject to any limitation or exclusion of actions or remedies or any other similar limiting provisions stated in the Agreement. Without limiting the foregoing: (a) there will be no limitations or exclusions on the Contractor's liability arising under this Addendum, the Agreement or otherwise relating to Claims pertaining to privacy, security, or confidentiality or relating to unauthorized use of Authority Data, and (b) the Contractor will be liable for all obligations under this Section and for reimbursement of Losses for Remediation Efforts regardless of whether such amounts are characterized by any person, court or other third party as direct, indirect, consequential, special, or punitive damages.

13. Notice to the Authority Customers and Employees. Any notifications to any of the Authority's customers or employees regarding Security Incidents will be handled exclusively by the Authority and the Contractor may not under any circumstances contact the Authority's customers or employees relating to such Security Incident unless the Contractor is under a legal obligation to do so, in which event (i) the Contractor must notify the Authority in writing promptly after concluding that the Contractor has the legal obligation to notify such customers or employees and explain in such notice to the Authority the basis for the legal obligation and (ii) the Contractor will limit the notices to any of the Authority's customers and employees to those required by the legal obligation or as pre-approved by the Authority. The Contractor will reasonably cooperate in connection with notices to the Authority's customers and employees regarding a Security Incident and the Contractor will assist with sending such notices if so requested by the Authority.

14. Equitable Relief. The Contractor acknowledges that the Authority may have no adequate remedy at law if there is a breach or threatened breach of any of the obligations set forth in this Addendum and, accordingly, that the Authority may, in addition to any legal or other remedies available to the Authority, seek injunctive or other equitable relief to prevent or remedy such breach without requirement of a bond or notice. The Contractor will not object or defend against such action on the basis that monetary damages would provide an adequate remedy.

**EXHIBIT E-3**  
**IT TERMS AND CONDITIONS - SERVICES**  
**(ADDITIONAL TERMS AND CONDITIONS FOR THE PERFORMANCE OF INFORMATION**  
**TECHNOLOGY (IT) SERVICES)**

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1.1 Definitions. Unless otherwise specified in this Contract (or an Exhibit hereto), the following definitions shall apply, if applicable:

- 1.1.1 “Acceptance” shall have the meaning set forth in Section 1.4 of this Exhibit.
- 1.1.2 “Applicable Laws” means any and all applicable statutes, laws, treaties, rules, codes, ordinances, regulations, permits, interpretations, or orders of any Federal, state, or local governmental authority having jurisdiction over the Project, this Contract, and the parties all as in effect as of the date of this Contract and as amended during the Service Term of this Contract.
- 1.1.3 “Authority Data” means all data, content and information (i) submitted by or on behalf of the Authority or Customers to the Contractor, (ii) obtained, developed, produced or processed by the Contractor in connection with this Contract, or (iii) to which the Contractor has access in connection with this Contract, and all derivative versions of such data, content and information, and any derivative versions thereof, in any form or format.
- 1.1.4 “Authority Electronic Property” means (i) any websites, servers, hardware, equipment, routers and other system components, software or networks owned or controlled by the Authority, (ii) any Authority mobile device apps, (iii) any interfaces to the Authority’s information technology systems, (iv) any other kiosks, devices or properties for consumer interaction that are created, owned, or controlled by the Authority, and (v) versions and successors of the foregoing, any form or format now known or later developed, that may be used by Customers.
- 1.1.5 “Confidential Information” shall have the meaning set forth in Section 2.2 of this Exhibit.
- 1.1.6 “Contractor’s Certification” shall have the meaning set forth in Section 1.4.3 of this Exhibit.
- 1.1.7 “Contractor Technology” means all software and hardware as applicable, and any technology, information, content and data, together with Intellectual Property Rights related thereto, owned or used by the Contractor in the performance of the Services.
- 1.1.8 “Deliverable(s)” means all information, data, materials, devices (including equipment and hardware), software, systems, integrations with any software and hardware, interfaces to any software and hardware, system or operating environment (including Authority Electronic Property) and other items to be delivered by the Contractor to the Authority as part of the Services, as specified in the Project Plan.
- 1.1.9 “Documentation” means the documentation provided to the Authority including, but not limited to, user manuals, system administration manuals, maintenance manuals, diagrams and operator instructions related to the Services furnished by the Contractor to the Authority in any format, including paper and electronic.
- 1.1.10 “Intellectual Property Rights” means any and all intellectual property rights, including without limitation, invention, patents, patent and patent applications (including all reissues, divisions, renewals, continuations, continuations-in-part, extensions, provisionals, and reexaminations) and all rights therein provided by international treaties or conventions and all improvements to the inventions disclosed in each such registration, patent or application, trademarks, service marks, trade dress, logos, slogans, configurations, trade names, corporate names, and business names, whether or not registered, including all common law rights, and registrations and applications for registration thereof, and all rights therein provided by international treaties or conventions, works of authorship and

copyrights (registered or otherwise) and registrations and applications for registration thereof, and all rights therein provided by international treaties or conventions, all internet uniform resource locators, and domain names, including any domain name application or registration, all industrial designs and any registration or application thereof anywhere in the world, data and database rights, trade secrets, proprietary know-how and show-how, whether or not reduced, all rights to obtain and rights to apply for patents, and to register trademarks and copyrights, and any similar or equivalent rights to any of the foregoing anywhere in the world.

- 1.1.11 “Malware” means any malicious data, code, script, active content, program, or other malicious software that could damage, destroy, alter or disrupt any computer program, data, firmware or hardware.
- 1.1.12 “Project” means the project from pre-production launch to pre-final notice related to any Deliverables and Services as described in more detail in this Exhibit.
- 1.1.13 “Project Plan” means the project plan for the delivery, implementation, customization, configuration and/or installation of any software, hardware and any Deliverables and Services required for the Project, as provided or approved by the Authority.
- 1.1.14 “Remediation Efforts” means, with respect to any Security Incident, activities designed to remedy a Security Incident, which may be required by Applicable Law or by the Authority’s or the Contractor’s policies or procedures or under the Security Requirements, or which may otherwise be necessary, reasonable or appropriate under the circumstances, commensurate with the nature of such Security Incident.
- 1.1.15 “Security Incident(s)” means: (i) the loss or misuse of Authority Data; (ii) the inadvertent, unauthorized, or unlawful processing, alteration, corruption, sale, rental, or destruction of Authority Data; (iii) unauthorized access to internal resources; (iv) programmatic manipulation of a system or network to attack a third party; (v) elevation of system privileges without authorization; (vi) unauthorized use of system resources; (vii) denial of service to a system or network; or (viii) any potential or confirmed exposure (which may stem from an act or omission to act) that would result in any of the events described in (i) through (viii).
- 1.1.16 “Security Requirements” means industry best practices and other reasonable physical, technical and administrative safeguards, procedures, protocols, requirements and obligations related to facility and network security in order to protect Authority Data from unauthorized access, processing, destruction, modification, distribution and use, as approved in writing by the Authority.
- 1.1.17 “Service Term” means the term of the contract as set forth in Exhibit A to the Contract.
- 1.1.18 “Services” means collectively all services to be performed by the Contractor for or on behalf of the Authority, as described in the Project Plan and this Exhibit.
- 1.1.19 “Technical Specifications” means the technical specifications, functional specifications, descriptions, designs, standards, instructions, and business requirements of the Authority related to the S, as may be further described in this Contract. Unless otherwise agreed upon in writing by the Authority, the Technical Specifications shall be outlined in detail in Exhibit H to this Contract.
- 1.1.20 “Updates” means all bug fixes, error corrections, patches, updates, upgrades or new releases or version of any software created or acquired by the Contractor and used in provision of the Services during the Service Term.

## 1.2 Contractor Requirements.

- 1.2.1 Unless specified in the applicable Project Plan, the Contractor will shall furnish, at its own expense, all resources, personnel, equipment, tools, and supplies necessary for the timely performance of the Services and the Deliverables. The Contractor may use any means necessary and appropriate to perform the Services and the Deliverables under this

Contract; provided, however, that in no event shall the Contractor take any action that may subject either it or the Authority to civil or criminal liability.

- 1.2.2 The parties agree that the Contractor will not be tasked or responsible for establishing and managing Security Requirements necessary to protect Authority Data integrity in performance of the Services. The Authority agrees that it will be solely responsible for and ensure that all desired Security Requirements necessary to protect Authority Data integrity are established, implemented and managed internally. If requested, however, by the Authority, the Contractor will reasonably cooperate with and assist the Authority and the Authority's other Product contractors to implement security protocols (e.g., firewalls, SSI, McAfee anti-virus, configuring the system for Cisco ICE, configuring the system for the NetScaler application firewall, monthly Microsoft security patches, etc.) and take appropriate actions with respect to any software, hardware and all Authority Data and Authority Electronic Property disclosed or provided to the Contractor so as to enable the Contractor to satisfy its obligations under this Contract and to help prevent the loss, alteration or unauthorized use of the Authority Data and the Authority Electronic Property, to the extent within the Contractor's access, possession or control. The Contractor agrees that it will, and it will cause its personnel and contractors to timely comply with the Authority's privacy policies and safety and network security policies, as the same may be provided to the Contractor's, at all times while on-site at the Authority's facilities or remotely accessing the Authority's systems or facilities. In event that the Contractor utilizes computers, laptops or other devices comprising development software, applications or tools in its performance of the Services, Contractor is required to consult in advance of use thereof with Authority and review security measures installed on such computers or devices and sign-off that it will ensure its computers and devices are consistently maintained during the term of this Agreement per Authority with all patches and upgrades at all times to minimize potential induced security issues from such Contractor devices.
- 1.2.3 The Contractor will perform formal classroom training and provide necessary related documentation, equipment, tools, training aids and other materials, required or requested for the operation and use of the Deliverables and any software and/or hardware, upon initial deployment and during the Service Term, as reasonably requested by the Authority. Such training will be performed on the operating environment at the Authority's facilities (unless otherwise agreed upon by the parties in the Project Plan).
- 1.2.4 The Contractor and/or its designated third party auditor(s) will perform all audits necessary to ensure data integrity and adherence to the requirements of the Project. As part of its routine audits, the Contractor will, on a regular basis, test the integrity of Authority Data backed up by the Authority's or its Project contractors.
- 1.2.5 The Contractor will use commercially reasonable efforts to reasonably assist the Authority, if requested, to adopt and implement all facility and network security, disaster recovery plans and back-up plans as to protect against theft and unauthorized access, disclosure and use of the Authority Data, the Authority Electronic Property and the Authority's Confidential Information, to the extent within the Contractor's access, possession or control, and to ensure the integrity and continuity of the performance of Services and the Project under this Contract and consult and cooperate with the Authority and any contractors it designates, in its performance of these obligations.
- 1.2.6 The Contractor, as well as its agents, representatives, and employees, shall comply with all of the Authority rules, regulations, and guidelines then in effect when on-site at the Authority and all Applicable Laws.
- 1.2.7 The Contractor will promptly notify the Authority upon discovering or otherwise learning of any Security Incident involving Authority Data. Following any Security Incident, the Contractor will consult in good faith with the Authority regarding Remediation Efforts that may be necessary and reasonable.

- 1.2.8 Any notifications to Customers or any employees of the Authority regarding Security Incidents will be handled exclusively by the Authority and the Contractor may not under any circumstances contact Customers or employees of the Authority relating to such Security Incident unless the Contractor is under a legal obligation to do so, in which event (i) the Contractor must notify the Authority in writing promptly after concluding that the Contractor has the legal obligation to notify such Customers or employees and explain in such notice to the Authority the basis for the legal obligation and (ii) the Contractor will limit the notices to such Customers and employees to those required by the legal obligation or as pre-approved by the Authority. The Contractor will reasonably cooperate in connection with notices to Customers and any employees of the Authority regarding a Security Incident and the Contractor will assist with sending such notices if so requested by the Authority.

1.3 Project Plan and Milestone Deadlines.

- 1.3.1 The Contractor shall provide Services necessary to assess and evaluate the Authority's business requirements and information technology systems in order to create, deploy, configure, customize, migrate, deliver and/or implement the Services and any software and/or hardware and, if required by the Authority, any Authority Data to be migrated, interfaced to or used in conjunction with the Deliverables. Unless otherwise provided or specified by the Authority, the Contractor will prepare for the Authority's review and approval a Project Plan setting forth in detail (i) the scope of the Project and the Services required to complete the Project, (ii) the milestones and schedule for completing all tasks and requirements for the Project (including the creation, deployment, configuration, customization, migration, delivery and/or implementation of any software, hardware, systems and any Authority Data), (iii) all Authority Electronic Property required for the Contractor to perform the Services, if any, (iv) all Deliverables, and (v) all acceptance criteria, testing and post-implementation tasks. No Project Plan will be effective until approved in writing by the Authority's designated project manager.
- 1.3.2 This is a fast track Project with completion deadlines that cannot reasonably be extended. For this reason, it is the desire of the Authority to recognize any likely budget overruns as soon as possible, and by this Contract it is employing the Contractor to perform design monitoring, estimating, value analysis and other functions to help the Authority meet the Project budget. At any time that the Contractor develops concerns about the integrity of the budget for the Project, the Contractor shall promptly advise the Authority of the concerns through a variance report, which shall, at a minimum, state: (i) the Contractor's concern; (ii) the apparent cause of the concern, delay, or budgetary issue; (iii) in the event of a concern about a delay, specifically demonstrate the negative impact of the delay to the critical path for the Project Plan; (iv) define any cost impacts to the Project; and (v) provide the Contractor's proposed resolution to the concern. If any estimate submitted to the Authority exceeds previously approved estimates or the Authority's budget, the Contractor shall make appropriate recommendations to the Authority.
- 1.3.3 If, using reasonable project monitoring techniques, the Contractor determines that it is unlikely or fails to meet a completion date or a cost estimate due under the Project Plan for any reason regardless of which party is at fault, in addition to any other rights and remedies that may be available to the Authority, at no additional cost to the Authority and at the Authority's option, the Contractor shall provide all necessary additional personnel at its own cost to accelerate performance as may be required or necessary to complete the activities required under the Project Plan within a re-adjusted time frame agreed to by both parties in a Change Order. The completion date shall be considered met if completed in accordance with the terms of this Contract within ten (10) working days of the originally estimated completion date. The Contractor will provide the Authority with prior written notice for any delays impacting delivery or other Services completion under the Project Plan in the form of a proposed Change Order.
- 1.3.4 The Contractor shall use its best efforts, after obtaining explicit consent from the Authority, to re-sequence the Services to overcome and/or mitigate, to the greatest practicable



extent, the effect of any delays regardless of the cause of such delays. Without limiting the foregoing, the Contractor shall diligently prosecute its Services in order to meet the proposed start date despite a dispute with the Authority relating in any way to this Contract including, without limitation, any and all the Contractor's claims for modifications to the payments due to the Contractor. The Contractor and the Authority shall cooperate to resolve all disputes and to adjust the Project Plan accordingly by Contract modification in a timely manner (not to exceed two (2) weeks from the date of notice).

- 1.3.5 Should the Contractor not progress in its performance of Services at a rate commensurate with the Service Term of this Contract, or fail to meet any scheduled date under the Project Plan, the Authority may, in its sole discretion, direct the Contractor to accelerate the Services by employing additional personnel and equipment or providing overtime to existing personnel as is necessary to complete by the start date. Notwithstanding any dispute, controversy, or question that might arise in the interpretation of any provision of this Contract, the performance of any Services, the delivery of any material, the payment of any monies to the Contractor, or otherwise, the Contractor agrees that it will not directly or indirectly stop or delay any Services or part thereof on its part required to be performed, nor will it stop or delay the delivery of any materials on its part required to be furnished for the Deliverables, pending the determination of such dispute or controversy so long as the Authority pays the Contractor for undisputed amounts in accordance with the Contract.

#### 1.4 Acceptance.

- 1.4.1 Unless otherwise defined or specified in an Exhibit to this Contract, the provisions set forth in this Section 1.4 shall apply to determine the Authority's Acceptance of the Services performed and associated Deliverables.
- 1.4.2 Implementation shall be completed in a timely manner and appropriate tests conducted by the Authority to facilitate Acceptance of each Deliverable as more fully set forth in this Exhibit and the Project Plan; provided, however, that the Authority may upon written request require that the Contractor perform testing with cooperation of the Authority.
- 1.4.3 Unless otherwise specified in the Project Plan, within thirty (30) days after installation and testing are completed, the Contractor shall certify in writing that any software, hardware, integration and implementation related to the Services conforms to the Technical Specifications and is capable of being put into full commercial productive use in accordance with the Technical Specifications and otherwise meets the functional and business requirements set forth in this Contract (the "Contractor's Certification"). The Contractor Certification shall not be issued by the Contractor unless the Contractor has completed all tasks required for the delivery, installation, configuration, deployment (including Authority Data migration) and operational testing of any Deliverables, as applicable, and such items are ready for final testing and launch for production use by the Authority.
- 1.4.4 The Deliverables shall be finally accepted by the Authority when all action items opened from the beginning of the Project through the Warranty Period are closed and each component is fully installed and operational on the Authority's facilities, network, transportation vehicles or operating environment properly configured by the Contractor, and in conformity with the requirements outlined in this Contract ("Acceptance"). The final invoice will not be issued by the Contractor until final Acceptance by the Authority. The Authority reserves the right to modify the Acceptance plan during the implementation process if it is evident that anything related to Acceptance has been missed or are not appropriate for the successful provisioning of any solution.
- 1.4.5 If there is any objection to Acceptance, the Authority will provide the Contractor with a written notice (the "Defect Notice") reasonably identifying any claimed discrepancies between the actual performance and the requirements set forth in this Contract within reasonable time after the issuance of the Contractor's Certification.

- 1.4.6 Upon receiving a Defect Notice from the Authority, the Contractor shall confer with the Authority and jointly review each asserted discrepancy to determine if the claimed discrepancy is valid. The Contractor shall promptly correct the discrepancy and resubmit for Acceptance by the Authority for review and testing on the same basis as initially submitted. If, in the reasonable professional judgment of the Contractor such discrepancy is not valid, the Contractor shall so notify the Authority in writing.
- 1.4.7 In the event that the Authority, upon final review, does not accept the Deliverables or any hardware or software or only makes a partial acceptance thereof, the Authority may elect to: (i) accept delivery of the Deliverables "AS IS" at a negotiated equitable reduction in the price and payment schedule for the Services and any Deliverables; or (ii) terminate the Project and receive a refund of all fees paid in advance to the Contractor, which in such event. The Contractor shall immediately repay all fee advances paid by the Authority under the Project Plan and the Authority may retain all holdbacks.
- 1.5 Additional Representations and Warranties. In addition to all other representations, warranties, and covenants included in this Contract, Contractor represents, warrants, and covenants, for itself, its employees, subcontractors and agents that:
- 1.5.1 it is not contractually prohibited from engaging in the Services or providing the Deliverables, and that it is not a party to any contract or under any obligation which conflicts with the terms of this Contract or which prohibits Contractor from carrying out its responsibilities under this Contract;
- 1.5.2 it is fully able to furnish the Services as contemplated by this Contract;
- 1.5.3 there are no contracts to which it is a party which would prevent its timely and complete performance of the terms and conditions of the Contract, and the Contractor agrees not to enter into any such contract during the pendency of this Contract;
- 1.5.4 it is experienced in the type of engineering necessary for completion of the Project, and it understands the complexity involved in this type of project and the necessity of coordination of its Services Authority project stakeholders within which the Project will be performed;
- 1.5.5 any software provided or utilized in the Services will not contain any Malware;
- 1.5.6 the Services and all Deliverables will comply with all Applicable Laws at all times from the date of Acceptance; and
- 1.5.7 with respect to the Services and all Deliverables there is, and on the date of Acceptance will be, no claim, litigation or proceeding pending or threatened against the Contractor with respect such Services or Deliverables, or any component thereof, alleging infringement or misappropriation of any patent, copyright, trade secret, trademark or any other personal or proprietary right of any third party in any country.
- 1.6 Additional Warranty Remedies. The Authority is entitled to all warranties implied by law or regulation. These warranties shall survive any inspection, testing, acceptance and payment by the Authority for the Services and are in addition to, and shall not be construed as restricting or limiting the warranties of the Contractor, express or implied, that are provided by law or exist by operation of law. For any breach of the warranties contained in this Section, the Authority's remedy, in addition to all remedies available at law or in equity, shall be:
- 1.6.1 For the Services. The satisfactory re-performance of the Services within ten (10) days (or such other reasonable period of time approved by the parties in writing) following the Authority's notice to the Contractor that the Services were not performed satisfactorily in accordance with the Project Plan.
- 1.6.2 For the Deliverables. The correction of errors or otherwise in the Deliverables that cause breach of the warranty. If the Contractor is unable to provide such error corrections or otherwise make the Deliverables operate as warranted within the periods specified in this Contract, the Authority shall be entitled to terminate this Contract with respect to the

affected feature and recover a prorated amount paid to the Contractor based on each feature, which prorated amount will be calculated based on a useful life of five years from the date of final Acceptance. If, however, the loss of functionality cause by such error impacts the overall performance of any Deliverables, then the Authority shall be entitled to terminate this Contract and recover all amounts paid to the Contractor by the Authority.

1.7 Intellectual Property Rights.

1.7.1 As between the Contractor and the Authority (i.e., without addressing rights of third parties), the Authority is the sole owner of all rights, title and interest in and to any Authority Data and Authority Electronic Property and all Deliverables (excluding the Contractor Technology included in or embodied in the Deliverables), together with all improvements, derivative works or enhancements to any of the foregoing and all Intellectual Property Rights related thereto ("Authority IP"). Except as expressly authorized in this Exhibit in the performance of the Services solely for the benefit of the Authority or Customers, the Contractor may not use, edit, modify, create derivatives, combinations or compilations of, combine, associate, synthesize, re-identify, reverse engineer, reproduce, display, distribute, disclose, sell or Process any Authority Data or Authority Electronic Property. The Contractor will not use any Authority Data or Authority Electronic Property in a manner that is harmful to the Authority. To the extent possible, the Deliverables (excluding any Contractor Technology embodied therein) shall be a work made for hire specifically commissioned for the Authority. In order to protect and preserve the Authority's rights, the Contractor hereby irrevocably and unconditionally assigns and transfers to the Authority all right, title and interest in and to the Authority IP that the Contractor may acquire without further consideration.

1.7.2 The Contractor grants to the Authority a non-exclusive, perpetual, royalty free, fully paid up, irrevocable, and transferable license, with the right to sublicense, in and to any Contractor Technology embodied in the Deliverables for the Authority and service providers to exercise and exploit its and their ownership rights in the Deliverables in any manner. The foregoing license does not authorize the Authority to separate any Contractor Technology from the Deliverable in which it is incorporated for creating a standalone product for marketing to others.

2. Proprietary Information and Non-Disclosure.

2.1 The Contractor acknowledges and agrees that this Contract creates a relationship of confidence and trust on the part of the Contractor for the benefit of the Authority. During the Term of this Contract, the Contractor may acquire certain "Confidential Information" (as defined herein) from or regarding the Authority employees, agents and representatives or documents, or otherwise as a result of performing the Services of the Contractor hereunder.

2.2 "Confidential Information" as used herein, shall mean and include, without limitation:

2.2.1 Any information concerning the Authority or the Project, which is provided by the Authority or any Project team members to the Contractor, such as accounting and financial data, product, marketing, development, pricing and related business plans and budgets, and all of the information and plans related to the Project, which are not published;

2.2.2 All Authority Data and Authority Electronic Property; and

2.2.3 All Deliverables (including without limitation all work in progress) and any Contractor Technology included or embodied therein.

2.3 The Contractor acknowledges and agrees that all such Confidential Information is and shall be deemed the sole, exclusive, confidential and proprietary property and trade secrets of the Authority at all times during the Service Term of this Contract and following any expiration or termination hereof. The Contractor agrees to hold in confidence without disclosing or otherwise using any Confidential Information, except as such disclosure or use may be required in connection with and limited to the Services of the Contractor hereunder.

- 2.4 The Contractor acknowledges and agrees that the Authority would not have entered into this Contract unless the Authority was assured that all such Confidential Information would be held in confidence by the Contractor in trust for the sole benefit of the Authority.
- 2.5 The Contractor shall not improperly use or disclose any proprietary information or trade secrets of any third party and will not bring on to the premises of the Authority any unpublished documents or any property belonging to any third party unless consented to in writing by the third party.
- 2.6 The Contractor's obligation of confidentiality hereunder shall not apply to information that: (i) is already in the Contractor's possession without an obligation of confidentiality; (ii) is rightfully disclosed to the Contractor's by a third party with no obligation of confidentiality; or (iii) is required to be disclosed by court or regulatory order, provided the Contractor's gives the Authority prompt notice of any such order.
- 2.7 The Authority shall have the perpetual and unrestricted right to use, copy, and incorporate into other works all reports, materials, presentations and other work product prepared by the Contractor and delivered to the Authority.
- 2.8 Upon any termination or expiration of this Contract, the Contractor agrees to deliver to the Authority any and all Confidential Information except that the Contractor may keep one file copy of any Confidential Information pertinent to its rights and obligations surviving the expiration or termination of this Contract, which copy shall be held in confidence in accordance with this Section.
3. Use of Authority's Name. The Contractor agrees not to make any written use of or reference to the Authority's name for any marketing, public relation, advertising, display or other business purpose or make any use of the Authority Data or Authority Electronic Property for any activity unrelated to the express business purposes and interests of the Authority under this Contract, without the prior written consent of the Authority.
4. Specific Performance. The Contractor acknowledges and agrees that the remedy at law for the breach of provisions of this Contract (particularly with respect to ownership of intellectual property and Confidential Information) may be inadequate and that the Authority may be entitled to injunctive relief without bond, in addition to any other rights or remedies which the Authority may have for such breach.
5. Indemnification. In addition to general indemnification set forth elsewhere in the Contract, the following indemnification obligations shall apply:
- 5.1 The Contractor shall indemnify, defend and hold harmless the Authority and its affiliates and their trustees, directors, officers, employees, Customers and agents from and against any and all Damages of any nature or kind to the extent arising out of, caused by, or resulting from: (i) any bodily injury or death of any person incurred by the Authority or any third party resulting from the negligence or willful misconduct of the Contractor or its employees, contractors or representatives; (ii) any failure of the Services or Deliverables to conform with Applicable Laws or the Technical Specifications or other requirements set forth in this Contract; (iii) any Security Incident; and (iv) any actual or alleged violation, infringement or misappropriation of any copyright, patent, trademark, trade secret, product name, right of privacy or persona or other intellectual property right and proprietary right of a third party related to the Services and Deliverables regardless of whether or not such claim, damage, loss, or expense is caused in part by any indemnitee. In particular, the Contractor acknowledges that the Contractor's obligation to indemnify the Authority extends to any liability arising out of any actual negligence by the Contractor in the delivery of any products or services under this Contract. Notwithstanding the foregoing, the Contractor shall not be liable to an indemnitee for any losses incurred by such indemnitee to the extent such claim is attributable solely to that indemnitee's sole negligence.
- 5.2 If the Deliverables are held to infringe or it is believed by the Authority to infringe the rights of others, the Contractor's will, at its expense and upon the Authority's request, to: (i) modify the infringing item to be non-infringing so long as the utility or performance of the Deliverables are

not materially impaired and the Deliverables continue to conform to the Technical Specifications and the Authority's original requirements in all respects, subject to the Authority's approval; or (ii) obtain for the Authority a license to continue using the infringing item.

5.3 The indemnity obligations contained in this Section shall survive the termination, suspension, abandonment and/or completion of this Contract.

6. Approval. Any approval given by the Authority shall not relieve the Contractor of its obligations and other duties under this Contract or be construed as an assumption or waiver by the Authority.
7. Waivers. No failure by the Authority to insist upon the performance by the Contractor of any provision of this Contract, and no failure of the Authority to exercise any right or remedy consequent upon a breach or other default, and no payment by the Authority or its use of the Project during the continuance of any breach or other default, shall constitute a waiver of the Contractor's breach or default or of any provision of this Contract.
8. UCITA. Neither the Uniform Computer Information Transactions Act nor any state laws incorporating such Act apply to this Contract or the transactions contemplated hereunder.

**EXHIBIT E-4**  
**IT TERMS AND CONDITIONS - HOSTED SOLUTIONS**  
**(ADDITIONAL TERMS AND CONDITIONS FOR THE PERFORMANCE OF INFORMATION**  
**TECHNOLOGY (IT) PRODUCTS AND SERVICES-HOSTED SOLUTIONS)**

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- 1.1 Definitions. Unless otherwise specified in this contract (or an Exhibit or Exhibit hereto), the following definitions shall apply, if applicable:
- 1.1.1 “Acceptance” shall have the meaning set forth in Section 1.4.5 of this Exhibit.
  - 1.1.2 “Applicable Laws” means any and all applicable statutes, laws, treaties, rules, codes, ordinances, regulations, permits, interpretations, or orders of any Federal, state, or local governmental authority having jurisdiction over the Project, this contract, and the parties all as in effect as of the date of this contract and as amended during the Service Term of this contract.
  - 1.1.3 “Application” means the technical system, platform, application and/or subscription services to be provided by the Contractor, as may be further described in the Technical Specifications.
  - 1.1.4 “Authority Data” means all data, content and information (i) submitted by or on behalf of the Authority or Customers to the Contractor or loaded into the System, (ii) obtained, developed, produced or processed by the Contractor or by the Application or System in connection with this contract, or (iii) to which the Contractor has access in connection with this contract, and all derivative versions of such data, content and information, and any derivative versions thereof, in any form or format.
  - 1.1.5 “Authority Electronic Property” means (i) any websites controlled by the Authority, (ii) any Authority mobile device apps, (iii) any interfaces to the Authority’s information technology systems, (iv) any other kiosks, devices or properties for consumer interaction that are created, owned, or controlled by the Authority, and (v) versions and successors of the foregoing, any form or format now known or later developed, that may be used by Customers.
  - 1.1.6 “Confidential Information” shall have the meaning set forth in Section 2.2 of this Exhibit.
  - 1.1.7 “Contractor’s Certification” shall have the meaning set forth in Section 1.4.4 of this Exhibit.
  - 1.1.8 “Contractor Technology” means (i) the System, (ii) the Application, and (ii) any technology, information, content and data, together with Intellectual Property Rights related thereto, owned or used by the Contractor in the performance of the Services.
  - 1.1.9 “Customer” means any purchaser of products or services from the Authority.
  - 1.1.10 “Deliverables” means all information, data, materials, devices (including equipment and hardware), software (including the Application) and other items to be delivered by the Contractor to the Authority, as specified in the Project Plan.
  - 1.1.11 “Documentation” means the documentation provided to the Authority, including user manuals and operator instructions related to the Application furnished by the Contractor to the Authority in any format, including paper and electronic.
  - 1.1.12 “Intellectual Property Rights” means any and all intellectual property rights, including without limitation, invention, patents, patent and patent applications (including all reissues, divisions, renewals, continuations, continuations-in-part, extensions, provisionals, and reexaminations) and all rights therein provided by international treaties or conventions and all improvements to the inventions disclosed in each such registration, patent or application, trademarks, service marks, trade dress, logos, slogans, configurations, trade names, corporate names, and business names, whether or not registered, including all

common law rights, and registrations and applications for registration thereof, and all rights therein provided by international treaties or conventions, works of authorship and copyrights (registered or otherwise) and registrations and applications for registration thereof, and all rights therein provided by international treaties or conventions, all internet uniform resource locators, and domain names, including any domain name application or registration, all industrial designs and any registration or application thereof anywhere in the world, data and database rights, trade secrets, proprietary know-how and show-how, whether or not reduced, all rights to obtain and rights to apply for patents, and to register trademarks and copyrights, and any similar or equivalent rights to any of the foregoing anywhere in the world.

- 1.1.13 “Malware” means any malicious data, code script, active content program, or other malicious software that could damage, destroy, alter or disrupt any computer program, data, firmware or hardware.
- 1.1.14 “Process” or “Processing” means, with respect to any Authority Data, to migrate, collect, access, use, process, modify, copy, analyze, disclose, transmit, transfer, sell, rent, store, or retain or destroy such data in any form. For the avoidance of doubt, “Process” includes the compilation or correlation of any Authority Data with information from other sources and the application of algorithmic analysis to create new or derivative data sets from any Authority Data.
- 1.1.15 “Project” means the project related to the Application and the Authority’s information technology systems as described in more detail in this Exhibit.
- 1.1.16 “Project Plan” means the project plan for the implementation, customization, configuration and/or installation or hosting of the Application and the Services and Deliverables required for the Project, as approved by the Authority in writing.
- 1.1.17 “Remediation Efforts” means, with respect to any Security Incident, activities designed to remedy a Security Incident which may be required by Applicable Law or by the Authority’s or the Contractor’s policies or procedures or under the Security Requirements, or which may otherwise be necessary, reasonable or appropriate under the circumstances, commensurate with the nature of such Security Incident.
- 1.1.18 “Security Incident” means: (i) the loss or misuse of Authority Data; (ii) the inadvertent, unauthorized, or unlawful processing, alteration, corruption, sale, rental, or destruction of Authority Data; (iii) unauthorized access to internal resources; (iv) programmatic manipulation of a system or network to attack a third party; (v) elevation of system privileges without authorization; (vi) unauthorized use of system resources; (vii) denial of service to a system or network; or (viii) any potential or confirmed exposure (which may stem from an act or omission to act) that would result in any of the events described in (i) through (viii).
- 1.1.19 “Service Levels” shall have the meaning set forth in Section 3.1 of this Exhibit.
- 1.1.20 “Security Requirements” means industry best practices and other reasonable physical, technical and administrative safeguards, procedures, protocols, requirements and obligations related to facility and network security in order to protect Authority Data and the Authority’s information technology systems from unauthorized processing, destruction, modification, distribution and use, as approved in writing by the Authority.
- 1.1.21 “Service Term” means (i) the term of the contract as set forth in Exhibit A to the contract, or (ii) with respect to any hosted service related to the Application, the specific term or period for subscription services set forth in Exhibit A of this contract.
- 1.1.22 “Services” means all services to be performed by the Contractor for or on behalf of the Authority or Customers, as described in the Project Plan and this Exhibit.
- 1.1.23 “System” means an application, network, database or system provided or used to perform the Services by the Contractor.

- 1.1.24 "Technical Specifications" means the technical specifications, functional specifications, descriptions, designs, standards, instructions, and business requirements of the Authority related to the Application and the Authority's information technology systems, as may be further described in this contract. Unless otherwise agreed upon in writing by the Authority, the Technical Specifications shall be outlined in detail in Exhibit H to this contract.
- 1.1.25 "Termination Assistance Services" means the Contractor's cooperation with the Authority in order to assist in the transfer of Authority Data to the Authority and to facilitate the transition to an alternative software or service for the Application at such time when the Authority may obtain authorization and/or funding for such replacement.
- 1.1.26 "Updates" means all bug fixes, error corrections, patches, updates, upgrades or new releases or version of the Application during the Service Term.

1.2 Contractor Requirements.

- 1.2.1 Unless specified in the applicable Project Plan, the Contractor will shall furnish, at its own expense, all resources, personnel, equipment, tools, and supplies necessary for the full access and use of the Application and the timely performance of the Services and the Deliverables. The Contractor may use any means necessary and appropriate to perform the Services and the Deliverables under this contract; provided, however, that in no event shall the Contractor take any action that may subject either it or the Authority to civil or criminal liability.
- 1.2.2 The Contractor will establish and manage all Security Requirements necessary to protect Authority Data integrity and permit appropriate access to the Application and the Authority Electronic Property. The Contractor will enable and stop access as users enter and leave the Application. The Contractor will cooperate with and assist the Authority and its other Project contractors to implement security protocols (e.g., firewalls, SSI, etc.) and take appropriate actions with respect to the Application and all Authority Data stored therein and the Authority Electronic Property so as to enable the Contractor to satisfy its obligations under this contract and to help prevent the loss, alteration or unauthorized access to the Application and all Authority Data stored therein, or the Authority Electronic Property, to the extent within the Contractor's control. The Contractor will, upon the Authority's request, for each year of the Term of this contract under the Project Plan, provide to the Authority copies of monthly firewall logs and third party audit reports, summaries of test results and other equivalent evaluations with regard to security and confidentiality in connection with the Services that the Contractor provides to the Authority. The Contractor will use commercially reasonable efforts in accordance with the Security Requirements to secure the Application and all Authority Data stored therein against access by parties external to the Project and by unauthorized users, and against damage, disruption and other activity aimed at data availability or the services or other trespass or illegal actions. The Contractor will employ computer anti- Malware protections and other reasonable commercial means to ensure a safe computing environment. The Contractor agrees that it will, and it will cause its personnel and contractors to timely comply with the Authority's privacy policies and safety and network security policies, as the same may be provided to the Contractor, at all times while on-site at the Authority's facilities or remotely accessing the Authority's systems or facilities (including Authority Electronic Property). The Contractor and/or its designated third party auditor(s) will perform all audits necessary to ensure the Authority's Data integrity and adherence to the Security Requirements of the Project. As part of its routine audits, the Contractor will, on a regular basis, test the integrity of Authority Data backed up by the Authority or its Project Contractors.
- 1.2.3 The Contractor shall adopt and implement all facility and network security, disaster recovery plans and back-up plans as to protect against data loss, theft and unauthorized access, disclosure and use of the Application, Authority Data, Authority Electronic Property and the Authority's Confidential Information and to ensure the integrity and continuity of the performance of Services and the Project under this contract. The Contractor will use best efforts in accordance with industry best practices and standards for this requirement



and consult and cooperate with the Authority and its other contractors who operate or access the Authority's data center and network systems (including Authority Electronic Property) in the performance of the Services.

- 1.2.4 The Contractor and/or its designated third party auditor(s) will perform all audits necessary to ensure data integrity and adherence to the requirements of the Project. As part of its routine audits, the Contractor will, on a regular basis, test the integrity of Authority Data backed up by the Authority's or its Project contractors.
- 1.2.5 The Contractor, as well as its agents, representatives, and employees, shall comply with all of the Authority's rules, regulations, and guidelines then in effect when on-site at the Authority and all Applicable Laws.
- 1.2.6 The Contractor will promptly notify the Authority upon discovering or otherwise learning of any Security Incident involving Authority Data. Following any Security Incident, the Contractor will consult in good faith with the Authority regarding remediation Efforts that may be necessary and reasonable.
- 1.2.7 Any notifications to Customers or any employees of the Authority regarding Security Incidents will be handled exclusively by the Authority and the Contractor may not under any circumstances contact Customers or employees of the Authority relating to such Security Incident unless the Contractor is under a legal obligation to do so, in which event (i) the Contractor must notify the Authority in writing promptly after concluding that the Contractor has the legal authority to notify such Customers or employees and explain in such notice to the Authority the basis for the legal obligation and (ii) the Contractor will limit the notices to Customers and any employees of the Authority regarding a Security Incident and the Contractor will assist with sending such notices if so requested by the Authority.

1.3 Project Plan and Milestone Deadlines.

- 1.3.1 The Contractor shall provide Services necessary to assess and evaluate the Authority's business requirements and information technology systems in order to create, deploy, configure, customize, migrate, deliver and/or implement the Application and any Authority Data to be migrated, interfaced to or used in conjunction with the Application unless otherwise provided or specified by the Authority, the Contractor will prepare for the Authority's review and approval a Project Plan setting forth in detail (i) the scope of the Project and the Services required to complete the Project, (ii) the milestones and schedule for completing all tasks and requirements for the Project (including the creation, deployment, configuration, customization, migration, and implementation of the Application and any Authority Data, (iii) all Authority Electronic Property required for access and use of the Authority and any Authority Data hosted by the Contractor, (iv) all Deliverables and (v) all acceptance criteria, testing and post-implementation tasks. No Project Plan will be effective until approved in writing by the Authority's designated project manager.
- 1.3.2 This is a fast track Project with completion deadlines that cannot reasonably be extended. For this reason, it is the desire of the Authority to recognize any likely budget overruns as soon as possible, and by this contract it is employing the Contractor to perform design monitoring, estimating, value analysis and other functions to help the Authority meet the Project budget. At any time that the Contractor develops concerns about the integrity of the budget for the Project, the Contractor shall promptly advise the Authority of the concerns through a variance report, which shall, at a minimum, state: (i) the Contractor's concern; (ii) the apparent cause of the concern, delay, or budgetary issue; (iii) in the event of a concern about a delay, specifically demonstrate the negative impact of the delay to the critical path for the Project Plan; (iv) define any cost impacts to the Project; and (v) provide the Contractor's proposed resolution to the concern. If any estimate submitted to the Authority exceeds previously approved estimates or the Authority's budget, the Contractor shall make appropriate recommendations to the Authority.

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- 1.3.3 If, using reasonable project monitoring techniques, the Authority determines, in its sole discretion, that it is unlikely or fails to meet a completion date or a cost estimate due under the Project Plan for any reason regardless of which party is at fault, in addition to any other rights and remedies that may be available to the Authority, at no additional cost to the Authority and at the Authority's option, the Contractor shall provide all necessary additional personnel at its own cost to accelerate performance as may be required or necessary to complete the activities required under the Project Plan within a re-adjusted time frame agreed to by both parties in a change order. The completion date shall be considered met if completed in accordance with the terms of this contract within ten (10) working days of the originally estimated completion date. The Contractor will provide the Authority with prior written notice for any delays impacting Application module/track delivery or other Services completion under the Project Plan in the form of a proposed change order.
- 1.3.4 The Contractor shall use its best efforts after obtaining explicit consent from the Authority to re-sequence the Services to overcome and/or mitigate, to the greatest practicable extent, the effect of any delays regardless of the cause of such delays. Without limiting the foregoing, the Contractor shall diligently prosecute its Services in order to meet the proposed start date for the Application despite a dispute with the Authority relating in any way to this contract, including without limitation any and all the Contractor's claims for modifications to the payments due to the Contractor. The Contractor and the Authority shall cooperate to resolve all disputes and to adjust the Project Plan accordingly by Contract modification in a timely manner (not to exceed two (2) weeks from the date of notice).
- 1.3.5 Should the Contractor not progress in its performance of Services at a rate commensurate with the Service Term of this contract, or fail to meet any scheduled date under the Project Plan, the Authority may, in its sole discretion, direct the Contractor to accelerate the Services by employing additional personnel and equipment or providing overtime to existing personnel as is necessary to complete the Application by the start date, or any portion of the Application by the milestone date specified in the Project Plan. Such the Authority-ordered acceleration shall be at the cost of the Contractor.
- 1.4 Acceptance.
- 1.4.1 Unless otherwise defined or specified in an Exhibit to this contract, the provisions set forth in this Section 1.4 shall determine the Authority's Acceptance of the Application.
- 1.4.2 Implementation of the Application shall be completed in a timely manner and appropriate tests conducted by the Contractor with the cooperation of the Authority to facilitate Acceptance of the Application as more fully set forth in the Project Plan; provided, however, that the Authority may upon written request require that the Contractor perform testing with cooperation of the Authority.
- 1.4.3 When each component of the Application has been developed and tested by the Contractor as being ready for operational testing, the Contractor shall notify the Authority in writing. The Authority shall provide reasonable assistance to commence operational testing.
- 1.4.4 Unless otherwise specified in the Project Plan, within thirty (30) days after operational testing, the Contractor shall certify in writing that the Application component conforms to the Technical Specifications and is capable of being put into full commercial productive use in accordance with the Technical Specifications and otherwise meets the functional and business requirements set forth in this contract ("the Contractor's Certification"). The Contractor Certification shall not be issued by the Contractor unless the Contractor has completed all tasks required for the installation, configuration, deployment (including data migration) and hosting or operational testing of the Application and such instance is ready for final testing and launch for production use by the Authority and Customers.
- 1.4.5 The Application shall be finally accepted by the Authority when (i) each component of the Application is fully operational and properly configured by the Contractor, as applicable, and/or (ii) when the instance of the Application is properly configured and made available

to the Authority for production use on the Contractor's hosted environment, each in conformity with the Security Requirements and Technical Specifications outlined in this contract ("Acceptance").

- 1.4.6 If there is any objection to Acceptance, the Authority will provide the Contractor with a written notice (the "Defect Notice") reasonably identifying any claimed discrepancies between the actual performance of the Application component and the requirements set forth in this contract within thirty (30) days after the issuance of the Contractor's Certification.
- 1.4.7 Upon receiving a Defect Notice from the Authority, the Contractor shall confer with the Authority and jointly review each asserted discrepancy to determine if the claimed discrepancy is valid. The Contractor shall either promptly correct the discrepancy and resubmit the Application component for acceptance by the Authority on the same basis as initially submitted or terminate this contract. If, in the reasonable professional judgment of the Contractor such discrepancy is not valid, the Contractor shall so notify the Authority in writing.
- 1.4.8 The written explanation of the Contractor set forth herein shall be deemed accepted by the Authority within thirty (30) days after the Authority's receipt of the written explanation and Acceptance shall be deemed to have occurred unless the Contractor receives from the Authority written notice rejecting such explanation and detailing exactly how the Application component does not conform with the Technical Specifications and/or Security Requirements. If the Application is not accepted by the Authority following two (2) attempts by the Contractor to provide an undisputed the Contractor's Certification, the Authority may terminate this Contract with respect to that particular component or the entire Application, at its sole discretion.
- 1.4.9 The foregoing Acceptance procedure shall apply with respect to the Authority's Acceptance of the overall turn-key system comprising all components of the Application (including migrated Authority Data, if applicable) in a condition ready for immediate use and operation by the Authority (i) in its facilities and/or the operating environment if a component of the Application is installed, or (ii) via the Contractor's hosted servers for the instance of the Application is hosted, as applicable, on or before the start date set forth in the Project Plan.
- 1.4.10 In the event that the Authority, upon final review, does not accept the Application or only makes a partial acceptance of the Application, the Authority may elect to: (i) accept delivery of the Application "AS IS" at a negotiated equitable reduction in the price and payment schedule for both the Application and any Services; or (ii) terminate the Project and receive a refund of all fees paid in advance to the Contractor, which in such event, the Contractor shall immediately repay all fee advances paid by the Authority under the Project Plan and the Authority may retain all holdbacks.
- 1.5 Training. The Contractor will perform all training required for access and use of the Application upon initial deployment and during the Service Term, as reasonably requested by the Authority. The Contractor will at a minimum provide the Authority with sufficient training and instruction on the use and operation of the Application. Such training will be performed at the Authority's facilities (unless otherwise agreed upon by the parties in the Project Plan).
- 1.6 Application Support and Performance.
  - 1.6.1 The Contractor shall (i) promptly notify the Authority of any errors in the Application of which it learns from any source; (ii) respond to user identified Application errors in no more than 4 hours after notification, and implement corrected Application copies or corrections or bypasses such that the Application performs in all material respects in accordance with the Documentation, within one (1) business day thereafter; (iii) provide to all authorized users on a 24 hours per day, 7 days per week basis, all reasonably necessary telephone or web consultation requested by them in connection with their use and operation of the Application; and (iv) treat any Application dumps, Authority Data, tapes or any other

documentation provided from users to resolve a reported problem as Confidential Information of the Authority.

- 1.6.2 The Contractor will periodically release maintenance Updates with minimum impact and downtime to the Authority and after business hours. At no additional cost to the Authority, the Contractor will provide access to all maintenance Updates and all new features and functionalities of the Application that are provided by the Contractor to any of its other customers. In each case, the Contractor will provide the Authority with prior written notice (by as much time as practicable but in no event less than one (1) day(s) of the release by the Contractor of any Updates, and will implement such Updates (including any configuration or integration thereto) for access and use by the Authority at no additional cost to the Authority. If the Authority requests the Contractor to test such Updates, the Contractor will promptly test such update to the Authority at no additional cost. If any Update is installed, such Update will thereupon be deemed to be part of the relevant Application upon delivery subject to Acceptance by the Authority. All such Updates, where reasonably necessary, will be accompanied by updated Documentation. The Contractor covenants that each upgrade and will be backwards compatible with all parts of the Application.
- 1.6.3 The Contractor will use commercially reasonable efforts to maintain the Application with a high level of quality and performance consistent with industry standards and the state of the art technology.
- 1.6.4 To the greatest extent possible, the Contractor will schedule maintenance during times least disruptive to the Authority's use of the Application. Scheduled maintenance is a period in which the Authority is notified in advance, during which the Contractor may suspend availability of all or part of the Application in order to carry out maintenance activities. Scheduled Maintenance will be scheduled after normal business hours ("Maintenance Window"). To the extent possible, the Contractor will perform maintenance without suspending the Application (i.e., hot) and will coordinate with the Authority by written notice to schedule maintenance requiring downtime at such hours and date least disruptive to its business.
- 1.6.5 The Authority will be notified by e-mail not less than three (3) calendar days in advance of any period of Scheduled Maintenance that will require suspension of all or the majority of the Application for a period of one (1) hour or more. The Authority will be notified by email not less than seven (7) calendar days in advance of any period of Scheduled Maintenance that will require suspension of all or the majority of the Application for a period of more than one (1) hour. The Contractor will schedule any period of Scheduled Maintenance that requires suspension of all or a major part of the Application for more than three (3) hours during a Maintenance Window on a Friday night, or Saturday or Sunday morning.
- 1.7 Additional Representations and Warranties. In addition to all other representations, warranties, and covenants included in this contract, Contractor represents, warrants, and covenants, for itself, its employees, subcontractors and agents that:
  - 1.7.1 it is not contractually prohibited from engaging in the Services or providing the Deliverables, and that it is not a party to any contract or under any obligation which conflicts with the terms of this Contract or which prohibits Contractor from carrying out its responsibilities under this contract;
  - 1.7.2 it is fully able to furnish the Services as contemplated by this contract;
  - 1.7.3 there are no contracts to which it is a party which would prevent its timely and complete performance of the terms and conditions of the contract, and the Contractor agrees not to enter into any such contract during the pendency of this contract;
  - 1.7.4 it is experienced in the type of software engineering necessary for completion of the Project, and it understands the complexity involved in this type of project and the necessity of coordination of its Services with stakeholders within which the Project will be performed;

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- 1.7.5 there are no contracts to which it is a party which would prevent its timely and complete performance of the terms and conditions of the contract, and the Contractor agrees not to enter into any such contract during the pendency of this contract;
- 1.7.6 the Application will not contain any Malware at all times during which the Application is made available for access and use by the Authority's user or Customers, or any Authority Data is processed using the Application. Any patches, Updates, upgrades or error corrections to the Application provided by the Contractor likewise will not contain any Malware;
- 1.7.7 the Application will not contain any security mechanisms, including, but not limited to, copy protect mechanisms, encryptions, time-activated disabling devices or other codes, instructions or devices which may disable the modules or other software or erase or corrupt data;
- 1.7.8 the Application will comply with all Applicable Laws at all times from the date of Acceptance to the expiration of the applicable Warranty Period;
- 1.7.9 With respect to the Application, (i) all modules and other materials (other than third party software and hardware approved by the Authority) will be original; (ii) there is, and on the date of Acceptance will be, no claim, litigation or proceeding pending or threatened against the Contractor with respect to the Application, or any component thereof, alleging infringement or misappropriation of any patent, copyright, trade secret, trademark or any other personal or proprietary right of any third party in any country; and (iii) the Application, and any use thereof, shall not infringe upon any Intellectual Property Right of any third party in any country; and
- 1.7.10 The System will not contain or otherwise be developed using any Open Source Software (as defined below) in a manner that subjects the Authority to any license obligations of such Open Source Software. "Open Source Software" means any software licensed under terms requiring that other software combined or used or distributed with such software: (i) be disclosed or distributed in source code form, or (ii) be licensed on terms inconsistent with the terms of this Contract.
- 1.8 Additional Warranty Remedies. The Authority is entitled to all warranties implied by law or regulation. These warranties shall survive any Acceptance and payment by the Authority for the Services and are in addition to, and shall not be construed as restricting or limiting the warranties of the Contractor, express or implied, that are provided by law or exist by operation of law. For any breach of the warranties contained in this Section, the Authority's remedy, in addition to all remedies available at law or in equity, shall be:
- 1.8.1 For Application. The correction of errors that cause breach of the warranty. If the Contractor is unable to provide such error corrections or otherwise make the Application operate as warranted within the periods specified in this contract, the Authority shall be entitled to terminate this contract with respect to the affected module/track and recover a prorated amount paid to the Contractor based on each module, which prorated amount will be calculated based on a useful life of five years from the date of final Acceptance. If, however, the loss of functionality cause by such error impacts the overall turn-key system performance of the Application, then the Authority shall be entitled to terminate this contract with respect to all modules/tracks and recover all amounts paid to the Contractor by the Authority. The Contractor shall not be responsible or liable for any errors that are determined to be attributable to the Authority's failure to comply with any user requirements under the applicable Technical Specifications, or any Force Majeure event.
- 1.8.2 For Deliverables. The correction of errors that cause breach of the warranty by re-performing the Services necessary to create the Deliverables and by providing Deliverables conforming with the Technical Requirements at no cost to the Authority.
- 1.8.3 For Services. The re-performance of any Services not conforming to the warranty at no cost to the Authority.
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2. Intellectual Property Rights.

- 2.1 The Contractor will not (i) use or register any trademark, service mark or domain name that is identical to or confusingly similar to any trademark, service mark, logo or other name owned or used by the Authority, including domain names and trade dress; or (ii) create, acquire, license or support any internet keyword or search term that contains any such marks or other Intellectual Property Rights owned or licensed by the Authority, except as expressly provided in the Project Plan and only in the performance of the Services for the benefit of the Authority. All use thereof inures solely to the benefit of the Authority and is subject to the Authority's quality control and standard guidelines.
- 2.2 As between the Contractor and the Authority (i.e., without addressing rights of third parties), the Authority is the sole owner of all rights, title and interest in and to any Authority Data and Authority Electronic Property and all Deliverables (excluding any Contractor Technology embodied in the Deliverables), together with all improvements, derivative works or enhancements to any of the foregoing and all Intellectual Property Rights related thereto ("Authority IP"). Except as expressly authorized in this Exhibit in the performance of the Services solely for the benefit of the Authority or Customers, the Contractor may not use, edit, modify, create derivatives, combinations or compilations of, combine, associate, synthesize, re-identify, reverse engineer, reproduce, display, distribute, disclose, sell or process any Authority Data or Authority Electronic Property. The Contractor will not use any Authority Data or Authority Electronic Property in a manner that is harmful to the Authority. To the extent possible, the Deliverables (excluding any Contractor Technology embodied therein) shall be a work made for hire specifically commissioned for the Authority. In order to protect and preserve the Authority's rights, the Contractor hereby irrevocably and unconditionally assigns and transfers to the Authority all right, title and interest in and to the Authority IP that the Contractor may acquire without further consideration.
- 2.3 As between the parties, and except for the licenses granted or as otherwise provided in this contract, the Contractor retains all right, title and interest in and to the System and all Contractor Technology and all Intellectual Property Rights related thereto. The Contractor grants to the Authority a non-exclusive, perpetual, royalty free, fully paid up, irrevocable, and transferable license, with the right to sublicense, in and to any Contractor Technology embodied in the Deliverables for the Authority and its Customers and service providers to exercise and exploit its and their ownership rights in the Deliverables in any manner. The foregoing license does not authorize the Authority to separate any Contractor Technology from the Deliverable in which it is incorporated for creating a standalone product for marketing to others.
- 2.4 The Contractor further agrees to perform all obligations set forth in the Authority's Proprietary Rights and Data Security Exhibit attached to this Exhibit.

3. Proprietary Information and Non-Disclosure.

- 3.1 The Contractor acknowledges and agrees that this contract creates a relationship of confidence and trust on the part of the Contractor for the benefit of the Authority. During the term of this contract, the Contractor may acquire certain "Confidential Information" (as defined herein) from or regarding the Authority employees, agents and representatives or documents, or otherwise as a result of performing the Services of the Contractor hereunder.
- 3.2 "Confidential Information" as used herein, shall mean and include, without limitation:
- 3.2.1 Any information concerning the Authority or the Project, which is provided by the Authority or any Project team members to the Contractor, such as accounting and financial data, product, marketing, development, pricing and related business plans and budgets, and all of the information and plans related to the Project, which are not published;
- 3.2.2 All Authority Data; and
- 3.2.3 The Deliverables (including without limitation all work in progress) other than any Contractor Technology embodied in the Deliverables.

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- 3.3 The Contractor acknowledges and agrees that all such Confidential Information is and shall be deemed the sole, exclusive, confidential and proprietary property and trade secrets of the Authority at all times during the Service Term and following any expiration of termination hereof. The Contractor agrees to hold in confidence without disclosing or otherwise using any Confidential Information, except as such disclosure or use may be required in connection with and limited to the Services of the Contractor hereunder.
- 3.4 The Contractor acknowledges and agrees that the Authority would not have entered into this contract unless the Authority were assured that all such Confidential Information would be held in confidence by the Contractor in trust for the sole benefit of the Authority.
- 3.5 During the Service Term, the Contractor shall not improperly use or disclose any proprietary information or trade secrets of any third party and will not bring on to the premises of the Authority any unpublished documents or any property belonging to any third party unless consented to in writing by the third party.
- 3.6 The Contractor's obligation of confidentiality hereunder shall not apply to information that: (i) is already in the Contractor's possession without an obligation of confidentiality; (ii) is rightfully disclosed to the Contractor by a third party with no obligation of confidentiality; or (iii) is required to be disclosed by court or regulatory order, provided the Contractor gives the Authority prompt notice of any such order.
- 3.7 Upon any termination or expiration of this contract, the Contractor agrees to deliver to the Authority any and all Confidential Information except that the Contractor may keep one file copy of any Confidential Information pertinent to its rights and obligations surviving the expiration or termination of this contract, which copy shall be held in confidence in accordance with this Section.
4. Hosted Services. With respect to the Application and/or any Authority Data hosted or Processed by the Contractor, the following terms will apply:
- 4.1 Unless otherwise designated in the contract or agreed upon in writing by the Authority, the Contractor will use commercially reasonable efforts to make the Application available 24 hours per day 7 days a week. The Contractor represents that access to the Application for The Authority and its Customers will be maintained at an availability standard of 99.99% as measured over the course of a calendar month, excluding Standard Exceptions (the "Service Levels"). "Standard Exceptions" to the 99.99% service-availability standard shall mean scheduled maintenance, maintenance downtime to resolve extraordinary technical problems with the Application or the host operating environment, force majeure (including state or federally declared natural disasters in the Contractor's physical locations), or technical difficulties attributable to any non-Contractor computer hardware, or technical difficulties attributable to the Authority's interface with the Application unless such technical difficulties are the direct fault of the Contractor. The Contractor agrees to measure and provide a detailed report to the Authority, on a monthly basis, showing the Contractor's provision of the Application as compared to the Service Levels.
- 4.2 Unless otherwise approved in writing by the Authority, the Contractor must host the Application in the United States of America ("U.S.A.") at the location(s) specified by the Contractor, must provide services under this contract with resources (e.g., hardware and software) located in the U.S.A, and must not transfer or process any Authority Data outside of the U.S.A.
- 4.3 In the event of the expiration or termination of the Service Term, upon the Authority's written request, the Contractor will provide Termination Assistance Services for a period of time commencing on the effective date of termination or expiration of this Contract and ending on a date designated in advance by the Authority.
- 4.4 The Contractor will promptly notify the Authority upon discovering or otherwise learning of a Security Incident. Following any Security Incident, the Contractor will consult in good faith with the Authority regarding Remediation Efforts that may be necessary and reasonable. The Contractor will (i) at the Authority's direction undertake Remediation Efforts at the Contractor's

sole expense and reimburse the Authority for its reasonable costs and expenses in connection with any Remediation Efforts that it elects to undertake, (ii) ensure that such Remediation Efforts provide for, without limitation, prevention of the recurrence of the same type of Security Incident, and (iii) reasonably cooperate with any Remediation Efforts undertaken by the Authority.

- 4.5 In addition to any other indemnification obligations set forth in this Exhibit and the contract, the Contractor will indemnify, defend and hold harmless all the Authority Indemnitees from and against any and all losses, damages, liabilities, judgments, awards, penalties, interest, fines, costs and fees or expenses of whatever kind, including reasonable attorneys' fees ("Losses") incurred by such the Authority Indemnitee as a result of any claim, demand, suit, action, investigation, allegation or any other proceeding (collectively, "Claims") arising out of or relating to: (i) any Security Incident and/or (ii) the Contractor's or its employees', agents' or contractors' breach of any of the terms, conditions or obligations relating to data security, privacy, or any Authority Data set forth in the contract or this Exhibit. However, if the Contractor can demonstrate through clear and convincing evidence that the Authority was the sole cause of a Security Incident and the Contractor was fully compliant with the Contractor's obligations, then this Section will not apply to such Security Incident. For the purposes of this Section, Losses will include, without limitation, the cost of Remediation Efforts. The Contractor's obligations in this Section are in addition to any indemnification or similar obligations that the Contractor may have under the contract. The rights and remedies of the Authority under this Exhibit will not be subject to any limitation or exclusion of actions or remedies or any other similar limiting provisions stated in the contract. Without limiting the foregoing: (a) there will be no limitations or exclusions on the Contractor's liability arising under this Exhibit, the contract or otherwise relating to Claims pertaining to privacy, security, or confidentiality or relating to unauthorized use of Authority Data, and (b) the Contractor will be liable for all obligations under this Section and for reimbursement of Losses for Remediation Efforts regardless of whether such amounts are characterized by any person, court or other third party as direct, indirect, consequential, special, or punitive damages.
- 4.6 Any notifications to Customers or any employees of the Authority regarding Security Incidents will be handled exclusively by the Authority and the Contractor may not under any circumstances contact Customers or employees of the Authority relating to such Security Incident unless the Contractor is under a legal obligation to do so, in which event (i) the Contractor must notify the Authority in writing promptly after concluding that the Contractor has the legal obligation to notify such Customers or employees and explain in such notice to the Authority the basis for the legal obligation and (ii) the Contractor will limit the notices to such Customers and employees to those required by the legal obligation or as pre-approved by the Authority. The Contractor will reasonably cooperate in connection with notices to Customers and any employees of the Authority regarding a Security Incident and the Contractor will assist with sending such notices if so requested by the Authority.
5. Rights to Access and Use Application. The Contractor hereby grants to the Authority, Customers (but only in their capacity as Customers), and third-party service providers providing services to the Authority (but only in their capacity as the Authority's service providers) a non-exclusive, worldwide, royalty-free license to access and use the Application during the Service Term. Such license shall be enterprise-wide for an unlimited number of users or transactions, unless limitations on use are expressly agreed upon by the Authority in this contract. The Authority may allow its contractors and service providers to access and use the Application in the course of performing services for the Authority, including application development services, data processing and facilities management services.
6. Use of Authority's Name. The Contractor agrees not to make any written use of or reference to the Authority's name for any marketing, public relation, advertising, display or other business purpose or make any use of Authority Data for any activity unrelated to the express business purposes and interests of the Authority under this contract, without the prior written consent of the Authority, which consent will not be unreasonably withheld.



7. Specific Performance. The Contractor acknowledges and agrees that the remedy at law for the breach of provisions of this contract (particularly with respect to ownership of intellectual property and Confidential Information) may be inadequate and that the Authority may be entitled to injunctive relief without bond, in addition to any other rights or remedies which the Authority may have for such breach.
8. Indemnification. In addition to general indemnification set forth elsewhere in the contract, the following indemnification obligations shall apply:
  - 8.1 The Contractor shall, to the proportionate extent that they are responsible, indemnify, defend and hold harmless the Authority and its trustees, directors, officers, employees, Customers and agents from and against any and all Claims and Losses of any nature or kind to the extent arising out of, caused by, or resulting from: (i) any failure of the Application or the Services to conform with Applicable Laws or the Technical Specifications or Security Requirements set forth in this Contract; (ii) any Security Incident; and (iii) any actual or alleged violation, infringement or misappropriation of any Intellectual Property Rights of a third party related to the Services and the Application, regardless of whether or not any such Claim or Loss is caused in part by any indemnitee. In particular, the Contractor acknowledges that the Contractor's obligation to indemnify the Authority extends to any liability arising out of any actual negligence by the Contractor in the delivery of any products or services under this contract. Notwithstanding the foregoing, the Contractor shall not be liable to an indemnitee for any losses incurred by such indemnitee to the extent such claim is attributable solely to that indemnitee's sole negligence.
  - 8.2 Either party shall promptly advise the other party in writing of any action, administrative or legal proceeding, or investigation to which this indemnification may apply. The Contractor shall, at its expense, assume on behalf of the indemnitees and conduct with due diligence and in good faith the defense thereof with counsel satisfactory to the Authority; provided, however, that the Authority shall have the right, at its option, to be represented therein by advisory counsel of its own selection and at its own expense. This indemnification shall not be limited to damages, compensation, or benefits payable under insurance policies, workers' compensation acts, disability benefit acts, or other employees/benefit acts.
  - 8.3 If the Application or any use thereof by the Authority or Customers is held to infringe or it is believed by the Authority to infringe the rights of third parties, the Contractor's will, at its expense and upon the Authority's request, to: (i) modify the Application (and each affected module) to be non-infringing so long as the utility or performance of the Application is not materially impaired and the Application continues to conform to Applicable Laws, the Technical Specifications and the Authority's original requirements in all respects, subject to the Authority's approval; or (ii) obtain for the Authority a license to continue using the infringing Application (or affected component thereof).
  - 8.4 The indemnity obligations contained in this Section shall survive the termination, suspension, abandonment and/or completion of this contract.
9. Approval. Any approval given by the Authority shall not relieve the Contractor of its obligations and other duties under this contract or be construed as an assumption or waiver by the Authority.

**CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY**  
**EXHIBIT F-1 – REVISED-3: TECHNICAL SPECIFICATIONS**

EXHIBIT F-1: TECHNICAL SPECIFICATIONS  
40-FOOT and 60-FOOT BATTERY ELECTRIC BUSES

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## 1. Overview

### 1.1. Contents

The technical specifications contained herein define requirements for Capital Metropolitan Transportation Authority’s heavy-duty, battery electric buses, in both 40-foot and 60-foot lengths, for use in combined depot charge and on-route charging strategy, which will be used in Bus Rapid Transit (BRT) and general services on urban arterial streets. Buses shall 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 people with disabilities.

Capital Metropolitan Transportation Authority may be referred to as the “Authority” or “Capital Metro” from herein.

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## 1.2. Brand Names

Brand name, if used, is only for establishing a minimum requirement of the component specified. Wherever a component is called by brand name, the proposer may propose that brand name or seek to propose an approved equivalent. Alternative brand proposals along with supporting documentation must be submitted through the deviation process during the solicitation phase.

## 1.3. Buy America Requirements

The buses shall meet Buy America Requirements.

## 1.4. Improvements to Scope

Proposers are invited to include in their proposal any suggested or recommended improvements to the buses, bus systems or ancillary aspects described in these technical specifications, especially with regard to future proofing the bus and the Authority's operations.

## 1.5. Pilot Bus

There shall be one "Lead ~~Pilot~~ Bus" for ~~both~~ each length, 40-foot and 60-foot, of battery electric vehicle. The "Lead ~~Pilot~~ Bus" shall have completed manufacturing a minimum of 30 days prior to the next bus entering the production line. The 30 days will allow time for the "Lead Bus" vehicles to be reviewed and the agreed upon configuration validated. ~~be manufactured and delivered to the Authority after which the vehicle will be placed into service for 30 pilot service days during which time the vehicle will be reviewed and improvements or changes to configuration will be identified. A pilot service day is defined as one where the bus is assigned to and completes a revenue service block, or is assigned to and completes a special assignment such as public review. If the bus cannot complete a substantial portion of the pilot service day, due to mechanical issue, the day shall not be counted toward the 30 day count. If the bus is available but not used by the Authority, the day shall count toward the 30 day count. The Manufacturer and Authority shall work together to implement any corrections to the configuration improvements and changes prior to production of the rest of the fleet. The cost changes to the original technical specification will be negotiated in good faith.~~

The Authority shall identify subcomponent vendors that shall submit installation/application approval documents, such as first article inspections, to be delivered with the Lead ~~pilot~~ buses.

~~The "Pilot Bus" vehicles shall remain at the Authority's facility after initial delivery and will not be returned to the Manufacturer. The Authority may request the Manufacturer to make remedial changes to the "Pilot Bus" for purposes of fleet conformity. The cost of remedial changes will be negotiated in good faith.~~

## 2. Definitions

The following terms are defined so that proposers can gain a clear understanding of the descriptions and specifications contained in this technical specification. The definitions will also aid in conveying the meaning of the specifications.

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

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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 Signal(s): A continuously variable signal that is solely dependent upon magnitude to express information content.

NOTE: Analog signals are used to represent the state of variable devices such as rheostats, potentiometers, temperature probes, etc.

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

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

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

Body: the main section of a vehicle.

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

Cell: Simplest discrete component of the battery storage system, such as a battery. Specifically speaking, cell, means a single encased electrochemical unit containing one positive and one negative electrode which exhibits a voltage differential across its two terminals.

Charging Equipment: The equipment that encompasses all the components needed to convert, control and transfer electricity from the grid to the vehicle for the purpose of charging batteries. May include chargers, controllers, couplers, transformers, ventilation, etc. See Electric Vehicle Supply Equipment (EVSE).

Charging Interface: The equipment and/or coupler used to create a connection between the charging equipment and the vehicle for the purpose of recharging a vehicle's batteries.

Charging Station: The location that houses the charging equipment connected to a utility's electric service to provide electricity to a vehicle's battery system through a charging interface.

Chassis: the base frame of a motor or battery electric vehicle.

Code: A legal requirement.

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

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

DC/DC Converter: A module that converts a source of direct current from one voltage level to another.

Operating Profile: The operational requirements under standard operating conditions that the bus must be able to achieve. Reference section 6.5.

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

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

Electrical Pack: An electrical equivalent of a collection of cells or modules or physical sub-packs forming the highest-level energy storage system. Often multiple physical sub-packs are connected in series, and these may also be connected in parallel.

End of Life: A condition reached when an energy storage system fails to meet specified capacity, power or function in specified use conditions.

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

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

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

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.

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

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

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

Gross Load: 150 lbs. for every designed passenger seating position, for the driver, and for each 1.5 sq. ft. of free floor space.

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

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

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

Hose: Flexible line.

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

Labeled: Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization, which is acceptable to the authority having jurisdiction and concerned with product evaluation, which maintains periodic inspection of production labeled equipment or materials, and by

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whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Leakage: Release of contents through a Defect or a crack.

Line: All tubes, flexible and hard, that carry fluids or wire that conducts electrical current or signals.

Local Regulations: Regulations below the state level.

Low-Floor Bus: A bus that, between at least the front (entrance) and rear (exit) doors, has a floor sufficiently low and level so as to remove the need for steps in the aisle between the doors and in the vicinity of these doors.

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

Module: A collection of cells forming a physical and electrical subassembly contained within an enclosure. Singular component of a set of standardized parts used to construct a more complex.

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

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

Pack: A collection of cells or modules described on the basis of electrical or physical attributes, to include Electrical Pack and Physical Pack.

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

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

Pipe: Nonflexible line.

Power: Work or energy divided by time

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

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

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

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

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

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

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

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Serial Data Signals: A current loop-based representation of ASCII or alphanumeric data used for transferring information between devices by transmitting a sequence of individual bits in a prearranged order of significance.

NOTE: An example is the communication that takes place between two or more electronic components with the ability to process and store information.

Special Tools: Tools not normally stocked by the Authority.

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

Standard: A firm guideline from a consensus group.

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

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

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

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

Supplier: Any manufacturer, company or Authority providing units, components or subassemblies for inclusion in the bus that are installed by the Contractor.

Vehicle Inlet: The device on the electrical vehicle into which the connector is inserted for the purpose of transferring energy and exchanging information, integral with the coupler.

NOTE: Since this is a thermally activated device, it does not protect against over-pressure from improper charging practices.

Warrantable End of Life (WEOL): A measure of battery degradation determined as the point at which the batteries can no longer provide the desired energy or power. It is expressed as a percentage of remaining battery capacity as compared with gross capacity at the beginning of useful life. For purposes of this specification, WEOL shall be a measure of the useful and intended life of the energy storage device. WEOL shall be used as a condition for battery replacement and to potentially initiate warranty claims.

Wheelchair: A mobility aid belonging to any class of three- or four-wheeled devices, usable indoors, designed for and used by individuals with mobility impairments, whether operated manually or powered. A “common wheelchair” is such a device that does not exceed 30 inches in width, 48 inches in length, measured 2 inches above the ground, and does not weigh more than 900 lb. when occupied.

Work: Any and all labor, supervision, services, materials, machinery, equipment, tools, supplies and facilities called for by the Contract and necessary to the completion thereof.



### 3. Referenced Publications

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

Any inconsistency in compliance with this Technical Specification and its referenced documents shall be resolved by giving precedence in the following order:

1. Federal requirements (Title 49, FMVSS, etc.)
2. State requirements (in Texas, Title 7 Vehicles and Traffic, Transportation Code of Texas Statutes, etc.)
3. Local requirements
4. Referenced standards, practices, and codes (SAE, ASTM, UL, ISO, etc.)
5. Technical content of this Technical Specification section

### 4. Legal Requirements

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

Buses shall meet all applicable Federal Motor Vehicle Safety Standards (FMVSS) regulations and shall accommodate all applicable Federal Motor Carrier Safety Administration (FMCSA) regulations in effect at the location of the Authority and the date of manufacture.

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

### 5. Overall Requirements

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

#### 5.1. Safety

The bus design, materials used, mechanical, hydraulic, electrical, and Input/ Output Control systems shall be assembled following FMVSS, manufacturer's recommended practices, industry best practices, and applicable legal requirements. All critical components and systems (propulsion, energy storage, steering, fire detection, and sensors) shall be designed with fail safes, overrides, and backup systems if necessary, so that a safe and reliable vehicle is provided to the Authority.

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**5.1.1. Fire Safety**

The bus shall be designed and manufactured in accordance with all applicable NFPA (National Fire Protection Association) codes and standards for fire safety and smoke emission.

**5.1.2. Fire Detection and Alarm**

The bus shall be equipped with a suitable means of automatically detecting fires and overtemperature situations that may cause unsafe or unreliable operation. If the energy storage device(s) is capable of releasing combustible gas, then this same system shall incorporate an integrated gas detection and alarm feature. This system shall employ intrinsically safe detectors capable of reliable operation, alert, and shutdown to ensure safe operation. The system shall include an uninterruptible power supply (UPS) capable of sustaining operation for a period of at least 72 hours regardless of the primary energy source State of Charge (SoC) and remain uninterrupted regardless of “run”/ “ign.” switch position. The quantity, location, and technology for sensors, etc. shall be best practice for the intended application and environment. The manufacturer shall submit their proposed solution for a Fire Detection and Alarm system for the Authority’s review with their response to this RFP.

**5.1.3. Materials**

All materials used in the construction of the passenger compartment of the bus shall be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90-A, dated March 9, 2016 or approved equivalent. Materials entirely enclosed from the passenger compartment, such as insulation within the sidewalls and sub-floor, need not comply. In addition, smaller components and items, such as seat grab rails, switch knobs, small light lenses, door seals, window seals, steering wheel, steering column and escape hatches shall be exempt from this requirement.

It shall be a manufacturers design goal to give careful consideration and preference to passenger evacuation provisions as they relate to doors, windows, and escape hatches.

Fluid lines that are routed inside the passenger compartment shall be guarded against leaking or spilling their contents onto passengers or the operator.

The manufacturer shall submit their standard for the installation for all hydraulic system(s) hoses, pipes, lines, and fittings.

**5.2. Weight**

It shall be a design goal to construct each bus as light in weight as possible without degradation of safety, appearance, comfort, traction, longevity, or performance.

Buses at gross vehicle weight (GVW) shall not exceed the tire factor limits, brake test criteria, structural design criteria or the gross vehicle weight rating (GVWR).

**5.2.1. Curb Weight**

Curb weight of the bus, as defined in section 2.0 of these specifications, shall be minimized to the extent practical without compromising the integrity, durability, safety, or comfort of the vehicle.

*40-ft length bus*

Curb weight: should not exceed 35,000 pounds.

*60-ft length bus*

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Curb weight: shall not exceed 49,500 pounds.

### 5.3. Capacity

The vehicle shall be designed to carry the gross vehicle weight, which shall not exceed the bus GVWR and shall not exceed the GAWR.

### 5.4. Service Life

The minimum useful design life of the bus body and chassis in transit service shall be at least 12 years or 500,000 miles. The vehicles shall be capable of operating at least 40,000 miles per year, including the 12th year.

### 5.5. Maintenance and Inspection

Scheduled maintenance tasks for buses shall be related and shall be in accordance with the manufacturer's recommended preventive maintenance schedule (along with routine daily service performed during the servicing). The overall PM schedule for buses shall be based upon a minimum of a 6,000 miles interval and/or multiples of same.

Based upon the operating profile defined in section 6.5, routine scheduled maintenance actions, such as filter replacement and adjustments, shall not be required at intervals less than 6,000 miles. Higher levels of scheduled maintenance tasks shall occur at even multiples of mileage for lower level tasks and only on one of the following mileage intervals: 6K, 12K, 18K, 24K, 36K, 48K, 72K, or 144K miles.

The manufacturer shall provide a Standard Repair Time in the service manual listing the times required for typical repair and service items on the bus.

Checking the operation of systems or components, such as door sensitive edge, that requires a tool, shall not be required at interval levels of less than 6K miles. Any other maintenance and inspection requirements requiring a tool that are at a higher level than the "no-tool required" Operators Pre-Trip inspection and Fuel/Wash/Clean Service, shall be performed by a trained vehicle technician at intervals of not less than 6K miles.

Any special tools that are specific to the manufacturer's vehicle and are required to maintain the bus shall be listed and presented as one of the required submittals.

The manufacturer shall be responsible for providing a written comprehensive 52-week and long-term rehab/replacement maintenance plan encompassing buses for their entire useful life. The plan should include times (in hours) to complete the jobs.

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

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

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

The Contractor shall provide a list of all special tools and pricing for maintaining this equipment.

NOTE: Tools such as compartment door keys, bellows gauges and other tools required for daily maintenance and inspection shall not be included in the special tools list and shall be furnished for each bus.

#### **5.6. Interchangeability**

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

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

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

The Authority shall review proposed product changes on a case-by-case basis, reserves the right of final approval, and shall have the right to require extended warranties to ensure that product changes perform at least as well as the originally supplied products.

#### **5.7. Technical/Service Representatives**

The Contractor shall have one or more competent technical service representatives on site during commissioning of each vehicle. Commissioning shall be taken to mean the time period starting when a battery electric bus is delivered to when the vehicle is placed into revenue service. The Contractor shall, at its own expense, have one or more competent technical service representatives available on request to assist the Authority in the solution of engineering or design problems within the scope of the specifications that may arise during the warranty period. This does not relieve the Contractor of responsibilities of the vehicle's warranty.

#### **5.8. General Operating Environment**

The bus shall at a minimum be capable of satisfying the requirements of this specification while operating in ambient temperature ranges of 10 °F to 115 °F, at relative humidity between 50 and 100 percent, and at altitudes up to 1000 ft above sea level. Degradation of performance due to atmospheric conditions shall be minimized at temperatures below 10 °F, above 115 °F or at altitudes above 1000 feet.

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**5.8.1. Water Test**

Each bus shall be capable passing a water test. The water test shall require each bus to be sprayed continuously with water on the top and sides of the vehicle for a minimum of 15 minutes to verify all seal integrity.

**5.9. Noise**

The manufacturer is expected to meet interior and exterior noise requirements specified in Sections 5.9.1 and 5.9.2. Furthermore, it shall be a design goal to minimize noise emitted by and allowed into the interior cabin of the vehicle. Component layout and packaging, material selection, and build quality shall reflect that goal.

**5.9.1. Interior Noise**

The combination of inner and outer panels and any material used between them shall provide sufficient sound insulation so that a sound source with a level of 80 dBA measured at the outside skin of the bus shall have a sound level of ~~65~~ **78** dBA or lower at any point inside the bus. These conditions shall prevail with all openings, including doors and windows, closed and with the propulsion/drive system and accessories switched off. Refer to section 11.5 that describes resonance and vibration.

Maximum internal noise level shall not exceed ~~65~~ **78** dBA in the operator's area near normal operator ear level or all other areas in the interior of the vehicles under all normal operating conditions at locations inside the bus in adherence with the standards of ISO 5128.

The interior design of the vehicle shall be such that drumming, squeaks, and rattles are eliminated.

**5.9.2. Exterior Noise**

The airborne noise generated by the bus and measured from either side shall not exceed 80 dBA under full-power acceleration when operated at 0 to 35 mph at curb weight. The maximum noise level generated by the bus pulling away from a stop at full power shall not exceed 80 dBA. The bus-generated noise at curb idle shall not exceed 65dBA. If the noise contains an audible discrete frequency, a penalty of 5 dBA will be added to the sound level measured. Manufacturer will comply with the exterior noise requirements defined in local laws and ordinances in effect in and around the greater Austin, Texas area at the time of manufacture and SAEJ366.

The "Pedestrian Audible Alert" described in section 30.5 is exempted from noise limits within this section.

Variable sounds caused by mechanical, hydraulic and pneumatic systems shall be oriented to emit sounds away the curbside of the vehicle and muffled when possible.

**5.10. Respect for the Environment**

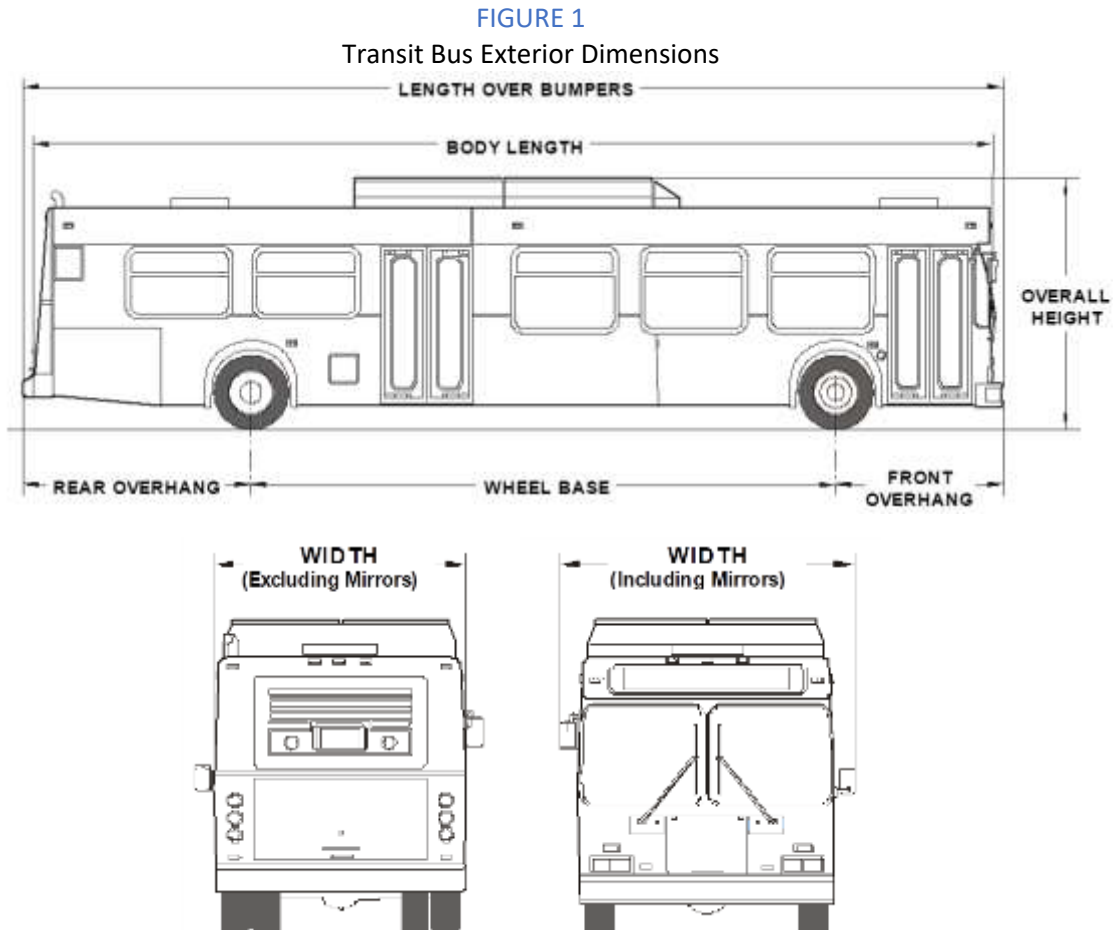
In the design and manufacture of the bus, the Contractor shall make every effort to reduce the amount of potentially hazardous waste. In accordance with Section 6002 of the Resource Conservation and Recovery Act, the Contractor shall use, whenever possible and allowed by the specifications, recycled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

The Contractor shall provide a plan for reuse or recycling of replaced battery cells and/or battery packs.

# DIMENSIONS

## 5.11. Physical Size

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



### 5.11.1. Bus Length (40-foot and 60-foot)

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

- 40-foot bus: 40 ft to 44 ft, 11 in.
- 60-foot (articulated) bus: 59 to 65 ft

### 5.11.2. Bus Width (40-foot and 60-foot)

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

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5.11.3. Bus Height (40-foot and 60-foot)

Maximum overall height shall be 140 inches, including all rigid, roof-mounted items such as A/C, exhaust, fuel system, covers, etc. The manufacturer shall provide and install a decal stating the vehicle's clearance height easily visible in the operator's area. The Authority reserves the right of final approval for the clearance height decal configuration and location.

5.12. Step Heights (40-foot and 60-foot)

5.12.1. Doorway Step Heights

The step height at each doorway **should** **shall** be at a height so that the vehicle complies with the "near level" boarding requirement as specified in Section 15.6. **No doorway step heights should not shall** exceed 14.0 in. at normal ride height, measured from a level street surface to the top of the floor in the door threshold. Refer to section 15.6 for "near Level" boarding.

5.12.2. Step Height at Rear Interior of Coach

A maximum of two steps are allowed to accommodate a raised aisle floor in the rear interior of the bus. Step requirements shall be the same requirements as OSHA regulations. Refer to section 12.3.4 Rear step to rear platform requirements.

5.13. Ramp Clearances

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

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

The breakover angle is the angle measured between two lines tangent to the front and rear tire static loaded radius and intersecting at a point on the underside of the vehicle that defines the largest ramp over which the vehicle can roll. Refer to table 2A and figure 2.

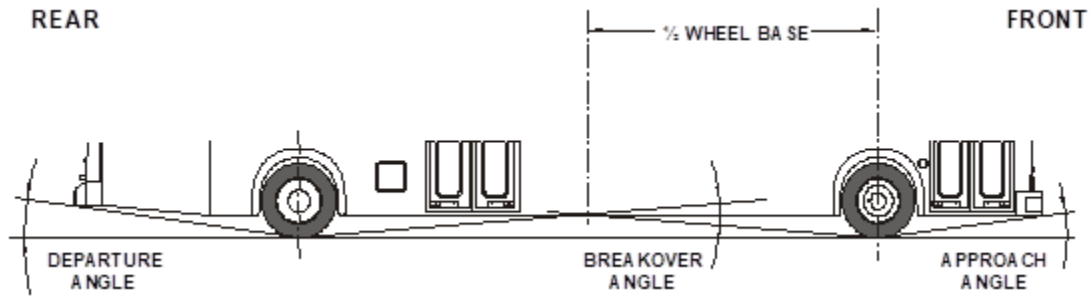
**TABLE 2A**

Default Breakover Angle

Angle	30 to 45 ft Bus	60 ft Bus
Approach	8.6 deg (min.)	8.6 deg (min.)
Front breakover	8 deg (min.)	10.2 deg (min.)
Rear breakover (articulated only)	N/A	8.7 deg (min.)
Departure	8.6 deg (min.)	8.6 deg (min.)

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FIGURE 2



#### 5.14. Ground Clearance

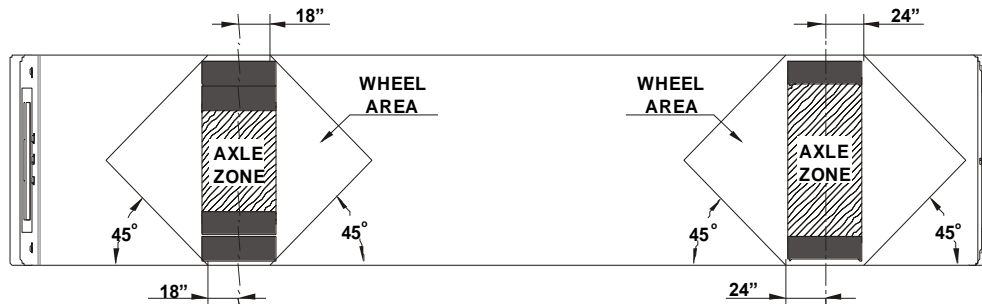
Ground clearance shall be no less than 10 inches, except within the axle zone and wheel area.

Axle zone clearance, which is the projected area between tires and wheels on the same axial centerline, shall be no less than 5.5 inches.

Wheel area clearance shall be no less than 8 in. for parts fixed to the bus body and 6 in. for parts that move vertically with the axles.

FIGURE 3

Transit Bus Minimum Road Clearance



#### 5.15. Floor Height

Height of the step above the street shall be no more than 16 in. measured at the centerline of the front and rear doorway. All floor measurements shall be with the bus at the design running height and on a level surface and with the standard installed tires. A maximum of two steps are allowed to accommodate a raised aisle floor in the rear of the bus.

#### 5.16. Interior Headroom

Headroom above the aisle and at the centerline of the aisle seats shall be no less than 76.75 inches in the forward half of the bus, tapering to no less than 74 inches forward of the rear settee. At the centerline of the window seats, headroom shall be no lower than 61 inches. Headroom at the back of the rear bench seat may be reduced to a minimum of 48 inches, but it shall increase to the ceiling height at the front of the seat cushion. In any area of the bus directly over the head of a seated passenger and positioned where a passenger entering or leaving the seat is prone to strike his or her head, padding shall be provided on the overhead paneling.



# VEHICLE PERFORMANCE

## 6. Power Requirements

The propulsion and drive system shall be sized to provide sufficient power to enable the bus to meet the defined acceleration, top speed, route, GVWR and gradeability requirements, while operating all accessories. This shall be verified using actual road test results and/or simulated vehicle performance data.

### 6.1. Top Speed

The bus shall be capable of achieving a speed of 60 mph on a straight, level road at GVWR with all accessories operating. The vehicle shall be governed to a maximum of 65 mph. The bus shall be capable of safely maintaining the vehicle speed according to the recommendations by the tire manufacturer. Manufacturer shall supply the Authority with data if there is a variance between peak performance and sustained vehicle performance.

#### 6.1.1. Yard Speed Control

The vehicle shall be equipped with a Yard Speed Control device (functionality) consisting of a manually operated dash switch which when activated prevents the vehicle from exceeding 5 miles per hours. While engaged, a visual indicator shall be illuminated on the dash. The device shall be configured to be failsafe such that if it fails, the device disengages.

### 6.2. Startability and Gradeability

The propulsion system shall enable the bus to start from a full stop on dry commercial asphalt or concrete pavement at GVWR with all accessories operating and achieve and maintain a speed of 40 mph on a 2.5 percent ascending grade continuous, 10 mph on a 10 percent ascending grade continuous, and 7 mph on a 16 percent ascending grade for a minimum of 60 seconds.

### 6.3. Acceleration

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

**TABLE 3**

Maximum Start Acceleration Times on a Level Surface (Note 1. below)

Speed (mph)	Maximum time (seconds)
10	5
20	10
30	18
40	30
50	60
65	145

Note 1.- Vehicle weight = GVWR

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**6.4. Braking System Performance**

Braking application and performance shall remain consistent regardless of battery system state of charge (SoC) or other variances related to regenerative braking.

**6.5. Operating Range (40-foot and 60-foot)**

In addition to the Altoona-defined profile, the bus must also be able to meet the Authority operating profiles addressing the needs presented below. The Proposer must validate that the proposed bus will meet the Authority operating profiles using sound mathematical modeling and simulation or empirical methods. Proposers must demonstrate the agreement of their mathematical models and methods against Altoona results using the Manhattan cycle, the Orange County cycle and the EPA HD-UDDS cycle test results from the Energy Economy and Range Test.

The Authority operating profiles must be met under maximum auxiliary loads and at GVWR. It is assumed that buses will start daily duty cycle at maximum standard operating SoC. Batteries shall not be depleted below minimum standard operating SoC during operations. Minimum standard operating SoC shall allow for reserve battery capacity that the bus can draw upon to return to the closest charging point in degraded mode. Charging of the batteries during normal operations shall not exceed maximum standard operating SoC at any time during charging.

Nominal conditions

- Ambient temperature: 68 °F
- Bus weight: SLW

Worst-case conditions

- Ambient temperature: 110 °F
- Bus weight: GVWR

The following are general operating profile data: Expo Rapid

Average route speed (nominal)	___12.6___	mph
Average route speed (worst case)	___12.6___	mph
Average distance between stops	___0.55___	miles
Maximum required trip duration	___68.0___	minutes
Average required trip duration	___60.1___	minutes
Distance from depot to start of route	___10.5___	miles
Longest distance from depot	___11.0___	miles
Average miles per bus per day	___180.4___	miles
Longest miles per day for a bus	___249.8___	miles
Minimum layover time for charging during day	___19.0___	minutes
Average layover time for charging during day	___unknown___	minutes
Available depot charge time	___3.0___	hours
Minimum depot charge time required for full charge	___3.7___	hours
Maximum number of buses required to operate daily	___16___	buses

The following are general operating profile data: Pleasant Valley Rapid

Average route speed (nominal)	___14.2___	mph
Average route speed (worst case)	___14.2___	mph
Average distance between stops	___0.77___	miles
Maximum required trip duration	___74.0___	minutes

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Average required trip duration	___68.2___	minutes
Distance from depot to start of route	___13.1___	miles
Longest distance from depot	___19.4___	miles
Average miles per bus per day	___190.7___	miles
Longest miles per day for a bus	___297.2___	miles
Minimum layover time for charging during day	___19.0___	minutes
Average layover time for charging during day	___unknown___	minutes
Available depot charge time	___3.0___	hours
Minimum depot charge time required for full charge	___3.7___	hours
Maximum number of buses required to operate daily	___19___	buses

## 6.6. Altoona Energy Economy and Range Tests

The Altoona Energy Economy and Range Test for buses is an energy consumption and range test for battery electric buses under Altoona’s pass/fail procedures. Buses are tested using the Manhattan cycle (a low average speed, highly transient urban cycle), the Orange County cycle (consists of urban and highway driving segments), and the EPA HD-UDDS cycle test results from the Energy Economy and Range Test or other applicable test procedures. Results shall include vehicle configuration and test environment information. Altoona Energy economy data shall be provided for each duty cycle.

# POWERPLANT

## 7. Propulsion System

### 7.1. Propulsion System Description

The bus shall be powered by an electric propulsion system. The electric propulsion system shall conform to SAE J2910 and SAE J2344. SAE J2344 shall be applied as it pertains to commercial vehicles (i.e., transit buses).

The propulsion system shall not be supplemented by any onboard range extenders, including but not limited to internal combustion engines, gas turbines and/or hydrogen fuel cells.

The Manufacturer shall ensure that the bus structure is suitable for the electric propulsion system and can be operated safely for the service life of the bus without structural failure. The propulsion system shall comply with applicable local, state and/or federal emissions requirements.

Labels should be posted on high-voltage devices to identify them as components conducting high-voltage potential. These labels shall be applied in such a way that they can be seen when access doors are opened or closed, to protect both emergency first responders and maintenance personnel.

In the event of a propulsion system shutdown a control (override switch) shall be available to the operator to allow a 30-second override, which when depressed, will allow the operator to delay the propulsion drive system shutdown to “get out of harm’s way” but not the de-activation of the alarm system. A loss of power to the bus shall not cause the driver to lose control of the bus or to lose steering or braking. The bus shall be able to be safely brought to a controlled stop.

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### 7.2. Propulsion System Service

The propulsion system shall be arranged so that accessibility for all routine maintenance is ensured i.e. the traction motor mounts shall be easily visible for routine inspection. No special tools, other than dollies and hoists, shall be required to remove the propulsion system or any subsystems. The Authority recognizes that properly rated test equipment and safe electrical work practices are essential when servicing high-voltage components. The Contractor shall identify safe electrical work practices that are essential when servicing high-voltage components.

### 7.3. Energy Storage System Design

The Energy Storage System (ESS) shall be of a commercial design capable of operation in the Authority's operating environment and operating profile as described in Sections 5.8 and 6.5. The ESS shall use battery technology with a field-proven track record of safe, reliable, and durable operation in similar transit applications. The ESS shall be designed, sized, and selected to ensure that the vehicle performance specifications, compatibility with charging, and other related requirements are met or exceeded, bearing in mind cost/benefit and reliability variables as they relate to the characteristics of the different battery types.

The ESS shall comply with ECE R100 Revision 2, UN/DOT 38.3, and/or SAE J2464 requirements for lithium batteries **prior to the delivery of the first bus**. If non-lithium batteries are proposed, the ESS shall comply with similar applicable standards.

The manufacturer shall deliver the bus with an installed, functioning ESS, charged with sufficient usable energy for delivery and to be maneuvered around the Authority's property. The ESS shall be fully formed, installed, and tested in accordance with the battery manufacturer's recommended practices.

The battery system shall be capable of withstanding the current and voltage profiles necessary to accomplish daily depot charging and on route charging of up to 450 kW.

Thermal management will be provided as needed to ensure optimal life and performance of the ESS over the environmental operating range. The battery thermal management system shall be adequate to maintain the battery within the battery manufacturer's recommended temperature range during operation in the specified duty cycle and climatic conditions.

Thermal management system shall be compatible and fillable with the Authority's fleetwide selected coolant: Fleetgard ES Compleat (blue).

### 7.4. Energy Storage System Capacity

The ESS shall have sufficient energy storage to meet the requirements of the intended duty cycle when new and up until the degradation has reached warrantable end of life (WEOL) of 80% of original energy storage capacity.

The ESS will be measured periodically during the 12-year design life of the bus per the following protocol by the bus manufacturer at an interval or at a minimum the battery manufacturer's recommended interval. The bus manufacturer shall provide their test method for measuring the ESS system WEOL and certify that the results are true and accurate. The test will be performed according to a documented test procedure. The Authority shall be allowed to engage third parties for capacity testing.

### 7.5. Energy Storage System Safety

The ESS shall be placed on the bus to optimize both interior space and vehicle weight distribution. The batteries shall be load-distributed within the bus to equalize weight between the wheels on the same axles and to achieve appropriate weight distribution between axles so as not to adversely affect handling of the bus.

The bus body shall be designed and constructed to ensure that passengers and the operator will not be exposed to hazardous electrical current. This design shall also minimize potential exposure to hazardous electrical current in the event of a vehicle accident. The vehicle and energy storage system shall be designed and constructed to prevent gassing or fumes from the energy storage system from entering the interior of the bus, i.e., a vent path to the exterior, preferably at or above the roof, rearward.

The battery manufacturer shall attest in writing to the safety of the proposed battery system in the specified application and charging profile and shall include along with this RFP full disclosure and discussion of any and all relevant issues or prior incidents relating to safety.

Both automatic and manual battery disconnect devices must be included and documented. Contactors shall be rated to interrupt the full load of the bus. Service and emergency manual disconnect(s) must be included and their usage documented. Contractor shall provide a means to isolate the high-voltage battery during maintenance operations. Manual and automatic disconnects should open both poles of each physical battery pack.

The HV system and ESS shall include isolation protection between the HV and bus chassis system, to include automatic detection of isolation faults, alerts to the operator, diagnostic system, and appropriate action to prevent personnel from HV exposure. Detection, alerting and vehicle control shall occur in accordance with SAE J2910. Detection shall be provided at two levels, as per J2910, and detection at any level shall be alerted to the operator and maintenance personnel.

The system described above shall also be an integral part of the overall emergency shutdown system, with functions to include the following:

- Offers a quick, safe, and organized means for the operator, maintenance personnel and/or first responders to shut down the HV system.
- “opening” of all HV contactors
- discharging of capacitors (if used)
- disconnecting of any devices that could provide HV during normal operation and including during charging
- Devices used to initiate shutdown shall be located within and outside the bus to satisfy ease of use by the mentioned personnel and shall be clearly marked as to location and use.
- There shall be more than one location on the vehicle from which to initiate HV batteries disconnect, such as first responders.
- In addition to manual use, this same functionality shall extend to the charging operation in the event of a fault sensed by the GFI, to also include termination of charge.

### 7.6. Battery Containers

Battery containers or electrical packs shall be constructed to withstand the rigors of transit service for the design life of the bus. Construction shall be of materials compatible with the battery electrolyte. All electrical connections shall be fully shielded and hand operable. Connector and cabling design shall be

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such that inappropriate or unsafe connections are prevented. Vent-and-fill system components for individual battery packs or containers shall not require any disassembly on removal or installation of the battery packs or containers. Electrical pack design must comprehend the protection of battery cabling and vent/watering system components during pack removal and installation. The batteries, when installed, shall be secured to the chassis to prevent any movement that may cause damage or personal harm while the vehicle is in operation.

#### **7.7. Battery Management System**

The battery management system must be designed to ISO 26262, as applicable, safety principles to control state of charge, voltage, current, and temperatures on a cell-to-cell level and provide diagnostic output at the lowest field-serviceable element. The diagnostic output must be made available to the maintainer via a report available on the multi-functional dash screen. Reference section 23.5.1 Multi-Function Display. Diagnostic ports for the battery management system shall be made available at a minimum in two locations at the interior rear of the vehicle and within four feet of the operator seat if not available via the vehicle body control system. Both locations shall be behind easily accessible hinged access doors as described in section 31.12.

At a minimum, the battery management system (BMS) shall perform the following functions:

1. Monitoring the voltage of cells within each battery pack. The BMS must be able to read individual battery or block voltages at a frequency sufficient to ensure reliable, functional and safe operation.
2. Monitoring battery temperatures, mitigating damage to the battery and surroundings, and preventing thermal runaway.
3. Communicating when a battery fault (as defined by the battery manufacturer) has occurred and must be able to identify and communicate the location of the faulty battery in order to perform maintenance.
4. Engaging prudent safety interlocks when an unsafe battery condition has been detected.
5. Monitor the battery SoC and provide information to the rest of the vehicle.
6. Communicate all data to the bus level information system (reference section 40.1 Data Communications) for storage and communication.
7. Able to reset/ restore a connection to a battery “pack” or “string” when disconnected for “out of tolerance” conditions.

##### **7.7.1. Battery Thermal Management**

Thermal management of the batteries shall be provided to ensure optimal life and performance of the Energy Storage System over the environmental operating range.

Battery temperatures must never exceed the manufacturer’s recommended range during operation in the Authority’s operating profile and specified ambient conditions. Battery cooling must be sufficient to prevent the temperature from exceeding the battery manufacturer’s recommended maximum temperature.

## 7.8. Battery Charging

The buses will be used interchangeably between depot-only and on-route charging strategies, and therefore shall be capable of being charged by both plug in type chargers and by overhead pantograph down style chargers.

The bus shall support SAE-approved charging standard (SAE J1772, ~~J3068~~, and SAE J3105 as applicable).

All charging systems provided for use with the bus and in conjunction with the battery management system must comply with the battery manufacturer's electrical and thermal limits.

The bus shall be immobilized during all charging operations. Upon successful engagement of the charging interface, the bus shall be interlocked such that propulsion is rendered non-tractive and the brakes applied. The bus shall be immobilized at any point when connected to the charger, meaning regardless of the charger's state "charging or not charging" when connected the bus shall be immobilized.

### 7.8.1. Plug-In Charging (40 and 60-foot)

The vehicles (40 and 60-foot) shall be capable of accepting plug in charging via receptacles (vehicle inlets) located on both the left and right sides of the bus, within ~~2-feet~~ 30 inches from the rear of the vehicle, and located within a range of height from grade at normal suspension ride height between 30 and 50 inches. These receptacles shall be designed to accept charging at rates as high as 150 kW.

### 7.8.2. Overhead Conductive Charging (40 and 60-foot)

The vehicles (40 and 60-foot) shall be capable of accepting overhead pantograph down type charging at a charging rate of up to 450 kW. The design shall be compatible for use as both on route charging (fast charging) and depot charging.

#### 7.8.2.1. Roof Rails

The roof contact rails shall be equipped with a de-icing device or heating system to assure operation in inclement weather. The rails shall accept a pantograph of standard size by a multitude of pantograph suppliers.

## 7.9. Propulsion System Controller (PSC)

The PSC shall regulate energy flow throughout system components to provide motive performance and accessory loads, as applicable, while maintaining critical system parameters (voltages, currents, temperatures, etc.) within specified operating ranges. The controller shall monitor and process inputs and execute outputs as appropriate to control the operation of all propulsion system components.

## 8. Cooling Systems

The capacity of the cooling system shall be adequate to maintain design component temperatures under all operating conditions for the design life of the vehicle in the service area and environment of the Authority. The cooling system shall be equipped with an electronic detection device to indicate overheating on the driver's control panel.

Operation of required battery thermal management systems shall be automatically controlled under all normally encountered operating and charging conditions and shall be powered by an onboard source at all times. Thermal management shall be continuously monitored during all periods of charge and discharge with appropriate safety interlocks installed to react to adverse conditions.



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Air intakes shall be properly positioned and configured to minimize the intake of water, road dust and debris and shall be adequately filtered.

In the event of a failure of the battery thermal management system while charging, the charge system shall be disabled and a visual alert shall be activated on the dashboard, the reset of which shall require the deliberate action of maintenance personnel. In the event of a failure of the battery thermal management system during bus operation, an audible and visual alert shall be activated on the dashboard, the reset of which shall require the deliberate action of maintenance personnel. In the event of a fire onboard a bus, thermal management fans shall be automatically turned off.

#### 8.1. Component Thermal Management

Under the vehicle operating temperature range, the thermal management system shall be designed such that each component will operate within its respective operating range.

Component temperature sensors may be used for monitoring, control, or component/system protection. If equipped and serviceable, component temperature sensors shall be easily accessible. Under typical failure modes or out-of-limit conditions, component temperature sensors shall not disable the bus unless there is an immediate risk of hazardous fault propagation (e.g., temperature levels in the motor area known to start fires). In the event that a component temperature sensor must disable the bus, the component/system must comply with the automatic propulsion system protection/shutdown override feature requirement of section 7.1.

Motor cooling fans shall be of durable, corrosion-resistant construction and designed so a mechanic can gain access. The cooling fan and mounting bracket shall be designed to withstand the thermal fatigue and vibration associated with the installed configuration.

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

The radiator shall be of durable, corrosion-resistant construction with either removable or non-removable tanks.

For roof mounted radiators, a pressure filler shall be provided in the rear compartment no more than  $\pm 60$  inches above the ground.

The radiator/ cooling assembly shall be made of replaceable or serviceable components (i.e., fans, mounting brackets, radiator core).

##### 8.1.1. Radiator Screen

No requirement of a screen in front of radiator. If the proposer offers a screen it shall be an easily cleanable screen designed to collect large debris.

##### 8.1.2. Coolant

Coolant shall have: 1,000,000-mile coolant approximate life expectancy, provide antifreeze and anti-boil protection, provided aluminum and solder protection, compatible with gaskets, elastomers and other non-metallics in battery modules, traction motors, and other components, and contains scale inhibitors (compatible with Fleetguard "Compleat ES" (blue)).



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The cooling system(s) shall be equipped with a properly sized serviceable water filter/ screen filter. ~~and a spin-on element that has an automatic system for releasing supplemental coolant additives as needed to replenish and maintain protection properties.~~ The manufacturer shall design the cooling system so that when servicing or replacing the water filter/ screen filter assembly or the spin-on element, only the fluid in the filter assembly or spin-on element will be lost.

**8.1.3. Fan Drive Design**

The bus shall be equipped with an electric fan drive bus cooling system, including a safety screen guard which must be installed on electric motor fans per SAE J1308.

**8.1.4. Transmission Cooling**

If a transmission is present in the bus, the transmission shall be cooled by a heat exchanger sized to maintain operating fluid within the transmission manufacturer's recommended parameters of flow, pressure, and temperature. Where applicable, the transmission cooling system shall be matched to the retarder (if present) and motor cooling systems to ensure that all operating fluids remain within recommended temperature limits established by each component manufacturer. ~~Where applicable, the motor cooling system should provide coolant bypass flow to the transmission cooling system with the motor thermostats closed (if thermostats are used).~~ If transmission cooler is a "stand alone" it shall be sized correctly so that operating fluids remain within the manufactures' operating limits.

## **9. Propulsion Drive / Transmission**

**9.1. Transmission, if equipped**

If a multiple-speed transmission is used, the transmission shall be automatic shift with electronic controls. Gross input power, gross input torque and rated input speed shall be compatible with the propulsion system. The transmission/ propulsion drive shall be designed to operate for not less than 300,000 miles on the operating profile without replacement or major service. The transmission should be easily removable without disturbing the traction motor and accessible for service.

**9.2. Drivetrain Controls**

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

The electronically controlled transmission shall have onboard diagnostic capabilities, be able to monitor functions, store and timestamp out-of-parameter conditions in memory, communicate faults, and vital conditions to service personnel. The transmission shall contain built-in protection software to guard against severe damage. The onboard diagnostic system shall trigger a visual alarm to the driver when the electronic control unit detects a malfunction. There shall be two locations for diagnostic ports for the drivetrain made available, one at the rear interior of the vehicle and one within four feet of the

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operator seat, if maintenance functionality is not available via the vehicle body controller. Both diagnostic ports shall be behind easily accessible hinged access doors as described in section 31.12.

An electronic transmission fluid level monitoring and protection system shall be provided.

A brake pedal application of 6 to 10 psi shall be required by the driver to engage forward or reverse range from the neutral position to prevent sudden acceleration of the bus from a parked position.

### 9.3. Hill Holder

A vehicle hill holder function shall be integrated with an automatic or reduced propulsion load state function to prevent inadvertent vehicle movement while the transmission is not in forward range.

### 9.4. Automatic Neutral Function with Automatic Reengagement

The transmission/ propulsion drive, when in forward direction, may automatically shift the transmission to neutral when the vehicle registers zero road speed, propulsion system is idle and service brakes are applied. If the status of any one or more of the three signals changes, then the transmission shall immediately and automatically resume forward mode operation.

### 9.5. Transmission/ Propulsion Drive(s) Mounting

All electrical/electronic hardware shall be serviceable. All electrical/electronic hardware mounted in the interior of the vehicle shall be resistant to tampering from passengers.

All electrical/electronic hardware mounted on the exterior of the vehicle that is not designed to be installed in an exposed environment shall be mounted in a protective enclosure. The hardware shall be mounted in such a manner as to protect it from the environment.

All electrical/electronic hardware and its mounting shall comply with the shock and vibration requirements of SAE J1455.

### 9.6. Transmission/ Propulsion Drive System Service/ Routine Maintenance

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

Mechanical propulsion components requiring lubricant shall have easily accessible filling systems with filler caps that prevent leakage. All fluid fill locations shall be properly labeled in a permanent manner to help ensure that correct fluid is added. All fillers shall be easily accessible with standard funnels, pour spouts and automatic dispensing equipment. All lubricant sumps shall be fitted with magnetic-type drain plugs or magnets in pan.

## 10. Hydraulic Systems

Hydraulic system(s) service tasks shall be minimized and scheduled no more frequently than those of other major coach systems or in accordance with the maintenance requirement in section 5.5. All elements of the hydraulic system(s) shall be easily accessible for service or unit replacement. Critical points in the hydraulic system(s) shall be fitted with service ports so that portable diagnostic equipment may be connected or sensors for an off-board diagnostic system permanently attached to monitor system operation when applicable. A tamperproof priority system shall prevent the loss of power steering during operation of the bus if other devices are also powered by the hydraulic system(s).

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The hydraulic system(s) shall operate within the allowable temperature range as specified by the lubricant manufacturer.

#### Hydraulic System Sensors

Sensors in the main hydraulic system shall indicate out of range conditions on the driver's onboard diagnostic panel/ dash. Out of range conditions include but not limited to low hydraulic fluid level, temperature overlimit, electric overcurrent, etc.

The hydraulic system specifications shall apply to a wheelchair ramp should the ramp be hydraulically driven.

#### 10.1. Fluid Lines

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

Lines shall be as short as practicable and shall be routed or shielded so that failure of a line shall not allow the contents to spray or drain onto any component operable above the auto-ignition temperature of the fluid.

#### 10.2. Fittings and Clamps

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

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

#### 10.3. Hydraulic System Radiator/ Heat Exchanger

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

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

#### 10.4. Hydraulic System Heat Exchanger Fluid Transfer Lines

All systems lubrication shall meet or exceed component manufacturer's recommendation for installation, operation, and maintenance. The fluid transfer lines shall be designed and intended for use in the environment where they are installed (for example, high-temperature resistant in the rear compartment, resistant to road salts near the road surface and so on). Fluid lines shall not be the lowest point of the bus undercarriage.

## STRUCTURE

### 11. Chassis General

#### 11.1. Design

The structure of the bus shall be designed to withstand the transit service conditions typical of an urban or intercity duty cycle throughout its service life. The vehicle structural frame shall be designed to operate with minimal maintenance throughout the 12-year design life.

#### 11.2. Altoona Testing

Prior to submitting the proposal, the vehicle must have completed and received a passing score in the FTA-required Altoona testing. A copy of the Altoona Test Report shall be provided to the Authority as part of the proposal.

Any items that required repeated repairs or replacement during the Altoona testing must have undergone corrective action with supporting test and analysis. A report clearly describing and explaining the failures and corrective actions taken to ensure that any and all such failures will not occur shall be submitted to the Authority.

#### 11.3. Structural Validation

The structure of the bus shall have undergone appropriate structural testing and/or analysis. At minimum, appropriate structural testing and analysis shall include Altoona testing or finite element analysis (FEA).

#### 11.4. Distortion

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

#### 11.5. Resonance and Vibration

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

#### 11.6. Propulsion Compartment Bulkheads

The passenger and propulsion system compartments shall be separated by a fire-resistant bulkhead. This bulkhead shall preclude or retard propagation of a compartment fire into the passenger compartment and shall be in accordance with the Recommended Fire Safety Practices defined in FTA

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Docket 90A, dated Oct. 20, 1993. Only necessary openings shall be allowed in the bulkhead, and these shall be fire-resistant. Any passageways for the climate control system air shall be separated from the rear compartment by fire-resistant material. Piping through the bulkhead shall have fire-resistant fittings sealed at the bulkhead. Wiring may pass through the bulkhead only if connectors or other means are provided to prevent or retard fire propagation through the bulkhead. Rear compartment access panels in the bulkhead shall be fabricated of fire-resistant material and secured with fire-resistant fasteners. These panels, their fasteners and the bulkhead shall be constructed and reinforced to minimize warping of the panels during a fire that will compromise the integrity of the bulkhead.

#### **11.7. Crashworthiness**

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

The bus shall withstand a 25 mph impact by a 4000 lb. automobile at any side, excluding doorways, along either side of the bus and the articulated joint, if applicable, with no more than 3 in. of permanent structural deformation at seated passenger hip height. This impact shall not result in sharp edges or protrusions in the bus interior.

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

#### **11.8. Corrosion**

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

All materials that are not inherently corrosion resistant shall be protected with corrosion-resistant coatings. All joints and connections of dissimilar metals shall be corrosion resistant and shall be protected from galvanic corrosion. Representative samples of all materials and connections shall withstand a two-week (336-hour) salt spray test in accordance with ASTM Procedure B-117 with no structural detrimental effects to normally visible surfaces and no weight loss of over 1 percent.

#### **11.9. Towing**

Towing devices shall be provided on each end of the vehicle. 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 deg of the longitudinal axis of the bus. The rear towing device(s) shall not provide a toehold for unauthorized riders. The method of attaching the towing device shall not require the removal or disconnection of front suspension or steering components. Removal of the bike rack is permitted for attachment of towing devices. The OEM shall provide the towing procedure.

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Shop air connectors shall be provided at the front and rear of the bus and shall be capable of supplying all pneumatic systems of the bus with externally sourced compressed air. The location of these shop air connectors shall facilitate towing operations.

A plug connector, if standard, should be permanently mounted at the front of the bus and shall provide for bus tail lamp, marker, stop and turn signal lamp operation as controlled from the towing vehicle. The connector shall include a spring-loaded dust- and water-resistant cap. Manufacturer/ proposer shall propose the plug connector style subject to approval by the Authority.

#### 11.9.1. Lifted (Supported) Front Axle and Flat Towing Capability

The front towing devices shall allow attachment of adapters for a rigid tow bar and shall permit the lifting of the bus until the front wheels are clear off the ground in order to position the bus on the towing equipment by the front wheels. These devices shall also permit common flat towing.

Two rear recovery devices/tie-downs shall permit lifting and towing of the bus for a short distance, such as in cases of an emergency, to allow access to provisions for front towing of the bus. The method of attaching the tow bar or adapter shall require the specific approval of the Authority. Any tow bar or adapter exceeding 50 lb. should have means to maneuver or allow for ease of use and application. Each towing device shall accommodate a crane hook.

### 11.10. Jacking

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

#### 11.10.1. Jacking Pad Requirements

Jacking pads shall be painted safety yellow.

Decals for jacking pads not required. The Authority reserves the right of final approval should jacking pad decals be provided.

### 11.11. Hoisting 40 and 60-foot

The bus axles or jacking plates shall accommodate the lifting pads of the Authority's current hoist systems. A set of adapters shall be supplied for each bay if required. Jacking plates, if used as hoisting pads, shall be designed to prevent the bus from falling off the hoist. Other pads or the bus structure shall support the bus on jack stands independent of the hoist.

The vehicle shall be capable of lifting by the wheels and, as necessary to meet tire load requirements, the proper number for wheel lifts and/or adapters must be used.

## 12. Floor

The floor shall be essentially a continuous plane, except at the wheel housings and platforms. Where the floor meets the walls of the bus, as well as other vertical surfaces such as platform risers, the surface edges shall be blended with a circular section of radius not less than ¼ inch. Similarly, a molding or cover

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

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

A floor drain is not required. However, if a floor drain is installed it should be of noncorrosive materials on the bus behind the front, curbside wheelhouse near the wall to help drain any water that may accumulate due to ice, snow, rain, etc. The drainpipe shall be approximately 1½ in. in diameter and shall extend no more than 5 in. below the floor. The drainpipe shall be fitted with a rubber drain spout to minimize or prevent air drafts to the interior of the bus. The strainer shall be firmly retained but also removable to allow flushing of any accumulated debris.

### 12.1. Strength

The floor deck may be integral with the basic structure or mounted on the structure securely to prevent chafing or horizontal movement and designed to last the life of the bus. Sheet metal screws shall not be used to retain the floor, and all floor fasteners shall be serviceable from one side only. Any adhesives, bolts or screws used to secure the floor to the structure shall last and remain effective throughout the life of the coach. Tapping plates, if used for the floor fasteners, shall be no less than the same thickness as a standard nut, and all floor fasteners shall be secured and protected from corrosion for the service life of the bus.

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

### 12.2. Construction

The floor shall consist of the subfloor and the floor covering that will last the life of the bus. The floor as assembled, including the sealer, attachments and covering, shall be waterproof, non-hygroscopic, and resistant to mold growth. The subfloor shall be resistant to the effects of moisture, including decay (dry rot). Flooring throughout the vehicle at a minimum shall offer some level of noise reduction characteristics. The subfloor on the upper level shall be of sound deadening material approved equivalent.

Composite material for sub-flooring shall be used, it shall provide all the salient characteristics as listed below:

- unitized molded assembly
- consist of two glass-reinforced polyester resin face sheets encapsulating a core of honeycomb
- filled with closed-cell polyurethane or polyisocyanurate foam

The manufacturer may propose other composite sub-flooring material subject to approval by the Authority.



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Reference the following sections for relevant flooring requirements:

- 31.11 Floor Covering specifications.
- 31.12.3 Floor Access Panels

### 12.3. Platforms

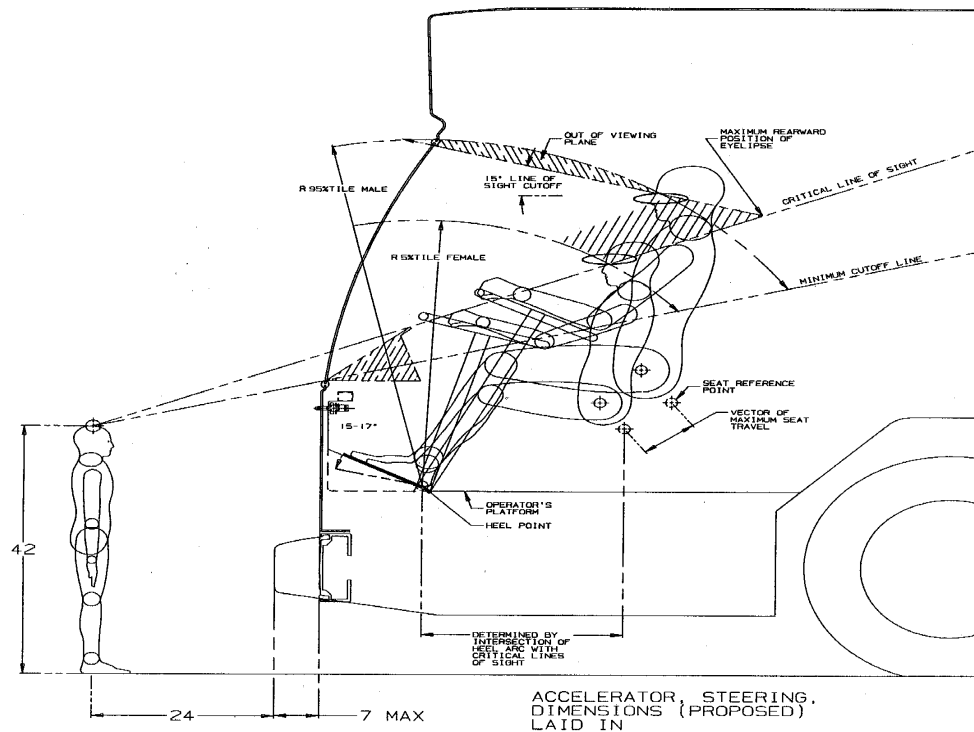
#### 12.3.1. Driver's Area

The covering of platform surfaces and risers, except where otherwise indicated, shall be the same material as specified for floor covering. Trim shall be provided along top edges of platforms unless integral nosing is provided. Trim installed along edges of platforms shall be constructed of stainless steel or aluminum. Other raised areas such as for providing for space for under-floor installation of components shall be limited. Such raised areas shall be constructed in accordance with these specifications.

#### 12.3.2. Driver's Platform

The driver's platform shall be of a height such that, in a seated position, the driver can see an object located at an elevation of 42 inches above the road surface, 24 inches from the leading edge of the bumper or bike rack. Notwithstanding this requirement, the platform height shall not position the driver such that the driver's vertical upward view is less than 15 degrees. A warning decal or sign shall be provided to alert the driver to the change in floor level. Figure 4 illustrates a means by which the platform height can be determined, using the critical line of sight.

**FIGURE 4**  
Determining Platform Height





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12.3.3. Farebox Platform

The farebox will be mounted at floor level in order to minimize impact to passenger access and minimize interference with the driver's line of sight. The position of the farebox shall be so that there are no dirt traps on the sides and behind the farebox that are inaccessible for cleaning.

12.3.4. Rear Step Area to Rear Area

If the vehicle is of a bi-level floor design, then a rear step area shall be provided along the center aisle of the bus to facilitate passenger traffic between the upper and lower floor levels. This step area shall be cut into the rear platform and shall be approximately the aisle width, a minimum 12 in. deep and approximately half the height of the upper level relative to the lower level. The horizontal surface of this platform shall be covered with skid-resistant material with a visually contrasting nosing and shall be sloped slightly for drainage. A warning decal or sign shall be provided at the immediate platform area to alert passengers to the change in floor level, reference Exhibit F-1A – Typical Capital Metro Interior Decal Requirements.

## 13. Wheel Housing

### 13.1. Design and Construction

Sufficient clearance and air circulation shall be provided around the tires, wheels, and brakes to preclude overheating. Wheel housings shall be constructed of corrosion-resistant and fire-resistant material. Wheel housings, as installed and trimmed, shall withstand impacts of a 2-inch steel ball with at least 200 ft-lb of energy without penetration.

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

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

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

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

Where wheel housings are equipped with seats or equipment enclosures, all fasteners passing through to the outside of the coach shall be fully sealed to prevent the intrusion of water into the coach.

No provision shall be made to chain buses.

## 14. Articulated Joint (60-foot)

60-foot articulated buses shall be equipped with a turntable that permanently joins the lead unit and trailing unit sections, allows relative motion between the sections about the pitch and yaw axes, and allows a small amount of relative roll between the sections without damage. A rotating turntable

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connection shall be provided between the lead unit and trailing unit to serve as a floor and to allow passenger access between the sections of the bus under all operating conditions. The turntable design shall provide for all horizontal and vertical turns that the bus is capable of making without introducing discontinuities between the turntable and adjacent vehicle floors.

The structures and finishes in the interconnecting section shall be designed to prevent passenger injury under all conditions. The turntable floor cover plate shall be supported so that there will be no honing of the floor plate, making it sharp at the outer edge. The gap between the floor and the turntable shall be minimized in order to prevent a tripping hazard. It shall be designed for ease of access for inspection and repairs of all devices that are part of it or devices that pass through the turntable area. Underfloor turntable components shall be easily accessible. Floor plates must be easily lifted and secured in the open position by one person for inspection and repairs. There shall be no seats in the turntable area, however a set of stanchions shall be provided for passengers to grip while riding or moving inside the coach. The underfloor turntable area shall be completely enclosed by the bellows and bulkheads on the lead and trailing units to prevent drafts into the passenger compartment. The area between the turntable floor and the bellows shall be closed to prevent collection of trash in the bottom of the bellows. Closeouts shall be attached with removable fasteners. An access hatch shall be provided for routine maintenance (i.e., greasing, adjusting potentiometer, maintenance items).

An anti-jackknife joint shall be provided. This joint—by sensing vehicle speed, relative angle between the lead and trailing sections, throttle and braking actions, and any other necessary inputs—will control the degree of stiffness in the joint to ensure that the bus does not jackknife or operate in a dangerous or unsafe condition. The Authority shall approve the anti-jackknife joint. The interconnecting structure shall be designed to prevent separation of the lead and trailing units as a result of a road accident with a commercial or private vehicle. An override switch shall be installed in the open and within reach of the 95th percentile operator from the operator seat, preferably overhead, so that the driver can override the control or recover from a “jack knife” situation. The bus shall be equipped with a reverse speed governor that shall apply the brake and accelerator interlocks when the bus speed in reverse gear exceeds 1.5 mph, but the bus shall have sufficient power in reverse to back out of wheel locator depressions at a floor hoist. The proposed configuration of these devices and the reverse-speed requirements shall be submitted for approval of the Authority.

Easy access shall be provided to overhead lines (electric, air, hydraulic, refrigerant) passing through the turntable. Hydraulic fittings shall be suitable for the given application and must be compatible with other fittings throughout the vehicle.

In order to prevent damage to the structure and electrical, air, hydraulic and refrigerant lines when the vertical or horizontal bending capabilities of the hinge are exceeded, the bus shall be provided with appropriate warning devices (visual, audible, and interlock application) that warn the operator and apply a brake interlock or positive mechanical stop at 90% of the maximum turntable bending capability. An override switch shall be installed within reach of the operator seat so that the brake interlock or positive mechanical stop can be overridden at the 90% warning. These devices shall operate when the maximum bend angle is being approached in either plane.

#### **14.1. Raceway**

A raceway shall be provided through the turntable area to accommodate to maximum deflection of the turntable. The raceway shall prevent chafing, binding, rubbing, crimping or leakage of all hydraulic, air,

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fuel, and system support lines, as well as all electrical and electronic cabling through or to the turntable area. Lines shall be secured, separated, and labeled at the lead and trailing unit bulkheads. Separation shall be maintained on the flexible portion of all lines through the use of a raceway. All electrical terminations and hose fittings shall be easily visible and easily tightened or removed without removing any other component. Lines, routing, securement, and labeling shall be approved by the Authority.

Bulkhead fitting shall be provided for all lines: air, coolant, electrical, hydraulic and AC at both ends of the raceway. The bulkhead area shall be easily accessible for servicing.

#### 14.2. Bellows

Replacement fabric type bellows with draft-free, no-sag bottom closure and water drains shall be provided between the lead and trailing sections to seal the bus interior and keep it free of water, dirt and drafts. Hardware for bellows shall be corrosion resistant, and the underfloor area of the bellows shall be easy to clean when necessary. The passageway between the lead unit and trailing unit shall have an inside cross-section that is as nearly equal as possible to the inside cross-section of the bus bodies, with no tripping or pinching hazards created by the turntable cross-section or closeouts. The bellows shall be durable, and its supporting structure and stiffeners shall support the bellows material in a neat, sag-free manner. The Contractor shall supply information on the actual service life achieved by the type of bellows being proposed. A sample of the bellows and attaching hardware may be requested for evaluation at the Authority's option. Bellows shall be approved by the Authority.

No bellows liner shall be provided.

## CHASSIS

### 15. Suspension

#### 15.1. General Requirements

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

#### 15.2. Alignment

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

#### 15.3. Springs and Shock Absorbers

##### 15.3.1. Suspension Travel

The suspension system shall permit a minimum wheel travel of 2.75 in. jounce-upward travel of a wheel when the bus hits a bump (higher than street surface), and 2.75 in. rebound-downward travel when the bus comes off a bump and the wheels fall relative to the body. Elastomeric bumpers shall be provided at the limit of jounce travel. Rebound travel may be limited by elastomeric bumpers or hydraulically within the shock absorbers. Suspensions shall incorporate appropriate devices for automatic height control so that regardless of load the bus height relative to the centerline of the wheels does not change more

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than ½ in. at any point from the height required. The safe operation of a bus cannot be impacted by ride height up to 1 in. from design normal ride height.

#### 15.3.2. Damping

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

#### 15.4. Lubrication

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

#### 15.5. Kneeling

A kneeling system shall lower the entrance(s) of the bus a minimum of 2 in. during loading or unloading operations regardless of load up to GVWR, measured at the longitudinal centerline of the entrance door(s) by the driver. The kneeling control shall provide the following functions:

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

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

An indicator visible to the driver shall be illuminated until the bus is raised to a height adequate for safe street travel. An audible warning alarm will sound simultaneously with the operation of the kneeler to alert passengers and bystanders. The audible warning alarm shall be adjustable via an attenuation adjustment. A warning light mounted near the curbside of the front door, a minimum 2.5 in. diameter amber lens, shall be provided that will blink when the kneel feature is activated. Kneeling shall not be operational while the wheelchair ramp is deployed or in operation. The kneeling valve air exhaust, if equipped, shall be routed away from the curbside of the bus and the noise level reduced via a muffler.

#### 15.6. Requirements to Accommodate “Near” Level Boarding

CMTA has plans to offer “near level boarding” service in the near future. The manufacturer shall design a bus with a “normal ride height” so that the bus will not have raise for the entrance floor heights to be within 1.5 inches of a 9 inch curb height. Nominal curb height on the Austin area BRT route is 9 inches +/- 1.0 inches. The vehicle may lower to achieve a “near level boarding” height to the curb but shall not

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raise to achieve the nominal curb height level. The vehicle ~~should~~ **shall** have a door threshold height level and curb height difference of within 3 inches between the two horizontal planes when the vehicle is sitting at its “normal” ride height.

The kneeling system ~~should~~ **shall** be designed so that the door thresholds of the vehicle at all doors shall be within 1.5 inches of Austin’s BRT route 9-inch curb height.

## 16. Wheels and Tires

### 16.1. Wheels

All wheels shall be interchangeable except for the middle axle of an artic where a super single tire size may be used 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.

The wheels shall have the following salient features or approved equivalent:

- Brushed aluminum on both sides
- A durable and bright surface treatment
- A durable flange wear protection
- Not have a tire-pressure monitoring system.
- ~~Three~~ Two-piece (minimum) captive locking lug nut system

### 16.2. Tires

Tires shall be suitable for the conditions of transit service and sustained operation at the maximum speed capability of the bus. Load on any tire at GVWR shall not exceed the tire supplier’s rating.

The tires shall be provided under agreement between the Authority’s Service Provider and their tire supplier. The tires shall be the appropriate size and load range for the vehicle.

## 17. Steering

Electrically assisted or electrically driven hydraulic pump power steering shall be provided to reduce steering effort. The manufacturer shall endeavor to provide a power steering system that is virtually problem free.

The steering system controller (if applicable) shall report any and all diagnostic codes on the J1939 Communication Area Network so that the vehicle can warn the operator of a steering system condition.

The codes shall be able to be read via the operator interface or a laptop that is connected to the J1939 diagnostic port. All programs necessary to read and clear the steering system diagnostic codes shall be provided by the manufacturer.

### 17.1. Steering Axle

The front axle may be a Solid beam or independent design suspension. Either configuration shall have the following characteristics:

#### *Solid Beam Axle and Grease or Oil Type Front Bearings and Seals*

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

### *Independent Suspension Axle*

The front axle may be of an independent suspension design, non-driving, with a load rating sufficient for the bus loaded to GVWR and may be equipped with grease or oiled-type front wheel bearings and seals.

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

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

## 17.2. Steering Wheel

### 17.2.1. Turning Effort

Steering effort shall be measured with the bus at GVWR, stopped with the brakes released, propulsion system running, with vehicle on clean, dry, level, commercial asphalt pavement and the tires inflated to recommended pressure.

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

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

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

### 17.2.2. Steering Wheel, General

The steering wheel diameter shall be approximately 18 to 20 in.; the rim diameter shall be  $\frac{7}{8}$  to 1 $\frac{1}{4}$  in. and shaped for firm grip with comfort for long periods of time or approved equivalent.

Steering wheel spokes and wheel thickness shall ensure visibility of the dashboard so that vital instrumentation is clearly visible at center neutral position (within the range of a 95th-percentile male and 5<sup>th</sup> percentile female, as described in ANSUR II). Placement of steering column must be as far forward as possible, but either in line with or behind the instrument cluster.

### 17.2.3. Steering Column Tilt

The steering column shall have full tilt capability with an adjustment range of no less than 40 deg from the vertical and easily adjustable by the driver and shall be accessible by a 5th percentile female and 95th percentile male. Driver's knees shall not contact wheel spokes at any adjustment.

### 17.2.4. Steering Wheel Telescopic Adjustment

The steering wheel shall have full telescoping capability and have a minimum telescopic range of 2 in. and a minimum low-end adjustment of 29 in., measured from the top of the steering wheel rim in the horizontal position to the cab floor at the heel point.

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TABLE 4

Steering Wheel Height<sup>1</sup> Relative to Angle of Slope

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

1. Measured from bottom portion closest to driver.

## 18. Axles

### 18.1. Drive Axle

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

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

#### 18.1.1. Hubodometer

The vehicle shall be equipped with an electronic programmable hub

### 18.2. Non-Drive Axle

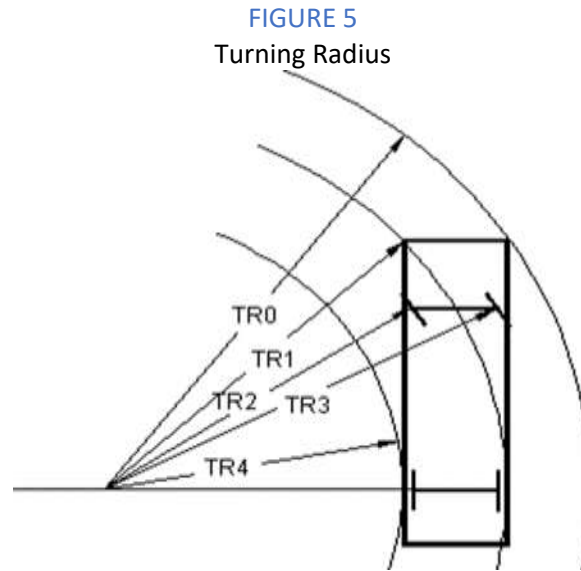
The non-drive axle is the drive axle without the drive gear and shall have a load rating sufficient for the load to GVWR.

### 18.3. Turning Radius

TABLE 5

Maximum Turning Radius

Bus Length (approximate)	Maximum Turning Radius (see Figure 5)	Authority Requirement
40 ft	44 ft (TR0)	Less than 45 ft
60 ft	44.5 ft (outside front axle, TR0) 17 ft (inside rearmost axle, TR4)	Less than 45.5 ft



## 19. Brakes

### 19.1. Service Brake

Brakes shall be self-adjusting. Brake wear indicators (visible brake indicators) shall be provided on exposed push rods.

### 19.2. Regenerative Braking

In addition to traditional mechanical friction service braking, the bus shall be equipped with regenerative braking designed to improve energy efficiency and extend brake lining service life. The application of regenerative braking shall cause a smooth blending of both regenerative and service brake function. Actuation of ABS and/or automatic traction control (ATC) shall override the operation of the regenerative brake.

### 19.3. Actuation

Service brakes shall be controlled and actuated by a compressed air system. Force to activate the brake pedal control shall be an essentially linear function of the bus deceleration rate and shall not exceed 75 lbs. at a point 7 in. above the heel point of the pedal to achieve maximum braking. The heel point is the location of the driver's heel when his or her foot is rested flat on the pedal and the heel is touching the floor or heel pad of the pedal. The ECU 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 among all wheels in such a ratio as to ensure equal friction material wear rate at all wheel locations. The manufacturer shall demonstrate compliance by providing a copy of a thermodynamic brake balance test upon request.

Microprocessor-controlled ATC shall be provided.

### 19.4. Friction Material

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



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which replacement becomes necessary shall be provided on each brake lining. The complete brake lining wear indicator shall be clearly visible from the hoist or pit without removing backing plates.

No remote brake wear indicator shall be required.

#### 19.5. Hubs and Discs

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

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

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

#### 19.6. Parking/Emergency Brake

##### 19.6.1. Parking Brakes

The parking brake shall be a spring-operated system, actuated by a valve that exhausts compressed air to apply the brakes. The parking brake may be manually enabled when the air pressure is at the operating level per FMVSS 121. The parking brake valve button shall apply/ "pop out" when air pressure drops below the required range per FMVSS 121. The parking brake control valve knob shall be yellow in color and installed in a location that is ergonomic to the operator i.e. in the effort to mitigate the potential harm to an operator when the brake is applied and released repetitively. The manufacturer **should** ~~shall~~ install a toggle switch that when activated ~~shall~~ **applies** the parking brake. The switch, **if provided**, shall be "momentary" type, with a switch guard, installed on the side dash panel that engages the parking brake when activated. The Authority reserves the right of final switch installation location approval.

##### 19.6.2. Parking Brake Alarms

An audible alarm shall sound if the vehicle's "master switch" is turned to the "off" position and the parking brake is not applied.

As part of the Authority's safety initiative, the bus shall be equipped with Empty-Seat Alarm system. The Empty Seat alarm system shall activate when the operator is not occupying the operator seat and the master switch is on the position with the vehicle is placed in gear. Once activated the system shall sound a unique alarm and display a prominent warning message on the dash. The Authority reserves the right of final configuration approval.

##### 19.6.3. Emergency Brake Release

An emergency brake release shall be provided to release the brakes in the event of automatic emergency brake application. 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 driver releases the emergency brake release valve, the brakes shall engage to hold the bus in place. Air to the emergency brake release system shall be provided by a dedicated emergency air tank or a dual air supply system. The emergency release brake knob shall be black in color.

## 20. Interlocks

### 20.1. Passenger Door Interlocks

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

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

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

A Non-adjustable brake interlock regulator shall be installed.

#### Accelerator Interlock Whenever Front Doors Are Open

An accelerator interlock shall lock the accelerator in the closed position, and a brake interlock shall engage the service brake system to stop movement of the bus whenever the doors are open.

## 21. Pneumatic System

### 21.1. General

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

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

### 21.2. Air Compressor

The electrically driven air compressor shall be sized to charge the air system from 40 psi to the governor cut-off pressure in less than 4 minutes. The compressor shall be mounted in a way to isolate vibration from carrying into the passenger compartment.

The air compressor shall have a system for filtering the incoming atmosphere before it enters the air compressor assembly. The filtering system at a minimum shall consist of a durable housing that contains

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a replaceable filter element, that is easily accessible for maintenance. The air filter maintenance shall fall in line with the 6,000 mile PM inspection as described in section 5.5 Maintenance and Inspection.

### 21.3. Air Lines and Fittings

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

- Green: Indicates primary brakes and supply.
- Red: Indicates secondary brakes.
- Brown: Indicates parking brake.
- Yellow: Indicates ~~compressor governor signal~~ controller feed (compressor governor, transmission, and/ or ride height).
- 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 2 ft intervals. Nylon lines may be grouped and shall be supported at 30 in. intervals or less.

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

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

### 21.4. Air Reservoirs

All air reservoirs shall meet the requirements of FMVSS 121 and SAE J10 and shall be equipped with drain plugs and guarded or flush type drain valves. Major structural members shall protect these valves from road hazards. Reservoirs shall be sloped toward the drain valve. All air reservoirs shall have drain valves that discharge below floor level with lines routed to eliminate the possibility of water traps and/or freezing in the drain line.

No automatic moisture ejector valves shall be installed on the air reservoirs. All air reservoirs shall have brass drain valves which discharge below floor level. The drain valves shall have quick disconnect fittings to connect hose ends for manifold gauge assembly when performing air system test on vehicle.

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The Authority has developed an air system testing manifold which requires quick connection of a test manifold to individual tanks within the air system. The quick disconnect fittings shall be a Nipple – ¼” NPT Series 10 couplers of a “Tru-Flate Design”. The shut off valves shall be manual ¼-turn valve, ¼ NPT, ¼-turn in clockwise direction to close.

The quick disconnect fittings shall have the following salient characteristics:

- Tubular valve delivers high air flow with minimal pressure drop
- Brass body option with stainless steel springs and locking balls is available for added corrosion resistance
- Standard seal is Nitrile

#### 21.5. Air System Dryer

An air dryer **shall be provided to** prevent accumulation of moisture and oil in the air system. **The air dryer system shall include one or more replaceable desiccant cartridges. The air dryer shall have the following requirements or approved equivalent.**

##### ~~21.5.1. Requirement for Additional Oil Separator Provision~~

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

~~The air system shall be equipped with an air dryer located before the No. 1 air tank and as far from the compressor as possible to allow air to cool prior to entering the air dryer. The air dryer shall have the following salient features or approved equivalent:~~

- ~~• Weight, lb. 53lbs. w / mounting bracket~~
- ~~• Envelope, in. 20” W x 15” H x 12” D~~
- ~~• Inlet/outlet ports ¾” – 14 NPT~~
- ~~• Control port ¼” – 18 NPT~~
- ~~• Purge port ¼” – 18 NPT~~
- ~~• Maximum working pressure, PSIG 150~~
- ~~• Safety valve, PSIG 160~~
- ~~• Ambient temp., °F 40° – 176°~~
- ~~• Maximum inlet air temp., °F 176°~~
- ~~• Recommended inlet air temp., °F +40° – 150°~~
- ~~• Air flow capacity, SCFM 70~~
- ~~• Minimum purge volume, (in. cubed) 600~~
- ~~• Electrical power 24 VDC / 5.0A • 12 VDC / 10.0 A~~
- ~~• Drain capacity 1.3cc per ADV / Operation~~
- ~~• Drain options Swivel on the pre treatment portion and open Muffler tube on the dryer portion~~

# ELECTRICAL, ELECTRONIC AND DATA COMMUNICATION SYSTEMS

## 22. Electrical, Electronic and Data Communication Systems

### 22.1. Overview of Electrical, Electronic and Data Communication Systems

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

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

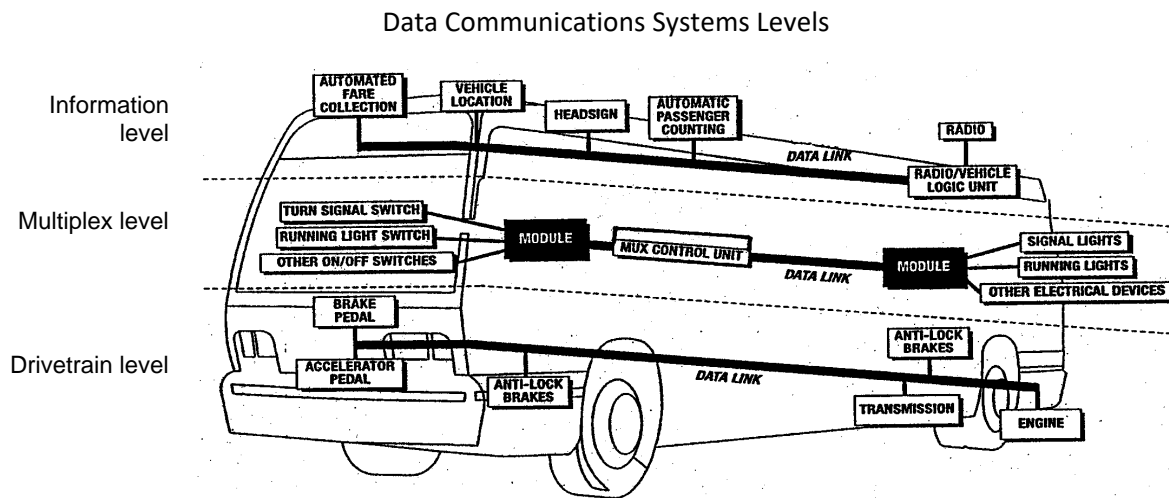
The data communication system consists of the bidirectional communications networks that electronic devices use to share data with other electronic devices and systems. Communication networks are essential to integrating electronic functions, both onboard the vehicle and off.

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

Data communications systems are divided into three level store the use of multiple data networks (see Figure 6):

- **Powertrain level:** Components related to the powertrain, including the propulsion system components (traction motor(s), transmission, and hybrid units) and anti-lock braking system (ABS), which may include traction control. At a minimum, powertrain components consisting of the propulsion system, transmission, retarder, ASR and anti-lock braking systems shall be powered by a dedicated and isolated ignition supply voltage to ensure data communication between components exists when the vehicle ignition is switched to the “on” position.
- **Information level:** Components whose primary function is the collection, control or display of data that is not necessary to the safe drivability of the vehicle (i.e., the vehicle will continue to operate when those functions are inoperable). These components typically consist of those required for automatic vehicle location (AVL) systems, destination signs, fareboxes, passenger counters, radio systems, automated voice and signage systems, video surveillance and similar components.
- **Multiplex level:** Electrical or electronic devices controlled through input/output signals such as discrete, analog and serial data information (i.e., on/off switch inputs, relay or relay control outputs). Multiplexing is used to control components not typically found on the drivetrain or information levels, such as lights; wheelchair lifts; doors; heating, ventilation and air conditioning (HVAC) systems (if applicable); and gateway devices.

FIGURE 6



## 22.2. Modular Design

Design of the electrical, electronic and data communication systems shall be modular so that each electronic device, apparatus panel or wiring bundle is easily separable from its interconnect by means of connectors. Reference section 22.6. Multiplexing for description of multiplexing requirements.

## 22.3. Environmental and Mounting Requirements

The electrical system and its electronic components shall be capable of operating in the area of the vehicle in which they will be installed, as recommended in SAE J1455.

Electrical and electronic equipment shall not be located in an environment that will reduce the performance or shorten the life of the component or electrical system when operating within the operating profile.

The Authority shall follow recommendations from bus manufacturers and subsystem suppliers regarding methods to prevent damage from voltage spikes generated from welding, jump-starts, shorts, etc.

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

All electrical/electronic hardware and its mounting shall comply with the shock and vibration requirements of published industry standards (SAE, ISO, etc.).

## 22.4. General Electrical Requirements

### 22.4.1. Low-Voltage (SLI) Batteries

Selected or specified batteries shall have a sufficient capacity to execute start after the as-delivered bus has been parked and off for a minimum of 48 hours.

### 22.4.2. Low-Voltage Batteries (24 V)

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Two appropriately sized deep-cycling sealed non-spillable maintenance-free absorbed glass mat (AGM) batteries shall be provided. The batteries shall be designed and installed to withstand the operating environment. Each battery shall have a purchase date no more than one year from the date of release for shipment to the Authority.

**22.4.3. Low-Voltage (LV) Battery Cables**

The battery terminal ends and cable ends shall be color-coded with red for the primary positive, black for negative and another color for any intermediate voltage cables. Positive and negative battery cables shall not cross each other if at all possible, shall be flexible, shall be sufficiently long to reach the batteries with the tray in the extended position without stretching or pulling on any connection, and shall not lie directly on top of the batteries. Except as interrupted by required components such as the master battery switch, and LV battery switch, all cables shall be continuous with connections secured by bolted terminals and shall conform to specification requirements of SAE J1127–Type SGR, SGT, SGX or GXL, and SAE J541 as applicable.

**22.4.4. Low Voltage “Jump-Start” Connector**

A jump-start connector, red for 24 V and blue for 12 V, shall be provided in the rear compartment or near the low voltage batteries, equipped with dust cap and adequately protected from moisture, dirt and debris.

**22.4.5. Battery Compartment**

The battery compartment shall prevent accumulation of snow, ice and debris on top of the batteries and shall be vented and self-draining. It shall be accessible only from the outside of the vehicle. All components within the battery compartment, and the compartment itself, shall be protected from damage or corrosion from the electrolyte. The inside surface of the battery compartment’s access 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. The battery compartment temperature should not exceed manufacturer’s specification.

The vehicle shall be equipped with a 12 VDC and 24 VDC quick disconnect switch. The switch shall disconnect both the 12 VDC and 24 VDC circuits simultaneously. The battery compartment door shall conveniently accommodate operation of 12 VDC and 24 VDC quick disconnect switch.

The battery quick disconnect access door shall be identified with a decal. The decal design shall be as noted on Exhibit F-1A – Typical Capital Metro Paint and Decal Scheme.

The battery quick disconnect access door shall be flush-fitting and incorporate a spring tensioner or equal to retain the door in a closed position when not in use. The access door shall open toward the front of the vehicle with the hinge on the forward side of the door.

**Non-Locking Access Battery and Battery Quick-Disconnect Doors**

The battery quick-disconnect access door shall not require any special locking devices to gain access to the switch, and it shall be accessible without removing or lifting the panel. The battery quick-disconnect access door shall open toward the front of the vehicle with the hinge on the forward side of the door. The low voltage battery access door shall not require any special locking devices to gain access to the batteries and shall open to an angle greater than 130 degrees.

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

The batteries shall be located in the “engine compartment area” (rear curbside of the bus), the same fire-resistant properties shall apply to the battery compartment. No sparking devices shall be located within the battery box.

**22.4.6. Auxiliary Electronic Power Supply**

If required, gel-pack, or any form of sealed (non-venting) batteries used for auxiliary power are allowed to be mounted on the interior of the vehicle if they are contained in an enclosed, non-airtight compartment and accessible only to maintenance personnel. This compartment shall contain a warning label prohibiting the use of vented (flooded) lead-acid batteries.

**22.4.7. Master Battery Switch**

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

The master switch shall be capable of carrying and interrupting the total circuit load.

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

**22.4.8. Low-Voltage Generation and Distribution**

The low-voltage generating systems shall maintain the charge on fully charged batteries. The low-voltage batteries shall be maintained through a DC/DC converter by the high-voltage batteries or approved equivalent.

Voltage monitoring and over-voltage output protection (recommended at 32 V) shall be provided. Charging profile shall be maintained within battery manufacturer’s guidelines or specifications.

Dedicated power and ground shall be provided as specified by the component or system manufacturer. Cabling to the equipment must be sized to supply the current requirements with no greater than a 5 percent volt drop across the length of the cable.

**22.4.9. Circuit Protection**

All branch circuits shall be protected by current-limiting devices such as circuit breakers, fuses or solid-state devices sized to the requirements of the circuit. The circuit breaker fuses shall be easily accessible for authorized personnel. Fuses shall be used only where it can be demonstrated that circuit breakers are not practicable. This requirement applies to inline fuses supplied by either the Contractor or a supplier. Fuse holders shall be constructed to be rugged and waterproof. All manual reset circuit breakers critical to the operation of the bus shall be mounted in a location convenient to the Authority mechanic with visible indication of open circuits. The Authority shall consider the application of automatic reset circuit breakers on a case-by-case basis. The Contractor shall show all in-line fuses in the final harness drawings. Any manually resettable circuit breakers shall provide a visible indication of open circuits.



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Circuit breakers or fuses shall be sized to a minimum of 15 percent larger than the total circuit load. The current rating for the wire used for each circuit must exceed the size of the circuit protection being used.

**22.4.10. Grounds**

The battery shall be grounded to the vehicle chassis/frame at one location only, as close to the batteries as possible. When using a chassis ground system, the chassis shall be grounded to the frame in multiple locations, evenly distributed throughout the vehicle to eliminate ground loops. No more than three ring terminal connections shall be made per ground stud with spacing between studs ensuring conductivity and serviceability. Electronic equipment requiring an isolated ground of the battery (i.e., electronic ground) shall not be grounded through the chassis.

**22.4.11. Low-Voltage and High-Voltage Wiring and Terminals**

All power and ground wiring shall conform to specification requirements of SAE J1127, J1128 and J1292. All high-voltage power and ground wiring shall conform to specification requirements of SAE ~~J1763~~, J1654 and J2910. In the case of conflicts with the requirements below, SAE standards shall apply. Double insulations shall be maintained as close to the junction box, electrical compartment or terminals as possible. The requirement for double insulations shall be met by wrapping the harness with plastic electrical tape or by sheathing all wires and harnesses with nonconductive, rigid or flexible conduit.

The bus shall be manufactured so that high-voltage systems and cabling do not interfere with the operation of low-voltage control systems. To this end, high-voltage cabling and low-voltage control wiring must be separated as far as practicable. Cabling and wiring must be installed damage-free. Additionally, parallel runs of high-voltage cabling and low-voltage control wiring shall be minimized.

Wiring shall be grouped, numbered and/or color-coded. Wiring harnesses shall not contain wires of different voltage classes unless all wires within the harness are insulated for the highest voltage presenting the harness. Kinking, grounding at multiple points, stretching, and exceeding minimum bend radius shall be prevented.

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

To the extent practicable, wiring shall not be located in environmentally exposed locations under the vehicle. Wiring and electrical equipment necessarily located under the vehicle shall be insulated from water, heat, corrosion and mechanical damage. Where feasible, front-to-rear electrical harnesses should be installed above the window line of the vehicle.

All wiring harnesses over 5 ft long and containing at least five wires shall include 10 percent (minimum one wire) excess wires for spares. This requirement for spare wires does not apply to datalinks and communication cables. Wiring harness length shall allow end terminals to be replaced twice without pulling, stretching or replacing the wire. Terminals shall be crimped to the wiring according to the connector manufacturer's recommendations for techniques and tools. All cable connectors shall be locking type, keyed and sealed, unless enclosed in watertight cabinets or vehicle interior. Pins shall be removable, crimp contact type, of the correct size and rating for the wire being terminated. Unused pin

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positions shall be sealed with sealing plugs. Adjacent connectors shall use either different inserts or different insert orientations to prevent incorrect connections.

Terminals shall be crimped, corrosion-resistant and full ring type or interlocking lugs with insulating ferrules. When using pressure type screw terminal strips, only stranded wire shall be used. Insulation clearance shall ensure that wires have a minimum of “visible clearance” and a maximum of two times the conductor diameter or 1/16 in., whichever is less. When using shielded or coaxial cable, upon stripping of the insulation, the metallic braid shall be free from frayed strands that can penetrate the insulation of the inner wires.

Ultra-sonic and T-splices may be used with 8 AWG or smaller wire. When a T-splice is used, it shall meet these additional requirements:

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

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

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

#### 22.4.12. Electrical Components

All electrical components, including switches, relays, flashers, and circuit breakers, shall be heavy-duty designs with either a successful history of application in heavy-duty vehicles or design specifications for an equivalent environment.

All electric motors shall be heavy-duty brushless type where practical and have a continuous duty rating of no fewer than 40,000 hours (except cranking motors, washer pumps, auxiliary heater pumps, defroster and wiper motors). All electric motors shall be easily accessible for servicing.

#### 22.4.13. Electrical Compartments

All relays, controllers, flashers, circuit breakers and other electrical components shall be mounted in easily accessible electrical compartments. Easily accessible compartments means access doors with square key locks as opposed to large panels that are fastened. All compartments exposed to the outside environment shall be corrosion-resistant and sealed. The components ~~and their functions~~ in each electrical compartment shall be identified and their location permanently recorded on a drawing attached to the inside of the access panel or door. The drawing shall be protected from oil, grease, and abrasion.

The front compartment shall be completely serviceable from the driver’s seat, via an access door that opens to the up position, large enough to service the front destination sign, secured with ¼ turn locks that can be turned by hand.

## 22.5. General Electronic Requirements

If an electronic component has an internal real-time clock, it shall provide its own battery backup to monitor time when battery power is disconnected, and/or it may be updated by a network component. If an electronic component has an hour meter, it shall record accumulated service time without relying on battery backup.

All electronic component suppliers shall ensure that their equipment is self-protecting in the event of shorts in the cabling, and also in over-voltage (over 32 VDC on a 24 VDC nominal voltage rating with a maximum of 50 VDC) and reverse polarity conditions. If an electronic component is required to interface with other components, it shall not require external pull-up and/or pull-down resistors. Where this is not possible, the use of a pull-up or pull-down resistor shall be limited as much as possible and easily accessible and labeled.

### 22.5.1. Wiring and Terminals

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

### 22.5.2. Discrete I/O (Inputs/Outputs)

All wiring to I/O devices, either at the harness level or individual wires, shall be labeled or color-coded in a fashion that allows unique identification at a spacing not exceeding 4 in. Wiring for each I/O device shall be bundled together. If the I/O terminals are the same voltages, then jumpers may be used to connect the common nodes of each I/O terminal.

### 22.5.3. Shielding

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

NOTE: A shield grounded at both ends forms a ground loop, which can cause intermittent loss of control or faults.

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

### 22.5.4. Communications

The data network cabling shall be selected and installed according to the selected protocol requirements. The physical layer of all network communications systems shall not be used for any purpose other than communication among the system components, unless provided for in the network specifications.

Communications networks that use power line carriers (e.g., data modulated on a 24 V power line) shall meet the most stringent applicable wiring and terminal specifications.

### 22.5.5. Radio Frequency (RF)

RF components, such as radios, video devices, cameras, global positioning systems (GPS), etc., shall use coaxial cable to carry the signal. All RF systems require special design consideration for losses along the

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cable. Connectors shall be minimized, since each connector and crimp has a loss that will contribute to attenuation of the signal. Cabling should allow for the removal of antennas or attached electronics without removing the installed cable between them. If this cannot be done, then a conduit of sufficient size shall be provided for ease of attachment of antenna and cable assembly. The corresponding component vendors shall be consulted for proper application of equipment, including installation of cables.

22.5.6. Audio

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

22.6. Multiplexing

22.6.1. General

Versatility and future expansion **should shall** be provided for by an expandable system architecture. The multiplex system **should shall** be capable of accepting new inputs and outputs through the addition of new modules or the utilization of existing spare inputs and outputs. All like components in the multiplex system **should shall** be modular, interchangeable, with self-diagnostic capabilities. The modules **should shall** be easily accessible for troubleshooting electrical failures and performing system maintenance. Multiplex input/output modules **should shall** use solid-state devices to provide extended service life and individual circuit protection.

Ten percent of the total number of inputs and outputs, or at least one each for each voltage type utilized (0 V, 12 V, 24 V) at each module location **should shall** be designated as spares. The components of the multiplex system shall be of modular design, thereby providing for ease of replacement by maintenance personnel. The modules shall be easily accessible for troubleshooting electrical failures and performing system maintenance. Each module shall be shielded to prevent interference by EMI and RFI; and **should shall** have an installed system to indicate circuit integrity and assist in rapid circuit diagnostics and verification of the load and wiring integrity. In conjunction with relays, if necessary, each circuit **should shall** be capable of providing a current load of up to 10 Amperes. The internal controls **should shall** be a solid-state device, providing an extended service life. Wiring for data bus and node module power **should shall** consist of three, 22 gage or larger, UL approved, shielded, twisted pairs.

The multiplex system **should shall** be capable of data acquisition and storage with sufficient memory to allow monitoring of all circuits for a minimum of one week. The multiplex system **should shall** also have provisions for current sensing to aid in determining whether certain components such as headlamps or motors are beginning to fail. Protection to each individual circuit **should shall** be provided. ~~An automatic test system, integral to the multiplexing, shall be provided.~~ The multiplex system **should shall** have self-diagnostics which monitor and display communication fault codes, program errors, etc. The system **should shall** be accessible by a personal computer (laptop) as well as the MFD (Multi-Function Display, reference section 23.5.1.). ~~The mechanic shall~~ **A maintenance technician should** be able to use either unit to check bus wire function. The system **should shall** revert to a "sleep mode" shutting off all electrical components, except as noted, after 20+ minutes of inactivity. All systems directly wired to the battery, such as the EDR, etc. shall not be shut down during this sleep mode. The hazard lights **should shall** not be affected **by the "sleep mode"**.

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Preference: In order to minimize training for the operation, functionality, and maintenance of the vehicle and its various components shall be standardized to be same as those on the Authority 's existing vehicles.

#### 22.6.2. System Configuration

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

#### 22.6.3. I/O Signals

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

Discrete signals shall reflect the on/off status of switches, levers, limit switches, lights, etc. Analog signals shall reflect numerical data as represented by a voltage signal (0–12 V, 10–24 V, etc.) or current signal (4 to 20 mA). Both types of analog signals shall represent the status of variable devices such as rheostats, potentiometers, temperature probes, etc. Serial data signals shall reflect ASCII or alphanumeric data used in the communication between other onboard components.

### 22.7. Data Communications

#### 22.7.1. General

All data communication networks shall be either in accordance with a nationally recognized interface standard, such as those published by SAE, IEEE, or ISO, or shall be published to the Authority with the following minimum information:

- Protocol requirements for all timing issues (bit, byte, packet, inter-packet timing, idle line timing, etc.) packet sizes, error checking and transport (bulk transfer of data to/from the device).
- Data definition requirements that ensure access to diagnostic information and performance characteristics.
- The capability and procedures for uploading new application or configuration data.
- Access to revision level of data, application software and firmware.
- The capability and procedures for uploading new firmware or application software.
- Evidence that applicable data shall be broadcast to the network in an efficient manner such that the overall network integrity is not compromised.

Any electronic vehicle components used on a network shall be conformance tested to the corresponding network standard.

#### 22.7.2. Drivetrain Level

Drivetrain components, consisting of the traction motor(s), motor inverter(s), regenerative braking system, antilock braking system and all other related components, shall be integrated and communicate fully with respect to vehicle operation with data using SAE Recommended Communications Protocols such as J1939, with forward and backward compatibilities or other open protocols. At a minimum, drivetrain components shall be powered by a dedicated and isolated ignition supply voltage to ensure that data communication among components exists when the vehicle ignition is switched to the “on” position.

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22.7.3.     Diagnostics, Fault Detection and Data Access

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

The drivetrain level shall have the ability to record abnormal events in memory and provide diagnostic codes and other information to service personnel. At a minimum, this network level shall provide live/fail status, current hardware serial number, software/data revisions and uninterrupted timing functions. These codes should be able to be read from the driver's digital display (MFD, Multi-Function Display) or the "Service Tool" (laptop/ PC). The minimum amount of J1939 communication/ diagnostic ports shall be located at the following locations:

- front of the vehicle, within 4 feet of the operator seat
- Radio/ electronics box located above the front driver side wheel well
- rear interior of the vehicle behind an access panel with ¼ turn square key locks

The Authority reserves the right of final configuration and location.

22.7.4.     Programmability (Software)

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

22.7.5.     Multiplex Level

22.7.5.1.     Data Access

At a minimum, information shall be made available via a communication port on the multiplex system. The location of the communication port shall be easily accessible behind a hinged accessible panel that shall follow the requirements in section 31.12. A hardware gateway and/or wireless communications system are options if requested by the Authority. The communication port(s) CAN J1939 ports shall be located at a minimum in three locations as described in section 22.7.3.

22.7.5.2.     Diagnostics and Fault Detection

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

In addition to the indicators, the system **should shall** employ an advanced diagnostic and fault detection system, which shall be accessible via either a personal computer **(lap top)**, handheld unit or interface on the dash from the operator seat "driver's instrument cluster". **Either Any of the diagnostic units should shall** have the ability to check logic function.

No requirement for mock-up board.

22.7.5.3.     Programmability (Software)

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

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

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

- Hardware component identification where labels are included on all multiplex hardware to identify components
- Hardware series identification where all multiplex hardware displays the current hardware serial number and firmware revision employed by the module
- Software revision identification where all copies of the software in service display the most recent revision number
- A method of determining which version of the software is currently in use in the multiplex system

Revision control labels shall be electronic.

#### **22.8. Electromagnetic Compatibility (EMC)**

Electrical and electronic subsystems and components on all buses shall not emit electromagnetic radiation that will interfere with onboard systems, components or equipment, telephone service, radio or TV reception, or violate regulations of the Federal Communications Commission.

Electrical and electronic subsystems on the coaches shall not be affected by external sources of RFI/EMI. This includes, but is not limited to, radio and TV transmission, portable electronic devices including computers in the vicinity of or onboard the buses, AC or DC power lines, and RFI/EMI emissions from other vehicles.

As a recommendation, no vehicle component shall generate or be affected by RFI/EMI that can disturb the performance of electrical/electronic equipment as defined in CAN/CSA-CISPR 12-10, SAE J1113, SAE J1455 or UNECE Council Directive 95/54(R10).

# DRIVER PROVISIONS, CONTROLS, AND INSTRUMENTATION

## 23. Driver's Area Controls

### 23.1. General

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

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

### 23.2. Glare

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

### 23.3. Visors/ Sunshades

#### Driver's Window Sunscreens

An adjustable roller type ~~mesh~~ solid sunscreen shall be provided over the driver's windshield and/or the driver's side window or approved equivalent. The sunscreen shall be capable of being lowered, at a minimum, to the midpoint of the driver's side window. When deployed, the screen shall be secure, stable, and shall not rattle, sway, or intrude into the driver's field of view due to the motion of the coach or air movement. Once lowered, the screen shall remain in the lowered position until returned to the stowed position by the driver. Sunscreen shall be shaped to minimize light leakage between the visor and windshield pillars to the extent possible. The screen shall not interfere with the operator's line of site with any mirror.

### 23.4. Driver's Controls

Frequently used controls must be in easily accessible locations. These include the door control, kneel control, windshield wiper/washer controls, ramp, and lift and run switch. Any switches and controls necessary for the safe operation of the bus shall be conveniently located and shall provide for ease of operation. They shall be identifiable by shape, touch, and permanent markings. Controls also shall be located so that passengers may not easily tamper with control settings.

All panel-mounted switches and controls shall be marked with easily read identifiers. Graphic symbols shall conform to SAE J2402, "Road Vehicles – Symbols for Controls, Indicators, and Tell Tales," where available and applicable. Color of switches and controls shall be dark with contrasting typography or symbols. Verbiage or terms used to describe the functionality of each shall be consistent with the functionality of each switch i.e. not confusing to the operator. Verbiage shall be intuitive in meaning so that an operator can easily understand the functionality of the switch.



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Mechanical switches and controls shall be replaceable, and the wiring at these controls shall be serviceable from a convenient location. Switches, controls, and instruments shall be dust- and water-resistant. At the direction of the Authority specified driver control toggle switches shall have a protective cover so that accidental activation is prevented.

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

The layout, verbiage and functionality of all driver's controls is subject to review by the Authority.

#### 23.4.1. Vehicle "Lockout" Feature

The vehicle shall be equipped with a self-actuating vehicle "lockout" that engages when the vehicle is placed into Neutral with the Parking Brake engaged, for the purpose of preventing unauthorized use of the vehicle. The lock shall be disengaged by the operator via performance of a special sequence or activity that is not common knowledge to the general public, such as entering of a code. The lockout feature shall not require a physical key. The lockout feature shall be of failsafe design such that in the system malfunctions, the vehicle defaults to unlocked status.

#### 23.5. Normal Bus Operation Instrumentation and Controls

The following list identifies bus controls used to operate the bus. These controls are either frequently used or critical to the operation of the bus. They shall be located within easy reach of the operator. The operator shall not be required to stand or turn to view or actuate these controls unless specified otherwise.

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

The indicator panel shall be located within easy view of the operator instrument panel. All indicators shall have a method of momentarily testing their operation. The audible alarm shall be tamper-resistant and shall have an outlet level between 80 and 83 dBA when measured at the location of the operator's ear.

Onboard displays visible to the operator shall be limited to indicating the status of those functions described herein that are necessary for the operation of the bus. All other indicators needed for diagnostics and their related interface hardware shall be concealed and protected from unauthorized access. Table 6 represents instruments and alarms. The intent of the overall physical layout of the indicators shall be in a logical grouping of systems and severity nature of the fault.

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

The Four-Way flashers shall not automatically engage with the doors opening. Activation of the Four-Way Flasher shall only be achieved by the dash switch.

The vehicle shall be equipped with a Light Test functionality that when activated, turns on all exterior lights, including headlights, ramp warning light, turn signals, marker lights, and engages the back-up alarm, with the exception that the reverse lights shall flash when in test mode.

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All devices indicated in Table 6 shall be configured and installed described unless an alternative arrangement is authorized by the Authority.

**TABLE 6**

Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/Audible
Master run switch	Rotary, four-position detent	Side console	Master control for bus, off, day run, night run and clearance ID lights	
System start, front	Approved momentary switch	Side console	Activates vehicle systems	
Drive selector	Touch panel switch	Side console or Dash	Provides selection of propulsion: forward, reverse and neutral	Gear selection
HVAC	Switch or switches to control HVAC	Side console Dash, or Driver Overhead Console	Permits selection of passenger ventilation: off, cool, heat, low fan, high fan or full auto with on/off only	
Driver's ventilation	Switch or switches to control driver ventilation	Side console or dash left wing	Permits supplemental ventilation: fan off, low or high	
Defroster fan	Switch or switches to control defroster fan	Side console or dash left wing	Permits defroster: fan off, low, medium or high	
Defroster temperature	Variable position	Side console or dash left wing	Adjusts defroster water flow and temperature	
Windshield wiper	One-variable position switch operating both wipers	Dash left wing	Variable speed control of left and right windshield wipers	
Windshield washer	Push button	Dash left wing	Activates windshield washers	
Dash panel lights	Rotary rheostat or stepping switch	Side console or dash left wing	Provides adjustment for light intensity in night run position	
Interior lights	Three-position switch	Side console	Selects mode of passenger compartment lighting: off, on or reduced lighting	
WC ramp/kneel enable	Two-position switch <sup>1</sup>	Side console or dash right wing	Permits operation of ramp and kneel operations at each door remote panel	Amber light
Front door ramp/kneel enable	Two-position keyed switch <sup>1</sup>	Front door remote or dash right wing	Permits ramp and kneel activation from front door area, key required <sup>1</sup>	Amber light
Front door ramp	Three-position momentary switch	Right side of steering wheel	Permits deploy and stow of front ramp	Red light
Front/rear kneel	Three-position momentary switch	Front door remote	Permits kneeling activation and raise and normal at front door remote location	Amber or red dash indicator exterior alarm and amber light
Rear door ramp/kneel enable	Two-position keyed switch <sup>1</sup>	Rear door remote	Permits ramp and kneel activation from rear door area; key required <sup>1</sup>	Red light
Rear door ramp	Three-position momentary switch	Rear door remote	Permits deploy and stow of rear ramp	

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TABLE 6

Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/Audible
Rear kneel	Three-position momentary switch	Rear door remote	Permits kneeling activation and raise and normal at rear door remote location	
Silent alarm	Recessed momentary push button	Side console	Activates emergency radio alarm at dispatch and permits covert microphone and/or enables destination sign emergency message	
Video system event switch	Momentary on/off switch with plastic guard	Side console	Triggers event equipment and event light on dash	Amber light
Left remote mirror	Four-position toggle type	Side console	Permits two-axis adjustment of left exterior mirror	
Right remote mirror	Four-position toggle type	Side console	Permits two-axis adjustment of right exterior mirror	
Mirror heater	Switch or temperature activated	Side console	Permits heating of outside mirrors when required	
Passenger door control	Five-position handle type detent or two momentary push buttons	Side console, forward	Permits open/close control of front and rear passenger doors	Red light
Passenger Door Control System	Two Position Toggle Switch	Side Console	Permits open/close control of front and rear passenger doors by the passengers when active.	Lamp on the dash or Message on the MFD.
Rear door override	Two-position switch in approved location	Side console, forward	Allows driver to override activation of rear door passenger tape switches	
System shutdown override	Momentary switch with operation protection	Side console	Permits driver to override auto system shutdown	
Hazard flashers	Two-position switch with long toggle switch/extension	Side console or dash right wing	Activates emergency flashers	Two green lights
Mobile data terminal	Mobile data terminal coach operator interface panel	Above right dash wing	Facilitates driver interaction with communication system and master log-on	LCD display with visual status and text messages
Farebox interface	Farebox coach operator interface panel	Near farebox	Facilitates driver interaction with farebox system	LCD display
Destination sign interface	Destination sign interface panel	In approved location	Facilitates driver interaction with destination sign system, manual entry	LCD display
Turn signals	Momentary push button (two required) raised from other switches	Left foot panel	Activates left and right turn signals	Two green lights and audible indicator
PA manual	Momentary push button	Left foot panel	Permits driver to manually activate public address microphone	
Low-profile microphone	Low-profile discrete mounting	In approved location	Permits driver to make announcements with both hands on the wheel and focusing on road conditions	

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TABLE 6

Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/Audible
High beam	Push button	Left foot panel	Permits driver to toggle between low and high beam	Blue light
Parking brake	Pneumatic PPV	Side console or dash left wing	Permits driver to apply and release parking brake	Red light
Master door/interlock	Multi-pole toggle, detented	Out of operator's reach	Permits driver override to disable door and brake/throttle interlock	Red light
Warning interlocks deactivated	Red indicator light	Dash panel center	Illuminates to warn driver that interlocks have been deactivated	Red light
Speedometer	Speedometer, odometer, and diagnostic capability, 5-mile increments	Dash center panel	Visual indication of speed and distance traveled, accumulated vehicle mileage, fault condition display	Visual
Air pressure gauge	Primary and secondary, 5 psi increments	Dash center panel	Visual indication of primary and secondary air systems	Red light and buzzer
Fire detection	Coach operator display	Property specific or dash center	Indication of fire detection activation by zone/location	Buzzer and red light
Door obstruction	Sensing of door obstruction	Dash center	Indication of rear door sensitive edge activation	Red light and buzzer
Door ajar	Door not properly closed	Property specific or dash center	Indication of rear door not properly closed	Buzzer or alarm and red light
Low system air pressure	Monitors primary and secondary air tank pressure	Dash center	Indication of low air system pressure	Buzzer and red light
System coolant indicator	Low coolant indicator may be supplied as audible alert and visual and/or text message	Within driver's sight	Detects low coolant condition	Amber light
Hot system indicator	Temperature indicator may be supplied as audible alert and visual and/or text message	Within driver's sight	Detects system overheat condition and initiates time delay shutdown	Red light
ABS indicator	Detects system status	Dash center	Displays system failure	Amber light
HVAC indicator	Detects system status	Dash center	Displays system failure	Amber or red light
LV charging system indicator (12/24 V)	Detect charging system status	Dash center	Detects no-charge condition and optionally detects battery high, low, imbalance, no-charge condition, and initiates time-delayed shutdown	Red light flashing or solid based on condition
Bike rack deployed indicator	Detects bike rack position	Dash center	Indicates bike rack not being in fully stowed position	Amber or red light

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TABLE 6

Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/Audible
HV charging system indicator (ESS)	Detects charging system status	Dash center	Indicates when bus is connected to off-board charger and ESS is accepting charge	Visual
State of charge indicator	Gauge, graduated based on SoC	Dash center	Indicates usable SoC of ESS	Visual
Regenerative braking indicator	Detects status	Dash center	Indicates when regenerative braking is being used	Visual
Turntable	Detects status	Dash center	Warning indication for hinge locking	Audible and amber warning and red light if locked
Turntable	Interlock momentary switch	Side console or overhead of operator within reach	Momentarily release interlock brakes due to overangled condition	

#### 23.5.1. Multi-Function Display (MFD)

In addition to, and in place of some meters, gauges, controls, indicator lights, and other instruments on the instrument panel, the proposer shall include a Multi-Function Display (MFD). The Multi-Function Display shall have complete on-board computer system with a definite purpose, color LCD screen that displays safety related information in large, easy to read graphics, programmable LED warning lights designed to comply with FMVSS for critical information such as Stop Propulsion system, Check Transmission, and Directional Signal indicators; both driving mode and maintenance mode with the driving mode intended to provide useful information during vehicle operation, and the maintenance mode used for vehicle troubleshooting or service. The gauges may display information such as coolant temperature, oil temperature, oil pressure, air pressure, etc., which come directly from the power train J1939 interface. In maintenance mode, the MFD can test certain outputs in real time and the results are shown on the LCD screen. The MFD shall be an integral component of the Input/ Output (I/O) system.

#### 23.6. Driver Foot Controls

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

##### 23.6.1. Pedal Angle

The vertical angle of the accelerator and brake pedals shall be determined from a horizontal plane regardless of the slope of the cab floor. The accelerator and brake pedals shall be positioned at an angle of 37 to 50 deg at the point of initiation of contact and extend downward to a maximum angle of 10 to 18 degrees at full throttle application.

The location of the brake and accelerator pedals shall be determined by the manufacturer, based on space needs, visibility, lower edge of windshield and vertical H-point.

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**23.6.2. Pedal Dimensions and Position**

The floor-mounted accelerator pedal shall be 10 to 12 in. long and 3 to 4 in. wide. Clearance around the pedal must allow for no interference precluding operation.

The accelerator and brake pedals shall be positioned such that the spacing between them, measured at the heel of the pedals, is between 1 and 2 in. Both pedals should be located approximately on the same plane coincident to the surface of the pedals.

**23.6.3. Brake and Accelerator Pedals**

Brake Pedal shall be installed in a fixed location and non-adjustable.

**23.6.4. Driver Foot Switches**

**23.6.4.1. Turn Signal Controls**

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

The Four-Way flashers shall not automatically engage with the doors opening. Activation of the Four-Way Flasher shall only be achieved by the dash switch.

**23.6.4.2. Foot Switch Control**

The control switches for the turn signals shall be mounted on an inclined, floor-mounted stainless-steel enclosure or metal plate mounted to an incline integrated into the driver's platform, located to the left of the steering column. The angle of the turn signal platform shall be determined from a horizontal plane, regardless of the slope of the cab floor. The turn signal platform shall be angled at a minimum of 10 deg and a maximum of 37 deg. It shall be located no closer to the seat front than the heel point of the accelerator pedal.

The location and design of this enclosure shall be such that foot room for the operator is not impeded. The Authority prefers to have the inclined mounting surface shall be skid resistant. All other signals, including high beam and public address system, shall be in approved locations.

The foot switches shall be UL-listed, heavy-duty type, of a rugged, corrosion-resistant metal construction. The foot switches for the directional signals and PA system shall be momentary type, while those the switch for the PA system and the high beam shall be latching type. The spacing of the switches shall be such that inadvertent simultaneous deflection of switches is prevented.

**23.6.4.3. Other Floor-Mounted Controls**

The PA system control switch shall be floor mounted near the foot signal turn switches, same style as the turn signal foot switches, momentary "on" (normally open circuit), UL-listed, heavy-duty type, of a rugged, corrosion-resistant metal construction.

## **24. Driver's Amenities**

**24.1. Coat Hanger**

Coat Hanger

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

**24.2. Drink Holder**

A device shall be provided to securely hold the driver's drink container, which may vary widely in diameter. It must be mounted within easy reach of the driver and must have sufficient vertical clearance for easy removal of the container. When the container is in the device, the driver's view of the road

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must not be obstructed, and leakage from the container must not fall on any switches, gauges or controls.

#### **24.3. Driver Storage Box**

An enclosed driver storage area shall be provided with a positive latching door but shall not lock. The minimum size is 2750 cu inches or approved equivalent. Proposers shall offer a USB charging port in the operator storage box. The Authority reserves the right to review the installation location.

### **25. Windshield Wipers and Washers**

#### **25.1. Windshield Wipers**

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

Single-control, electric two-speed intermittent wiper is preferred.

##### **Intermittent Wiper with Variable Control**

A variable-speed feature shall be provided to allow adjustment of wiper speed for each side of the windshield between approximately five and 25 cycles per minute.

##### **Non-Synchronized Wipers**

For non-synchronized wipers, separate controls for each side shall be supplied.

#### **25.2. Windshield Washers**

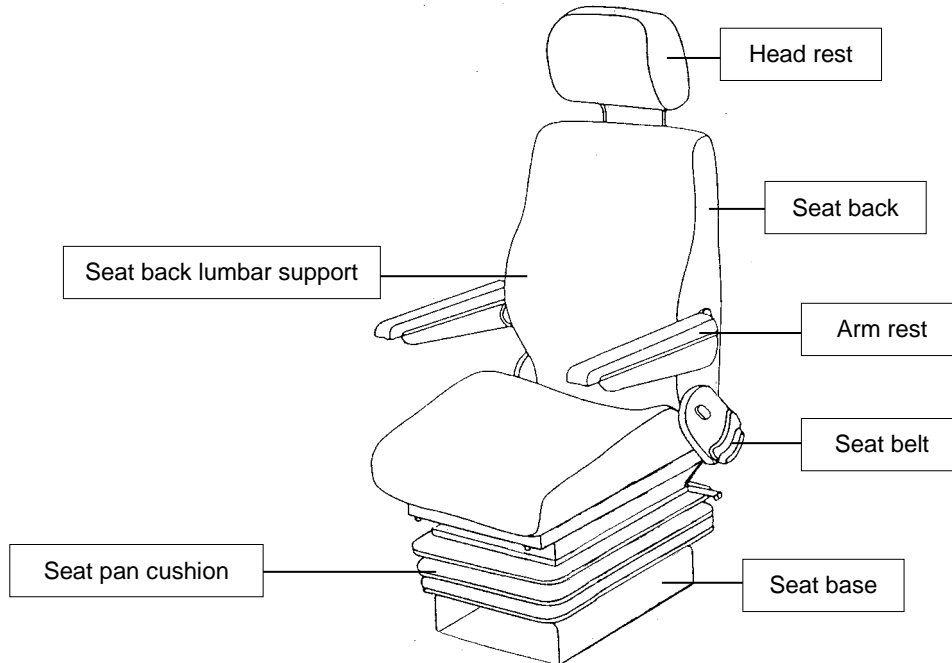
The windshield washer system, when used with the wipers, shall deposit washing fluid evenly and completely wet the entire wiped area.

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

## 26. Driver's Seat

FIGURE 7

Driver's Seat



### 26.1. Dimensions

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

#### 26.1.1. Seat Pan Cushion Length

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

#### 26.1.2. Seat Pan Cushion Height

##### Dimensions

Measurement shall be from the cab floor to the top of the level seat at its center midpoint. The seat shall adjust in height from a minimum of 14 in. to a maximum of 20 in., with a minimum 6 in. vertical range of adjustment or approved equivalent.

#### 26.1.3. Seat Pan Cushion Slope

Measurement is the slope of the plane created by connecting the two high points of the seat, one at the rear of the seat at its intersection with the seat back and the other at the front of the seat just before it waterfalls downward at the edge. The slope can be measured using an inclinometer and shall be stated in degrees of incline relative to the horizontal plane (0 deg). The seat pan shall adjust in its slope from no less than plus 12 deg (rearward "bucket seat" incline) to no less than minus 5 deg (forward slope).



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**26.1.4.     Seat Base Fore/Aft Adjustment**

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

All parts of the driver's seat shall be prevented from making physical contact with the driver barrier or any other part of the bus behind and beside the driver regardless of the wide range of adjustment available in the driver's seat design.

NOTE: The Manufacturer shall take into account when designing and installing the driver barrier that the Farebox OCU (Operator Control Unit) will be mounted on the farebox and both must be considered with respect to potential interference.

**26.1.5.     Seat Pan Cushion Width**

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

**26.1.6.     Seat Suspension**

The driver's seat shall be appropriately dampened to support a minimum weight of 650 lb. The suspension shall be capable of dampening adjustment in both directions.

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

**26.1.7.     Operator Area Depth**

The measurement is the horizontal distance from the heel-point to the barrier at the height at which the top of the seat back reclines. For all low-floor buses, the operator area depth shall be a minimum of 45" and be able to accommodate the full range of seat adjustment and travel (for a seat with the specifications as described in these guidelines).

**26.1.8.     Seat Back**

Width-

Measurement is the distance between the outermost points of the front of the seat back, at or near its midpoint in height. The seat back width shall be no less than 19 in. Seat back will include dual recliner gears on both sides of the seat.

Height-

Standard height seat back.

**26.1.9.     Headrests**

Adjustable headrest.

**26.1.10.    Seat Back Lumbar Support**

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

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**26.1.11. Seat Back Angle Adjustment**

The seat back angle shall be measured relative to a level seat pan, where 90 deg is the upright position and 90 deg-plus represents the amount of recline.

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

**26.2. Seat Belt**

The belt assembly should be an emergency-locking retractor (ELR). All seat belts should be stored in automatic retractors. The belts shall be mounted to the seat frame so that the driver may adjust the seat without resetting the seat belt.

The seat and seatbelt assemblies as installed in the bus shall withstand static horizontal forces as required in FMVSS 207 and 210.

**26.2.1. Lap and Shoulder (Three-Point) Seat Belt**

The driver seat be equipped with a three-point lap and shoulder belt. The shoulder belt shall be non-detachable from the lap belt. The seatbelt shall be emergency locking retractor (ELR) in design. The Shoulder Belt shall have an adjustable height D-ring. The seatbelt webbing shall be Orange.

The seatbelt, buckle and driver seat shall be integrated into the bus to provide an audible and visual dash warning to the operator if the seatbelt is not buckled.

The lap belt assembly shall be a minimum of 72 in. in length with an optional use 8 in. extension. Each bus shall be supplied with one 8-inch extension.

**26.3. Adjustable Armrest**

No armrests.

**26.4. Seat Control Locations**

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

**26.5. Seat Structure and Materials**

**Cushions**

Cushions shall be fully padded with at least 3 in. of materials in the seating areas at the bottom and back.

**Cushion Materials**

Foam and fabric that meets FTA Docket 90A.

**26.6. Pedestal**

Shall be powder-coated steel at a minimum (black). Unpainted stainless steel or aluminum is allowed.

**26.7. Seat Options**

Manufacturers shall provide driver seat to include the following choices to be determined during vehicle configuration:

- seat occupied sensor/ “empty seat alarm”, reference section 19.6.2.
- seat belt sensor
- fabric and vinyl upholstery options
- side bolsters adjustments

## 27. Mirrors

### 27.1. Exterior Mirrors

The bus shall be equipped with corrosion-resistant, outside rearview mirrors mounted with stable supports to minimize vibration. Mirrors shall be firmly attached to the bus to minimize vibration and to prevent loss of adjustment. Mirrors shall permit the driver to view the roadway along the sides of the bus, including the rear wheels. Mirrors should be positioned to prevent blind spots.

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

Exterior mirrors shall be installed without a breakaway mounting system.

Combination of flat and convex mirrors referred to as transit specific.

The exterior mirrors shall be aesthetically pleasing, having form as a design factor as well as function.

#### 27.1.1. Curbside Mirrors

The curbside rearview mirror shall be mounted so that its lower edge is ~~no less than 80 in.~~ inches (+/- 3 inches) above the street surface.

##### 27.1.1.1. Remote Adjustment of Curbside Mirror

The driver shall be able to adjust both the flat and convex mirror glass in 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.

##### 27.1.1.2. Heated Mirrors Curbside

The heaters shall be energized for 15 minutes whenever the driver's heater or defroster is activated or activated independently via a momentary switch on the dash.

#### 27.1.2. Street-Side Mirrors

The street-side mirror shall be **similar** the same style and configuration and mounted **at similar** the same height as the curbside mirror to enhance aesthetic appearance and eliminate low-mounted mirror accidents.

##### 27.1.2.1. Remote Adjustment of Street-Side Mirror

The driver shall be able to adjust both the flat and convex mirror glass in the street-side mirror remotely while seated in the driving position. The control for remote positioning of the mirror shall be a single switch or device.

##### 27.1.2.2. Heated Mirrors Street-Side

The heaters shall be energized for 15 minutes whenever the driver's heater or defroster is activated or activated independently via a momentary switch on the dash.

#### 27.1.3. Exterior Mirror turn signals

Exterior mirrors shall display amber turn signals.

### 27.2. Interior Mirrors

One or more interior mounted mirrors shall be provided for the driver to observe passengers throughout the bus without leaving the driver's seat and without shoulder movement. The driver shall be able to observe passengers in forward areas of the bus, including all seats and aisles in the lower

section, including directly behind the driver, as well as the steps leading to upper level (on 40-ft bus), or articulating joint (on 60-ft bus). The Authority reserves the right to approve interior mirror configuration.

No requirement for relay mirror to view the exit door area.

# WINDOWS

## 28. Vehicle Glass

### 28.1. General Requirement

Use with 40 ft length: A minimum of 10,000 sq in. of window area, including operator and door windows, shall be required on each side of the standard configuration bus.

Use with 60 ft length: A minimum of 16,000 sq in. of window area, including operator and door windows, shall be required on each side of the standard configuration bus.

### 28.2. Windshield

The windshield shall permit an operator's field of view as referenced in SAE J1050. The vertically upward view shall be a minimum of 14 deg, measured above the horizontal and excluding any shaded band. The vertically downward view shall permit detection of an object 3½ ft high no more than 2 ft in front of the bus. The horizontal view shall be a minimum of 90 deg above the line of sight. Any binocular obscuration due to a center divider may be ignored when determining the 90 deg requirement, provided that the divider does not exceed a 3 deg angle in the operator's field of view. Windshield pillars shall not exceed 10 deg 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 windshields shall not be used. Winglets may be bonded.

#### 28.2.1. Glazing

The windshield glazing material shall have a ¼ in. nominal thickness laminated safety glass conforming to the requirements of ANSI Z26.1 Test Grouping AS-1 and the recommended practices defined in SAE J673.

#### 28.2.2. Shaded Band

The upper portion of the windshield above the driver's field of view shall have a dark, shaded band and marked AS-3, with a minimum luminous transmittance of 5 percent when tested in accordance to ASTM D1003.

One or two-piece windshield will be allowed.

### 28.3. Driver's Side Window

The driver's side window shall be the sliding type, allowing a minimum of half of the sash to latch upon closing, and shall open sufficiently to permit the seated operator to easily extend their hand out of the window for hand signaling. When in an open position, the window shall not rattle or close during accelerating or braking. This window section shall slide in tracks or channels designed to last the service

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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. The window shall be non-egress.

The driver's view, perpendicular through the operator's side window glazing, should extend a minimum of 33 in. (840 mm) to the rear of the heel point on the accelerator, and in any case must accommodate a 95th percentile male operator. The view through the glazing at the front of the assembly should begin not more than 26 in. (560 mm) above the operator's floor to ensure visibility of an under-mounted convex mirror. Driver's window construction shall maximize ability for full opening of the window.

The driver's side window glazing material shall have a ¼ in. nominal thickness laminated safety glass conforming to the requirements of ANSI Z26.1-1996 Test Grouping AS-2 and the recommended practices defined in SAE J673.

The design shall prevent sections from freezing closed in the winter. Light transmittance shall be 75 percent on the glass area below 53 in. from the operator platform floor. On the top-fixed-over-bottom-slider configuration, the top fixed area above 53 in. may have a maximum 5 percent light transmittance.

#### 28.3.1. UV Blocking Driver Window

The driver's side window shall also have a high level of UV-blocking and infrared reflecting properties to minimize energy transmittance from the sun onto the driver.

### 28.4. Side Windows

#### 28.4.1. Configuration

All side windows shall be flush mount and fixed in position, except as necessary to meet the emergency escape requirements. Side windows shall not be bonded in place but shall be easily replaceable without disturbing adjacent windows and shall be mounted so that flexing or vibration from power plant operation or normal road excitation is not apparent. All aluminum and steel material will be treated to prevent corrosion.

#### 28.4.2. Emergency Exit (Egress) Configuration

All Emergency Exit Windows shall be, when viewed from the outside, similar in appearance to non-egress windows.

#### 28.4.3. Fixed Side Windows Configuration

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

#### 28.4.4. Materials

##### 28.4.4.1. Safety Glass Glazing Panels

Side windows glazing material shall have a minimum of 3/16 in. nominal thickness tempered safety glass. The material shall conform to the requirements of ANSI Z26.1-1996 Test Grouping 2 and the recommended practices defined in SAE J673.

##### 28.4.4.2. Laminated and Tempered Safety Glazing with Anti-Vandalism Polyester Sacrificial Film

All glazing material that is aft of the standee line shall be equipped with 6 mm laminated polyester film. Film material shall be easily installed and removed without the use of specialized tools. Polyester film shall adhere to the window and be resistant to peeling, curling and discoloration by ultraviolet rays. The film shall withstand normal cleaning operations.

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Windows on the bus sides and in the rear door shall be tinted a gray color. The maximum solar energy transmittance shall not exceed 13 percent, as measured by ASTM E424. Luminous transmittance shall be measured by ASTM D1003. Windows over the destination signs shall not be tinted.

*NOTE: All glass treatments must be permanent, within the glass and/or in the center membrane. Surface films shall not be permitted.*

SHGC and light transmission performance shall be defined by the National Fenestration Rating Council.

## 28.5. Rear Window

A rear window is not required. However, if a rear-view window is installed the rear window shall be glazed with the same material (including anti-vandalism provision) and tint the same fashion, color, and light transmittance as side windows or approved equivalent. The glazing shall be set in rubber channels or be push-out type to meet FMVSS 217. If push-out type, it shall be one-piece, rugged sash design, meeting specifications for side windows.

## 29. HVAC

### 29.1. HVAC Capacity and Performance

The HVAC unit(s) may either be AC or DC electrically driven and shall have hermetic compressor(s), condenser fan and evaporator blower motors. The units shall use either R134a or R407C and may be roof or rear mounted.

The HVAC system shall, after first reaching a stabilized interior temperature of  $70 \pm 3$  °F, and with the bus running at the operating profile with corresponding door opening cycle, and carrying a number of passengers equal to 150 percent of the seated load, control the average passenger compartment temperature within arrange between 65 and 80 °F, while maintaining the relative humidity to a value of 50 percent or less.

The system shall maintain these conditions while subjected to any outside ambient temperatures within a range of 10 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 to 115 °F, the interior temperature of the bus shall be permitted to rise 0.5 °F for each degree of exterior temperature in excess of 95 °F.

When the bus is connected to a charger, whether charging or not, the bus shall use shore power to control the interior temperature at the most recent selected set point.

### 29.2. Controls and Temperature Uniformity

The bus **should shall** be equipped with two HVAC systems and controls for each. Each HVAC system **should shall** be capable of working independently of one another: one dedicated to the passenger area and one dedicated to the operator area. The interior climate control systems **should shall** switch automatically to the ventilating mode if the refrigerant compressor or condenser fan fails.

### 29.3. Passenger HVAC System

The passenger HVAC system shall be centrally controlled with an advanced electronic/diagnostic control system compliant with J1939 Communication Protocol for receiving and broadcasting of data for extracting/reading.

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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  $\pm 2^{\circ}\text{F}$  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  $68^{\circ}$  and  $78^{\circ}\text{F}$ . From then on, all interior climate control system requirements shall be attained automatically, unless re-adjusted by operator.

Interior temperature distribution shall be uniform to prevent hot and/or cold spots. After stabilization with doors closed, the temperatures between any two points in the passenger compartment in the same vertical plane, and 6 to 72 in. above the floor, shall not vary by more than  $5^{\circ}\text{F}$  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 with APTA's "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 that the majority of the measured temperatures fall within the specified requirement.

#### 29.4. Driver HVAC System

The Authority desires a driver climate control system that mimics as much as possible a standard automotive air conditioning and heating system. The system may be integrated into the existing standard design for heating, ventilation and defroster system.

The driver air conditioning system **should shall** have dash mounted controls that allow the operator to control air speed, temperature, direction, and fresh air mix. Cool air **should shall** flow from vents in the dash that cool the driver's head and torso. Cool air may also be supplied by overhead vents, but these do not strictly satisfy the requirements for a driver's air conditioning system. The driver air conditioning system **should shall** be independently controlled from the passenger HVAC system and **should shall** include a separate and dedicated evaporator, heater core, fan speed and system controls.

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

The defroster supply outlets shall be located at the lower edge of the windshield. These outlets shall be durable and shall be free of sharp edges that can catch clothes during normal daily cleaning. The system shall be such that foreign objects such as coins or tickets cannot fall into the defroster air outlets. Adjustable ball vents or louvers shall be provided at the left of the driver's position to allow direction of air onto the side windows.

The ventilation system **should shall** be capable of providing fresh (exterior) air in both the foot and head areas. Vents **should shall** be controllable by the driver from the normal driving position. Decals **should shall** be provided, indicating "operating instructions" and "open" and "closed" positions. When closed, vents **should shall** be sealed to prevent the migration of water or air into the bus.

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HVACs that use coolant pumps for driver's defroster/heat shall be sized for the required flow and be brushless, having a minimum maintenance-free service life for both the brushless motor and the pump of at least 40,000 hours at full power.

Driver controls for all cooling, heating, ventilation, and defroster systems are subject to the approval of the Authority.

#### 29.5. Auxiliary Heater

~~The~~ If required, auxiliary heating system will consist of electric grid type heaters.

#### 29.6. Load Shedding and Derating

HVAC control must include a method to provide multistage load shedding when required to conserve battery power. The HVAC system may be operated with reduced performance to allow the bus to operate when the high-voltage batteries are below critical levels.

#### 29.7. Air Flow

##### 29.7.1. Passenger Area

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

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

The climate control blower motors and fan shall be designed such that their operation complies with the interior noise level requirements.

The vehicle does not require "Fresh Air" to be mixed into the HVAC airflow as regular door opening cycle results in effectively providing an adequate "fresh air" mixture.

##### 29.7.2. Driver's Area

The bus interior climate control system shall deliver at least 100 cfm of air to the driver'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 J382, "Windshield Defrosting Systems Performance Requirements," and shall have the capability of diverting heated air to the driver's feet and legs. The defroster or interior climate control system shall maintain visibility through the driver's side window.

##### 29.7.3. Air Filtration

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



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Air filters shall be of disposable type.

**29.7.4. Roof Ventilators**

Each ventilator shall be easily opened and closed manually. When open with the bus in motion, this ventilator shall provide fresh air inside the bus. The ventilator shall cover an opening area no less than 425 sq in. and shall be capable of being positioned as a scoop with either the leading or trailing edge open no less than 4 in., or with all four edges raised simultaneously to a height of no less than 3½ in. An escape hatch shall be incorporated into the roof ventilator. Roof ventilator(s) shall be sealed to prevent entry of water when closed.

For 40-foot bus, ~~two (2)~~ a minimum of one ventilator (two preferred) ~~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.

For 60-ft articulated bus, three (3) Roof Ventilators. One ventilator installed approximately over each axle.

**29.8. HVAC Maintainability**

Manually controlled shutoff valves in the refrigerant lines shall allow isolation of the compressor and dehydrator filter for service. Self-sealing couplings using O-ring seals shall be used to break and seal the refrigerant lines during removal of major components, such as the refrigerant compressor. Shutoff valves may be provided in lieu of self-sealing couplings. The condenser shall be located to efficiently transfer heat to the atmosphere and shall not ingest air warmed above the ambient temperature by the bus mechanical equipment, or to discharge air into any other system of the bus. The location of the condenser shall preclude its obstruction by wheel splash, road dirt or debris. HVAC components located within 6 in. of floor level shall be constructed to resist damage and corrosion. Driver HVAC components shall be maintainable independent of the passenger HVAC. For example the driver evaporator shall be capable of being isolated from the passenger HVAC system to prevent from evacuating the entire HVAC system for maintenance.

**29.9. Entrance/Exit Area Heating and Floor Heating**

The vehicle does not require special door area heating.

The vehicle does not require special floor-level heating.

# EXTERIOR PANELS, FINISHES AND EXTERIOR LIGHTING

## 30. Exterior Panels, Finishes, and Exterior Lighting

### 30.1. Exterior Design

The bus shall have a clean, smooth, simple design, primarily derived from bus performance requirements and passenger service criteria. The exterior and body features, including grilles and louvers, 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 the interior of the vehicle is prevented by other means, then rear cap panels may be lapped otherwise. The windows, hatches and doors shall be able to be sealed. Accumulation of spray and splash generated by the bus's wheels shall be minimized on windows and mirrors.

Exterior access panels shall be designed so that they open to the "up" position, with the exception of quick access doors (windshield washer or ESS charging connection port). The exterior access doors shall open up to a minimum of 130° from the 0° starting point formed from side the bus body, in an effort to facilitate maintenance access and eliminate maintenance access related injuries. The exterior access door handles and hand grips shall have a minimum of 1.5 inches knuckle clearance.

### 30.2. Body Materials

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

No requirement for protection against graffiti/vandalism for body material surfaces.

### 30.3. Pedestrian Safety

Exterior protrusions along the side and front of the bus greater than ½ in. and within 80 in. of the ground shall have a radius no less than the amount of the protrusion. The exterior rearview mirrors, cameras and required lights and reflectors are exempt from the protrusion requirement. Advertising frames shall protrude no more than ¾ in. from the body surface. Grilles, doors, bumpers and other features on the sides and rear of the bus shall be designed to minimize toeholds or handholds.

Exterior protrusions shall not cause a line-of-sight blockage for the driver.

### 30.4. Pedestrian Deflector

The vehicle manufacturer shall install a safety device mounted in front of the right rear wheels designed for the intended purpose of deflecting a person out of the path of the wheels. The Pedestrian Deflector shall have the following salient features:

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- Curved replaceable polyurethane deflector
- Black powder coated steel mounting assembly
- Mounting assembly shall be specifically designed to fit securely to the vehicle with enough strength and specific dimensions (height, length, and proximity tolerances) to carry out the in-tended function of deflecting a person out of the path of the wheels

### 30.5. Pedestrian Audible Alert

Due to the silent nature of electric propulsion, the vehicle **should** ~~shall~~ be equipped with a “noise maker” device designed to alert pedestrians, especially visually impaired pedestrians, and bicyclists, of the approaching bus. The device, **if provided**, shall have **an** adjustable volume accessible by maintenance only to allow fine tuning for the street application. The sound emitted shall be unique, and indicative of the proximity and speed of the bus.

### 30.6. Side Body Panel Repair

**Exterior body or body panels shall be of a material that allow quick repairs using standard body repair techniques.**

~~Structural elements supporting exterior body panels shall allow side body panels below the windows to be repaired in lengths not greater than 12.5 ft. and side panels shall be attached using standard attachment methods.~~

### 30.7. Rain Gutters

Rain gutters shall be provided to prevent water flowing from the roof onto the passenger doors and driver’s side window. When the bus is decelerated, the gutters shall not drain onto the windshield, driver’s side window or door boarding area. Cross-sections of the gutters shall be adequate for proper operation.

### 30.8. License Plate Provisions

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

Final location of license plates is subject to review by the Authority.

### 30.9. Rub Rails

No requirement for rub rails.

### 30.10. Fender Skirts

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.

### 30.11. Wheel Covers

Wheel covers required. The manufacturer shall install wheel covers on all wheels with the exception of the steering axle. The Authority reserves the right of final approval or allowance for equivalent.

### 30.12. Splash Aprons

Splash aprons, composed of ¼ in. minimum composition or rubberized fabric, shall be installed behind and/or in front of wheels as needed to reduce road splash and to protect underfloor components. The

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splash aprons shall extend downward to within 6 in. off the road surface at static conditions. Apron widths shall be no less than tire widths. Splash aprons shall be bolted to the bus understructure. Splash aprons and their attachments shall be inherently weaker than the structure to which they are attached. The flexible portions of the splash aprons shall not be included in the road clearance measurements. Splash apron shall be installed as necessary to protect the wheelchair loading device from road splash. Other splash aprons shall be installed where necessary to protect bus equipment.

### 30.13. Access Doors to Exterior Service Compartments

#### 30.13.1. Access Doors

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. All access doors shall be retained in the open position by props or counterbalancing with over center or gas-filled springs with safety props and shall be easily operable by one person. Springs and hinges shall be corrosion resistant. Latch handles shall be flush with, or recessed behind, the body contour and shall be sized to provide an adequate grip for opening. Access doors, when opened, shall not restrict access for servicing other components or systems.

If precluded by design, the manufacturer shall provide door design information specifying how the requirements are met.

#### 30.13.2. Access Door Latch/Locks

Access doors larger than 100 sq in. in area shall be equipped with corrosion-resistant flush-mounted latches or locks except for coolant and fuel fill access doors. All such access doors that require a tool to open shall be standardized throughout the vehicle and will require a nominal 5/16 in. square male tool to open or lock or approved equivalent.

### 30.14. Bumpers

#### 30.14.1. Location

Bumpers shall provide impact protection for the front and rear of the bus with the top of the bumper being 27 in.,  $\pm 2$  in., above the ground. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other.

#### 30.14.2. Front Bumper

No part of the bus, including the front bumper, shall be damaged as a result of a 5 mph impact of the bus at curb weight with a fixed, flat barrier perpendicular to the bus's longitudinal centerline. The bumper shall return to its pre-impact shape within 10 minutes of the impact. The bumper shall protect the bus from damage as a result of 6.5 mph impacts at any point by the common carriage with contoured impact surface defined in Figure 2 of FMVSS 301 loaded to 4000 lb parallel to the longitudinal centerline of the bus. It shall protect the bus from damage as a result of 5.5 mph impacts into the corners at a 30 deg angle to the longitudinal centerline of the bus. The energy absorption system of the bumper shall be independent of every power system of the bus and shall not require service or maintenance in normal operation during the service life of the bus. The bumper may increase the overall bus length specified by no more than 7 in.

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**30.14.3. Rear Bumper**

No part of the bus, including the rear bumper, shall be damaged as a result of a 2 mph impact with a fixed, flat barrier perpendicular to the longitudinal centerline of the bus. The bumper shall return to its pre-impact shape within 10 minutes of the impact. When using a yard tug with a smooth, flat plate bumper 2 ft wide contacting the horizontal centerline of the rear bumper, the bumper shall provide protection at speeds up to 5 mph, over pavement discontinuities up to 1 in. high, and at accelerations up to 2 mph per second. The rear bumper shall protect the bus when impacted anywhere along its width by the common carriage with contoured impact surface defined in Figure 2 of FMVSS 301 loaded to 4000 lb, at 4 mph parallel to or up to a 30 deg angle to the longitudinal centerline of the bus. The rear bumper shall be shaped to prevent unauthorized riders standing on the bumper. The bumper shall not require service or maintenance in normal operation during the service life of the bus. The bumper may increase the overall bus length specified by no more than 7 in.

**30.14.4. Bumper Material**

Bumper material shall be corrosion-resistant and shall withstand repeated impacts of the specified loads without sustaining damage. These bumper qualities shall be sustained throughout the service life of the bus. Bumpers (front and rear) shall not be painted.

**30.15. Bicycle Rack**

Manufacturer shall install bicycle racks. The bike racks shall be finished in brushed stainless steel.

For 40-foot bus, the vehicle shall have mounting provisions and a ~~for integrated~~ three position bike rack on the front bumper area, centered on the front of the vehicle. The bike rack securement arm shall remain fully functional regardless of kneeling position of the bus.

For 60-foot bus, the vehicle shall have a bicycle rack installed on the interior, near the rear most entrance/ exit door. A dedicated “bike stop request” button shall be installed near the interior bike rack and shall send a corresponding message to the driver when activated.

The Authority reserves the right of final configuration acceptance for all bike racks.

**30.16. Exterior Finish and Color**

**30.16.1. Surface Appearance**

All exterior surfaces shall be smooth and free of wrinkles and dents. Exterior surfaces to be painted shall be properly prepared as required by the paint system Supplier prior to application of paint to ensure a proper bond between the basic surface and successive coats of original paint for the service life of the bus. Drilled holes and cutouts in exterior surfaces shall be made prior to cleaning, priming, and painting, where possible, to prevent corrosion. The bus shall be painted prior to installation of exterior lights, windows, mirrors, and other items that are applied to the exterior of the bus. Body filler materials may be used for surface dressing, but not for repair of damaged or improperly fitted panels. Any joint or seam filler shall be of a color that provides for a uniform appearance of the exterior, such as use of color matched or color compatible filler. Joint color and appearance shall last the life of the bus without fading, cracking, or deterioration.

Paint shall be applied smoothly and evenly with the finished surface free of visible dirt and the following other imperfections:

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- blisters or bubbles appearing in the topcoat film
- chips, scratches, or gouges of the surface finish
- cracks in the paint film
- craters where paint failed to cover due to surface contamination
- overspray
- peeling
- runs or sags from excessive flow and failure to adhere uniformly to the surface
- chemical stains and water spots
- dry patches due to incorrect mixing of paint activators
- buffing swirls

All exterior finished surfaces shall be impervious to diesel fuel, gasoline, and commercial cleaning agents. Finished surfaces shall resist damage by controlled applications of commonly used graffiti-removing chemicals.

Proper adhesion between the basic surface and successive coats of the original paint shall be measured using an Elcometer adhesion tester as outlined in ASTM D4541-85. Adhesion shall be a minimum 300 ft-lb. The bus manufacturer shall supply test samples of the exterior surface for each step of the painting process that may be subject to adhesion testing per ASTM G4541-87 and ASTM D4145-85. ASTM D4541-93 may be used for inspection testing during assembly of the vehicle. Reference paint scheme in Exhibit F-1A Typical Capital Metro Paint and Decal Scheme. The Exhibit F-1A shall serve as a guide as the Authority reserves the right of final approval.

#### 30.16.2. Paint Strategy

The paint strategy shall be a Base coat/clear coat paint system.

#### 30.16.3. High Gloss External Paint Finish Quality

Painted surfaces shall have a minimum 95 gloss and an orange peel rating of 7 or more on the Advanced Coating Technologies Inc., orange peel standard panels set #APR 14941 or Authority -accepted wave scan equipment. Paint shall last a minimum of six years with a minimum gloss of 90 as measured in ASTM E97 92, "Standard Test Method For Directional Reflectance."

### 30.17. Decals, Numbering and Signing

Energy storage and delivery systems shall be identified in accordance with federal, state, and local requirements, codes, and standards.

Monograms, numbers, and other special signing shall be applied to the inside and outside of the bus as required. All decals shall be installed per the decal Supplier recommendations. Signs shall be provided in compliance with the ADA requirements defined in 49 CFR Part 38, Subpart B, 38.27.

Reference paint scheme in Exhibit F-1A Typical Capital Metro Paint and Decal Scheme. The Exhibit F-1A shall serve as a guide as the Authority reserves the right of final approval.

The Authority reserves to right to review and approve all decals and signage on the bus, including media, language, translations, font, color, sizing, and location.

#### 30.17.1. Passenger Information

ADA priority seating signs as required and defined by 49 CFR shall be provided to identify the seats designated for passengers with disabilities.

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The public information system provided shall be in accordance with 49 CFR.

Capital Metro-Specified: Reference paint scheme in Exhibit F-1A Typical Capital Metro Paint and Decal Scheme. The Exhibit F-1A shall serve as a guide as the Authority reserves the right of final approval.

**30.17.2. Braille Bus Number Plates**

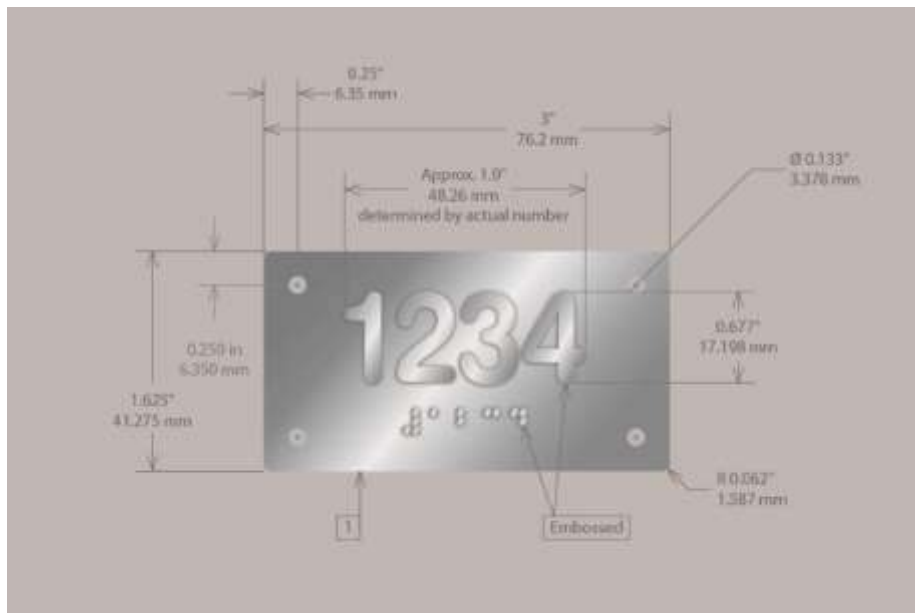
The proposer shall provide and install Braille Bus Number Plate Signs, three (3) braille plates in a 40-foot bus and four (4) plates in a 60-foot bus, on the interior of each vehicle. Two (2) plates shall be installed in the front of the vehicle (both lengths) near the forward most seats on both sides of vehicle, so that the plates are accessible to a person sitting in those seats, for both lengths of bus (40 and 60 foot). The third and fourth plates on the 40-foot and 60-bus shall be installed in the rear door areas. The number on the Braille Plates shall display (numerals and braille numerals) the same as the number of the bus designated by the Authority.

The Braille Bus Number Plates shall be embossed stainless steel, permanently mounted, and vandal resistant.

The Authority reserves the right of final configuration approval.

Reference figure 8 below for dimensions:

**FIGURE 8**



**30.18. Exterior Lighting**

All exterior lights shall be designed to prevent entry and accumulation of moisture or dust. Lamps, lenses, and fixtures shall be interchangeable to the extent practicable. Light lenses shall be designed and located to prevent damage when running the vehicle through an automatic bus washer.

Commercially available LED-type lamps shall be used at all exterior lamp locations.

LED lamps shall be potted type with the exception of the head lamps and designed to last the life of the bus or approved equivalent.

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Size of LED lamps used for tail, brake and turn signal lamps should ~~shall~~ be 7-inch LED and standard installation of OEM. CMTA prefers larger signals on rear of bus.

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

**30.18.1. Backup Lights/Alarm**

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

**30.18.2. Doorway Lighting**

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

**30.18.3. Turn Signals**

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

All turn signal lights shall be amber, including any associated with exterior rear view mirrors.

Rear high mounted amber LED turn signals shall be installed, with the Authority to approve design, style, and installation location.

**30.18.4. Headlamps**

Headlamps shall be LED (Light Emitting Diode) sealed beam and designed for ease of replacement.

**Daytime Running Lights**

Headlamps shall incorporate a daytime running light feature.

**30.18.5. Brake Lamps**

Brake lamps shall be provided in accordance with federal regulations.

**High and Center Mount Red Brake Lamp**

Bus shall include red, high and center mounted brake lamp(s) along the backside of the bus in addition to the lower brake lamps required under FMVSS. The high and center mounted brake lamp(s) shall illuminate steadily with brake application. The Authority reserves the right of final approval for rear lamp configuration.

**30.19. Service Area Lighting (Interior and Exterior)**

LED lamps shall be provided in the engine and all other compartments where service may be required to generally illuminate the area for night emergency repairs or adjustments. These service areas shall include, but not be limited to, the engine compartment, the communication box, junction/apparatus panels and passenger door operator compartments. Lighting shall be adequate to light the space of the



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service areas to levels needed to complete typical emergency repairs and adjustments. The service area lamps shall be suitable for the environment in which they are mounted.

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

LED lamps for each of the rear J1772 charge ports (both sides of vehicle) shall be provided. The lamps shall be lit for a minimum of 5 minutes after the “master run switch” is switched to the “off” position. LED lamps shall remain on while the J1772 connectors are connected to the bus.

### 30.20. Custom “Light Up” Branding Option

The Authority is requesting cost information in Exhibit A, Optional Items, for the manufacturer to design and install custom “Light Up” branding lights on the exterior of the bus. The vehicle shall be equipped with exterior lighting displayed for the purposes of branding and route identification. The lights shall be color programmable LED strips, with a heavy duty and ruggedized design, and with maintainability in mind. The lights shall appear integral to the body, or windows, of the bus and capable of withstanding the rigorous duty cycle of transit with consideration, to vibration, tree branches, bus wash and other hazards. The lights shall have a control unit capable of receiving a signal from other on board system or switch to change the color to the appropriate route color. The lights shall be bright enough to be visible in daylight, and auto-dimming if necessary to avoid glare for other drivers. The lights shall not interfere with operator visibility through windows or mirrors. The lights shall comply with ADA regulations. Refer to figure 9 for Draft Concept Rendering. The Authority is open to suggestions and creative input from the manufacturer to solve this creative request.

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FIGURE 9

DRAFT – CONCEPT RENDERING



# INTERIOR PANELS AND FINISHES

## 31. Interior Panels and Finishes

### 31.1. General Requirements

Materials shall be selected on the basis of maintenance, durability, appearance, safety, noise reduction, flammability and tactile qualities. Materials shall be strong enough to resist everyday abuse and be vandalism and corrosion resistant. Trim and attachment details shall be kept simple and unobtrusive. Interior trim shall be secured to avoid resonant vibrations under normal operational conditions.

Interior surfaces more than 10 in. below the lower edge of the side windows or windshield shall be shaped so that objects placed on them fall to the floor when the coach is parked on a level surface. Any components and other electrical components within close proximity to these surfaces shall also be resistant to this cleaning method.

Internal surfaces, as possible, to be stainless steel or other resistant material. The Authority reserves the right of final approval.

The design and layout of the interior shall facilitate easy cleaning and disinfecting of the vehicle. The layout and installation of interior hardware, seats, panels, stanchions, and other supports shall avoid configurations that result in floor areas that cannot be easily and readily swept and mopped, nor result in spaces or cavities that allow accumulation of dirt and trash without falling to the open floor where they can be easily swept.

#### 31.1.1. Fire Resistance

It is the Authority's preference that all materials shall comply with the Recommended Fire Safety Practices defined in FTA Docket 90-A, dated Oct. 20, 1993. At a minimum, all materials shall comply with the requirements of FMVSS 302.

### 31.2. Interior Panels

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. Panels may be fabricated from textured stainless steel, composite, scratch resistant plastic, melamine-type material, or approved equivalent. The Authority to approve materials/ fasteners used, patterns, designs, and installation locations for stainless steel.

### 31.3. Driver Area Barrier

A barrier or bulkhead between the driver and the street-side front passenger seat shall be provided. The barrier shall minimize glare and reflections in the windshield directly in front of the barrier from interior lighting during night operation. Location and shape must permit full seat travel and reclining possibilities that can accommodate the shoulders of a 95th-percentile male. The partition shall have a side return and stanchion to prevent passengers from reaching the driver by standing behind the driver's seat. The lower area between the seat and panel must be accessible to the driver. The partition must be strong enough in conjunction with the entire partition assembly for mounting of such equipment as flare kits, fire extinguishers (1.2 kg), microcomputer, public address amplifier, etc. The panel should be properly attached to eliminate noise and rattles.

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The driver's barrier shall be Full-Height (Floor-to-Ceiling) Configuration of Driver's Barrier, extending continuously from the floor area to the ceiling and from the bus wall to the first stanchion immediately behind the driver to provide security to the driver and to limit passenger conversation.

#### 31.4. Driver Area Enclosure/ Door

The proposers shall install a heavy-duty operator enclosure or door. The door shall have the following salient features:

- The barrier shall be designed for heavy duty transit service use
- Anti-glare, anti-reflective
- Comply with ADA regulations, not to impede wheelchair path
- Rattle-free
- Sliding upper glass
- does not impede foot traffic
- does not interfere with access to the farebox by passenger or operator

#### 31.5. Modesty Panels

Sturdy divider panels constructed of durable, unpainted, corrosion-resistant material complementing the interior shall be provided to act as both a physical and visual barrier for seated passengers.

Design and installation of modesty panels located in front of forward-facing seats shall include a handhold or grab handle along their top edge. These dividers shall be mounted on the sidewall and shall project toward the aisle no farther than passenger knee projection in longitudinal seats or the aisle side of the transverse seats. Modesty panels shall extend from at least the window opening of the side windows, and those forward of transverse seats shall extend downward to ~~1 and 1½ in.~~ approximately 8.5 inches above the floor. Panels forward of longitudinal seats shall extend to below the level of the seat cushion. Dividers positioned at the doorways, where applicable, shall provide no less than a 2½ in. clearance between the modesty panel and a fully open, inward opening door, or the path of a deploying flip-out ramp to protect passengers from being pinched. Modesty panels installed at doorways shall be equipped with grab rails if passenger assists are not provided by other means. Panels shall not interfere with access to emergency door exit systems. Panels shall accommodate the Authority's On Board Validator System.

The modesty panel and its mounting shall withstand a static force of 250 lb applied to a 4 × 4 in. area in the center of the panel without permanent visible deformation.

Modesty panels shall be installed as stated.

Clear non-glass panel from above the modesty panel to the top of the daylight opening and attached to the stanchion on all modesty panels near the rear door(s) of the bus.

#### 31.6. Front End

The entire front end of the bus shall be sealed to prevent debris accumulation behind the dash and to prevent the driver's feet from kicking or fouling wiring and other equipment. The front end shall be free of protrusions that are hazardous to passengers standing at the front of the standee line area of the bus during rapid decelerations. Paneling across the front of the bus and any trim around the driver's compartment shall be formed metal or composite material. Composite dash panels shall be reinforced as necessary, vandal-resistant and replaceable. All colored, painted and plated parts forward of the

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driver's barrier shall be finished with a surface that reduces glare. Any mounted equipment must have provision to support the weight of equipment.

### 31.7. Rear Bulkhead

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

The rear bulkhead paneling shall be contoured to fit the ceiling, sidewalls and seat backs so that any litter or trash will tend to fall to the floor or seating surface when the bus is on a level surface. Any air vents in this area shall be louvered to reduce airflow noise and to reduce the probability of trash or litter being thrown or drawn through the grille. If it is necessary to remove the panel to service components located on the rear bulkhead, then the panel shall be hinged or shall be able to be easily removed and replaced. Grilles where access to or adjustment of equipment is required shall be heavy duty and designed to minimize damage and limit unauthorized access.

### 31.8. Headlining

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

### 31.9. Panel Fastening

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

### 31.10. Insulation

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

The combination of inner and outer panels on the sides, roof, wheel wells and ends of the bus, and any material used between these panels, shall provide a thermal insulation sufficient to meet the interior temperature requirements. The bus body shall be thoroughly sealed so that the driver or passengers cannot feel drafts during normal operations with the passenger doors closed.

#### 31.10.1. Insulation FTA Docket 90-A

It is the Authority's preference that all insulation materials shall comply with the Recommended Fire Safety Practices defined in FTA Docket 90-A, dated Oct. 20, 1993. At a minimum, all insulation materials shall comply with the requirements of FMVSS 302.

Manufacturers shall endeavor to comply with the FTA Docket 90-A requirement or offer an approved equivalent.

### 31.11. Floor Covering

The floor covering shall have a nonskid walking surface that remains effective in all weather conditions. The floor covering, as well as transitions of flooring material to the main floor and to the entrance and exit area, shall be smooth and present no tripping hazards. Seams shall be sealed/welded per manufacturer's specifications. The color and pattern shall be consistent throughout the floor covering.

The floor covering shall have the following salient features or approved equivalent:

- reduced weight to contribute to increased range on battery electric vehicles
- No reduction in aggregate content ensuring sustained slip resistance and safety performance
- lightest 2.7mm heavy duty bus floor
- High tensile strength
- High elongation strength
- Installation flexibility
- Flooring welds with high integrity
- Highly scratch resistant
- Long lasting visual appearance
- Naturally hygienic

#### 31.11.1. Standee Line

The standee line shall be approximately 2 in. wide and shall extend across the bus aisle and contrast with the rest of the floor covering. The location of the standee shall be subject to approval by the Authority and agreed upon during pre-production. The floor covering color shall be subject to approval by the Authority and agreed upon during pre-production.

Any areas on the floor that are not intended for standees, such as areas "swept" during passenger door operation, shall be clearly and permanently marked.

#### 31.11.2. Floor Covering Installation

The floor shall be easily cleaned and shall be arranged to minimize debris accumulation.

The manufacturer shall install the floor covering so that the following is met:

- Ease of installation
- Ease of maintenance
- Ease of cleaning
- In accordance with the floor covering manufacturers installation requirements and recommendations
- If necessary, a coving shall be installed at the transition line that is formed where the sub-floor meets the wall. The coving shall offer structure for the floor covering to rest upon so that floor "tearing" is prevented in that area

### 31.12. Access Doors to Interior Service Compartments

Access for maintenance and replacement of equipment shall be provided by panels and doors that appear to be an integral part of the interior. Access doors shall be hinged with gas props or over center springs, where practical, to hold the doors out of the mechanic's way. Panels shall prevent entry of

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mechanism lubricant into the bus interior. All fasteners that retain access panels shall be captive in the cover.

*31.12.1. Access Doors That Do Not Require Tools or Keys to Open*

Access doors that allow access to service areas shall be secured with 1/4 turn latches that can be turned by hand or 5/16" square key. If fasteners are used on non-service area access doors the access panels shall have the fasteners be captive in the cover and the opposite component of the fastener captive on the body.

*31.12.2. Access Doors with Locks*

The ITS/ Electrical cabinet access door shall be secured with a keyed lock. The locks shall be standardized so that only one tool is required to open access doors on the bus. The locks shall be standardized to the Southco M3-10 #64-22-11 768854 with Southco key #H257.

*31.12.3. Floor Access Panels*

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

The number of special fastener tools required for panel and access door fasteners shall be minimized. Preference: In order to maximize the accessibility of the vehicle for maintenance technicians the tools required shall be standardized to be same as those on the Authority's existing vehicles e.g. 5/16" square key or approved equivalent.

**31.13. Fare Collection Installation Provisions**

Space and structural provisions shall be made for installation of currently available fare collection devices, which shall be as far forward as practicable. Location of the fare collection device shall not restrict traffic in the vestibule, including wheelchairs, and shall allow the driver to easily reach the farebox controls and to view the fare register. The farebox shall not restrict access to the driver's area, shall not restrict operation of driver controls, and shall not—either by itself or in combination with stanchions, or route destination signs—restrict the driver's field of view per SAE J1050. The location and mounting of the fare collection device shall allow use, without restriction, by passengers. The farebox location shall permit accessibility to the vault for easy manual removal or attachment of suction devices. Meters and counters on the farebox shall be readable on a daily basis. The Farebox shall be mounted to the floor meaning the base floor where passengers tread not the operator step or the operator pedestal. The floor under the farebox shall be reinforced as necessary to provide a sturdy mounting platform and to prevent shaking of the farebox.

Contractor shall provide fare collection installation layout to the Authority for approval.

The Authority will install its own farebox/card reader. Provisions for Farebox shall be installed per requirements as described in Automated Fare Collection section 40.17.



# PASSENGER ACCOMMODATIONS

## 32. Interior Lighting

All interior lighting shall be LED (Light Emitting Diode) or approved equivalent. The light source shall be located to minimize windshield glare, with distribution of the light focused primarily on the passengers' reading plane while casting sufficient light onto the advertising display. The lighting system may be designed to form part of or the entire air distribution duct.

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

### 32.1. Passenger Area Lighting

#### 32.1.1. First Row Lights

The first light on each side (behind the driver and the front door) is normally turned on only when the front door is opened, in "night run" and "night park." As soon as the door closes, these lights shall go out. These lights shall be turned on at any time if the switch is in the "on" position.

#### 32.1.2. Second Row Lights (Dimming)

To help eliminate windshield reflection on suburban roads where street lighting is at a low level, the second light on each side, when "night run" or "night park" is selected, shall be controlled by the switch; off in "off" and on in "normal." These lights shall be turned on at any time if the switch is in the "on" position.

All interior lighting shall be turned off whenever the vehicle is in reverse.

#### 32.1.3. First Light Modules Dim/Extinguish When Front Door Is Closed

When the master switch is in the "run" or "night/run" mode, the first light module on each side of the coach shall automatically extinguish or dim when the front door is in the closed position and illuminate when the door is opened.

*Note- The interior lighting design shall require the approval of the Authority.*

### 32.2. Driver's Area Lighting

The driver's area shall have a light to provide general illumination, and it shall illuminate the half of the steering wheel nearest the driver to a level of 5 to 10 fc (foot candles).

### 32.3. Seating Area Lighting

The interior lighting system shall provide a minimum 15 fc illumination on a 1 square foot plane at an angle of 45 degrees from horizontal, centered 33 inches above the floor and 24 inches in front of the seat back at each seat position. Allowable average light level for the rear bench seats shall be 7 fc (foot candles).

### 32.4. Vestibules/Doors Lighting

Floor surface in the aisles shall be a minimum of 10 fc, and the vestibule area a minimum of 4 fc with the front doors open and a minimum of 2 fc with the front doors closed. The front entrance area and curb



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lights shall illuminate when the front door is open and the master run switch is in the “lights” or “night run” position. Rear exit area and curb lights shall illuminate when the rear door is ~~unlocked~~-opened.

### 32.5. Step Lighting

Manufacturers shall endeavor to install step lighting for the intermediate steps between lower and upper floor levels or approved equivalent. The step lighting shall be a minimum of 4 fc and shall illuminate in all vehicle run positions. The step lighting shall be low profile to minimize tripping and snagging hazards for passengers and shall be shielded as necessary to protect passengers’ eyes from glare.

### 32.6. Ramp Lighting

Exterior and interior ramp lighting shall comply with all ADA and federal regulations.

### 32.7. Turntable Lighting (60-foot Articulated Coach)

Lighting in the turntable may be reduced to 7 fc.

### 32.8. Farebox/Card Reader Lighting

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 shall automatically turn on whenever the front doors are opened and the run switch is in the “night run” or “night park” position.

## 33. Passenger Seating

### 33.1. Arrangements and Seat Style

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

#### Combination Forward-Facing and Perimeter Seating Arrangement

Passenger seats shall be arranged longitudinal rows facing the centerline of the bus configuration at the front section of the bus, and in a transverse, two-position forward-facing seats provided at the rear of the bus. Each seat shall have a minimum width of 17 inches, not including any armrest. Seating capacity with this arrangement shall be maximized to allow as many seated passengers as possible without compromising spatial requirements, not including the driver, with the specified seating arrangement.

Passenger seating shall be Docket 90 compliant.

### 33.2. Rearward Facing Seats

Proposers will be allowed rearward facing ADA designated securements. No other rearward facing seats shall be allowed. The Authority reserves the right of final approval.

### 33.3. Turntable Area (60-foot Articulated Coach)

Handholds or leaning rail shall be installed in the turntable. The Authority reserves the right of final configuration approval.

There shall be no seating in the turntable.

#### **33.4. Padded Inserts/Cushioned Seats**

The passenger seats shall be equipped with padded inserts throughout the bus (measure to uncompressed surface). The seat cushion and back shall be padded with a cellular foam product and be no less than ½ in. thick in areas contacted and loaded by passengers in the normal seated position and shall be covered with vinyl.

Seats, back cushions, and other pads shall be securely attached and shall be detachable by means of a simple release mechanism so that they are easily removable by the maintenance staff but not by passengers, including the ADA flip seats, and all benches on the bus. Seat cushions and pads shall be interchangeable throughout the bus. Materials shall have high resistance to tearing, flexing, and wetting.

Seating shall be covered in textured “basket weave” vinyl, color code for vinyl is Camira Vinyl Rhino Horn RUP01 or approved equivalent.

#### **33.5. Drain Hole in Seats**

There shall be no drain hole in seat inserts.

#### **33.6. Hip-to-Knee Room**

Hip-to-knee room measured from the center of the seating position, from the front of one seat back horizontally across the highest part of the seat to a vertical surface immediately in front, shall be a minimum of 26 in. At all seating positions in paired transverse seats immediately behind other seating positions, hip-to-knee room shall be no less than 27 inches.

#### **33.7. Foot Room**

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

#### **33.8. Aisles**

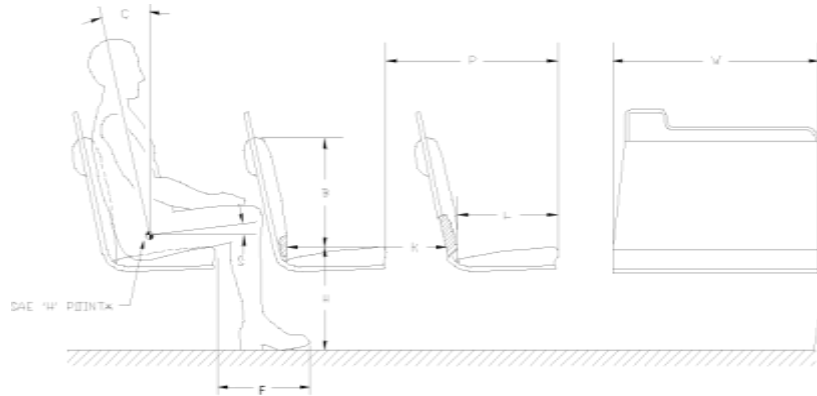
The aisle between the seats shall be no less than 22 inches wide at seated passenger hip height. Seat backs shall be shaped to increase this dimension to no less than 24 inches at 32 inches above the floor (standing passenger hip height).

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72.10. Dimensions

FIGURE 10

Seating Dimensions and Standard Configuration



Seat dimensions for the various seating arrangements shall have the dimensions as follows (refer to Figure 10):

- The width, W, of the two-passenger transverse seat shall be a minimum 35 in.
- The length, L, shall be 17 in.,  $\pm 1$  in.
- The seat back height, B, shall be a minimum of 15 in.
- The seat height, H, shall be 17 in.,  $\pm 1$  in. For the rear lounge (or settee) and longitudinal seats, and seats located above raised areas for storage of underfloor components, a cushion height of up to 18 in.,  $\pm 2$  in., will be allowed. This shall also be allowed for limited transverse seats, but only with the express approval of the Authority.
- Foot room = F.
- The seat cushion slope, S, shall be between 5 and 11 deg.
- The seat back slope, C, shall be between 8 and 17 deg.
- Hip to knee room = K.
- The pitch, P, is shown as reference only.

### 33.9. Structure and Design

The passenger seat frame and its supporting structure shall be constructed and mounted so that space under the seat is maximized and is completely free of obstructions to facilitate cleaning.

Seats, structures, and restraints around the securement area should not infringe into the mobility device envelope or maneuverability.

The transverse seat structure shall be fully cantilevered from the sidewall with sufficient strength for the intended service. The lowest part of the seat assembly that is within 12 inches of the aisle shall be at least 10 inches above the floor.

In locations at which cantilevered installation is precluded by design and/or structure, other seat mounting may be allowed.

All transverse objects—including seat backs, modesty panels and longitudinal seats—in front of forward-facing seats shall not impart a compressive load in excess of 1000 lbs. onto the femur of passengers

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ranging in size from a 5th-percentile female to a 95th-percentile male during a 10g deceleration of the bus. This deceleration shall peak at 0.05 to 0.015 seconds from initiation. Permanent deformation of the seat resulting from two 95th-percentile males striking the seat back during this 10g deceleration shall not exceed 2 inches, measured at the aisle side of the seat frame at height H. The seat back should not deflect more than 14 inches, measured at the top of the seat back, in a controlled manner to minimize passenger injury. Structural failure of any part of the seat or sidewall shall not introduce a laceration hazard.

The seat assembly shall withstand static vertical forces of 500 lb. applied to the top of the seat cushion in each seating position with less than ¼ inch permanent deformation in the seat or its mountings. The seat assembly shall withstand static horizontal forces of 500 lb. evenly distributed along the top of the seat back with less than ¼ inch permanent deformation in the seat or its mountings. The seat backs at the aisle position and at the window position shall withstand repeated impacts of two 40 lb. sandbags without visible deterioration. One sandbag shall strike the front 40,000 times and the other sandbag shall strike the rear 40,000 times. Each sandbag shall be suspended on a 36 inch pendulum and shall strike the seat back 10,000 times each from distances of 6, 8, 10 and 12 inches. Seats at both seating positions shall withstand 4000 vertical drops of a 40 lb. sandbag without visible deterioration. The sandbag shall be dropped 1000 times each from heights of 6, 8, 10 and 12 inches. Seat cushions shall withstand 100,000 randomly positioned 3½ inch drops of a squirming, 150 lb., smooth-surfaced, buttocks-shaped striker with only minimal wear on the seat covering and no failures to seat structure or cushion suspension components.

The back of each transverse seat shall incorporate a handhold no less than ⅞ inch in diameter for standees and seat access/egress. The handhold shall not be a safety hazard during severe decelerations. The handhold shall extend above the seat back near the aisle so that standees shall have a convenient vertical assist, no less than 4 inches long, that may be grasped with the full hand. This handhold shall not cause a standee using this assist to interfere with a seated 50th-percentile male passenger. The handhold shall also be usable by a 5th-percentile female, as well as by larger passengers, to assist with seat access/egress for either transverse seating position. The upper rear portion of the seat back and the seat back handhold immediately forward of transverse seats shall be padded and/or constructed of energy-absorbing materials. During a 10g deceleration of the bus, the HIC number (Head Injury Criterion as defined by SAE J211a) shall not exceed 400 for passengers ranging in size from a 5th percentile female through a 95th percentile male.

The seat back handhold may be deleted from seats that do not have another transverse seat directly behind and where a vertical assist is provided.

Longitudinal seats shall be the same general design as transverse seats but without seat back handholds. Longitudinal seats may be mounted on the wheelhouses. Armrests shall be included on the ends of each set of longitudinal seats except on the forward end of a seat set that is immediately to the rear of a transverse seat, the driver's barrier, or a modesty panel, when these fixtures perform the function of restraining passengers from sliding forward off the seat. Armrests are not required on longitudinal seats located in the wheelchair parking area that fold up when the armrest on the adjacent fixed longitudinal seat is within 3½ in. of the end of the seat cushion. Armrests shall be located from 7 to 9 inches above the seat cushion surface. The area between the armrest and the seat cushion shall be closed by a barrier or panel. The top and sides of the armrests shall have a minimum width of 1 inch and shall be free from sharp protrusions that form a safety hazard.

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Seat back handhold and armrests shall withstand static horizontal and vertical forces of 250 lb. applied anywhere along their length with less than ¼ in. permanent deformation. Seat back handhold and armrests shall withstand 25,000 impacts in each direction of a horizontal force of 125 lb. with less than ¼ in. permanent deformation and without visible deterioration.

### **33.10. Passenger Seating USB Charge Port**

Bus manufacturer shall provide and install USB charge ports at a minimum of 1 per seat accessible from all seats. USB charge ports shall not interfere with wheelchair movement in the ADA area. Harness routing to USB ports shall be concealed from passenger access.

### **33.11. Construction and Materials**

Selected materials shall minimize damage from vandalism and shall reduce cleaning time. The seats shall be attached to the frame with tamper-resistant fasteners. Coloring shall be consistent throughout the seat material, with no visually exposed portion painted. Any exposed metal touching the sides or the floor of the bus shall be stainless steel. The seat, pads and cushions shall be contoured for individuality, lateral support and maximum comfort and shall fit the framework to reduce exposed edges.

Longitudinal seats shall have stainless-steel back panels.

The minimum radius of any part of the seat back, handhold or modesty panel in the head or chest impact zone shall be a nominal ¼ inch. The seat back and seat back handhold immediately forward of transverse seats shall be constructed of energy-absorbing materials to provide passenger protection and, in a severe crash, to allow the passenger to deform the seating materials in the impact areas. Complete seat assemblies shall be interchangeable to the extent practicable.

## **34. Passenger Assists**

Other than the stanchions mentioned specifically in this section, all vertical stanchions and all horizontal grab rails and those connecting to the walls and ceiling are to be either powder coated black or plain stainless steel. All powder coated stanchions and grab rails may be constructed of stainless steel or mild steel.

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 5th-percentile female standee and the 95th-percentile male standee. Starting from the entrance door and moving anywhere in the bus and out the exit door, a vertical assist shall be provided either as the vertical portion of the seat back assist or as a separate item so that a 5th-percentile female passenger may easily move from one assist to another using one hand and then the other without losing support.

All handholds and stanchions at doorways, and around farebox, 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 black to match the rest of vehicle.

### **34.1. Assists**

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 clearance

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around the assist. Passenger assists shall be designed to minimize catching or snagging of clothes or personal items and shall be capable of passing the NHTSA Drawstring Test.

Any joints in the assist structure shall be underneath supporting brackets and securely clamped to prevent passengers from moving or twisting the assists. Seat handholds may be of the same construction and finish as the seat frame. Door-mounted passenger assists shall be of anodized aluminum, stainless steel, or powder-coated metal. Connecting tees and angles may be powder-coated metal castings. Assists shall withstand a force of 300 lb applied over a 12 in. lineal dimension in any direction normal to the assist without permanent visible deformation. All passenger assist components, including brackets, clamps, screw heads and other fasteners used on the passenger assists, shall be designed to eliminate pinching, snagging and cutting hazards and shall be free from burrs or rough edges.

**34.1.1. Front Doorway**

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

**34.1.2. Vestibule**

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

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

**34.1.3. Rear Doorway(s)**

Vertical assists that are functionally continuous with the overhead assist shall be provided at the aisle side of the transverse seat immediately forward of the rear door and on the aisle side of the rear door modesty panel(s). Passenger assists shall be provided on modesty panels that are functionally continuous with the rear door assists. Rear doors, or the exit area, shall be fitted with assists having a cross-sectional diameter between 1¼ and 1½ inches or providing an equivalent gripping surface with no corner radii less than ¼ inch, and shall provide at least 1½ inches of knuckle clearance between the assists and their mounting. The assists shall be designed to permit a 5th-percentile female to easily move from one assist to another during the entire exiting process. The assists shall be located no farther inboard than 6 in. from the outside edge of the rear doorway step.

For an articulated bus, passenger assists will be provided to aid in the transition between the front and rear sections of the bus.

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**34.1.4. Overhead**

Except forward of the standee line and at the rear door, a continuous, full-grip, overhead assist shall be provided. The assist shall be no less than 70 in. above the floor.

Grab straps or other extensions as necessary shall be provided for sections where vertical assists are not available and for use by passengers who cannot reach to 70 inches. A minimum of 14 straps for a 40 ft bus shall be installed in the lower deck of the bus (7 on each side, curb and street side). A minimum of 28 straps shall be installed on a 60 ft bus (14 on each side, curb and street side). The Authority reserves the right of final approval.

Grab straps shall be plastic. The Authority reserves the right of final approval.

Overhead assists shall simultaneously support 150 lbs. on any 12 inches length. No more than 5 percent of the full grip feature shall be lost due to assist supports.

**34.1.5. Longitudinal Seat Assists**

Longitudinal seats shall have vertical assists located between every other designated seating position, except for seats that fold/flip up to accommodate wheelchair securement. Assists shall extend from near the leading edge of the seat and shall be functionally continuous with the overhead assist. Assists shall be staggered across the aisle from each other where practicable and shall be no more than 52 in. apart or functionally continuous for a 5th percentile female passenger.

**34.1.6. Wheel Housing Barriers/Assists**

Unless passenger seating is provided on top of wheel housings, passenger assists shall be mounted around the exposed sides of the wheel housings (and propulsion compartments if applicable), which shall also be designed to prevent passengers from sitting on wheel housings. Such passenger assists shall also effectively retain items, such as bags and luggage, placed on top of wheel housings.

## **35. Passenger Doors**

Doorways will be provided in locations and styles as follows. Passenger doors and doorways shall comply with ADA requirements. Passenger Doors shall be electrically driven.

**35.1. Front door**

Door shall be forward of the front wheels and under direct observation of the driver. The front door shall be a slide-glide type. The front door shall have a wheelchair roll off guard if the door in the open position is wider than the ramp.

**35.2. Rear Door(s)**

**35.2.1. 40-foot transit bus**

~~Curbside doorway~~ Door shall be installed curbside centerline located rearward of the point midway between the front door centerline and the rearmost seat back. The rear door shall be a plug-type.

**35.2.2. 60-foot articulated bus**

~~Curbside~~ Door shall be installed curbside located forward of the rear axle of the trailer section.

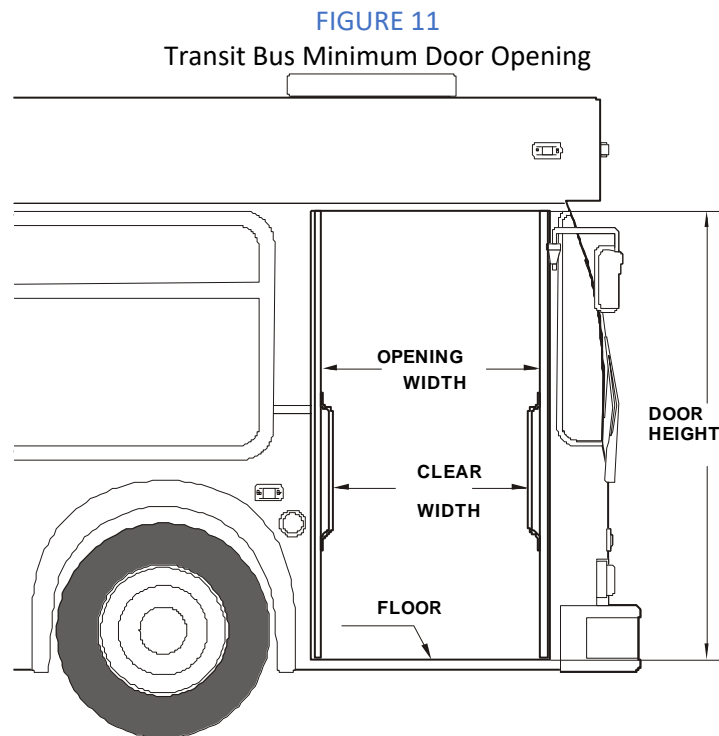
~~Curbside~~ Door shall be installed curbside doorway centerline located rearward of the point midway between the front door centerline and the rearmost seat back. The mid and rear door shall be plug-type.

### 35.3. Door Materials and Construction

Structure of the doors, their attachments, inside and outside trim panels and any mechanism exposed to the elements shall be corrosion resistant. Door panel construction shall be of corrosion-resistant metal or reinforced non-metallic composite materials. When fully opened, the doors shall provide a firm support and shall not be damaged if used as an assist by passengers during ingress or egress. Door edges shall be sealed to prevent infiltration of exterior moisture, noise, dirt, and air elements from entering the passenger compartment, to the maximum extent possible based on door types.

The closing edge of each door panel shall have no less than 2 inches of soft weather stripping. The doors, when closed, shall be effectively sealed, and the hard surfaces of the doors shall be at least 4 inches apart (not applicable to single doors). The combined weather seal and window glazing elements of the front door shall not exceed 10 degrees of binocular obstruction of the driver's view through the closed door.

### 35.4. Door Dimensions



When open, the doors shall leave an opening no less than 75 inches in height. Front door clear width shall be a minimum of 32 inches with the doors fully opened. Rear door opening clear width shall be a minimum of 40 inches with the doors fully opened.

### 35.5. Door Glazing

The upper section of both front and rear doors shall be glazed for no less than 45 percent of the respective door opening area of each section. The lower section of the front door shall be glazed for no less than 25 percent of the door opening area of the section.



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Door glazing shall be easily replaceable.

Full exterior glass quick change glazing hidden frame (tempered glass only).

The front door panel glazing material shall have a nominal ¼ inch thick tempered glass conforming with the requirements of ANSI Z26.1 Test Grouping 2 and the recommended practices defined in SAE J673.

Glazing material in the rear doorway door panels shall be the same as material, thickness, and color as the side windows defined in section 28.4.3 Side Windows or approved equivalent.

### 35.6. Door Projection

#### 35.6.1. Exterior

The exterior projection of the front doors beyond the side of the bus shall be minimized and shall not block the line of sight of the rear exit door via the curbside mirror when the doors are fully open. The exterior projection of both doors shall be minimized and shall not exceed 14 inches during the opening or closing cycles or when doors are fully opened.

#### 35.6.2. Interior

Projection inside the bus shall not cause an obstruction of the rear door mirror or cause a hazard for standees.

### 35.7. Door Height Above Pavement

It shall be possible to open and close either passenger door when the bus, loaded to gross vehicle weight rating, is not knelt and parked with the tires touching a 9 inches high curb on a street sloping toward the curb so that the street-side wheels are 5 inches higher than the right-side wheels.

### 35.8. Door Closing Force

Closing door edge speed shall not exceed 12 inches per second and opening door speed shall not exceed 19 inches per second. Power doors shall not slam closed under any circumstance, even if the door is obstructed during the closing cycle. If a door is obstructed during the closing cycle, the pressure exerted on the obstruction shall not increase once initial contact has been made.

Doors closed by a return spring or counterweight-type device shall be equipped with an obstruction-sensing device that, at a minimum, alerts the driver if an obstruction is detected between the closing doors. Doors closed by a return spring or counterweight type device, when unlocked, shall be capable of being pushed to the point where the door starts to open with a force not to exceed 25 lbs. applied to the center edge of the forward door panel.

Whether or not the obstruction-sensing system is present or functional, it 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 lbs.

#### 35.8.1. Rear Door Closing Force

Power-close rear doors shall be equipped with an obstruction-sensing system such that if an obstruction is within the path of the closing doors, the doors will stop and/or reverse direction prior to imparting a 10 pounds of force on 1 square inch of that obstruction. If a contactless obstruction sensing system is employed, then it shall be capable of discriminating between the normal doorway environment and passengers or other obstructions within the doorway, and of altering the zones of detection based upon the operating state of the door system.

### 35.9. Door Actuators

Doors shall open or close completely in not more than 3.5 seconds from the time of control actuation and shall be subject to the closing force requirements.

Door actuators shall be adjustable so that the door opening and closing speeds can be independently adjustable to satisfy the above requirements. Actuators and the complex door mechanism shall be concealed from passengers but shall be easily accessible for servicing. The door actuators shall be rebuildable.

Door actuators and associated linkages shall maximize door holding forces in the fully open and fully closed positions to provide firm, non-rattling, non-fluttering door panels while minimizing the force exerted by the doors on an obstruction midway between the fully open and closed positions.

The rear door actuator(s) shall have dual capabilities, the operator shall have control via a switch installed on the side console in the operator area. The capabilities shall be:

- 1) be under the complete control of the vehicle operator and shall open and close in response to the position of the driver's door control.
- 2) The rear door(s) shall be passenger-controlled (reference 35.13.1). The vehicle operator shall unlock and enable the opening mechanism, which shall be annunciated by illumination of a green light near the door. After enabling and unlocking, the doors shall be opened by either the passenger manually pushing the door open, or by a powered mechanism actuated by passenger activation of a touch bar or touch switch.

Doors that employ a "swing" or pantograph geometry and/or are closed by a return spring or counterweight-type device shall be equipped with a positive mechanical holding device that automatically engages and prevents the actuation mechanism from being back-driven from the fully closed position. The holding device shall be overcome only when the driver's door control is moved to an "Exit Door Enable" position and the vehicle is moving at a speed of less than 2 mph, or in the event of actuation of the emergency door release.

Locked doors shall require a force of more than 300 lb. to open manually. When the locked doors are manually forced to open, damage shall be limited to the bending of minor door linkage with no resulting damage to the doors, actuators, or complex mechanism.

### 35.10. Door Emergency Operation

In the event of an emergency, it shall be possible to manually open doors designated as emergency exits from inside the bus using a force of no more than 25 lb. after actuating an unlocking device. The unlocking device shall be clearly marked as an emergency-only device and shall require two distinct actions to actuate. The respective door emergency unlocking device shall be accessible from the doorway area. The unlocking device shall be easily reset by the operator without special tools or opening the door mechanism enclosure. The unlocking device shall be easily accessible by maintenance without the use of tools. Doors that are required to be classified as "emergency exits" shall meet the requirements of FMVSS 217.

### 35.11. Door Control

The door control shall be located in the operator's area within the hand reach envelope described in SAE J287, "Driver Hand Control Reach." The driver's door control shall provide tactile feedback to indicate commanded door position and resist inadvertent door actuation.

Door control located on street side.

The front door shall remain in commanded state position even if power is removed or lost.

### 35.12. Door Controller

Five-Position Driver's Door Controller

The control device shall be protected from moisture. Mounting and location of the door control device handle shall be designed so that it is within comfortable, easy arm's reach of the seated driver. The door control device handle shall be free from interference by other equipment and have adequate clearance so as not to create a pinching hazard.

Position of the door control handle shall result in the following operation of the front and rear doors:

- Center position: Front door closed, rear door(s) closed or set to lock.
- First position forward: Front door open, rear door(s) closed or set to lock.
- Second position forward: Front door open, rear door(s) open or set to open.
- First position back: Front door closed, rear door(s) open or set to open.
- Second position back: Front door open, rear door(s) open or set to open.

### 35.13. Door Open/Close

#### 35.13.1. Operator-Controlled Front and Passenger-Controlled Rear Doors with Provision for Driver Override

Operation of, and power to, the front passenger doors shall be completely controlled by the operator. Power to rear doors shall be controlled by the operator. The Proposer shall install a system that allows passengers to open the vehicle doors when activated via a switch on the operator side console. When active, the system shall only open the door that is activated by the passenger. Switches for the passengers shall be installed on or near each door, on the interior and exterior of the bus. Each door switch shall illuminate green when the system is active/ enabled and red when deactivated/ disabled. The system shall work in conjunction with door interlock system. The Authority reserves the right of final configuration approval. ~~After enabling, the rear doors shall be opened by the passenger. A switch on the side console shall be provided to enable the driver to obtain full control of the rear doors.~~

A control or valve in the operator's compartment shall shut off the power to, and/or dump the power from, the front door mechanism to permit manual operation of the front door with the bus shut down. A master door switch, which is not within reach of the seated operator, when set in the "off" position shall close the rear/center doors (if applicable), deactivate the door control system, release the interlocks and permit only manual operation of the rear/center doors.

## 36. Accessibility Provisions

Space and body structural provisions shall be provided at the front door of the bus to accommodate a wheelchair loading system.

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### 36.1. Loading System

An automatically controlled, power-operated ramp system compliant to requirements defined in 49 CFR Part 38, Subpart B, §38.23c shall provide ingress and egress quickly, safely and comfortably, for a passenger in a wheelchair from a level street and up to 9-inch curb.

The wheelchair loading system **should shall** be located at the front door, have stainless steel construction, be electrically driven, without hydraulics, have a 32 inch wide ramp being of a simple hinged, flip-out type design being capable of deploying to the ground at a maximum 6:1 slope. The interior floor shall automatically lowers to a 1:6 incline when the outer ramp reaches a pre-determined angle. The ramp shall have a load capacity 1,000 lbs and require a manual operation force of less than 20 lbs of force. The ramp shall have tension control to prevent “free falling” of ramp platform in either direction. The ramp shall include an object detection functionality that should the ramp encounter an obstruction, the drive motor is disabled and ramp motion stops. The electronic enclosure shall be watertight, and regular maintenance and repair shall be possible without removing the ramp.

### 36.2. Wheelchair Accommodations

The bus shall be equipped with One Forward-Facing Wheelchair Securement Location on the curbside of the bus, and on the streetside shall be equipped with One Securement Location that can accommodate either Forward-Facing Wheelchair Securement or Rear-Facing Wheelchair Securement. The streetside position need only accommodate one wheelchair at a time. The Securement Locations shall be as close to the wheelchair loading system as practical, shall provide parking space and securement system compliant with ADA requirements for passengers in a wheelchair. The wheelchair area footprint shall be 30 inches wide and not less than 60 inches long. All passenger securement devices must be stowed off the floor and out of the way when not in use.

The Forward-Facing Securement System shall require only 3 attachment points to secure the wheelchair.

The Rear-Facing Securement System shall be semi-automatic and electrically driven, securing the wheelchair without retractors. The system shall meet or exceed all current regulations for rear-facing transit, European Directives and ADA/CSA requirements. The backrest shall have dimensions approximately 28in. wide x 33in. Long and 55in. tall.

Both Forward and Rear-Facing Systems shall offer optional use lap and shoulder belts.

### 36.3. Interior Circulation

Maneuvering room inside the bus shall be compliant with 49 CFR Part 38, Subpart B, §38.29 and accommodate easy travel for a passenger in a wheelchair from the loading device and from the designated securement area. It shall be designed so that no portion of the wheelchair protrudes into the aisle of the bus when parked in the designated parking space(s). When the positions are fully utilized, an aisle space of no less than 22 in. shall be maintained. As a guide, no width dimension should be less than 34 in. Areas requiring 90 deg turns of wheelchairs should have a clearance arc dimension no less than 45 in., and in the parking area where 180 deg turns are expected, space should be clear in a full 60 in. diameter circle. A vertical clearance of 12 in. above the floor surface should be provided on the outside of turning areas for wheelchair footrests.

# SIGNAGE AND COMMUNICATION

## 37. Destination Signs

A destination sign system shall be furnished on the front, on the curb side near the exit door (40ft.) The 60ft. shall have all the signs of a 40ft. plus an additional side destination sign near the rear most exit door on the curb side. The Authority reserves the right of approval for the final installation location. The glass directly in front of the destination signs, meaning the same size as the sign, shall be clear (no tinting), applies to signs installed on the interior.

A route sign shall be installed on the exterior rear of the vehicle or approved equivalent. An electronic route sign shall be installed on the interior front curbside corner of the dash.

### 37.1. Destination Signs

#### 37.1.1. General Design (40ft. and 60ft.)

The destination/ route signs shall have the following salient features or approved equivalent:

- Available in white and amber to best support multiple modes and provide optimal visibility
- 150 degree viewing angle
- Multiple discrete inputs are supported to trigger emergency alerts or automatically update messages based on current status of the vehicle
- Available for the front, side, rear or dash with optional integrated rear camera
- Automatic brightness adjustment, superior readability in daytime and nighttime conditions
- Slim design for ease of installation
- Allow message listing upload via USB, wireless or on board AVL system and diagnostic capabilities
- Backward compatible
- Compatible with RS232, J1708, RS485, and J1939
- Internally protected against voltage transients and RFI interference to ensure proper operation in the bus environment
- In the off position all signs shall be blank
- The displays shall consist of LEDs rated by their manufacturer for a 100,000-hour life expectancy.

All signs shall be controlled via a single human-machine interface (HMI). In the absence of a single mobile data terminal (MDT), the HMI shall be conveniently located for the bus driver within reach of the seated driver.

#### 37.1.2. Front Destination Sign

The front destination sign matrix display shall have amber colored LEDs with a message display area of 16 X 160 dots.

#### 37.1.3. Side Destination Sign (40-foot and 60-foot)

The side destination sign shall have amber colored LEDs with a message area of 14 X 112. The display must be easily read from the sidewalk level. The sign shall be located as near as possible midway between the front door and the rear/mid door shall not block the driver's critical horizontal line of sight.

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Display areas of destination signs shall be clearly visible in direct sunlight and/or at night. Parts shall be commercially available.

**37.1.4. Side Destination Sign (60-foot Articulated)**

The 60-foot bus shall have 2 side destination signs. One sign located near the front door and the second sign near the rearmost door. The Authority reserves the right of final configuration.

**37.1.5. Rear Destination Sign**

The rear run number display shall have amber colored LEDs with a message area of 16 X 48 dots. Sign shall be exterior mounted and encased in a weatherproof housing.

**37.1.6. Dash “Run Number” Sign**

The dash run number display shall be a four (4) character amber colored LED sign with a message area of 12 X 40 dots and shall be installed on the dash such that glare on the windshield is eliminated.

**37.2. Destination sign compartments**

The destination sign compartments shall meet the following minimum requirements:

- Compartments shall be designed to prevent condensation and entry of moisture and dirt.
- Compartments shall be designed to prevent fogging of both compartment window and glazing on the unit itself.
- Access shall be provided to allow for service and cleaning of inside compartment window and unit glazing.
- The front window shall have an exterior display area of no less than 8.5 in. high by 56 in. wide.
- Compartments shall be easily accessible for maintenance including removal and installation of destination signs without further removal of components or disassembly.

No active defogging required.

**38. Passenger Information and Advertising**

**38.1. Static Interior Displays**

**38.1.1. Interior Advertising**

Advertising media 11 in. high and 0.09 in. thick shall be retained near the juncture of the bus ceiling and sidewall. The retainers may be concave and shall support the media without adhesives. The media shall be illuminated by the interior light system.

**38.1.2. Brochure/ Map Rack**

The vehicle shall be equipped with brochure/ map holder. Shall be of heavy-duty ruggedized construction, painted metal, no sharp edges, easy to clean, not trap dirt. The rack shall have a minimum of 8 pockets. Each pocket shall be designed to securely hold brochures that are 3.5 inches x 8.5 inches, while leaving a portion of the brochure visible.

**38.2. Dynamic On Board Digital Display**

The vehicle shall be equipped with interior mounted, full-color, high-definition LCD onboard digital displays (ONDDs) capable of displaying various media and GTFS-RT data. The ONDDs will connect to the

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bus cellular router. Each bus shall come with all hardware, software, and licenses to fully configure, install, integrate and operate the ONDDs.

Each 40-ft bus shall be equipped with two (2) displays. Each 60-ft bus shall be equipped with three (3) displays.

The interior displays shall have the following features:

- Display size: 29"
- Aspect Ratio: 32:9
- Resolution: 1080P
- Brightness: 400-600 units
- Power: 24vdc
- Ruggedized for transit applications
- IP54 Seal rating

Inputs required for displays:

- Door open (Cancels stop request)
- Standard stop request
- WC stop request
- Connected to cellular router

On Board Digital Display signs at a minimum shall be capable of displaying passenger "Stop Request" and "Next Stop".

Authority reserves the right of final configuration approval.

### 38.3. Exterior Displays

Exterior displays provision not required.

## 39. Passenger Stop Request/Exit Signal

### 39.1. Touch Tape/ ADA Passenger Signal

ADA passenger "stop requested" signal system that complies with applicable ADA requirements defined in 49 CFR, Part 38.37, shall be provided. The system shall consist of a touch tape and or buttons, double chime and interior sign message. The touch tape and or buttons shall be accessible to all seated ADA passengers, with provisions for standees. It shall be easily accessible to all passengers, seated or standing. Vertical or horizontal touch tape and or button(s) shall be provided at each window mullion and adjacent to each wheelchair parking position and in priority seating positions. Final configuration shall be approved by the Authority.

### 39.2. Pull Cord Passenger Signal

A passenger "stop requested" signal system that complies with applicable ADA requirements defined in 49 CFR, Part 38.37, shall be provided. The system shall consist of a heavy-duty pull cable, chime and interior sign message. The pull cable shall be located the full length of the bus on the sidewalls at the level where the transom is located. If no transom window is required, then the height of the pull cable shall approximate this transom level and shall be no greater than 63 inches as measured from the floor surface. It shall be easily accessible to all passengers, seated or standing. Pull cable(s) shall activate one or more solid state or magnetic proximity switches. At each wheelchair passenger position and at priority seating positions, additional provisions shall be included to allow a passenger in a mobility aid to



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easily activate the “stop requested” signal. Exit signals located in the wheelchair passenger area shall be no higher than 4 foot above the floor. Instructions shall be provided to clearly indicate function and operation of these signals. The color of the pull cord cover or cable casing shall be clear. The Authority reserves the right of final configuration approval.

### 39.3. Auxiliary/ Additional Stop Request Signals

An auxiliary passenger “stop requested” signal shall be installed at the rear door to provide passengers standing in the rear door/exit area a convenient means of activating the signal system. The signal shall be a heavy-duty push button type and shall be located so as not to conflict with the Authority’s plans for installing On Board Validators (typically on the vertical stanchion by mid/rear door.) An additional “Bike Stop Request” button shall be installed near the bike rack storage area on the 60-ft bus. Additional stop request buttons may be required at intervals to be determined by the Authority. Final configuration shall be approved by the Authority.

### 39.4. Signal Chime

A single “stop requested” chime shall sound when the system is first activated. A double chime shall sound anytime the system is activated from wheelchair passenger areas. A triple chime shall sound when the “bike stop” request is activated from the bike rack storage area on the 60-ft bus. Separate signal lines shall be run from the three stop request systems to the radio box area to be connected to the CAD/AVL system. Each stop request system shall illuminate a unique identifier on the dash to alert the operator which stop requests have been activated.

## 40. Communications/ Information

### 40.1. General, Information Level

Information Level components are those components whose primary function is the transmission of data to a system outside the vehicle; and/or the collection, control or display of data on the vehicle, none of which is necessary to the safe operation of the vehicle. The Authority shall receive a minimum of 2 (two) copies for each build of all the configurations for systems installed on the vehicle for the purpose of component replacement should a vehicle need to be rebuilt due to a catastrophic event. Copies of the following systems configurations shall be included but not limited to:

- Vehicle propulsion system(s)
- Vehicle Battery/ Charging Management system(s)
- Vehicle I/O system(s)
- Vehicle Door system(s)
- Vehicle Power Steering system(s)
- Camera Surveillance system(s)
- Auxiliary systems (Event Data Recorder, Data Logger, etc.)

### 40.2. IT Security Review and Requirements

For any system on the bus, or add-on system on the bus, that connects to the internet (i.e. cloud based), or connects to the CAN bus, there is risk of unauthorized access. To guard against unapproved access, the Authority requires a thorough review of security measures the bus manufacturer or their component supplier has undertaken to protect their network, and the bus network. For each system on the bus, the Manufacturer shall submit a completed IT Security Form with the proposal. The Authority



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recognizes that not all risk can be remediated however the expectation is the systems shall be as secure as possible and any unreasonable risk shall be required to be addressed.

#### 40.3. Vehicle Area Network (VAN)

The VAN shall meet the requirements of SAE J1939 / J1708.

##### 40.3.1. Network Cabling

The cabling for the Intelligent Transportation System (ITS) shall be Conduent and be supplied by the vehicle manufacturer and installed by the vehicle manufacturer.

The required ITS cabling and their associated costs may vary slightly between proposers due to the individual configuration of the proposer's vehicle. The proposer should contact Conduent for a list of cables and harnesses suited to the proposer's vehicle.

All other cabling installed in the vehicle shall meet the requirements of SAE J2496.

#### 40.4. Integration with Other Networks

An interface shall be supplied to allow communication between the Information Level Network and all other vehicle networks (Drive Train Levels.)

The ITS, Intelligent Transportation System (Conduent) requires SAE J1708 to communicate.

#### 40.5. Intelligent Transportation System, ITS

The vehicles being purchased in this solicitation shall be equipped with the Conduent Intelligent Transportation Systems (ITS). It will require procurement by the vehicle manufacturer and installation by the vehicle manufacturer of all electronic and ITS components with the exception of the Smart MDT and IVU-3100 units and the radio RF deck unit. The Smart MDT and IVU-3100 units will be supplied by the Authority and installed by the vehicle manufacturer. However, note that the vehicle manufacturer will order the Smart MDT and IVU-3100 units direct from Conduent, but will have a zero dollar cost. The radio RF deck unit will be supplied by the Authority and installed by the Authority post- delivery.

The vehicle manufacturer shall supply and install the following Conduent electronic and ITS components:

**ELECTRONIC AND ITS COMPONENTS FROM CONDUENT**

<b>Conduent Equipment</b>	<b>Typical Mounting Location</b>
ANTENNA, GPS RECEIVER	Roof Top
ANTENNA, RADIO	Roof Top
WLAN ANTENNA	Roof Top
ORBSTAR DCM	Drivers compartment where driver can easily see and access
HANDSET/SPEAKER	Drivers compartment where driver can easily access
AGC MICROPHONE	Mid-bus
CARD READER	Drivers Compartment
SILENT ALARM SWITCH	Drivers compartment where driver can easily access

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INTERIOR SIGN	Front bulkhead
DESTINATION SIGN(S)	Front above driver, side, rear, and dash
RADIO EQUIPMENT TRAY(S) INCLUDING:	Equipment enclosure behind driver
110231 Smart MDT and IVU-3100 (supplied by the Authority)	Typically part of CONDUENT Radio Equipment Tray
Voice/Data Radio(s) – supplied by the Authority and installed by the vehicle manufacturer at the Authority's facility (post delivery)	Typically part of CONDUENT Radio Equipment Tray
Power Input Fuse Blocks	Typically part of CONDUENT Radio Equipment Tray
Power Filter	Typically part of CONDUENT Radio Equipment Tray
Terminal Strips for external connections	Typically part of CONDUENT Radio Equipment Tray
Pigtail Cables for external connections	Typically part of CONDUENT Radio Equipment Tray
PA AMP	Equipment enclosure behind driver
APC ANALYZER	Equipment enclosure behind driver or front overhead
APC SENSOR(S)	Above door opening
ETHERNET SWITCH with Cabling	

<b>Conduent Cabling</b>	<b>Typical From/To Routing</b>
W01 CABLE ASSEMBLY ORBSTAR	OrbStar Display to Radio Equipment Tray
W02 CABLE ASSEMBLY PA AMP	PA Amp to Radio Equipment Tray
W03 CABLE ASSEMBLY J1708 INTERFACE	J1708 Interface to Radio Equipment Tray
W03A CABLE ASSEMBLY FAREBOX	Farebox to Radio Equipment Tray
W03B CABLE ASSY FRONT INTERIOR SIGN	Sign to Radio Equipment Tray
W03B CABLE ASSY REAR INTERIOR SIGN	Sign to Radio Equipment Tray
W04 CABLE ASSEMBLY RADIO	Radio to Radio Equipment Tray
W05 CABLE ASSY MECHANICAL DISCRETES	Discrete Connections to Radio Equipment Box
W08 CABLE ASSEMBLY SPEAKERS	PA Amp to Speakers
W08A CABLE ASSEMBLY SPEAKER SELECT	PA Amp to Speaker Select Switch
W08B CABLE ASSEMBLY AGC MIC	PA Amp to AGC Microphone
W09 CABLE ASSEMBLY HANDSET	Handset to Radio Equipment Tray
W10A CABLE ASSEMBLY W10A VEHICLE INTERFACE	Silent Alarm Switch to Radio Equipment Tray
W11 CABLE ASSEMBLY TO GPS ANTENNA	GPS Antenna to Radio Equipment Tray
W12 CABLE ASSEMBLY, ORBSTAR TO IVU, ETHERNET	OrbStar Display to Radio Equipment Tray

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W25 CABLE ASSEMBLY CARD READER	Card Reader to OrbStar Display
W13 CABLE ASSEMBLY J1708 DESTINATION SIGN CONTROLLER	OCU/ODK to Radio Equipment Tray
W20 CABLE ASSEMBLY RADIO COAX	UHF Radio Antenna to Radio Equipment Tray
W21 CABLE ASSEMBLY WLAN ANTENNA	WLAN Antenna to OrbStar Display
W106 CABLE ASSEMBLY(S) ANALYZER(S) TO J1708	APC Analyzer to Radio Equipment Tray
CABLE ASSEMBLY APC DOOR CONTACT FRONT	APC Analyzer to Door Contact
CABLE ASSEMBLY APC DOOR CONTACT REAR	APC Analyzer to Door Contact
W108A CABLE ASSEMBLY(S) APC SENSOR(S) FRONT	APC Analyzer to Door Sensor
W108B CABLE ASSEMBLY(S) APC SENSOR(S) FRONT	APC Analyzer to Door Sensor

The vehicle manufacturer will need to work with Conduent to ensure the correct installation of the ITS components and integration with all applicable onboard components (refer to section 40.5.1. *Block Diagram*). The contact information for Conduent is as follows:

Conduent  
7160 Riverwood Drive  
Columbia, MD 21046  
443-259-7000

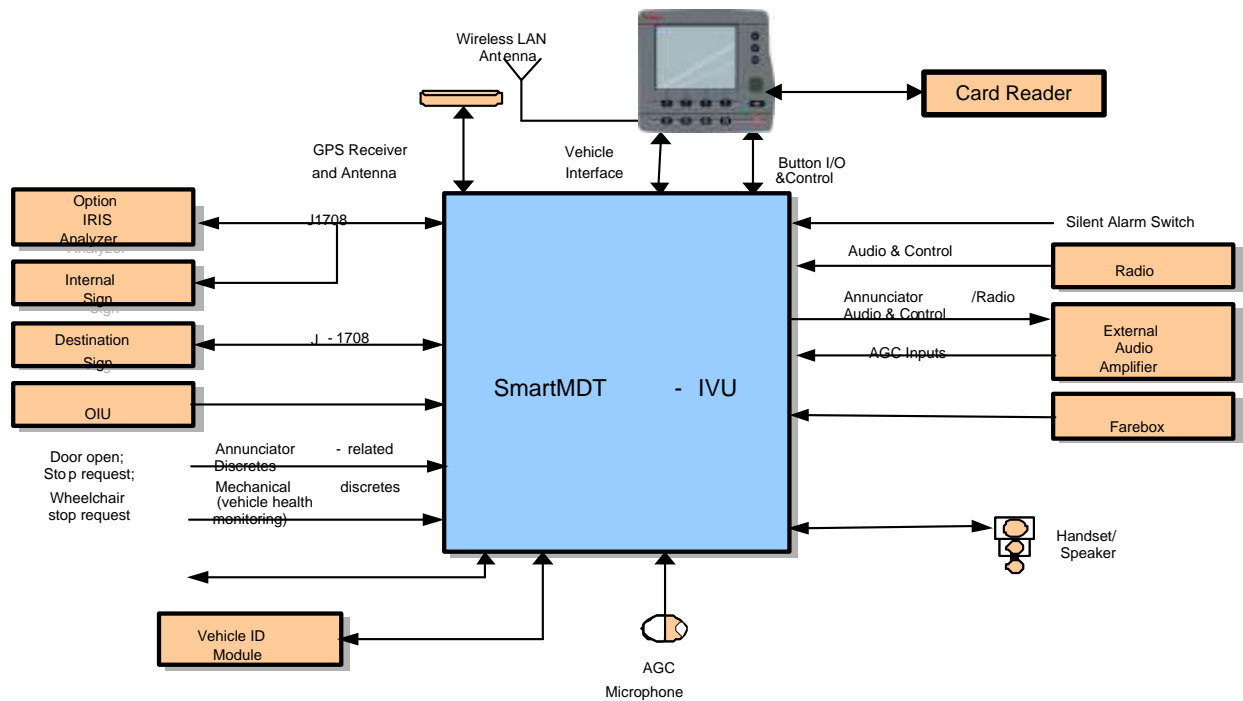
The manufacturer or supplier of the Intelligent Transportation Systems (ITS) shall conduct first article inspections and qualifications testing at the bus manufacturer's facility on the Authority's specific bus build.

The vehicle manufacturer shall validate and certify that all ITS components and installation kits are installed correctly on each vehicle in accordance with Conduent instructions.

The integration and testing of the ITS shall be the responsibility of the vehicle manufacturer.

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40.5.1. Block Diagram (typical layout)



Information Level Components

40.6. Mobile Data Terminal (MDT)

The MDT is a multifunctional data collection device onboard transit vehicles that serves as the communication hub integrating many onboard components and performing two-way data communication.

The MDT will be supplied by the Authority and installed by the vehicle manufacturer. Final installation location is subject for review and acceptance by the Authority.

Contractor shall install the MDT/ DDU in a location to be approved by the Authority. Reference section 40.5.1 *Block Diagram*.

40.7. Automatic Vehicle Location (AVL)

The AVL shall be Conduent and supplied and installed by the vehicle manufacturer.

40.8. Automatic Passenger Counter (APC)

With the APC, exiting and entering passengers are detected by means of sensors mounted at each door and their numbers are summed up for each stop or station. The APC sensors and APC Analyzer shall be Conduent and supplied and installed by the vehicle manufacturer. The APC sensors shall be InfraRed sensor Gen4-3D or as specified by Conduent. There shall be two (2) sensors on a wide door and one (1) sensor on a regular door. The APC Analyzer shall be IRMA-A21S-3-J1708 or as specified by Conduent.

#### 40.9. Covert Emergency Alarm

The Covert Emergency Alarm is for the operator's use in dangerous situations. It shall be supplied and installed by the vehicle manufacturer.

The alarm shall be integrated with the following Information Level components. When the alarm button is pressed, the radio transmits audio from a listen-in microphone; the External Route Display signals an emergency; and the CCTV tags and saves recordings.

The Covert Emergency Alarm (Silent Alarm) is included in one of the Conduent cable harnesses referenced in section 40.5, ELECTRONIC AND ITS COMPONENTS FROM CONDUENT Network Cabling Table. The location of the alarm button shall be located as agreed upon between the Authority and vehicle manufacturer.

#### 40.10. Radio Handset and Control System

##### 40.10.1. Driver's Speaker

Each bus shall have a recessed speaker in the ceiling panel above the driver. This speaker shall be the same component used for the speakers in the passenger compartment. The speaker shall be compatible with the Conduent CAD/ AVL system.

##### 40.10.2. Handset

Contractor will install a handset for driver use. The handset shall be compatible with the Conduent CAD/ AVL system. Reference section 40.5.

The handset shall be labeled with an orange decal with black lettering on the handset that reads "RADIO".

##### 40.10.3. Emergency Alarm

Contractor shall install an emergency alarm that is accessible to the driver but hidden from view of passengers.

#### 40.11. Automatic Voice Annunciation System (AVA)

The vehicle shall be equipped with an AVA system that is integrated to the Conduent system. It shall be supplied and installed by the vehicle manufacturer. A complete listing of internal and external announcements for initial configuration by the manufacturer will be provided at the time of award. The AVA system shall be in working order prior to final acceptance.

##### 40.11.1. Speakers

The vehicle shall be equipped with an adequate number, to be approved by the Authority, of interior loudspeakers, semi-flush mounted, on alternate sides of the bus passenger compartment, installed with proper phasing. Total impedance seen at the input connecting end shall be 8 ohms. Mounting shall be accomplished with riv-nuts and machine screws or approved equivalent.

Exterior speakers shall have an appearance integrated into the paint scheme of the bus, either painted to match adjacent color, or behind a perforated panel that is painted to match adjacent color.

#### 40.12. Public Address System

A public address system shall be supplied and installed by the vehicle manufacturer that is integrated to the Conduent system. The PA shall comply with the ADA requirements of 49 CFR, Part 38.35 and enables the operator to address passengers either inside or outside the bus. Inside speakers shall broad-cast, in

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a clear tone, announcements that are clearly perceived from all seat positions at approximately the same volume level. A speaker system shall be provided so announcements can be clearly heard by passengers standing outside the bus near the front door. An operator-controlled switch shall select inside or outside announcements. A separate volume control shall be provided for the outside system if volume adjustment would otherwise be necessary when switching from inside to outside. The system shall be muted when not in use. A provision shall be provided to secure the microphone in a stored position when not in use.

The operator's microphone shall be supplied (boom type microphone), installed by the vehicle manufacturer, and compatible with the Conduent ITS CAD/ AVL. The micro-phone shall be vandal resistant, mounted on a heavy-duty, flexible gooseneck, which is secured with tamper-proof fasteners and will allow the operator to comfortably speak into it without using his/her hands. The boom microphone shall be activated by a foot switch. The foot switch shall be compatible with the Conduent ITS CAD/ AVL and shall have the following salient features:

- Foot Switch, Momentary (normally open circuit)
- Floor mounted, on the same pedestal with the foot turn signal switches

#### 40.13. Radio/ Electronics Box

An equipment enclosure shall be provided to accommodate the Conduent equipment. It shall be supplied and installed by the vehicle manufacturer. The enclosure shall be located directly behind the operator's area on the street side. The enclosure shall be as large as practical to facilitate future expansion of ITS equipment. The enclosure shall be splash proof and properly ventilated when the service door is secured. The ITS enclosure **should shall** include modular slide out trays which are removable and can be repositioned to accommodate changes in equipment position as needed. Slide out trays **should shall** incorporate heavy-duty slide or roller mechanism to support a minimum of 150 lbs. of loading and **should shall** be able to withstand the normal shock and vibration, (under full load) experienced in revenue service, without damage to the slide or roller mechanisms. The equipment enclosure **should shall** be equipped with a minimum of two (2) extra slide out trays for future expansion. Service light(s) with suitable switch shall be provided within the enclosure, subject to approval by the Authority.

The following signals shall be brought into the radio box **to allow for connection to current ITS equipment and shall have some method of connecting future additional components** ~~and wired to a terminal strip~~ (multiple if needed):

- Odometer Signal - Monitor
- Internal Speaker Wiring – Control
- External Speaker Wiring - Control
- Internal/External Speaker Switch Wiring - Control
- Operator Microphone Wiring – Control
- Interior AGC Microphone - Control
- Emergency Alarm Switch Wiring - Control
- Stop Request – Monitor
- Wheelchair Stop Request – Monitor
- Bike Rack Stop Request - Monitor
- Wheelchair Ramp Stow – Monitor

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- Wheelchair Ramp Deploy – Monitor
- Front Door Open – Monitor
- Any Door Open – Control (used to cancel “stop request”)
- Front Door Closed – Monitor
- Rear Door Open – Monitor
- Rear Door Closed - Monitor
- Fire Alarm – Monitor
- J1939 VAN and Drivetrain – Monitor
- J1939 Luminator – Control/Monitor
- J1708 Luminator – Control/Monitor
- J1708 Farebox – Monitor

The following Main Power Requirements shall be brought from the vehicle's main power bus at the battery source into the equipment enclosure (radio/ electronics box), **but may be regulated by a time delayed shut off.**

Red Wire Color unless otherwise specified, fused at source - (30 AMP for 12 Volt), #8 AWG stranded main 24-hour power, 12 VDC preferred unless otherwise specified

- Black Wire Color unless otherwise specified, #8 AWG stranded 12 VDC Return to Battery Ground (Chassis Return not acceptable)
- White Wire Color unless otherwise specified, fused at source - (10 AMP for 12 Volt), #14 AWG stranded IGN, 12 VDC preferred unless otherwise specified

At a minimum, the following auxiliary power connections shall be provided inside the radio box **to allow connection of additional components**, all wired to a terminal strip, and with circuit protection provided and located inside the radio box:

- 2 (minimum) - 12V IGN
- 2 (minimum) - 12V BATT
- 2 (minimum) – 24V IGN
- 2 (minimum) – 24V BATT
- 2 (minimum) – GND

The radio/ electronics box keyed lock assembly shall be Southco M3-10 #64-22-11 768854 with Southco key #H257

Radio/ Electronics box keys (#H257) shall be provided by the vehicle manufacturer in quantity of one (1) for each vehicle and shall be delivered to the Authority on the delivery date of the vehicles.

#### 40.14. Antennas and Two-way Radio

Antenna mounting shall conform to the electromagnetic suppression requirements of SAE J551. A roof mounted radio antenna requires a ground plane to prevent electronic noise being generated inside the vehicle. A metal roof can serve as a sufficient ground plane; however, a fiberglass roof requires either a metallic surface, or an antenna with a virtual ground plane.

##### 40.14.1. Required Antennas

The vehicle manufacturer shall install antennas and provide antenna cables for the following systems:

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- RF Deck Two-way Radio, Harris
- AVA/ AVL System (reference section 40.5 Intelligent Transportation System)
  - GPS Antenna
  - WLAN Antenna
- Cellular router(s)- (reference sections 40.14.4 and 40.16)
  - 40-foot vehicle- one router
  - 60-foot vehicle- two routers
- Camera surveillance system, GPS Antenna
- AVM System Antenna
  - Tri-band Antenna
  - GPS Antenna

#### 40.14.2. Provisions for Radio RF Deck

The Manufacturer shall install provisions for the Authority's Radio RF Deck unit to be installed in the radio box. The Authority will supply and install post-delivery, a Harris voice/data radio.

The Authority will provide a test unit farebox during production for the Manufacturer to validate installation dimensions and test functionality and vehicle integration.

The Manufacturer shall provide the following:

- wiring harnesses
- antenna
- antenna cable

#### 40.14.3. GPS Antenna/ WLAN Antenna

The Manufacturer shall supply and install the GPS antenna/receiver and the WLAN antenna and cabling. The cable distance from the radio antenna, GPS antenna/receiver, and WLAN antenna to the radio box shall be less than 25 feet. The location of the antennas shall not be more than 10 degrees from horizontal. The GPS antenna/receiver must be located at least 1 meter from other radiating elements.

#### 40.14.4. Cellular Router Antennas

The Manufacturer shall supply and install two (2) antennas, model PCTEL, appropriate length 6-in-1 antenna cables, and route the antenna cables in conduit to the radio box. Provisions of shelf space shall be made available in the radio/ electronics box for the router. Reference section 40.13.

##### 40.14.4.1. Antenna Maintenance Access

Interior access panels shall be installed to gain access to the antennas for maintenance testing and repair procedures, an interior access panel for each antenna shall be provided inside the vehicle at the point where the antenna is mounted to the roof panel and where the antenna cable attaches to the antenna. If antennas are mounted in a designated area on top of the vehicle then provisions for maintenance access shall be required.

##### 40.14.4.2. Antenna Cable Conduits

Cable conduits shall be routed at the discretion of the Authority to ease cable replacement. Since cables are being installed during the bus build, the conduits should be considered on a case-by-case basis. These conduits should be 5/8" ID or larger and be routed in a continuous fashion. The conduit shall have bend radiuses that will permit the ease of pulling cables (no sharp or right angles).



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The radio antenna, GPS antenna/receiver, and WLAN antenna cables shall terminate in the radio/electronics box enclosure.

#### 40.15. Camera Surveillance System (Closed Circuit TV, CCTV)

The CCTV system shall be supplied and installed by the vehicle manufacturer. At the request of the Authority the vehicle manufacturer shall have the Camera Surveillance manufacturer perform a first article installation and certification. The CCTV system shall include ten (10) color cameras on the 40 ft. and fourteen (14) color cameras on the 60 ft., control system, an 8” reverse monitor (if MFD not capable of displaying images), and a recording storage device. The system shall have the capability of marking and saving an event as specified by the Authority. The system module shall be located/ installed in the electrical enclosure behind the operator above the street side wheel well or approved equivalent. Refer to figures 11 (40 ft) and 12 (60 ft) for general camera installation location on 40 ft and 60 ft vehicles. The Authority reserves the right of final approval.

The CCTV system shall operate 2 microphones. One microphone shall be mounted in the operator area, and the other microphone shall be mounted in near the rear door area on a 40-foot vehicle and rear most door area on a 60-foot vehicle.

##### 40.15.1. Digital Video Recorder (DVR)

The DVR system shall have a removable 8.0 TB Hard Disk Drive and a recording capacity of no less than 72 hours, and shall be programmable to automatically tag events, to include panic button activation or a hard deceleration/impact. The DVR shall have HD (high definition) recording and display capabilities. The system shall include a 3-axis accelerometer internal to the DVR. Tagged events shall be stored, and available through both wireless download and manual retrieval of the DVR.

The DVR/ surveillance shall have all of the following salient features or approved equivalent:

- The CCTV system shall operate 1 microphone at a minimum. The microphone shall be mounted in the operator area.
- The CCTV system shall have the following capabilities:
- The system shall be provided in compatible and interchangeable formats that support simultaneous recording of up to four (4), eight (8), twelve (12), or sixteen (16) high definition cameras and an equal number of microphones [up to four (4), eight (8), twelve (12), or sixteen (16)].
- The system shall support two additional audio channels capable of synchronizing to user-selectable cameras.
- The Recorder shall provide PoE (Power over Ethernet) to up to four (4), eight (8), twelve (12) or sixteen (16) high definition IP cameras directly with no additional hardware required.
- The system shall be capable of recording all cameras at the highest resolution and quality at a minimum of 30 images per second per camera.
- The Recorder shall be ruggedized and secure with lockable recording media without the need for an additional enclosure.
- The system shall include a driver event switch that features a system status “heartbeat” style health indicator to provide visual confirmation that the system is operating properly.
- The system shall be capable of simultaneous recording, playback and remote access allowing multiple users to review video without interruption of recording.

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- The system shall save the serial number of the hard disk drive to the system log in order to record and track the replacement of the recording media.
- The system shall have a recording capability of no less than 20 days of recording space on a 8TB SSD storage and shall be programmable to automatically tag events, to include panic button activation and a hard deceleration/impact. Tagged events shall be stored, and available through both wireless download and manual retrieval of the video on the DVR.
- All storage shall be removable. Systems that move data between multiple storage devices shall not be acceptable.
- The system shall record onto a removable hard disk drive equipped with a key lock to prevent tampering and shall be 'swappable' for use in any same model Recorder, regardless of the number of cameras supported.
- The system shall be capable of maintaining one (1) month of recorded high definition video at a rate of 30 images per second on every camera simultaneously on a single on-board drive.
- The system shall be made entirely of new materials and shall be engineered and constructed with rugged materials to protect the system from environmental elements including shock, dust and humidity.
- The Recorder shall be Mil-Spec Rated: STD-810F, and SAE Rated: J1455, for vibration and shock and include a shock absorbing mounting kit.
- The system shall be capable of configuring video quality, resolution and recording speed individually for each camera.
- The Recorder shall record video in user adjustable resolution settings of U-HD (3840x2160), F-HD (1920x1080), HD 1280x720), W-D1 (864x480), Q-HD (640x360) or W-CIF (432x240).
- The system shall not require defragmentation, maintenance or any other housekeeping operations that may interrupt recording when the vehicle ignition is powered on.
- All recorded data shall be immediately available on the removable storage media; the system shall not require a waiting period or completion of any processes prior to obtaining access.
- The recorder shall feature an eSATA (External Serial Advanced Technology Attachment) port for virtually unlimited onboard storage options.
- The system shall include a built-in heater for operating in temperatures as low as -20°F. Systems that require an additional enclosure to comply with this requirement are not acceptable.
- The system shall have an optional hard disk player and software to allow for transferring of files directly from the HDD to a PC, where the images can be printed, emailed or saved onto another storage media.
- The system shall feature a built-in 3-axis accelerometer capable of tagging video or sending alarm notification when the vehicle exceeds a pre-determined G-force setting.
- The system shall be FCC approved.
- The Recorder shall be designed to meet applicable requirements of ISO 16750-2 to address "Electrical disturbances from conduction and coupling".
- The Recorder shall provide regulated 12-volt power for all peripherals (up to 18 watts).
- The Recorder shall have the option to remain operating for a pre-determined length of time after the vehicle ignition is set to off, up to twenty-four hours.
- The system shall be capable of streaming live video through cellular or wireless LAN options.

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- The system shall feature a built-in GPS receiver.
- The system shall be equipped with a minimum of two (2) USB ports (at least one of which is USB 3.1 compatible) to allow for exporting video clips using USB flash memory.
- The Recorder shall include a Gigabit Ethernet port for system configuration and transmission of video using software over Wi-Fi or cellular networks.
- The Recorder shall feature H.264 and H.265 “Main Profile” video compression for superior video quality, network performance and recording duration. “Constrained Baseline Profile” or “Baseline Profile” type H.264/H.265 is not acceptable.
- The Recorder shall be programmable utilizing a mouse and LCD display.
- The system shall be capable of on-board viewing, downloading and control via laptop using the included software.
- The Recorder dimensions shall not exceed: 11.2” x 3.9” x 13.9” (Width x Height x Depth).
- Onboard system components shall be removable / replaceable as an entire component to minimize vehicle down times and simplify maintenance.
- IP cameras shall be set-up and configured for use during initial set up and for field replacement and/or adding additional cameras if needed at a later time per the Authority’s approval.
- Video clip samples shall be provided to display video quality recorded at the maximum recording quality and rate while maintaining on-board video on a single hard disk drive for a minimum of 20 days, utilizing the hard disk drive specified in the base bid of this proposal.
- The system shall feature an optional, internal, 2x2 MIMO, 802.11ac wireless module with maximum power output of 30dBm with support for both client and AP modes.
- The system shall support geo-fencing to automate mode changes to the internal wireless module. The system shall automatically switch from AP mode to allow connection to supervisor or police vehicles while away from the facility, and switch to client mode to allow connection to facility wireless when the vehicle is within the vicinity of the facility.
- The Recorder shall feature an HDMI output port that is capable of displaying camera layouts of 1 to 9 cameras, at 1080p resolution. The display output shall be capable of switching camera layouts based on triggers.
- The Recorder shall have the ability to manage the PoE camera power in order to power down cameras after vehicle ignition is turned off to eliminate unnecessary recording and to increase data transfer rates in a power-saving mode.
- Predictable recording duration (i.e. not using event recording that makes it variable)
- Camera firmware updates shall be managed through the recorder.
- ONVIF (Open Network Video Interface Forum) support
- Ability to enable/disable audio/video recording based on event inputs
- Provide a connection for power loss data protection
- Logging of input voltage and temperature
- The system shall have the following software/ firmware salient features:
- License-free software that is capable of live viewing, playback, calendar and event searches, and administration shall be provided at no extra cost, and shall be compatible with Windows® 7, Windows® 8, and Windows® 10.
- All future software updates for license-free software shall be available free of charge.
- The software shall provide various levels of user access rights that allow and restrict access to various functions. The software shall feature 256 user passwords and 64 user groups.

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- When equipped with GPS, the system shall provide historical and live software mapping to display routes of the vehicle location and speed charts.
- When equipped with GPS, the system software shall be capable of connecting to pre-recorded video by selecting a point on the map or selecting a point on the speed chart to view from that speed or location.
- To retrieve recorded video, the software shall provide searches by: event, time lapse, time and date, vehicle location and vehicle speed. Optional software shall allow for easy fleet-wide searches and wireless download of video based solely upon the date and a general map location.
- The software shall display the current time and date on the video.
- When events are detected, the unit shall display the event information and allow users to access the remote site directly to search the image associated with the event.
- The included software shall allow the user to connect to multiple units simultaneously and allow for viewing a minimum of 64 camera views at one time. Optional management software shall feature secure, instant live access to simultaneously provide live viewing to multiple parties with no reduction in video quality or additional use of wireless bandwidth.
- The system shall feature optional software for automated event video upload to a central server repository.
- The software shall allow for automated software upgrades and simultaneous updates to multiple sites.
- Image adjustments, ePTZ (Electronic Pan, Tilt, Zoom) control, and alarm out controls shall be administered utilizing the software.
- When utilizing the software, the system shall provide ePTZ control and de-warping of 360-degree cameras during live and video playback.
- The software shall be capable of synchronizing the time of all Recorder systems utilizing a “master Recorder” or to GPS (Global Positioning System) time (if applicable). Daylight savings adjustments shall be automatic.
- The recorder’s software settings shall allow the system (when networked) to send email notification for any system event including video loss, camera obstruction, and hard drive “full status.” Optional software shall supply health information of the video system with error logs, reports and automatic notification for: video blind events, video loss events, disk errors, disk temperature events, fan errors, recorder errors, disk almost full and disk S.M.A.R.T (Self-monitoring, analysis and reporting technology) events.
- The recorder’s software settings shall allow the system to send notification to the vehicle driver or external systems for any system event including video loss, camera obstruction, hard drive “full status”, etc. When networked, the system shall be capable of sending notification to a central location. Optional management software shall support fleet-wide email notification of system events as well as a fleet-wide health summary featuring camera and Recorder health reports.
- Options for archiving/retrieving video shall include: Saving a video clip as a Windows Media Player (.avi, audio/video interleaved) file, saving as an image (.bmp, bitmap), or saving video as a self-executable format (.exe, executable file).
- Video clips saved using the self-executable format (.exe) shall be encrypted and viewed without the use of any additional software, providing the ability to easily transfer secure video evidence.

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- Video clips shall include the option of viewing a single camera or multiple cameras on a single screen. Users shall have the ability to configure and save (for later use) various camera view layouts.
- Executable video clips shall display GPS map location vehicle and speed upon playback and metadata from other onboard systems.
- Video clips shall provide the option of saving a portion of the video clip (shorter in length and/or reducing the number of cameras) in order to make a smaller video clip from the original.
- The software shall feature the option to archive video clips requiring a password for reviewing.
- The system shall have the following salient features for the Management Software or approved equivalent:
  - Management software shall provide fleet-wide status reports, event logs, on-demand and automated video clip retrieval for easy fleet-wide video management.
  - Management software shall provide access to an unlimited number of users and feature multiple user access-levels with password protection to ensure system settings are secure.
  - User access-levels shall be configurable for individual vehicles or groups of vehicles, preventing access/visibility to vehicles and their respective data outside of the configured permissions.
  - Software licenses shall be provided on a per-vehicle basis and shall include 36 months of maintenance (software updates) at no additional charge.
  - Management software shall be fully web-based and not require any client-side software other than the Google Chrome™ web-browser.
  - Management software shall provide the ability to view video directly from supported web-browsers without downloading or exporting the video file.
  - Users shall be capable of programming the software to automatically download video clips based on specific event types.
  - All data logs and video clips shall be available for viewing anytime (regardless of current vehicle connection status) once the video clip has been uploaded.
  - Users shall be capable of requesting downloads of custom video clips.
  - Video clips scheduled or manually requested shall automatically download when the vehicle connects to the network.
  - Management software shall be capable of retrieving video data from all available vehicles simultaneously to ensure such data is available to users in a timely manner.
  - Software shall provide “connection status” to easily determine if a vehicle has not recently connected to the network.
  - The user shall be capable of requesting multiple video clips simultaneously from multiple sites.
  - Software shall provide chain of custody reports with a complete history of system and user actions associated with each video clip and live viewing sessions.
  - Users with granted permission rights shall be capable of classifying reviewed video clips to save to temporary or long-term storage or schedule for deletion.
  - Administrative users shall be capable of programming the software with an adjustable time period for storing the event log, temporary storage, long-term storage and deletion grace period (by which video clips are stored for a period time prior to deletion).

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- Management software shall provide fleet-wide monitoring of camera and Recorder health events, including the ability to generate health event video clips, to ensure optimal functionality and prevent manual system checks.
- Users shall have the ability to configure daily emailed health status reports detailing overall system health including: Recorder health events, camera health events, vehicle connection status and server storage.
- Management software shall be compatible with all Recorder systems proposed.
- Software shall provide users the ability to add customizable “tags” to classify video clips based upon pre-determined criteria.
- Software shall support searching/filtering of video clips based upon vehicle ID, video event type, clip review/download status, last reviewed by (user), date/time, length, speed, tag, and vehicle location.
- Users shall be capable of inserting and saving notes or comments regarding a specific video clip to document essential data regarding a clip. Such notes shall be associated with specific times in the respective video clip.
- Management software shall allow users to view the last location of each vehicle in the fleet with a graphical map interface.
- Search capabilities shall support the download of video clips by location in a specified time period – software shall upload video clips for all vehicles within the location and time parameters selected.
- Management software shall provide secure live streaming capabilities, including the ability to view previously recorded video with fast-forward and reverse functions.
- Live streaming security access shall be configurable on an individual user basis.
- Management software shall provide the ability to protect the privacy of individuals in exported video clips by automatically blurring faces for individuals identified by authorized users.
- Face blurring shall not be limited to static regions of the video, it shall intelligently follow individuals to protect identity as they move throughout the video recording
- Authorized Users shall have the ability to selectively de-blur up to two faces, which will remove the privacy feature for desired individuals.
- Management software shall support ADNS functionality for enabled Recorders.
- Management software shall support the use of secondary IP addresses for dedicated transmission of live data and video over cellular connections.
- Management software shall support the use of LDAP (Lightweight Directory Access Protocol) to authenticate users with a single sign-on.

The system Cameras shall have the following salient features/ available options or approved equivalent:

- All cameras shall utilize 48-volt PoE (Power over Ethernet), supplied from the Recorder.
- Interior cameras shall be high definition, low light, IR Illuminating with a lux rating of 0.
- Interior cameras shall be color with a built-in high sensitivity microphone.
- Camera resolution setting options shall be U-HD (3840x2160), F-HD (1920x1080), HD (1280x720), W-D1 (864x480), Q-HD (640x360) or W-CIF (432x240).
- 360-degree cameras with a resolution of 5MP (2560x2048) shall be supported.
- 360-degree cameras shall provide low light IR illumination with a lux rating of 0.

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- 360-degree cameras shall provide a built-in high sensitivity microphone.
- Exterior cameras shall be impact and tamper-resistant and rated a minimum of IP66 for proven durability in exterior mobile applications.
- Exterior cameras shall feature a UV coated dome for additional exterior protection.

The system shall offer the following salient features for warranty, service & support or approved equivalent:

- All hardware shall include a warranty of two (2) years parts and labor.
- Unlimited telephone and email technical support shall be provided at no additional charge for the life of the system.
- Additional extended warranty and service contracts shall be available.

The CCTV system shall have all necessary licensing proposed so that system operates seamlessly with existing like-CCTV systems the Authority may have. Authority reserves the right of final approval of the licensing.

The CCTV system shall have removable digital recorder, tag alarm push button switch, discreet and silent input for logging important events, and fail-safe circuit monitoring in case of wire breaks.

The cameras shall be mounted to provide a clear view of the entire passenger compartment and be protected to prevent tampering and vandalism. Outside cameras shall be securely installed and properly sealed to prevent water intrusion.

The system shall have a recording capability of no less than 20 days of recording space or a 8TB drive and shall be programmable to automatically tag events, to include panic button activation and a hard deceleration/impact. Tagged events shall be stored, and available through both wireless download and manual retrieval of the video on the DVR.

#### 40.15.2. Cameras

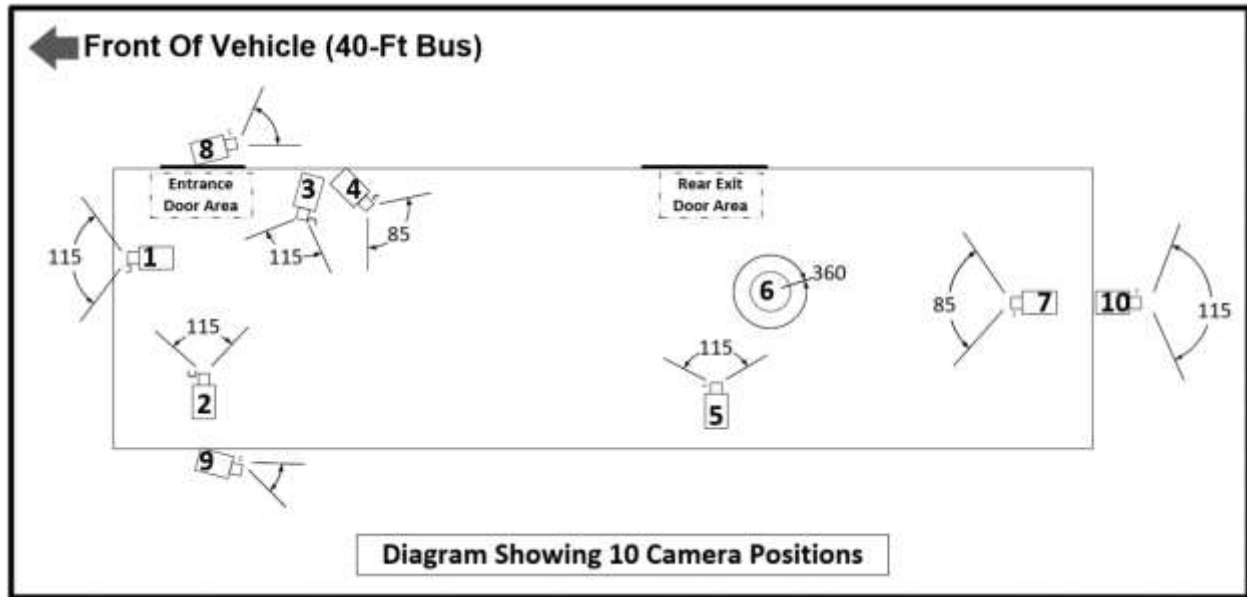
The cameras shall be mounted to provide a clear view of the entire passenger compartment and be protected to pre-vent tampering and vandalism. Outside cameras shall be securely installed and properly sealed to prevent water intrusion. Refer to camera installation guidance in figures 12 (40-foot bus) and 13 (60-foot bus).



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FIGURE 12

40-foot Camera Installation Guide

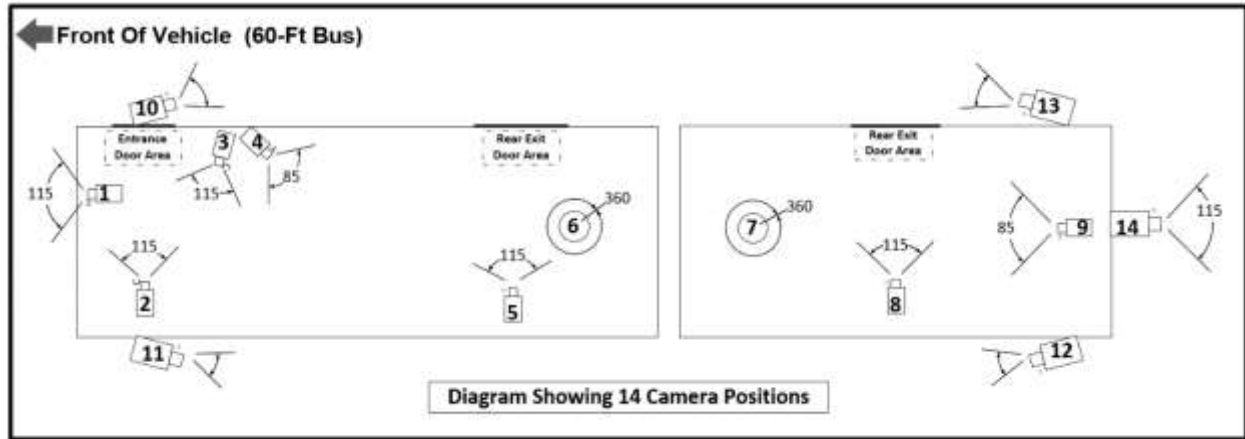


Camera	Location
1	Forward Facing (4K, 115° Field View)
2	Front Door (115° Field View)
3	Operator (115° Field View)
4	Front to Back (85° Field View)
5	Rear Door (115° Field View)
6	Platform Steps (360° Field View)
7	Back to Front (85° Field View)
8	Curb Side (3.0-8.5 mm, VARIFOCAI)
9	Street Side (3.0-8.5 mm, VARIFOCAI)
10	Rear View / Back-Up (115° Field View)



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**FIGURE 13**  
**60-foot Camera Installation Guide**



Camera	Location
1	Forward Facing (4K, 115° Field View)
2	Front Door (115° Field View)
3	Operator (115° Field View)
4	Front to Back (85° Field View)
5	Middle Door (115° Field View)
6	Near mid. Axle (360° Field View)
7	Aft. Turntable (360° Field View)
8	Rear Door (115° Field View)
9	Back to Front (85° Field View)
10	Front Curbside (3.0-8.5 mm, VARIFOCA)
11	Front Street Side (3.0-8.5 mm, VARIFOCA)
12	Rear Street Side (3.0-8.5 mm, VARIFOCA)
13	Rear Curbside (3.0-8.5 mm, VARIFOCA)
14	Rear View / Back-Up (115° Field View)

#### 40.15.3. Operator Rearview/Door Monitor

When the vehicle is in reverse, the exterior rear facing camera view shall appear on a minimum 8-inch monitor. When the rear door(s) is open, the monitor shall display a view from both rear door camera. The 8-inch monitor shall be installed within close proximity to the operator seat so that monitor can be easily viewed with minimal head movement.

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**40.15.4. Awareness Monitors**

Two (2) monitors shall be provided and installed, one 10-inch monitor and one 19-inch monitor or approved equivalents. The Authority shall retain the right of final configuration approval. The monitors shall continuously show a live “feed” of images from the vehicle’s interior cameras so as to create a more secure atmosphere.

**40.15.4.1. 10-inch Awareness Monitor**

The 10-inch monitor shall be installed on the header above the operator seat, facing the entrance door so that onboarding passengers may see the monitor. The monitor shall only display the camera “feed” that captures the entrance door as passengers board.

**40.15.4.2. 19-inch Awareness Monitor**

The 19-inch monitor shall be installed on the side of the electronic enclosure facing the rear of the vehicle so passengers may see the “live feed” scrolling images from the vehicle’s interior cameras. The Authority reserves the right of final configuration approval.

**40.16. Provisions for Cellular Router**

The manufacturer shall install provisions for the Authority’s Cellular Router to be installed in the radio box/electronics cabinet. The Authority will supply and install post-delivery, a Sierra Wireless MG-90 Cellular Router.

The Authority will provide the cellular router during production for the Manufacturer to test functionality and vehicle integration.

The Manufacturer shall provide the following:

- two antennas, model PCTEL (or approved equivalent)
- route the antenna cables to the radio box for each router
- shelf space in the radio box in a configuration approved by the Authority

**40.17. Automated Fare Collection (AFC)**

**40.17.1. Provisions for Farebox**

The manufacturer shall install provisions for the Authority’s Farebox to be installed at the front door. The Authority will supply and install post-delivery, a Genfare Odyssey with a cash box and overall height of 41-inches tall.

The Authority will provide a test unit farebox during production for the Manufacturer to validate installation dimensions and test functionality and vehicle integration.

The Manufacturer shall provide the following:

- Structural and mounting provisions for the Farebox
- Required cables/harnesses
- Arm, Ram Mount, 1.5" ball (RAM-201U) 6"- GFI Part # C26499-0001
- Farebox wiring which shall be connected and labeled as referenced in Table 7.

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Table 7

Wire	Label 1	Label 2	Label 3	Communications
Electrical Requirement	12V Battery	Ground	Ground (Shielded)	J1708 Harness
Amperage Requirement/ Notes	20 Amps			Runs ITS/ CAD/ AVL in the Radio/ Electronics box

The wiring shall be enclosed in a flexible conduit that runs continuous starting at the radio (electronics) box and terminates at the location where the farebox shall be mounted. The power, grounding, and communication harness shall be contained within the flexible conduit. There shall be a minimum of 12 inches of “slack/service loop” for each wire coiled underneath the farebox (future use).

NOTE: The Manufacturer shall take into account when designing and installing the driver barrier that the Farebox OCU (Operator Control Unit) will be mounted on the farebox and must be considered with respect to potential interference.

#### 40.17.2. Provisions for Electronic Fare Media Validators (40 and 60-foot)

The manufacturer shall install provisions for the Authority’s Electronic Fare Media Validators to be installed at all doors. The Authority will supply and install the Validators post-delivery. The Authority shall approve the locations of the Electronic Fare Media Validators.

The Authority has a contract with an Automatic Fare Collection system and therefore all provisions shall be compatible with INIT fare collection and revenue management. The Authority will provide test units during production for the Manufacturer to validate installation dimensions and test functionality and vehicle integration.

The Manufacturer shall provide the following:

- Three (3) locations on a 60-foot vehicle
- Two (2) locations on a 40-foot vehicle
- Appropriate length of INIT wired cable shall run from each mounting location to the network switch.
- Circuit connection blocks, for each cable shall be installed in “line”, in a maintenance accessible area, for ease of installation, maintenance, and component replacement.
- An Antaira managed switch or approved equivalent, shall be used to connect the validators to the cellular router
- An appropriate length CAT5e cable shall connect the network switch to the cellular router
- Wiring/ cabling shall be included in the vehicle wiring diagrams that are supplied to the Authority

#### 40.18. Event Data Recorder (EDR)

An EDR (Event Data Recorder) shall be installed on the bus, preferably near the front. The unit should be installed as low as possible. The EDR shall be able to record data from the J1939 CAN line and connect/ communicate to the cellular router (reference section 40.16), for data offloading. The manufacturer or supplier of the EDR shall conduct a first article installation, inspection, qualification testing, and

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certification at the bus manufacturers facility. A copy certification of the EDR system shall be supplied to Authority for each vehicle build. Testing and verification that EDR system installed on each vehicle shall be supplied to the Authority.

The EDR shall having the following salient features or approved equivalent:

- Power
  - Input Voltage: 9-34 V DC (42V & 72V peak respectively)
  - Power Consumption: <16W with cellular modem
- Communications
  - RS-232
  - USB 2.0
  - CAN 2.0
  - Wi-Fi 802.11n
  - Cellular Modem (3.5G/3G/2G, penta-band, worldwide coverage)
- Sensors
  - 3-axis accelerometer (2G/4G/8G/16G selectable, 50G optional)
  - GPS operating at up to 10 Hz
- Inputs
  - RPM (dedicated analogue sampled)
  - Speed (dedicated analogue sampled)
  - 8 x mixed signal analogue inputs (programmable frequency capture, analogue voltage, digital input emulation)
- Outputs
  - 4 x relay outputs (open collector 200 mA)
- Functions
  - RTC +/- 3ppm over -10 to 65 degrees C, 95 second per year free drift, corrected via GPS time synch
  - Backup battery with >10 years life
  - Networking (DHCP client, DNS client, HTTP server)
  - Firmware updates: on-board bootloader allowing remote updating
  - Data reporting & downloading via on-board HTTP server and USB mass storage
  - Device configuration via on-board HTTP server and USB mass storage
- Storage
  - On-board 64 GB non-volatile flash memory
- Environmental
  - Dimensions: 153 x 140\* x 39 mm (\*not including cables)
  - Weight: <500 g
  - Operating Temperature: -40 to 85 degrees C dependent on selected options
  - Ingress Protection: IP54 as standard, up to IP68 optional
  - Resistant to fluids found in typical industrial applications

Settings are to be finalized with the Authority during pre-production. The EDR shall also tag an event from a signal received over the J1939 CAN line from the silent alarm switch signal and the camera event button and in turn broadcast these events to the vehicle monitoring system. The EDR shall also record, at a minimum, the following operational data: headlights, turn signals, and hazard lights “on” or “off”;

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vehicle ignition “on” or “off”; low air pressure warnings; vehicle movement forward, reverse, or idling; and parking brake “on” or “off”. The Authority reserves of the right of final configuration.

#### 40.19. On Board Telematics

The vehicle shall be equipped with a data logger. The data logger/ data hub shall have the following capabilities at a minimum:

- Vehicle Monitoring
  - Vehicle statistics
  - Route energy statistics
  - Management reports
  - Telltale lights
  - Incident notifications
- Driving Behavior Monitoring
  - Driver style analysis
  - Regeneration profile
  - Summary reports
  - Actionable insights
  - Driver insights application
- Maintenance Monitoring
  - Battery status/ health insights
  - Fault logging overview
  - Diagnostic messages
  - Tire pressure monitoring, if provided
  - Brake lining monitoring
  - Auxiliary systems monitoring

The data hub or logger shall have the following salient features or approved equivalent:

#### SYSTEM

- CPU- 800 MHz 2core ARM processor (i.MX6), or better
- RAM- 1 GB DDR (*Double Data Rate*), or better
- On-Board Memory- 8GB (eMMC- *expanded multi-media card*), or better
- Built in sensors
  - GPS sensor (*Global Positioning System*)
  - Gyro sensor
  - Barometric sensor
  - 3 Axis Accelerometer
- Operating system- Embedded

#### COMMUNICATION

- Ethernet- 1Gb/ps (*Gigabyte per second*)
- Wireless- Wi-Fi 802.11 a/b/g/n (2.4 + 5GHz)
- Cellular- GSM/UMTE/LTE (2G/3G/4G)

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**CONNECTORS**

- TE Connectivity, Ampseal (23 pins)- 1 x RS485, 6 x Analog Inputs (0-10 V), 2 x Analog Outputs (0-10 V), 5 x Digital Outputs, 2 x CAN
- LAN Connector- 1 x RJ45
- USB (*Universal Serial Bus*)- 1 or more
- Antenna Connectors- 1 x WLAN (SMA), 1 x 2G/3G/4G Antenna (FME), 1 x GPS (SMA)

**CERTIFICATIONS**

- Automotive Standards- R\_10\_C5 Addendum 9: Regulation No. 10
- Environmental Standards- J1455:2017 Part 2-64, IP 65

The On Board Telematics device shall be installed in the radio box in a location to be approved by the Authority. The Authority reserves the right of final configuration approval.

**40.20. A-Pillar Camera System**

The manufacturer shall provide and install a blind spot- collision avoidance system that at a minimum consists of the following:

- A slender color monitor mounted on the “A” pillar that displays a “live-feed” image of the area normally concealed by the “A” pillar.
- Camera installed on the vehicle that captures the “live-feed” for the “A” pillar mounted monitor.
- Monitor only displays the “live-feed” when the left turn signal is applied/ engaged and turns off when the left turn signal is not applied/ disengaged.

Below are the desired features for the system:

Characteristic	Specification
Brightness (nits) 1200cd/m2	1200
Contrast	1300:1
Resolution (pixels)	1920 x 720
Latency	Less than 200ms
MTBF (Half-brightness lifetime)	Over 70000 hours +
Ingress Protection	IP54
Viewing Angle (no glass)	IPS
Automatic Brightness Control	yes
Manual Brightness Control	Rubber Buttons Backside
Protective Glass	PMMA AR
Sun Protection	Embedded Hood
Operating Temperature	-40~85°C
Storage Temperature	-4~90°C
RoHs Compliance	Yes
Ambient Light Sensor Position	Backside
DC In	12/24V DC
USB Firmware Update Connector	Option in Controller
Setup/Control	OSD
Video Input	1 Composite (1 VGA 1 DVI 2 HDMI options ready)
Cable / Connector	2m Din connector with Molex connector for camera
Mounting	VESA 100
Diagonal Size	10”
Active tft Height (mm)	244

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Active tft Width (mm)	91
Active Area (mm^)	22204
Housing Height (mm)	270
Housing Width (mm)	130
Housing Depth (mm)	65

The Authority reserves the right of final configuration approval.

#### 40.21. Provisions for Accident Avoidance and Inertia Based Camera Systems

The Manufacturer shall install provisions for the Authority's Accident Avoidance and Inertia Based Camera Systems to be installed on the windshield. The Authority will supply and install the Accident Avoidance and Inertia Based Camera Systems hardware post-delivery.

The Authority is using Mobileye and DriveCam systems. The Authority will provide test units during production for the Manufacturer to validate installation dimensions and test functionality and vehicle integration.

The Manufacturer shall provide the following:

- wiring connected to the circuits in the Table 8 below for each system and terminate the wiring harnesses in a 15 inch "slack/service" loop with labels located above the center of the windshield.

Table 8

Accident Avoidance System	
Wire	Circuit
J1939 harness	J1939
12-volt +	12-volt battery positive (unswitched, 10-amp circuit)
12-volt ign.	12-volt master switch ignition
Ground	Vehicle Ground
Inertia Based Camera System	
Wire	Circuit
12-volt +	12-volt battery positive (unswitched, 10-amp circuit)
12-volt ignition	12-volt master switch ignition
Ground	Vehicle Ground

#### 40.22. Provisions for Upgrade of Automated Vehicle / Connected Vehicle Technology

The Manufacturer shall install provisions where possible which will aid in future retrofit and integration of Automated Vehicle / Connected Vehicle Technology. Systems may include Advanced Driving Assist Systems such as Lane Keeping, Automated Braking, Collision Avoidance, and Pedestrian Avoidance, and/or Autonomous Drive modes such as self-parking and auto-queueing in the depot. Physical provisions may include:

- additional electronic cabinet storage capacity for AV/AC computers,
- conduit with fishwire for LIDAR, RADAR, Optical Cameras, and Antennas,
- Reinforced mounting provisions for LIDAR, RADAR, Optical Cameras, and Antennas
- Provisions for Brake by Wire sensors and control units
- Provisions for Assisted Steering

EXHIBIT F-1A

TYPICAL CAPITAL METRO PAINT AND DECAL SCHEME

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**METRO*****BUS***

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## Branding Standards

60ft & 40ft



# Branding Standards

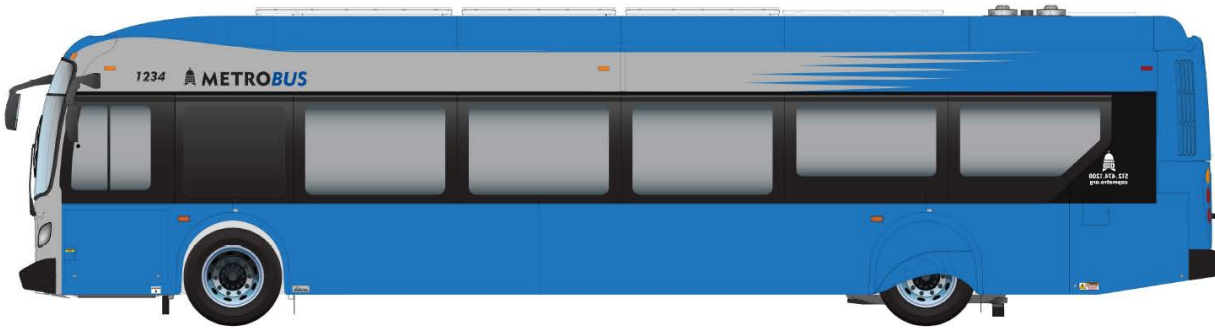
## 60ft & 40ft

This document provides livery and branding specifications for interior and exterior surfaces. No alternative decals, colors or substrates may be used without written consent by Capital Metro Quality Assurance and Marketing. Vector artwork of all decals are available from the Marketing Department. Information on logistics, installation or engineering is available from the Quality Assurance team.

Updated April, 2018

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DECAL	QTY	LOCATION(S)	SIZE
ADA Icon	1	Exterior, beside front door	5 x 5
ADA Statement	1	Interior, digital display unit on first curb-side window	17 x 4
Battery Cut Off	1	Exterior, flip door of battery cut-off switch panel	7 x 3
Bike Rack	1	Exterior, centered between windshield wipers	14 x 3
Caution Children	1	Exterior, left side of rear side, below upper tail lights	10 x 9
Caution Door/Eng	1	Interior, door frame	1 x 6
Caution Door/Span	1	Interior, door frame	1 x 6
Courtesy Statement	1	Interior, utility box, facing passengers	20 x 8
Do Not Cross	1	Interior, front header	5 x 6
Do Not Lean	2	Interior, both glass panes of rear doors	5 x 6
GoLine w Dome	2	Exterior, last curb-side window, rear side on bottom right corner	18 x 15.5
Kneel Hazard	1	Exterior, beside ADA icon	5 x 5
Lap Belt	2	Interior, underneath flip-up seats	5 x 6
MetroBus	2	Exterior, inside silver stripe area, curb & street sides	47 x 7
No Food or Drinks	2	Interior, front header & rear header	5 x 6
Priority Seating_window	4	Interior, centered near bottom of priority seating area window	17 x 4
Pull to Signal	16	Interior, centered on window columns below the pull cord	1.5 x 1.75
PSI	4	Exterior, above each wheel base	2 x 1
Rear View Reflective	2	Exterior, centered near bottom of rear view mirrors, facing oncoming traffic	6 x 4
Safety Tape: red/white	1	Exterior, across bottom of engine compartment panel (rear side)	84 x 2
Stand Behind Yellow Line	1	Interior, utility box (facing aisle)	5 x 6
Unit Number/Standard	6	Exterior: all sides; Interior: front & rear header	4" h
Unit Number/Rooftop	1	Exterior: rooftop (see spec)	24" h
Video Surveillance	2	Interior, front header & rear header	5 x 6
Watch for Peds	1	Interior, A-column beside steering wheel	1 x 6
Watch Your Step	2	Interior, operator's step and first passenger's step in aisle	17 x 4
Wheelchair Seating	2	Interior, centered near bottom of wheelchair seating area window	17 x 4



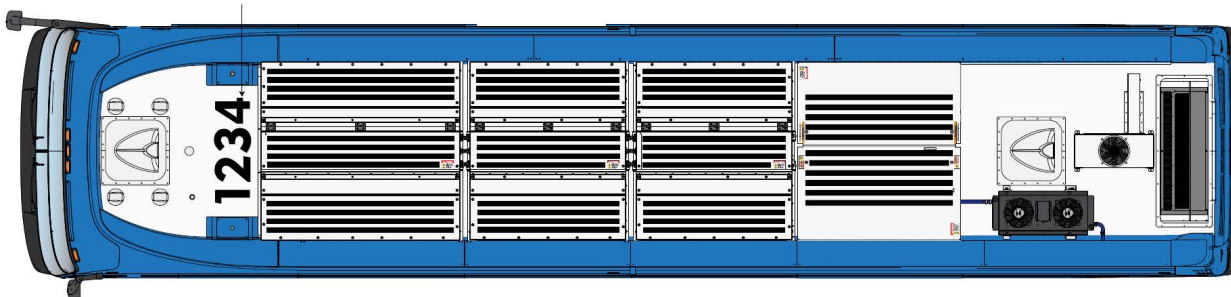
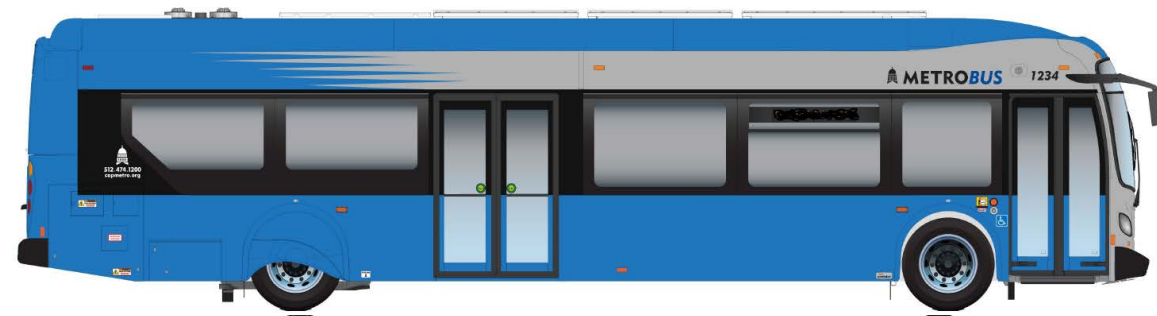
Accent Stripe:  
DuPont F2573  
Lt. Silver Effect



Main Body Color:  
DuPont 867601EG



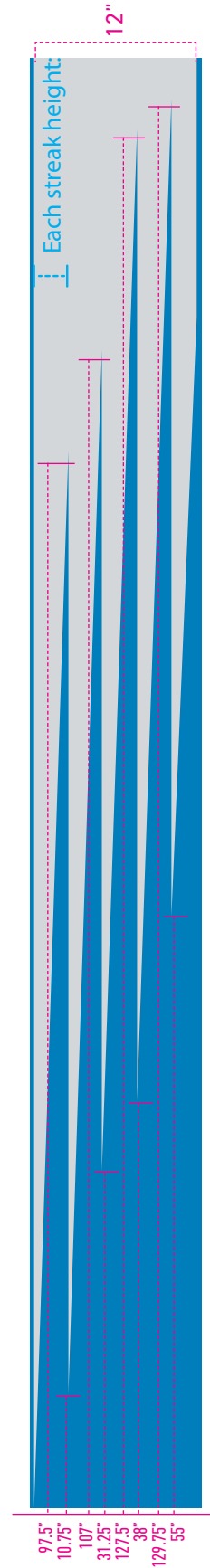
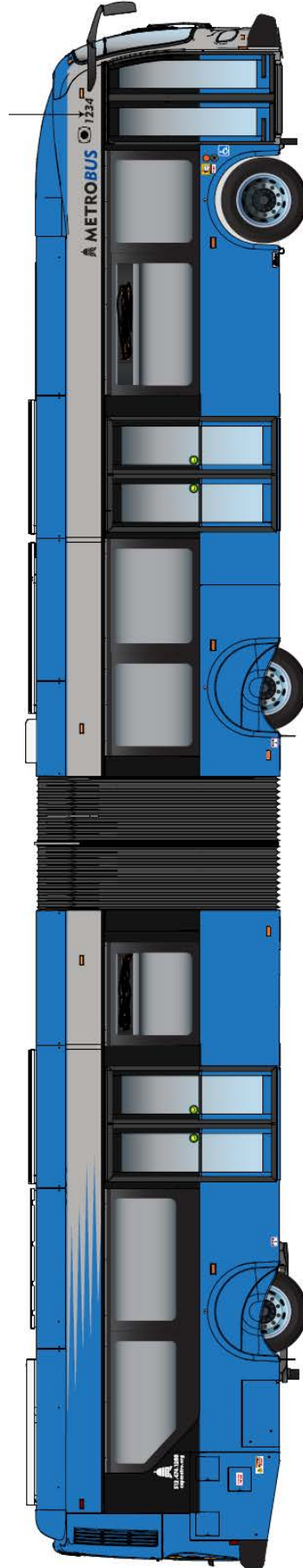
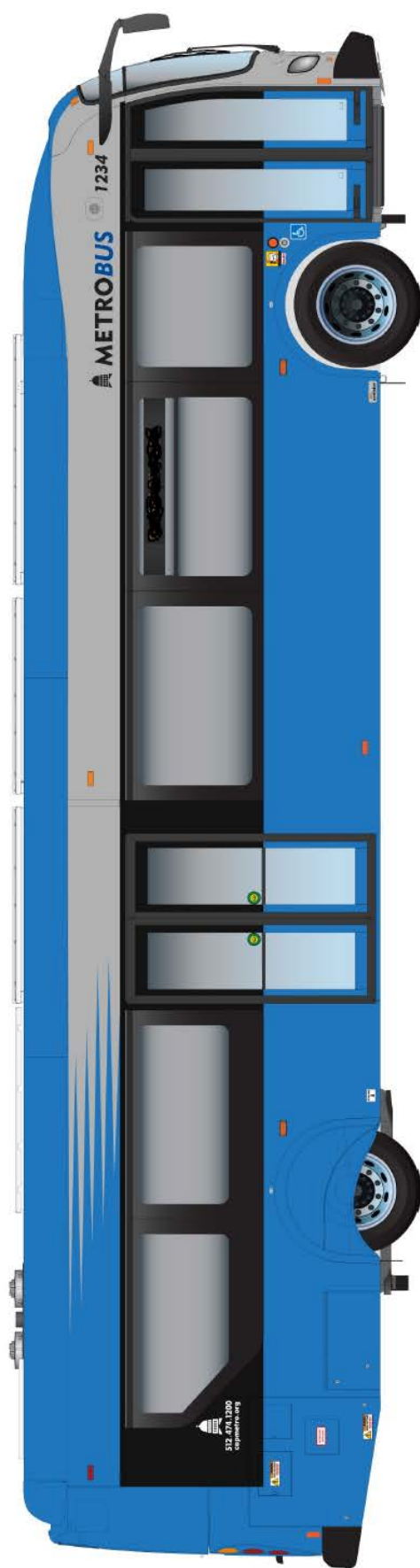
Black trim:  
DuPont Fleet #99

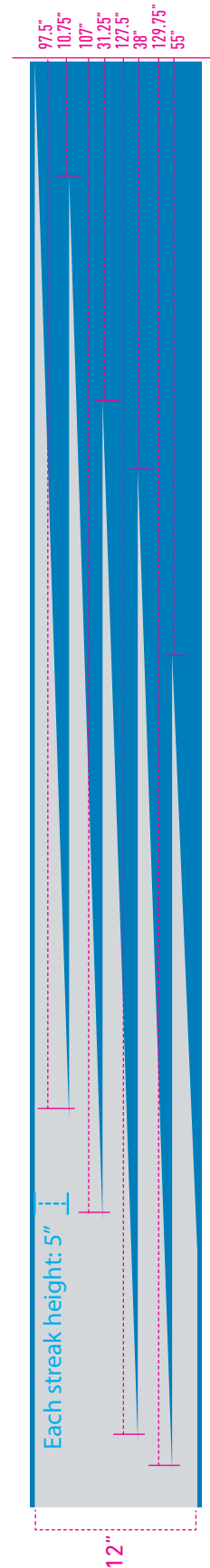
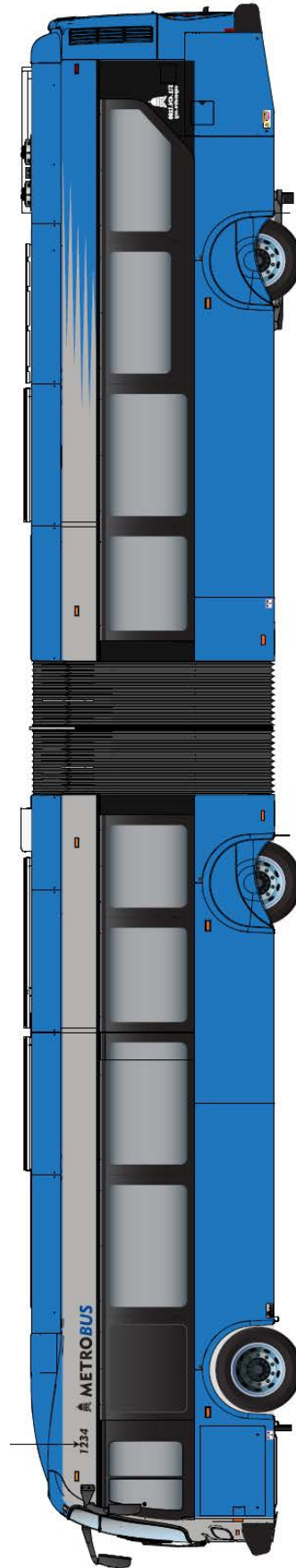
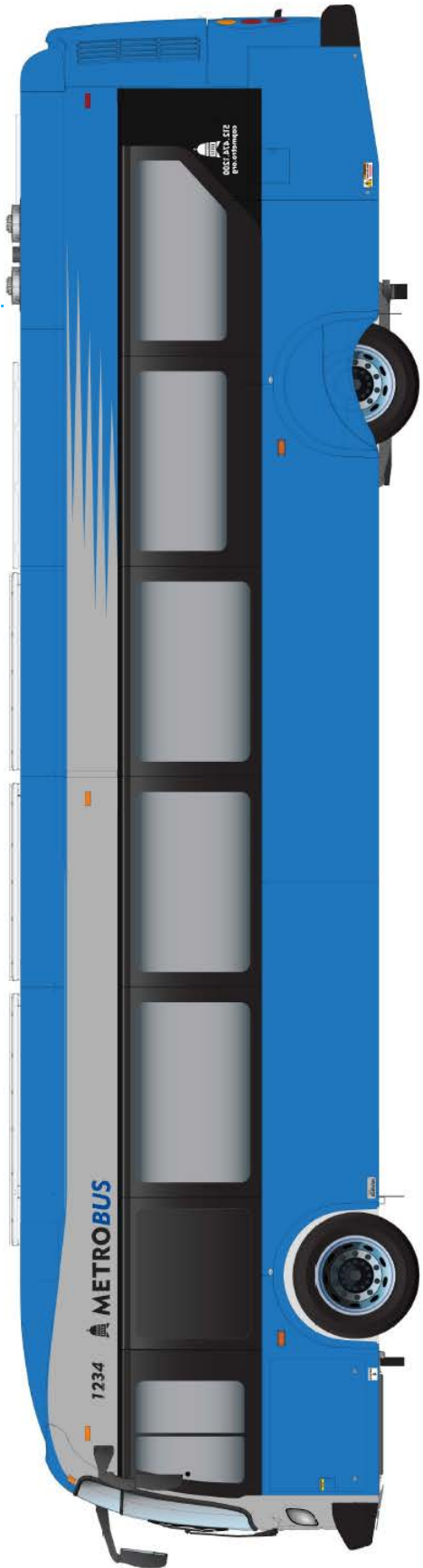


**Roof Number/ Vinyl Decal:**  
15"height, centered on roof  
font: Geometric 415 Black  
3M Scotchlite Reflective Black 680-85



Silver paint should follow  
same diagonal line







## ADA Icon

5"w x 5"h

Qty. 1

Curb Side

 PMS Process Cyan c



## Kneel Hazard

5"w x 5"h

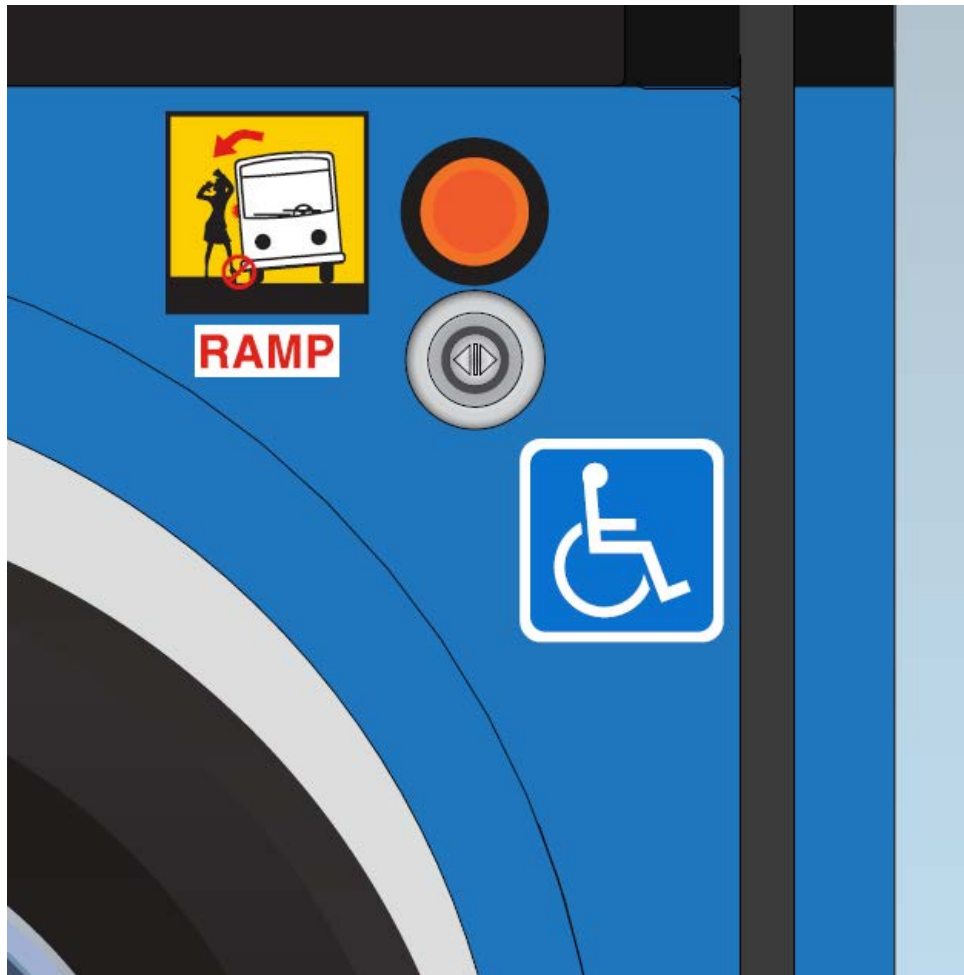
Qty. 1

Curb Side


 PMS 485c

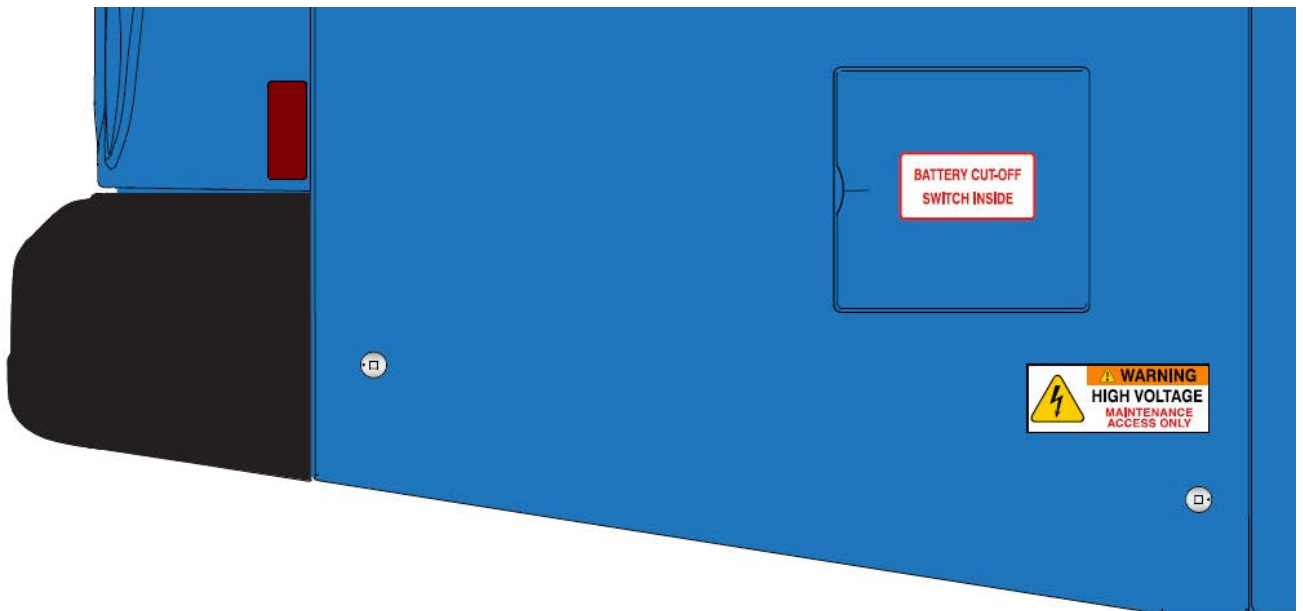
 PMS 116c

 PMS Black c





Battery Cut-Off	
7" w x 3" h	
Qty. 1	
Street Side	
 PMS 485c	





## 40-FT Bus - Front of Vehicle



## 60-FT Bus - Front of Vehicle



### Bike Rack

14" w x 3" h

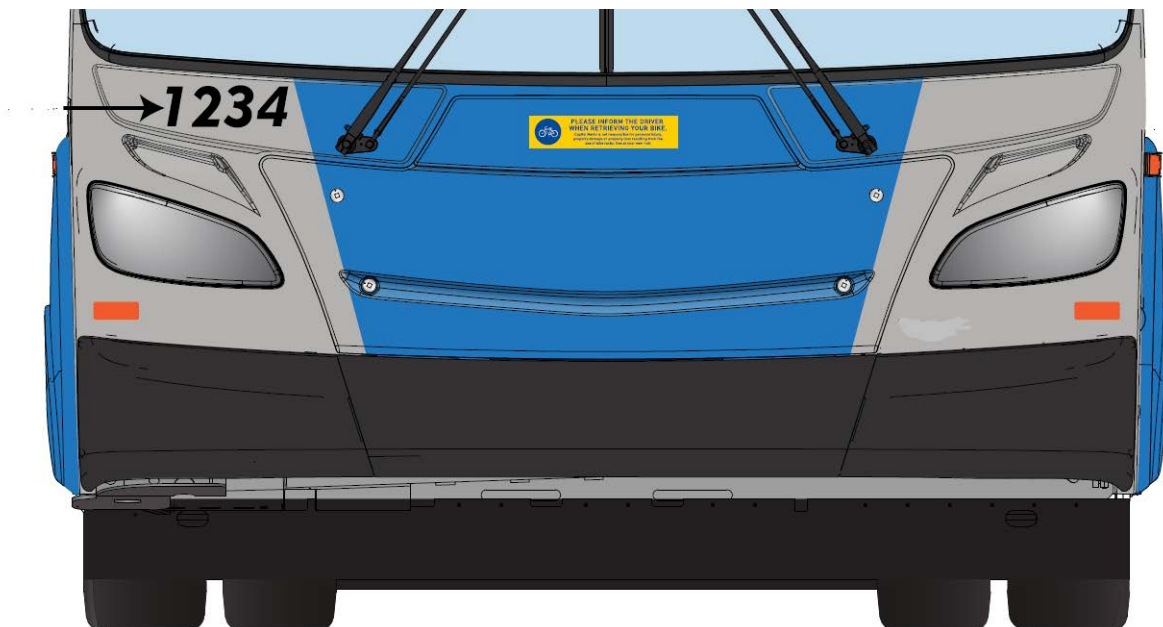
Qty. 1

Front Side

 PMS 116c

 PMS 2945c

## 60-FT Bus - In front of the rear most exit door







## Caution Children May Be Exiting

10" w x 9" h

Qty. 1

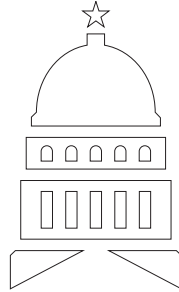
Rear Side

 PMS 485c

 PMS 116c

 PMS Black c





512.474.1200  
capmetro.org

## Go Line & Dome

18"w x 15.5"h

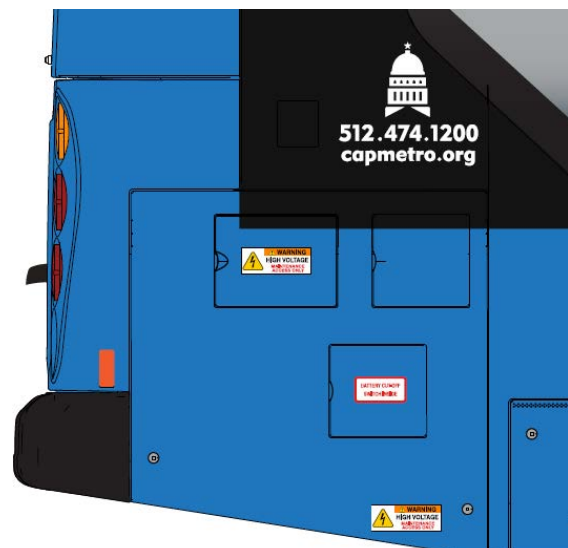
Qty. 2

Rear & Curb Side

3M Scotchlite Reflective  
White 680-10



Rear Side



Curb Side & Street Side



## MetroBus service logo

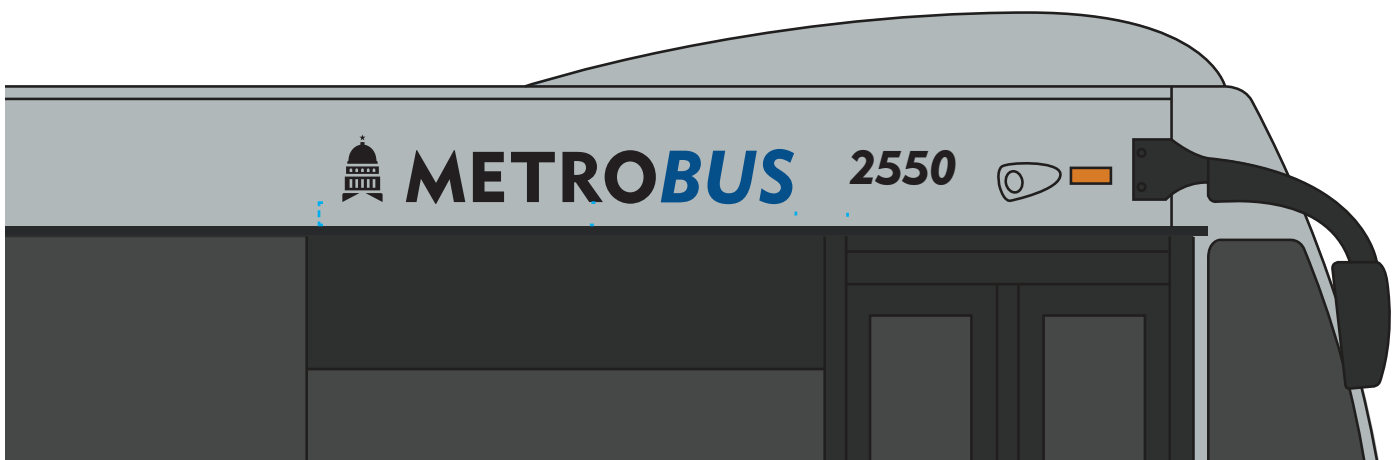
47" w x 7" h (letters are 5.25" h)

Qty. 2

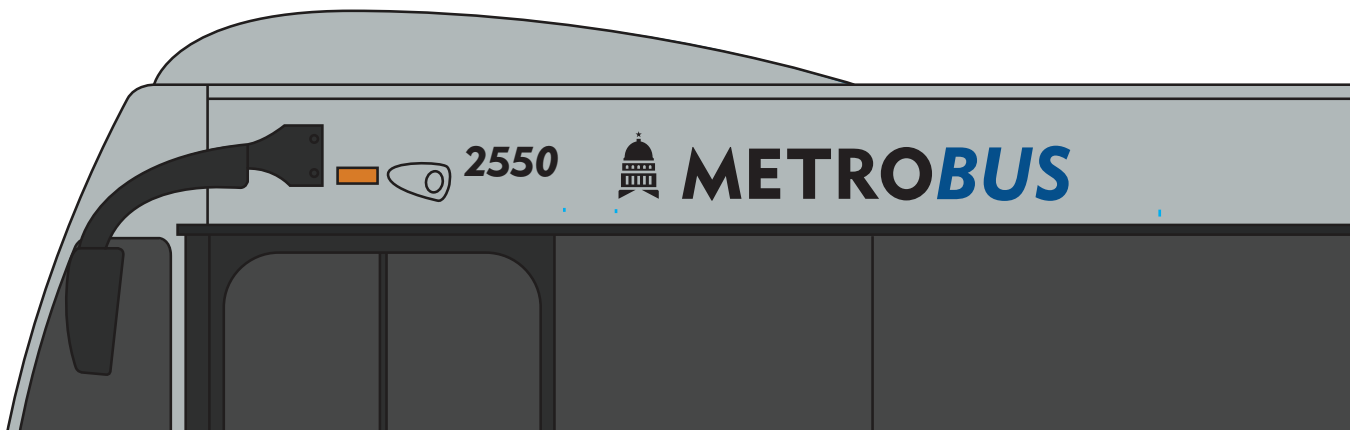
Street Side & Curb Side

 3M Scotchlite Reflective Blue 680-75

 3M Scotchlite Reflective Black 680-85



Curb Side



Street Side

# 2550

## Unit Number (Curb side & Street Side)

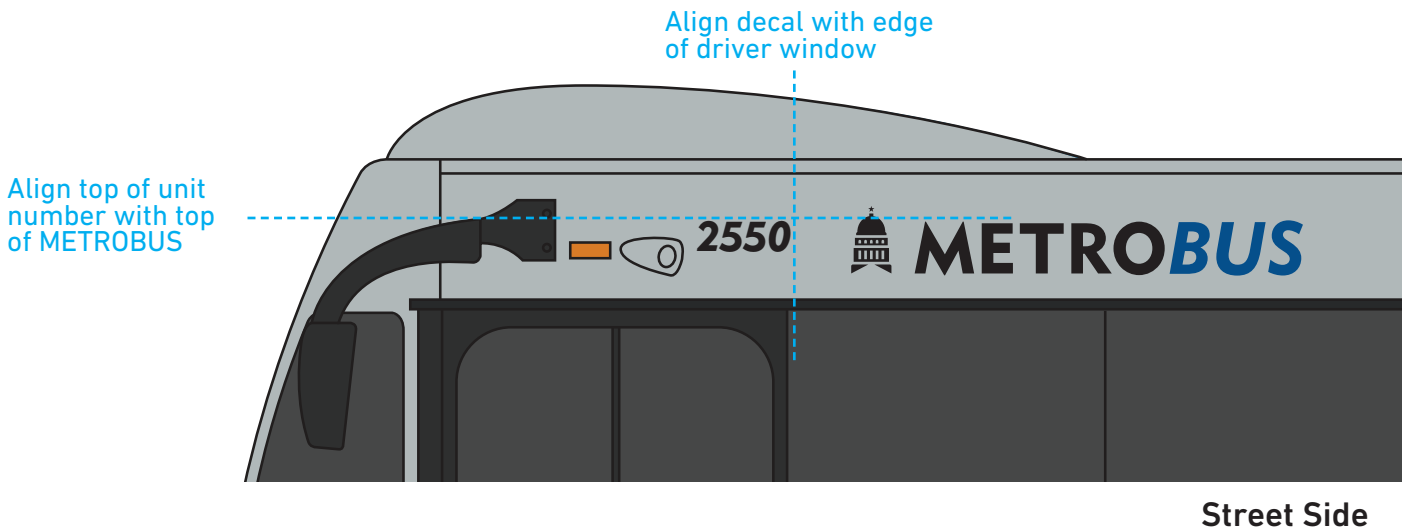
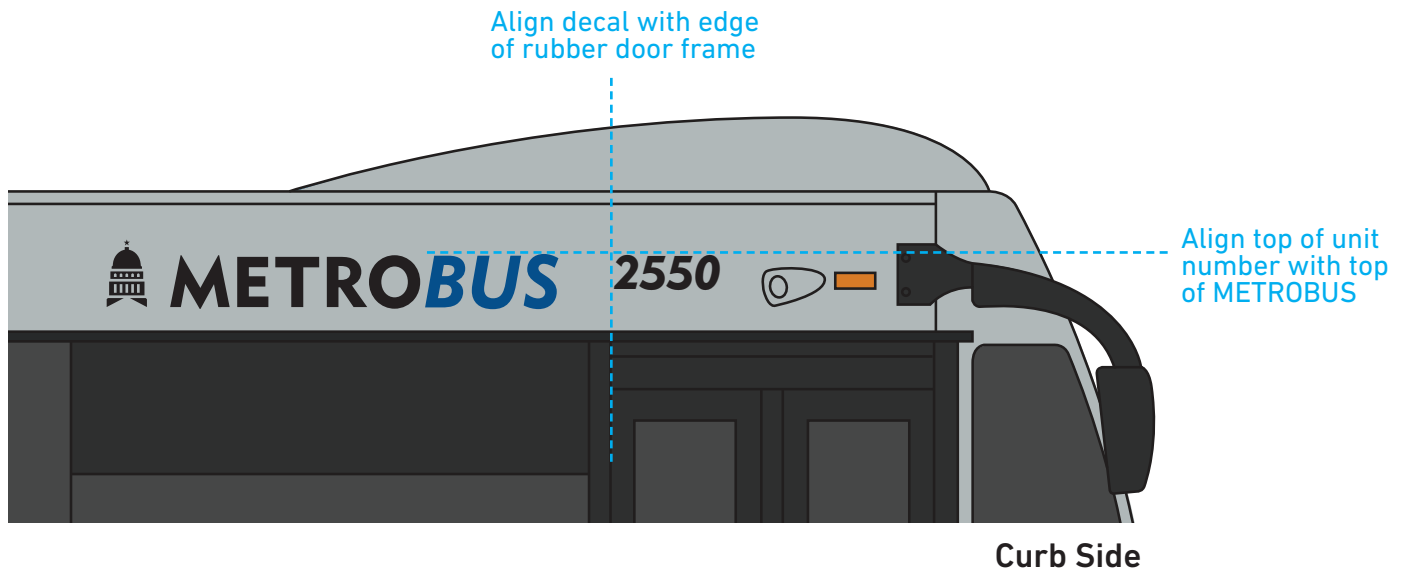
4" h

Qty. 2

Street Side & Curb Side

font: Geometric 415 Black Italic

■ 3M Scotchlite Reflective Black 680-85



# 2550

## Unit Number (Rear Sides)

4" h

Qty. 2

Front Side & Rear Side

font: Geometric 415 Black Italic

3M Scotchlite Reflective White 680-10



Rear Side

# 2550

## Unit Number (Front)

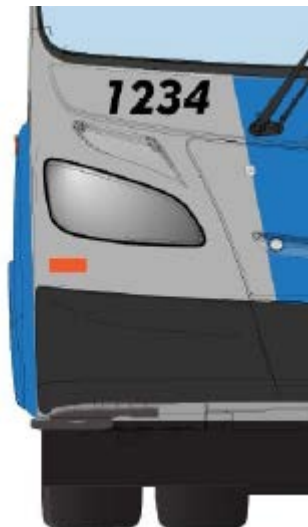
4" h

Qty. 2

Street Side & Curb Side

font: Geometric 415 Black Italic

3M Scotchlite Reflective Black 680-85



Front Side



PSI Decals
2"w x 1"h
Qty. 4
Street Side & Curb Side
Black/White

A PSI decal should be placed above each wheel base.





Rear-View Reflective Amber
6" w x 4" h
Qty. 2
Rear-view mirror housings

Center decal on  
mirror housing

Center decal on  
mirror housing

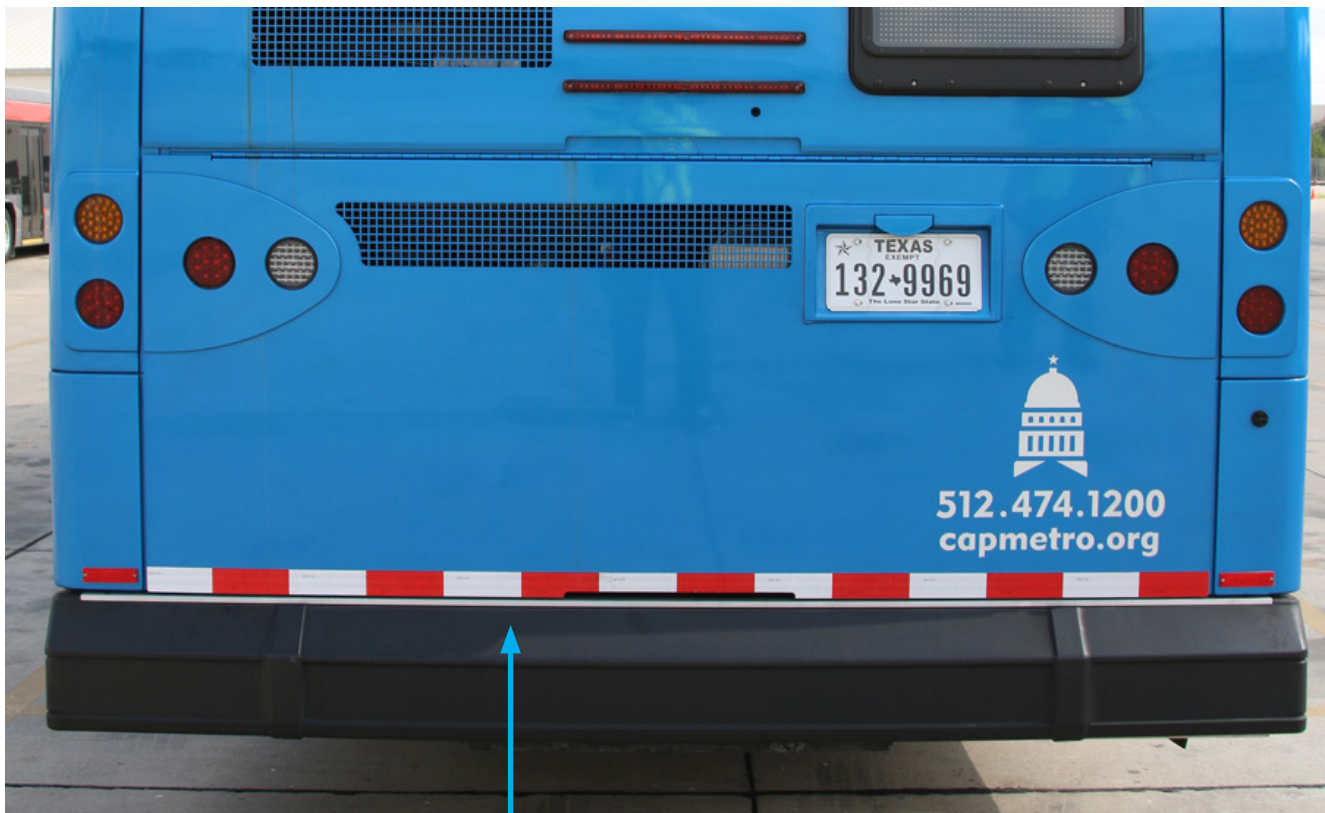


**Safety Tape: DOT Red/White**

84"w x 2"h

Qty. 1

Rear side, bottom of engine compartment



Apply tape below the tail lights,  
across the bottom of engine  
compartment





ADA Statement
17" w x 4" h
Qty. 1
Centered on LCD display unit (curb side)
<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #005596; margin-right: 5px;"></div> PMS 2945c </div>
<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #cccccc; margin-right: 5px;"></div> PMS Cool Gray 1 </div>





## Courtesy Statement

20"w x 8"h

Qty. 1

Utility box, above message center

 PMS 2945c

 PMS Cool Gray 1c




 PMS Cool Gray 6c



 PMS Cool Gray 11c

 PMS Black c

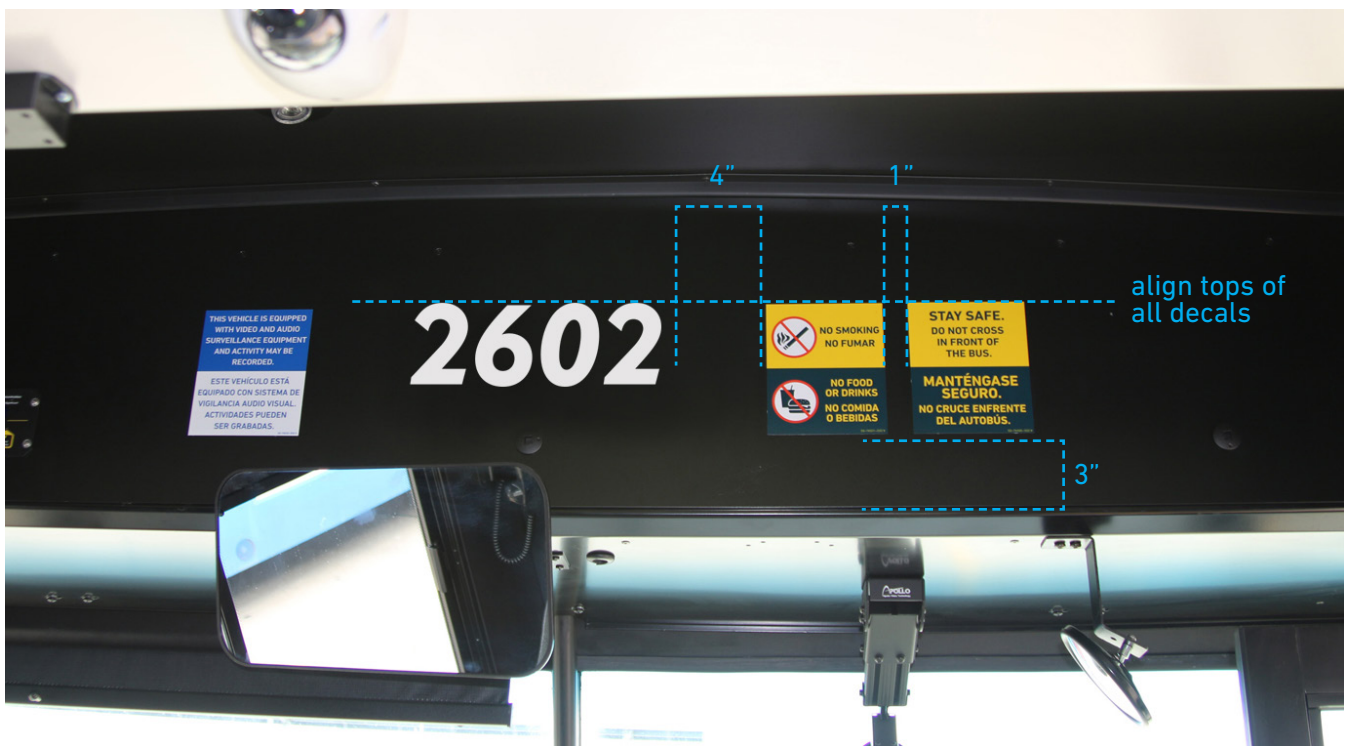




No Smoking/Food	
5"w x 6"h	
Qty. 2	
Front & rear header	
 PMS 116c	
 PMS 548c	
 PMS 485c	

Do Not Cross	
5"w x 6"h	
Qty. 1	
Front header	
 PMS 116c	
 PMS 548c	

## FRONT HEADER



THIS VEHICLE IS EQUIPPED  
WITH VIDEO AND AUDIO  
SURVEILLANCE EQUIPMENT  
AND ACTIVITY MAY BE  
RECORDED.

ESTE VEHÍCULO ESTÁ  
EQUIPADO CON SISTEMA DE  
VIGILANCIA AUDIO VISUAL.  
ACTIVIDADES PUEDEN  
SER GRABADAS.

## Video Surveillance

5"w x 6"h

Qty. 2

Front & rear header

 PMS 2945c

## FRONT HEADER



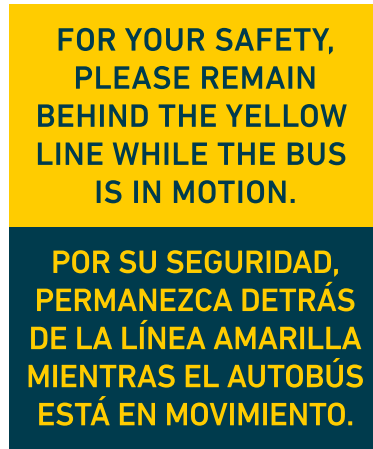
2602



Unit Number (front)
4" h
Qty. 1
Front header
white vinyl

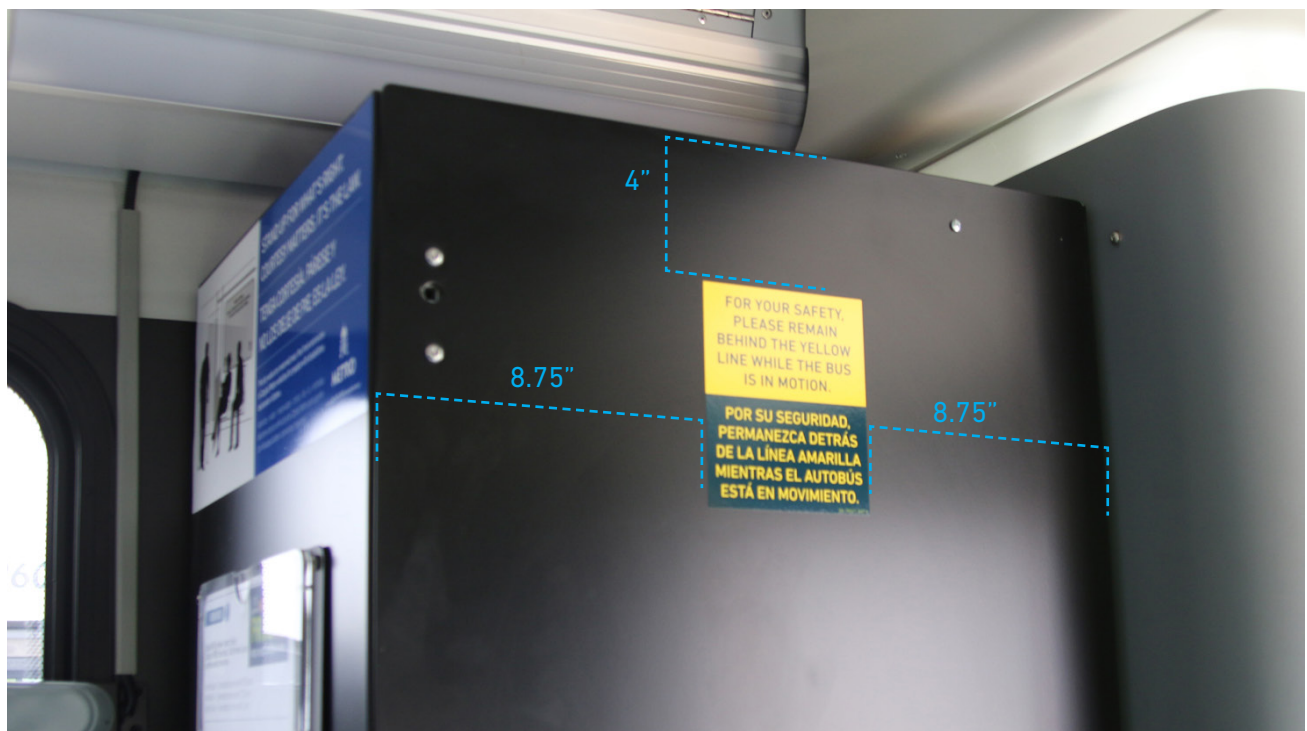
## FRONT HEADER











Stand Behind Yellow Line	
5" w x 6" h	
Qty. 1	
Utility box (aisle-facing)	
 PMS 116c	
 PMS 548c	





Video Surveillance
5"w x 6"h
Qty. 2
Front & rear header
 PMS 2945c

No Smoking/Food
5"w x 6"h
Qty. 2
Front & rear header
 PMS 116c
 PMS 548c
 PMS 485c

## REAR HEADER



# 2602

Unit Number (rear)
4" h
Qty. 1
Rear header
black vinyl



## REAR HEADER







Caution Door (english)	
1"w x 6"h	
Qty. 1	
Rear door	
 PMS 116c	
 PMS 548c	

Caution Door (spanish)	
1"w x 6"h	
Qty. 1	
Rear door	
 PMS 116c	
 PMS 548c	





## Do Not Lean on Door

5"w x 6"h

Qty. 2

Rear doors


 PMS 116c

 PMS 548c

 PMS 485c







Pull to Signal
1.5"w x 1.75"h
Qty. 16
window columns
 PMS 2945c







Watch for PEDS	
1" w x 6" h	
Qty. 1	
A-column beside steering wheel	
	PMS 116c
	PMS 548c

Place decal in this space beside window frame





Watch Your Step	
17" w x 4" h	
Qty. 2	
Operator's step & rear step	
 PMS 116c	
 PMS 548c	

Operator's step




align decal with  
edge of step

Rear step








Wear Lap Belt	
5"w x 6"h	
Qty. 2	
Underneath flip seats	
 PMS 2945c	


Place decal next to signal button

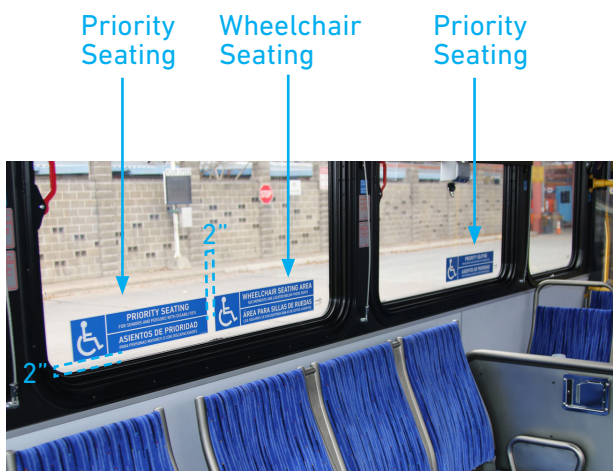




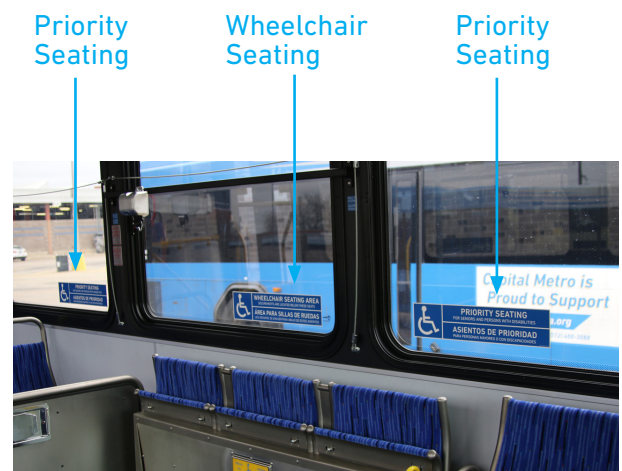
Wheelchair Seating
17"w x 4"h
Qty. 2
curb & street side window
 PMS 2945c



Priority Seating
17"w x 4"h
Qty. 4
curb & street side window
 PMS 2945c



**CURB SIDE**



**STREET SIDE**

**Stanchions:** yellow powder coat on stanchions by doors and grab handle at front by windshield; all other stanchions should be stainless steel

**Modesty panels:** TBD

**Wheel Wells and Driver Barrier:** all black with stainless steel kick panel

**Flooring & Lower Panels:** Altro Transflor - Chroma Capri

**Wall Panels:** Wilsonart Cloud Zephyr #4856-60

**Interior Bulkhead Panels:** Wilsonart Cloud Zephyr #4856-60

**Driver Ceiling:** black

**Passenger Ceiling:** Wilsonart Linen #D427

**Pull cords:** clear



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CHARGERS for BATTERY ELECTRIC BUSES

EXHIBIT F-1B: TECHNICAL SPECIFICATIONS  
CHARGERS for BATTERY ELECTRIC BUSES

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## 1. Overview

### 1.1. Contents

The technical specifications contained herein define requirements for Capital Metropolitan Transportation Authority's heavy-duty, battery electric bus chargers, to include Depot Plug-In Chargers, Depot Overhead Chargers, and On-Route Overhead Chargers to be compatible with both 40-foot and 60-foot bus lengths, including commissioning, training, manuals.

### 1.2. Buy America Requirements

The charger units shall meet Buy America Requirements.

### 1.3. Pricing

Note that because Depot chargers may be configured to connect multiple buses to a single electrical box, the pricing for Depot Plug-In and Depot Overhead Chargers is requested on a per bus price while On-Route Charger pricing is requested on a per charger basis.

### 1.4. Future Proofing

Proposers are invited to include in their proposal any suggested or recommended improvements to the charging equipment, systems or ancillary aspects described in these technical specifications, especially with regard to future proofing the bus charger systems, and the Authority's operations.

## 2. Depot Plug-In Chargers

### 2.1. Depot Plug-In Charger Design Requirements

- a) The depot plug-in charging stations must comply with all applicable local, state, and federal codes.
- b) The chargers shall be capable of connecting to 3-phase, 60-Hz electrical supply at a range of voltages.
- c) Charging system must be able to dispense a rated continuous output of at least 125 kW to 150kW.
- d) Operational power factor shall exceed 95%.
- e) Standby power consumption must be minimized.
- f) The Charging Equipment shall be capable of operating continuously without performance or safety degradations.
- g) The connectors shall not be energized except when mated with the bus mounted receptacle.
- h) Access doors shall be lockable with handle and three-point latching.
- i) Chargers equipped with robust cable management hardware sufficient to store charging cables safely and effectively, regardless of length, while providing operators ease of connection to the bus.
- j) Chargers equipped with local operator panel for automatic or manual operation.
- k) Chargers shall be capable of setting operational limitations on charging.
- l) Chargers shall be self-restarting after loss of power.
- m) Controls shall include features to prevent progressive charging system damage resulting from any one or more operating issues, or out of limit operating conditions.
- n) If electronics enclosures are located outdoors, they must be rated at NEMA 3R or above.
- o) Each charger will include an electrical disconnect switch to facilitate isolation from other chargers in the same bank of chargers.
- p) Charging equipment with multiple dispensers shall be capable of providing power to all connected buses to provide battery and cabin temperature preconditioning.
- q) If multiple dispensers cannot be powered simultaneously, charging equipment provides a means of sequencing among the dispensers during and after charging to provide battery and cabin

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temperature preconditioning as well as to continually restore any charge that may be lost in the bus while the dispenser was unpowered.

- r) Charging equipment is capable of scheduled completion of charges and temperature preconditioning activities where the schedule is settable and changeable by the Authority.

## 2.2. Depot Plug-In Charger Supporting Materials

The Proposers shall provide the following supporting materials with the proposal:

- a) Complete charging equipment specifications for the equipment being proposed.
- b) Provide information and options for power supply requirements for individual chargers.
- c) Provide mounting and installation manuals for all necessary components including civil, electrical, mechanical infrastructure requirements.
- d) The bid package shall contain a complete description of the Charging Equipment including:
  - 1) Compliance with charge standards, electrical safety standards, and UL Classification,
  - 2) Charger efficiency,
  - 3) Charger dimensions,
  - 4) Connector type,
  - 5) Number of connectors,
  - 6) Connector cable length,
  - 7) Electrical disconnect switch for each charger,
  - 8) Charge method (AC or DC),
  - 9) Rated power output,
  - 10) Standby power consumption,
  - 11) Enclosure IP and/or NEMA ratings,
  - 12) Country of origin,
  - 13) A graph showing continuous current output versus voltage throughout the operating range,
  - 14) Details on:
    - Charging instructions,
    - Automatic and manual control capabilities,
    - Maintenance requirements; and
    - Warranty terms.
  - 15) The charger manufacturer shall describe all transit bus models that charger has been validated for and note any exceptions.
  - 16) If the chargers can support multiple dispenser outputs, the Proposer must clearly describe the total number of potential dispenser outputs, the power level for each dispenser, charge sequencing logic for multiple buses connected to the same charger, and any additional charging hardware cost for each dispenser. If separated charging stanchions are available or provided, Proposers shall describe their layout, installation, and operation requirements.
  - 17) The Proposer shall propose a method for control of the charging cycle to manage the use of power from the utility grid for reduction of peak demand charges and general fleet charging management. The proposed solution shall be able to be controlled by an Open Charge Point Protocol (OCPP)-compliant system.
  - 18) Proposers shall describe any automatic or “smart” charging features including programmable charging capability, networking multiple chargers, charge monitoring, remote charge management, vehicle-to-grid capability, and charge data collection and reporting. Describe whether these features are provided as a standard offering or as an option to the proposal

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submission. If certain features are provided as an option clearly describe costs. Describe both upfront costs and any necessary subscription service costs.

- 19) Proposers shall describe the cable management hardware being offered including functionality, specifications, dimensions, drawings, installation requirements, and component replacement costs. If optional cable management systems are available, provide additional details costs for those system(s).

### 3. Depot Overhead Chargers

#### 3.1. Depot Overhead Charger Design Requirements

- a) The depot plug-in charging stations must comply with all applicable local, state, and federal codes.
- b) The chargers shall be capable of connecting to 3-phase, 60-Hz electrical supply at a range of voltages.
- c) Charging system must be able to dispense a rated continuous output of at least 125 kW to 150kW.
- d) The overhead pantograph support structural element shall be designed so that it can attach to horizontal ground as a free-standing structural element.
- e) The Charging Equipment shall be capable of safely and effectively making connection and operating in snow and freezing environmental conditions, without manual intervention.
- f) Each charging interface shall be capable of operating continuously.
- g) To ensure proper bus alignment, charger shall utilize communication links in accordance with SAE J3105 standards to determine bus identity and when bus is in properly aligned for extension of pantograph. Charger must be able to operate in a multi-lane environment safely and effectively, with other pantographs mounted 12 feet away and simultaneous approaching buses.
- h) Rated for wind and seismic loadings as determined ASCE 7, with an importance factor of 1.0, while supporting a retracted or operationally extended pantograph.
- i) Operational power factor shall exceed 95%.
- j) Standby power consumption must be minimized.
- k) The Charging Equipment shall be capable of operating continuously without performance or safety degradations.
- l) The connectors shall not be energized except when mated with the bus mounted receptacle.
- m) Access doors shall be lockable with handle and three-point latching.
- n) Chargers equipped with local operator panel for automatic or manual operation.
- o) Chargers shall be capable of setting operational limitations on charging.
- p) Chargers shall be self-restarting after loss of power.
- q) Controls shall include features to prevent progressive charging system damage resulting from any one or more operating issues, or out of limit operating conditions.
- r) If electronics enclosures are located outdoors, they must be rated at NEMA 3R or above.
- s) Each charger will include an electrical disconnect switch to facilitate isolation from other chargers in the same bank of chargers.
- t) Charging equipment with multiple dispensers shall be capable of providing power to all connected buses so as to provide battery and cabin temperature preconditioning.
- u) If multiple dispensers cannot be powered simultaneously, charging equipment provides a means of sequencing among the dispensers during and after charging to provide battery and cabin temperature preconditioning as well as to continually restore any charge that may be lost in the bus while the dispenser was unpowered.

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- v) Charging equipment is capable of scheduled completion of charges and temperature preconditioning activities where the schedule is settable and changeable by the Authority.

### 3.2. Depot Overhead Charger Supporting Materials

The Proposers shall provide the following supporting materials with the proposal:

- a) Complete charging equipment specifications for the equipment being proposed.
- b) Provide information and options for power supply requirements for individual chargers.
- c) Provide mounting and installation manuals for all necessary components including civil, electrical, mechanical infrastructure requirements.
- d) The bid package shall contain a complete description of the Charging Equipment including:
  - 1) Compliance with charge standards, electrical safety standards, and UL Classification,
  - 2) Charger efficiency,
  - 3) Charger dimensions,
  - 4) Connector type,
  - 5) Rated power output,
  - 6) Standby power consumption,
  - 7) Electrical disconnect switch for each charger,
  - 8) Charge method (AC or DC),
  - 9) Rated power output,
  - 10) Standby power consumption,
  - 11) IP and/or NEMA ratings,
  - 12) Country of origin,
  - 13) A graph showing continuous current output versus voltage throughout the operating range,
  - 14) Details on:
    - Charging instructions,
    - Automatic and manual control capabilities,
    - Electrical disconnect switch description,
    - Maintenance requirements; and
    - Warranty terms.
  - 15) Describe all transit bus models that charger has been validated for and note any exceptions.
  - 16) If the chargers can support multiple dispenser outputs, the Proposer must clearly describe the total number of potential dispenser outputs, the power level for each dispenser, charge sequencing logic for multiple buses connected to the same charger, and any additional charging hardware cost for each dispenser. If separated charging stanchions are available or provided, Proposers shall describe their layout, installation, and operation requirements.
  - 17) The Proposer shall propose a method for control of the charging cycle to manage the use of power from the utility grid for reduction of peak demand charges and general fleet charging management. The proposed solution shall be able to be controlled by an Open Charge Point Protocol (OCPP)-compliant system.
  - 18) Proposers shall describe any automatic or “smart” charging features including programmable charging capability, networking multiple chargers, charge monitoring, remote charge management, vehicle-to-grid capability, and charge data collection and reporting. Describe whether these features are provided as a standard offering or as an option to the proposal submission. If certain features are provided as an option clearly describe costs. Describe both upfront costs and any necessary subscription service costs.

- 19) The Proposer must describe the methods for ensuring that Charging Equipment is capable of safely and effectively making connection and operating in snow and freezing environment.
- 20) The Proposer must describe any bus-side connector requirements or recommendations.
- 21) Proposer must describe software and connectivity options, web tools, APIs, etc. to facilitate data transmission to back offices and remote management of the charger.

## 4. On-Route Overhead Charges

### 4.1. On-Route Overhead Charger Design Requirements

- a) The overhead Conductive charging stations must comply with all applicable local, state, and federal codes.
- b) The chargers shall be capable of connection to 3-phase, 60-Hz electrical supply.
- c) The overhead pantograph support structural element shall be designed so that it can attach to horizontal ground as a free-standing structural element.
- d) Charging system must be able to dispense a rated continuous output of 450 kW or higher.
- e) The Charging Equipment shall be capable of operating continuously without performance or safety degradations.
- f) The Charging Equipment shall be capable of safely and effectively making connection and operating in snow and freezing environmental conditions, without manual intervention.
- g) Each charging interface shall be capable of operating continuously.
- h) To ensure proper bus alignment, charger shall utilize communication links in accordance with SAE J3105 standards to determine bus identity and when bus is in properly aligned for extension of pantograph. Charger must be able to operate in a multi-lane environment safely and effectively with other pantographs mounted 12 feet away and simultaneous approaching buses.
- i) Rated for wind and seismic loadings as determined ASCE 7, with an importance factor of 1.0, while supporting a retracted or operationally extended pantograph.
- j) Operational power factor shall exceed 95%.
- k) Standby power consumption must be minimized.
- l) The connectors shall not be energized except when mated with the bus mounted receptacle.
- m) Access doors shall be lockable with handle and three-point latching.
- n) Chargers equipped with local operator panel for automatic or manual operation.
- o) Chargers capable of setting operational limitations on charging.
- p) Chargers shall be self-restarting after loss of power.
- q) Controls shall include features to prevent progressive charging system damage resulting from any one or more operating issues, or out of limit operating conditions.
- r) If electronics enclosures are located outdoors, they must be rated at NEMA 3R or above.
- s) Each charger will include an electrical disconnect switch to facilitate isolation from other chargers in the same bank of chargers.

### 4.2. On-Route Overhead Charger Supporting Materials

The Proposers shall provide the following supporting materials with the proposal:

- a) Proposer shall provide complete charging equipment specifications for the equipment being proposed.
- b) Proposer shall provide information and options for power supply requirements for individual chargers.
- c) Proposer shall provide mounting and installation manuals for all necessary components including civil, electrical, mechanical infrastructure requirements.
- d) If Proposer has multiple options above the required power level, those options should be clearly described, including costs for each.

- e) The bid package shall contain a complete description of the Charging Equipment including:
- 1) Compliance with charge standards, electrical safety standards, and UL Classification,
  - 2) Charger efficiency,
  - 3) Charger dimensions,
  - 4) Connector type,
  - 5) Rated power output,
  - 6) Standby power consumption,
  - 7) A graph showing continuous current output versus voltage throughout the full operating range,
  - 8) IP and/or NEMA Ratings,
  - 9) Country of origin,
  - 10) Details on:
    - Charging instructions,
    - Automatic and manual control capabilities,
    - Electrical disconnect switch description,
    - Maintenance requirements; and
    - Warranty terms.
  - 11) Charger manufacturer shall describe all transit bus models that charger has been validated for and note any exceptions.
  - 12) The Proposer must describe the methods for ensuring that Charging Equipment is capable of safely and effectively making connection and operating in snow and freezing environment.
  - 13) The Proposer must describe any bus-side connector requirements or recommendations.
  - 14) Proposer must describe software and connectivity options, web tools, APIs, etc. to facilitate data transmission to back offices and remote management of the charger.

## 5. Data Logging and Telematics

### 5.1. Data Logging and Telematics Requirements

- a) Proposer shall provide The Authority access to all data generated by the Chargers at no additional charge for the duration of the Authority's ownership of the Chargers.
- b) Proposer shall provide the Authority sufficient means to fully decode network traffic to engineering units including proprietary protocols or messages.
- c) The Proposer shall provide the Authority with the ability to physically connect to the monitoring system to view, retrieve, and analyze charger data. Proposer shall provide connectors for the Authority's use for the purpose of adding third-party data monitoring equipment. Proposers shall provide diagrams identify the location and pinouts of such connectors. The hardware for data collection and transmission shall be located behind a hinged and lockable panel with connection to the device(s) easily accessible.
- d) Data shall also be made available to the Authority via web tools and/or APIs.
- e) The Proposer shall be capable of providing a management and analytic software platform, or database repository, to monitor, log, track and analyze Charger data.
- f) The system shall be capable of collecting and providing reports to the Authority for the purpose of analyzing charger performance. Data collected and provided shall include but not be limited to energy consumption of the chargers and power output when charging as well as fault and diagnostic codes. The Authority prefers that at least that the following summary reports be readily available and accessible for analytics and diagnostics: All charging sessions, with charger ID, bus ID, timestamp, duration of charge, DC output energy (kWh), AC input energy (kWh), max power output (kW), and idle energy consumption.



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- g) The monitoring system shall have sufficient onboard storage to buffer data during brief loss of connection to the mobile data network.
- h) The Proposer shall provide cloud-based storage for at least one year's worth of collected information.
- i) Proposer shall provide the Authority access to the collected data at no additional charge.
- j) High resolution, high frequency data is preferred. The Authority favors systems that can provide second by second data over systems that only provide aggregated data.
- k) The chargers shall include instrumentation capable of metering and logging data and transmitting it to cloud storage, including but not limited to:
  - Measures and displays kWh consumed and real-time load in kW within 1% accuracy,
  - Records energy (kWh) for both the DC output and AC input,
  - Records fault codes and timestamp
  - Maintains interval data storage in a first-in, first-out format,
  - Data is recorded and stored at 10 second intervals during charging sessions and 15-minute intervals during idle periods.

## 5.2. Data Logging and Telematics Supporting Materials

The Proposers shall provide the following supporting materials with the proposal:

- a) Describe the type, resolution, and frequency of the available data.
- b) Provide information on management and analytic software platform or system used to log, track, and analyze Charger data.
- c) Provide an exemplar of the diagnostic software.
- d) List information that can be readily accessible independently by the Authority.
- e) List items that are tracked for maintenance and preventative maintenance.

## 6. Inspection, Acceptance, and Commissioning

### 6.1. Inspection, Acceptance, and Commissioning Requirements

- a) Inspections will be carried out by the Authority to determine compliance with Requirements that may be beyond the scope of jurisdictional inspections. The Authority, or its identified 3rd party authority, will prepare a punch list as a result of physical inspections, start-up tests, and functional demonstrations. The completion schedule for the punch list will be agreed upon by the Authority and the Proposer.
- b) The Proposer shall provide an acceptance testing and commissioning plan for all supplied equipment that shall include detailed instructions and requirements for testing and commissioning the charging system (i.e., dispensers, power converters, mounting hardware and equipment, and all required wires, cables, and connections). The Proposer shall include in the plan a list of activities to be performed by a third-party vendor during installation that would require technical support and provide details on how the Proposer will provide technical support for these activities.
- c) At the time of acceptance testing and commissioning, Proposer shall submit a written report to the Authority listing all incidents and unusual system performance issues, as well as documenting correct function per the approved commissioning plan. Acceptance testing and commissioning involves ensuring that the charging solution integrates with and charges with a pilot bus or the electric buses being ordered, respectively. In addition, the Proposer must demonstrate the successful operation of any data monitoring and charge management services. The Authority personnel may observe any testing in progress.

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## 6.2. Inspection, Acceptance, and Commissioning Supporting Documents

The Proposers shall provide the following supporting materials with the proposal:

- a) Acceptance Test and Commissioning Plan

## 6.3. Charging System Acceptance Requirements

- a) The charging systems will be considered complete and accepted for ownership by the Authority upon the Authority's issue of notice of Final Acceptance to the Proposer. The Authority's Final Acceptance will be issued immediately upon the Proposer's demonstration to the Authority that the depot charging systems designed, delivered, assembled, and installed/constructed by the Proposer are fully compliant with all Requirements, and all punch list items are complete. Minimum requirements for completion of the charging system are as follows:
  - The design, delivery, assembly, installation of complete and fully functional depot charging systems.
  - Successful completion of all necessary inspections as required by Authority Having Jurisdiction (AHJs) and receipt of all necessary operating approvals as required by AHJs.
  - Proposer to complete acceptance testing. Successful testing of charging system performance by completing the tests outlined below.

## 6.4. Performance Tests

### 6.4.1. Depot Plug-In Charger Performance Test Requirements

The Depot Plug-In Charger performance test requirements include:

- a) At a minimum, the Proposer shall demonstrate five (5) successful charge initiations and a minimum of one (1) hour of continuous bulk charging with the bus on each of the depot chargers. Completely charging a bus to full SOC is preferred.
- b) Commissioning certificate, from the Authority approved commissioning authority.
- c) Demonstrate charging at rated power or maximum power the bus will accept, whichever is lower, for 15 minutes.

### 6.4.2. Depot Overhead Charger Performance Test Requirements

The Depot Overhead Charger performance test requirements include:

- d) At a minimum, the Proposer shall demonstrate twenty (20) successful charge initiations with the bus on each of the overhead conductive chargers.
- e) Commissioning certificate, from the Authority approved commissioning authority.
- f) Demonstrate charging at rated power or maximum power the bus will accept, whichever is lower, for 15 minutes. Completely charging a bus to full SOC is preferred.
- g) The Proposer shall also demonstrate that all combinations of any two concurrent charging operations in the same vicinity successfully initiate and maintain a charge event.

### 6.4.3. On-Route Overhead Chargers Performance Test Requirements

The On-Route Overhead Charger performance test requirements include:

- a) At a minimum, the Proposer shall demonstrate twenty (20) successful charge initiations with the bus on each of the overhead conductive chargers.
- b) Commissioning certificate, from the Authority approved commissioning authority.
- c) Demonstrate charging at rated power or maximum power the bus will accept, whichever is lower, for 15 minutes. Completely charging a bus to full SOC is preferred.
- d) If possible, the Proposer shall also demonstrate that all combinations of any two concurrent charging operations in the same vicinity successfully initiate and maintain a charge event.

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## 6.5. Functional Tests Requirements

### 6.5.1. Noise Measurements.

Tests shall be conducted by the Proposer in the presence of the Authority representatives to ensure airborne noise generated by the depot charging system while operating at full capacity does not exceed 60 dBA when measured 25 feet from charging system equipment in any direction. The Proposer shall also ensure compliance with the exterior noise requirements defined in local laws and ordinances.

### 6.5.2. Emergency Shutdown System.

Tests of manual shutdown devices on the charging systems shall be conducted to determine their effectiveness in accordance with the emergency stop requirements of SAE J1772 or J3015, as applicable. To the extent possible without inflicting damage to charging or bus equipment, all automated emergency stop conditions shall also be simulated to determine their effectiveness in accordance with the emergency stop requirements of SAE J1772 or J3015, as applicable.

### 6.5.3. Remote Monitoring Provisions.

All remote monitoring, control, and data logging functionality shall be verified by the Proposer. Deficiencies shall be recorded and corrected by the Proposer to the satisfaction of the Authority. Punch lists, resulting from these tests shall be addressed and completed to the satisfaction of the Authority.

### 6.5.4. Ancillary Items.

The operation and function of ancillary items of the charging system shall be tested in the presence of the Authority representatives. Deficiencies shall be recorded and corrected by the Proposer to the satisfaction of the Authority. Ancillary items shall include but not be limited to: depot charging system lighting; doors; locks; control panels; switches; and security systems.

Punch lists, resulting from Inspections of charging system carried out by the Authority representatives, are addressed, and completed to the satisfaction of the Authority:

- The Proposer has presented the Authority all required deliverables per the Contract terms – including, but not limited to, product information / verification forms, installation / start-up checklists, functional performance tests, final customer experience report, operator and maintenance manuals, system manuals and diagrams, and parts manuals.
- The Proposer has completed all Contract specified Operational Training.
- The Proposer and the Authority have agreed to a schedule of Maintenance Training to be provided by the Proposer.

## 6.6. Final Commissioning.

For each of the chargers in the charging systems provided, a final commissioning will be completed on the electric buses upon their arrival on the Authority's property. The bus OEM shall coordinate with the charger OEMs to ensure each depot plug-in and overhead fast charger integrates with and charges each bus, as applicable.

## 7. Manuals, Diagrams, Training, and Recommended Spare Parts

### 7.1. Operating Manuals Requirements

- a) Proposer shall provide the Authority with three identically bound sets of operating manuals for the depot plug-in and fast lane overhead charging systems. Operating manuals shall include step-by-step instructions to properly start, utilize, control, and shut down depot charging systems components. The operating manuals shall include instruction in the proper utilization of the depot charging systems and procedures to be observed. The target audience for the operating manuals

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shall be the Authority fleet servicing personnel charged with opening, undertaking, and closing the fleet refueling process.

- b) The Proposer shall also provide the Authority with operating manuals in electronic (PDF) format. The operating manuals in electronic format shall be duplicate in content and organization to the bound sets of operating manuals for the on-route and depot charging systems.
- c) The Authority shall have final approval for content of delivered operating manuals.

#### 7.2. Diagrams Requirements

- a) Proposer shall provide single-line electrical diagrams for the installed charger bank in both PDF and CAD formats. Diagrams shall include (but not limited to) all of the chargers, conductors, switches, and show the connection to primary electrical service.

#### 7.3. Maintenance Manuals Requirements

- a) Proposer shall provide the Authority with three identically bound sets of maintenance manuals for the depot plug-in and fast lane charging systems. Maintenance manuals shall include step by step instructions to properly maintain all depot plug-in and fast lane charging systems and equipment/components. In addition to Process and Instrumentation Drawings (P&ID's) and detailed descriptions of system function and operation, maintenance manuals shall, at minimum, include information on proper trouble shooting steps, system logic, preventive maintenance, and repair procedures for all major components and systems. Maintenance manuals shall include all applicable wiring and logic diagrams.
- b) The target audience for the maintenance manuals shall be the Authority personnel charged with maintenance of the Authority facilities.
- c) The Proposer shall also provide the Authority with maintenance manuals in electronic text-selectable (PDF) format. The maintenance manuals in electronic format shall be duplicate in content and organization to the bound sets of maintenance manuals for the on-route and depot charging systems.
- d) The Authority shall have final approval for content of delivered maintenance manuals.

#### 7.4. Parts Manuals Requirements

- a) Proposer shall provide the Authority with three identically bound sets of parts manuals for the depot charging systems. Parts manuals shall include the P&ID's, graphical parts breakdowns (parts diagrams) and associated parts lists for all major systems, assemblies, components, and subcomponents of the on-route and depot charging systems. The parts diagrams shall be organized and clearly associated with parts lists using unique identifiers. Parts lists shall minimally define serviceable parts by system, assembly, noun name of part, the major component the part relates to, original equipment manufacturer (OEM), the OEM part number, life expectancy (in years or usage), unique part number and quantity per associated assembly.
- b) The Proposer shall also provide the Authority with parts manuals in electronic (PDF) format. The parts manuals in electronic format shall be duplicate in content and organization to the bound sets of parts manuals for the on-route and depot charging systems. Electronic manuals shall be compatible with the Authority's parts catalog documentation software. Manuals shall be text selectable. Parts list and associated parts graphics are preferred to be received in Excel format to facilitate seamless integration or parts lists with the Authority's system and its relational database.
- c) The Authority shall have final approval for the content of delivered parts manuals.

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## 7.5. Training Requirements

- a) Proposer shall provide 40 hours of training for the Authority's maintenance personnel upon initial system installation and for future maintenance of the system. The training plan shall consist of the following details: description of the courses, suggested attendees, course length, and suggested timing.
- b) The Authority reserves the right to modify the proposed training plan to meet the needs of the Authority.
- c) The instructor must be capable of training 10 of the Authority's personnel simultaneously in each course.
- d) The Proposer must provide a one hour bi-annual webinar for new Authority employees and a refresher course within 60 days before expiration of the warranty.
- e) The Proposer shall provide the training syllabus and all training material for review and approval by the Authority Project Manager prior to commencement of training. Proposer shall provide all necessary equipment to facilitate the training. The Authority will specify the time and location for delivery for the on-site training courses at a later date after consulting with the Proposer for availability.
- f) Proposer shall provide training video in video format for future training of Authority personnel.

## 7.6. Recommended Spare Parts List Requirements

- a) The Proposer shall provide the Authority with a list of recommended spare parts for the depot plug-in and fast lane charging systems. Recommended spare parts lists shall, at minimum, define serviceable parts by system, assembly, noun name of part, the major component the part relates to, original equipment manufacturer (OEM), the OEM part number, life expectancy (in years or usage), unit price, unique part number and quantity per associated assembly.
- b) The Proposer shall provide the Authority with a list of recommended spare parts to have on-hand for the first year of maintenance and repair after Final Commissioning.
- c) The Proposer shall also provide the Authority with a list of recommended spare parts for the charging systems in electronic (PDF and Excel) format. The list of recommended spare parts for the charging systems in electronic format shall be duplicate in content and organization to the hard copy of the recommended list of spare parts for the charging systems.

## 8. Updates and Changes

### 8.1. Updates Requirements

For a period of 15 years following the Authority's final acceptance of the charging systems, Proposer shall provide the Authority with all updates to maintenance manuals, parts lists, and procedures for all systems, equipment, or components of the charging system as issued by the Proposer and/or supplier to the Proposer.

### 8.2. System Changes

Changes to chargers, including hardware, software, and firmware, must be coordinated with the Authority to minimize disruptions to service. Additionally, Proposer must provide evidence to the Authority that the change has been successfully tested with the same model of buses provided by the Proposer to The Authority. If this is not possible, Proposer must submit a test plan to the Authority and the Authority must approve the test plan before work to implement the change at the Authority can commence. If initial validation or verification must be done on the Authority equipment, then the upgrades may only be made to a single charging unit and verified for a period of 7-days in service before

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rolling upgrades out to remainder of chargers in the fleet. If upgrades experience any issues during install or the 7-day period, then the chargers must be reverted back to the last working version until the issues are resolved at the factory.

## 9. Warranty

### 9.1. Warranty Requirements

The Proposer shall provide a minimum one (1) year parts and labor warranty, including planned service, on the depot plug-in, depot overhead and on-route overhead charging systems which shall commence upon the date of final acceptance of each charging system as issued by the Authority. Proposers should clearly define all terms of the warranty in their response and include the costs of a one-year warranty in the Cost Proposal. The Proposer is also asked to propose a six-year extended warranty in the pricing section. The proposer is also invited list other available warranty options in the proposal narrative, clearly defining all terms.

### 9.2. Voiding the Warranty

The warranty shall not apply to any depot charging system failure or damage resulting from accident, misuse, or negligence for which the Proposer is not responsible. Normal use shall include conditions prevalent in the normal (day to day) operational and maintenance procedures.

### 9.3. Warranty Repairs

A representative of the OEM of the malfunctioning equipment must be on-site at the Authority's property within 24 hours of receiving notice of a charging system issue from the Authority. The malfunctioning system or component must be properly functioning within 48 hours of receiving notice of a charging system issue from the Authority.

~~If during the warranty period, any replacement, repair, or modification on a charging system component, made necessary by defective design, materials, or workmanship is not completed within 48 hours, the warranty period for the entire charging system shall be extended by the number of days equal to the delay period.~~

## 10. Timeline

### 10.1. Timeline Requirements

Estimated lead time for delivery of the proposed chargers or charging assemblies and estimated lead time for delivery of charging assembly component elements (if available) is requested with the responses to this request.

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EXHIBIT F-1C: ITS FUNCTIONAL MAKE READY TEST

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**CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY  
EXHIBIT F-1C: INTEGRATED SYSTEM FUNCTIONAL MAKE READY TEST**

## 1. Scope

### 1.1. Overview

The Authority expects all add-on vehicle components and systems to be properly integrated and fully functioning at the time of delivery. The Manufacturer shall test and demonstrate to the Authority that each vehicle is fully functional between the time of delivery and as a requirement of the Authority issuing Acceptance. Test failures of the system whether on a single bus, or fleetwide, that are the result of faulty integration and installation shall be repaired by the Manufacturer prior to Acceptance. In case where vehicles must be equipped with the Authority's equipment, such as radio and farebox, the Authority will have these components installed for testing in not more than seven calendar days after delivery. The test scripts shall be provided by the subsystem supplier and may be amended by the Authority.

### 1.2. List of Systems for Testing

The Manufacturer shall demonstrate integration on functionality on the following systems:

- CAD/AVL System
- Two Way Radio
- Cellular Router
- Camera Surveillance System
- Fare Collection and Validation System(s)
- Event Data Recorder
- On Board Telematics
- On Board Digital Display
- Blind-Spot Camera (A-Pillar)
- Rear-facing Automated Wheelchair Securement System
- Pre-wiring for Inertia Camera System
- Pre-wiring for Collision Avoidance System

### 1.3. Example Tests

The following system functional/make ready test details are provided to demonstrate the level of effort necessary to ensure that the systems are properly integrated and fully functioning. Final/updated test procedures will be provided during the pre-build process for each vehicle order. Some systems may change.



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1.3.1. CAD/AVL Test Script

<b>BUS:</b>		<b>Date:</b> _____ <b>Start Time:</b> _____ <b>AM</b> ____ <b>PM</b> ____
<b>Pass</b>	<b>Fail</b>	<b>Vehicle Test Sequence</b>
		<b>Notes/Defect</b>
		Start unit, Start timer, boot-up time >4 min to ready status
		Verify correct Orbstar build when booting - 1.10.0.14 (lower right corner)
		Are the Destination Signs working?
		Note sign codes in ODK, A _____ B _____ PR _____
		Verify IVU Build as - 15.19C and Garage as East5th, if not, STOP Test and report
		Log-in using swipe card
		Did farebox auto-load operator info?
		Did the destination sign code change in ODK?
		Press Setup
		Is WLAN Idle displayed on Orbstar?
		Is GPS OK displayed on Orbstar?
		TIME Second colon has pulse -10:37:50 (SA not active)
		Via WLAN, PING unit for wireless test- 10.unit1
		Press Setup, Goto DIAG, Use code to access
		Verify Correct Unit # and as Type 1
		Verify GPS fixed on min of 6
		Goto APC- if equipped
		Cycle doors, Leave open and walk through each door 1X, Close doors, verify 1 count on each door
		Goto VSINFO
		Verify Orbstar Application Version as 1.2.1.0
		Verify Sign data effective date as : _____
		Goto SYSLOG, Note errors shown
		Goto EQUIP, Scroll down, Note failed systems
		Goto Odometer-(Reading Zero- 0)
		Drive unit around yard loop
		Press Odometer- Note reading displayed, should <u>not</u> be ZERO ODO: _____
		Press HOME
		Did destination signs change after yard point?
		Was there an internal announcement at yard point?
		Open front door for external announcement
		Close all doors
		Pull or press passenger stop request, listen for announcement and internal sign change to STOP requested
		Open Front door, then close
		Press W/C Stop request, listen for announcement and internal sign change displays LIFT requested
		Operate PA microphone, listen for internal and external voice
		Call radio control via HANDHELD on _____
		Call radio control via RTT on Orbstar "RTT Received"
		Radio Control should open speaker calling bus.
		Reply to Radio Control verifying operation of voice in handset
		Radio sends a CAN message to acknowledge
		Acknowledge as needed
		Press Setup, Goto DIAG, Use code to access
		Goto SYSLOG, Note errors shown
		Goto EQUIP, Scroll down, Note failed systems
		Log-out of system
		Did the system reboot/restart while observing or testing, YES? Fail
<b>PASS</b>	<b>FAIL</b>	<b>Technician</b>
		<b>Report and submit form to Supervisor for review</b>

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1.3.2. Farebox Test Script

TICKET DESCRIPTION						GFI FAREBOX				
#	Ticket or Cash	Sale Price	(Days)	Uses	Valid Service Levels (Events)	CASH	TRIM	SWIPE	CARD	BACK
<b>Local</b>										
1	Local Single Ride	\$1.00	1 ride	1 Time	Local	N/A	FAIL	FAIL	N/A	N/A
2	Local Day Pass	\$2.00	1	Unlimited	Local	N/A	FAIL	FAIL	N/A	N/A
3	Local 7-Day Pass	\$9.00	7	Unlimited	Local	N/A	FAIL	FAIL	N/A	N/A
4	Local 31-Day Pass	\$31.00	31	Unlimited	Local	N/A	FAIL	FAIL	N/A	N/A
5	Local Day Pass Reduced	\$1.00	1	Unlimited	Local	N/A	FAIL	FAIL	N/A	N/A
6	Local 31-Day Pass Reduced	\$16.50	31	Unlimited	Local	N/A	FAIL	FAIL	N/A	N/A
<b>Premium</b>										
7	only used)	\$1.50	1 ride	1 Time	Local, Premium	N/A	\$1.50	N/A	N/A	FAIL
8	Premium Day Pass	\$3.00	1	Unlimited	Local, Premium	N/A	\$3.00	N/A	N/A	FAIL
9	Premium 7-Day Pass	\$12.50	7	Unlimited	Local, Premium	N/A	\$3.00	N/A	N/A	FAIL
10	Premium 31-Day Pass	\$49.50	31	Unlimited	Local, Premium	N/A	\$3.00	N/A	N/A	FAIL
11	Premium Day Pass Reduced	\$1.50	1	Unlimited	Local, Premium	N/A	\$1.50	N/A	N/A	FAIL
	coins only used)	\$0.75	1	Unlimited	Local, Premium	N/A	\$1.50	N/A	N/A	FAIL
12	Premium 31-Day Pass Reduced	\$24.75	31	Unlimited	Local, Premium	N/A	\$1.50	N/A	N/A	FAIL
<b>Commuter</b>										
13	Commuter Single Ride (Cash)	\$2.75	1 ride	1 Time	Local, Premium, Commuter	N/A				
14	Commuter Day Pass	\$5.50	1	Unlimited	Local, Premium, Commuter	N/A				
15	Commuter 7-Day Pass	\$22.00	7	Unlimited	Local, Premium, Commuter	N/A				
16	Commuter 31-Day Pass	\$77.00	31	Unlimited	Local, Premium, Commuter	N/A				
17	Commuter Day Pass Reduced	\$2.75	1	Unlimited	Local, Premium, Commuter	N/A				
18	Commuter 31-Day Pass Reduced	\$38.50	31	Unlimited	Local, Premium, Commuter	N/A				
<b>Access</b>										
19	Access Monthly Pass	\$40.00	Month	Unlimited	Local, Premium, Commuter, Access	N/A				
<b>Pass ID's</b>										
20	2-Year Disability		2 Years	Unlimited	Local, Premium, Commuter, Access	N/A				
21	90-Day Disability		90 Days	Unlimited	Local, Premium, Commuter, Access	N/A				
22	2-Year Senior		2 Years	Unlimited	Local, Premium, Commuter, Access	N/A				
23	2-Year Medicare		2 Years	Unlimited	Local, Premium, Commuter, Access	N/A				
24	2-Year Access		2 Years	Unlimited	Local, Premium, Commuter, Access	N/A				
25	#NAME?		2 Years	Unlimited	Local, Premium, Commuter, Access	N/A				
<b>Business Passes</b>										
26	1-Year Business COA Pass		1 Year	Unlimited	Local, Premium, Commuter, Access	N/A	N/A	N/A	N/A	N/A
27	1-Year Business ACC Pass		1 Year	Unlimited	Local, Premium, Commuter, Access	N/A	N/A	N/A	N/A	N/A
28	Pass		1 Year	Unlimited	Local, Premium, Commuter	N/A	N/A	N/A	N/A	N/A
29	UT ID		Unlimited	Unlimited	Local, Premium, Commuter	N/A	N/A	N/A	N/A	N/A
<b>CASH</b>										
30	Local Day Pass					ticket is	N/A	N/A	N/A	
31	Local Day Pass Reduced					ticket is	N/A	N/A	N/A	

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## 1. Quality Assurance

### 1.1. Quality Assurance Organization

The Manufacturer shall have an established in-plant quality assurance organization specifically and directly responsible to the Manufacturer's top management.

The Manufacturer, the Manufacturer's manufacturing plant and organization shall be certified to the appropriate QS-9000/ISO 9000 series of standards. The Authority requests that the proposal include details on their respective Program and Certification meeting the QS-9000/ISO 9000 series of standards.

#### 1.1.1. Control

The Manufacturer's quality assurance organization must be capable of exercising quality control over all bases of production from initiation of design through manufacture and preparation for delivery. The organization must also control the quality of supplied articles.

#### 1.1.2. Authority and Responsibility

The Manufacturer's quality assurance organization must have the authority and responsibility for quality control, inspection, establishment of the quality control system, acceptance/rejection of materials, and manufactured articles in the production of the transit buses.

### 1.2. Quality Assurance Organization Functions

#### 1.2.1. Verify Instructions

The quality assurance organization must verify that the manufactured product meets all prescribed requirements.

#### 1.2.2. Records Maintenance

The quality assurance organization shall maintain and use records and data essential to the effective operation of its program. These records and data shall be available for review by Capital Metro's Resident Inspectors. Inspection and test records for this procurement shall be available for a minimum of three (3) years after inspections and tests are completed.

#### 1.2.3. Corrective Actions

The quality assurance organization shall detect and promptly assure correction of any conditions that may result in the production of defective transit buses. These conditions may occur in designs, purchases, manufacture, tests, or operations that culminate in defective supplies, series, facilities, technical data, or standards.

#### 1.2.4. Configuration Control

The Manufacturer shall maintain drawings and other documentation that completely describe a qualified bus that meets all of the options and special requirements of this procurement. The quality assurance organization shall verify that each transit bus is manufactured in accordance with these controlled drawings and documentation.

#### 1.2.5. Measuring and Testing Facilities

The Manufacturer shall provide and maintain the necessary instruments, other measuring and testing devices for use by the quality assurance organization to verify that the bus conforms to all specification

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requirements. These devices shall be calibrated at established periods against certified measurement standards that have known valid relationships to national standards.

**1.2.6. Production Tooling as Media of Inspection**

When production jigs, fixtures, tooling masters, templates, patterns, and other devices are used as media of inspection, they shall be certified for accuracy at formally established intervals and adjusted, replaced, or repaired as required to maintain quality.

**1.2.7. Equipment Used by Resident Inspectors**

The Manufacturer's gauges and other measuring and testing devices shall be made available for use by the Authority's Resident Inspectors to verify that the buses confirm to all specification requirements. If necessary, the Manufacturer's personnel shall be made available to operate the devices and to verify their condition and accuracy.

**1.3. Control of Purchases**

The Manufacturer shall maintain quality control of purchases.

**1.3.1. Supplier Control**

The Manufacturer shall require that each supplier maintains a quality control program for the services and supplies that it provides. The Manufacturer's quality assurance organization shall inspect and test materials provided by suppliers for conformance to specification requirements. Materials that have been inspected, tested, and approved must be identified as acceptable to the point of use in the manufacturing or assembly processes. Controls must be established to prevent inadvertent use of non-conforming materials.

**1.3.2. Purchasing Data**

The Manufacturer shall verify that all applicable specification requirements are properly included or referenced in purchase orders of articles to be used on transit buses.

**1.4. Manufacturing Control**

The Manufacturer shall ensure that all basic production operations, as well as all manufacturing processes are performed under controlled conditions. Establishment of these controlled conditions shall be based on the documented work instruction, adequate production equipment, and special work environments if necessary.

**1.4.1. Completed Items**

A system for final inspection and testing of completed transit buses shall be provided by the quality assurance organization. It shall measure the overall quality of each completed bus.

**1.4.2. Nonconforming Materials**

The Authority's Project Manager and Resident Inspector will monitor the Manufacturer's system for control of nonconforming materials. The system shall include procedures for identification, segregation, and disposition.

**1.4.3. Statistical Techniques**

Statistical analyses, tests, and other quality control procedures shall be used when appropriate in the quality assurance processes.

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**1.4.4. Inspection Status**

A system shall be maintained by the quality assurance organization for identifying the inspection status of components and completed transit buses. Identification may include cards, tags, or other normal quality control devices.

**1.5. Inspection System**

The Manufacturer's quality assurance organization will establish, maintain, and periodically audit a fully documented inspection system. The system must prescribe inception and test of materials, work in progress, and completed articles. As a minimum, it must include the following controls.

**1.5.1. Inspection Stations**

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

Stations shall also be at the best location 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 and insulation installation, engine installation completion, underbody dress-up and completion, bus prior to final paint touch-up, bus prior to road test, and bus final road test completion.

**1.5.2. Inspection Personnel**

Sufficient trained inspectors shall be used to ensure that all materials, components, and assemblies are inspected for conformance with the qualified bus design.

**1.5.3. Inspection Records**

Acceptance, rework, or rejection identification shall be attached to inspected articles. Articles that have been accepted as a result of approved materials review actions shall be identified. Articles that have been reworked to specified drawing configuration shall not require special identification. Articles rejected as unsuitable or scrap shall be plainly marked and controlled to prevent installation on the bus. Articles that become obsolete as a result of engineering changes or other actions shall be controlled to prevent unauthorized assembly or installation. Unusable articles shall be isolated and then scrapped.

Discrepancies noted by the Manufacturer or the Authority's Resident Inspector during assembly shall be entered by the inspection personnel on a record that accompanies the major components, subassembly, 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 causes articles to be out of compliance with the requirement 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, the Authority will approve the modification, repair, or method of correction to the extent that the contract specifications are affected.

**1.5.4. Quality Assurance Audits**

The Manufacturer's quality assurance organization shall establish and maintain a quality control audit program. Records of this program shall be subject to review by the Authority.

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**1.6. Resident Inspector**

The Authority will be represented at the Manufacturer's plant by its own Resident Inspectors or Inspectors under contract to the Authority or a combination of both. They will monitor the manufacture of transit buses built under the contract and shall be authorized to approve the pre-delivery acceptance tests to release the buses for delivery. Upon request to the Manufacturer's quality assurance supervisor, the Authority's Resident Inspectors will be provided access to the Manufacturer's quality assurance supervisor and Manufacturer's quality assurance files related to this procurement. These files must include drawings, material standards, parts lists, inspection processing and reports, and records of defects. The Authority's Resident Inspectors will conduct source inspections for improved control of purchases from suppliers.

No less than 30 days prior to the beginning of bus manufacture, the Resident Inspectors will meet with the Manufacturer's quality assurance manager to review inspection procedures and checklists. The Resident Inspectors may begin monitoring bus construction activities 2 weeks prior to the start of bus fabrication.

The Manufacturer 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 cabinet, chairs, and clothing lockers sufficient to accommodate the Resident Inspector staff.

The presence of these Resident Inspectors in the plant does not relieve the Manufacturer of its responsibility to meet all the requirements of this specification.

**1.7. Acceptance Tests**

**1.7.1. Responsibility**

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

**1.7.2. Pre-Delivery**

The Manufacturer shall conduct acceptance tests at its plant on each bus following completion of manufacture and prior to delivery to the Authority. These pre-delivery tests shall include visual and structural inspections, as well as testing the total bus operation. The tests must be conducted on total bus operation. The tests shall be conducted and documented in accordance with written tests plans. Additional tests may be conducted at the Manufacturer's discretion to ensure that the completed buses have attained the desired quality and have met the requirements in the Technical Specifications. This additional testing must be recorded on appropriate test forms provided by the Manufacturer. Pre-delivery tests shall be scheduled and conducted with sufficient 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 test, shall be filed with the assembly inspection records for each bus. The underfloor equipment shall be made available for inspection by the Resident Inspectors, using a pit or bus hoist provided by the Manufacturer. A hoist, scaffold, or elevated platform shall be provided by the Manufacturer to easily and safely inspect bus roofs. Delivery of each bus must require written authorization of a Capital Metro Resident Inspector. Authorization forms for the release of each bus for delivery shall be provided by the Manufacturer. An executed copy of the authorization shall accompany



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the delivery of each bus. Failure to provide adequate inspection facilities for resident inspectors will result in non-shipment of buses from the production plant without relief from liquidated damages.

**1.7.3. Post-Delivery**

After delivery, each vehicle will be thoroughly inspected by the Authority. After delivery, the Manufacturer shall test each add-on integrated system to demonstrate to the Authority that each vehicle is fully functional. Test failures of the system whether on a single bus, or fleetwide, that are the result faulty integration and installation shall be repaired by the Manufacturer prior to Acceptance. In case where vehicle testing requires installation of equipment by the Authority's equipment, such as radio and farebox, the Authority will have these components installed in not more than seven calendar days after delivery. The test scripts shall be provided by the subsystem supplier and may be amended by the Authority. Refer to Exhibit F-1C Integrated System Functionality Make Ready Test.

**1.8. Chassis Inspection**

**1.8.1. Inspection - Visual and Measured**

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

**1.8.2. Total Bus Operation**

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

Each bus shall be driven for a minimum of 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 meet pass/fail criteria in accordance with this technical specification.

**1.9. Post Delivery Tests**

The Authority will conduct acceptance tests on each delivered bus. These tests will be complete within 15 days after bus delivery and will be conducted in accordance with Manufacturer's written tests plans approved by the Authority. The purpose of these tests is to identify defects that have become apparent between the time of bus release and delivery to the Authority. The post-delivery tests will include visual inspection and bus operation.

Failure to pass first article air conditioning tests in the Authority location will constitute non-acceptance of all buses delivered and no other buses will be accepted by the Authority until corrective measures have been taken by the Manufacturer.

**1.9.1. Water Test**

Windows, escape hatches, doors, etc. are subject to an approved water test to be conducted at the manufacturers facility by the manufacturer and shall be observed by the Authority's Resident Inspector(s). Water testing may be verified by further testing at the Authority's Maintenance Facility prior to the acceptance of each vehicle if test observation or verification of leak repair is missed on or not observed by the Resident Inspector on any bus built for Capital Metro. Any bus that fails to pass the

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water test shall be corrected by the Manufacturer. The retest/corrective repair cycle shall repeat until the leak(s) have been eliminated to the Authority's satisfaction.

**1.9.2. Water Test Description**

The roof, roof hatches, front cap, rear cap, sidewalls, passenger windows, driver's windows, destination sign windows, windshields, wheel wells and all doors of all coaches shall be water tested prior to the delivery of each unit to the Authority as follows:

The water test shall consist of a series of nozzles which are strategically located around the perimeter of the vehicle to spray water over the entire surface of the vehicle.

The nozzles shall eject a volume of water no less than 2.6 gallons per minute per nozzle under a pressure of no less than 22 lbs. per minute measured at the nozzle tip.

The Manufacturer shall be required to water test each vehicle under the conditions described above for no less than (10) ten minutes in order to determine whether or not there are any body leaks at the window areas, door areas, roof panels etc.

Manufacturer shall take the necessary steps of corrective action to repair any leaks found as a result of the described test and shall retest to ensure that corrective steps have been successful. Documentation of each bus shall be kept by the manufacturer as to the location of the leak, what caused the leak to occur and shall describe the repair action taken to prevent the leak from reoccurring.

If the Manufacturer's bus manufacturing process water test differs from the water test process and criteria described above, then any deviations must be approved by the Authority's Project Manager.

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EXHIBIT F-3: TRAINING and MANUALS

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## 1. Training and Manuals

### 1.1. Training

The Manufacturer shall provide with each bus order, up to 80 hours of “train-the-trainer” vehicle orientation to the Authority’s maintenance and operations trainers, street supervisor’s, and dispatchers.

Additionally, the Manufacturer shall submit optional pricing for additional training as required in Exhibit A. The Authority may exercise up to 800 total instructor hours divided into ten (10) eighty-hour durations with consecutive two (2) work weeks of instructor time at the Authority’s facility.

The training and orientation shall take place at the Authority's two (2) locations and three (3) shifts of operation.

Sixty (60) days before the scheduled delivery date of the first bus in each order, schedules and lesson plans shall be provided for the Authority's approval for both Maintenance and Transportation training programs. As part of the lesson plan, the Manufacturer shall include name of the instructor. Utilization of vendor presenters is encouraged and supported by the Authority. The Manufacturer is responsible for scheduling and costs of vendor presenters. As part of the training schedule, Manufacturer shall also inform the Authority of any equipment needed to make the presentation, such as audio visual equipment, blackboards, wipe boards, flip charts, overhead or slide projectors. All training curricula shall become property of the Authority.

The Authority reserves the right to negotiate training requirements up to and including how the required hours are distributed. Adjustments in training hours and how those hours are used shall remain flexible to the property as determined by the Authority’s Training Department.

#### 1.1.1. Vehicle Maintenance Training

The Manufacturer shall provide a complete training and instruction program for the Authority to choose from for its designated mechanics and service personnel to attend should additional training options be exercised. The training program shall cover preventative maintenance, trouble shooting and repair of the buses that the Manufacturer will be providing to the Authority. The instruction program shall be in self-contained modules, or subject areas and to include hands-on trouble shooting. Exact schedules will be determined by the Authority's training personnel. The Authority will limit the number of maintenance personnel in each class to twelve (12) or less so that the class size will be manageable.

The Maintenance training and instruction program shall cover (but not be limited to) the following areas:

- A. Orientation
- B. Propulsion System
- C. Electrical Storage System
- D. Charging System
- E. Air Conditioning
- F. Doors
- G. Brakes
- H. Air Systems
- I. Suspension, Steering, & Axles
- J. Body

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- K. Parts
- L. Service Instruction
- M. Ramp Equipment
- N. Towing and Lifting
- O. Fire Detection System

Manufacturer shall inform the Authority of any special equipment that requires training before the bus is put into revenue service.

**1.1.2. Operator Training**

The Manufacturer shall provide complete training and instruction for the Authority's designated Bus Operator Instructors, Street Supervisors and Dispatchers. The Manufacturer shall train up to twelve (12) individuals. Each trainee will be given an opportunity to operate the bus with the Manufacturer's instructor on board.

The program shall include, but not be limited to, the following:

- A. Introduction
  - Special features of bus
- B. Operator Compartment
  - Controls and Switches
  - Warning Indicators
  - Seat Adjustment
  - Door Control
  - Emergency Systems
- C. Walk Around Inspection
  - Compartment-by-Compartment Explanation
  - Mirror Adjustments
  - Climate Control
- D. Driving Instruction
  - Turns
  - Braking
  - Transmission
  - Backing
- E. Wheelchair Ramp and Securement Equipment
  - Controls
  - Safety
  - Emergency Procedures
  - Securing Wheelchairs and Riders
  - Loading and Unloading

**1.1.3. Training Program Aids**

The individuals, to allow them to retain and remember salient areas of training and instruction modules, will be able to keep instructional material. The Manufacturer shall write all instructional material in clear, simple English, with literacy skills at 6th grade reading level.

The Authority reserves the right to duplicate, at its expense, all films, slides, view graphs, tapes and handouts for its sole use in follow-up reinforcement training at the option of the Authority's Training

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Division. Further, the Authority reserves the right to videotape and/or audio tape all Manufacturer and vendor presentations for its sole use without further costs, obligation or liability to the Authority.

**1.1.4. Training Facilities**

All training will be conducted at the Authority's facilities or facilities secured by the Authority. The Manufacturer shall inform the Authority in the lesson plans of any special facilities needed.

**1.1.5. Training Instructors**

All training instructors shall be competent to teach the course area they are instructing. Further, all instructors shall speak English and have a complete understanding of the English language. If the instructor or vendor presenter lacks the skill or knowledge to provide instruction, or cannot communicate with the students, the Authority reserves the right to request that the instructor be replaced and the area of training be repeated.

**1.2. Manuals**

**1.2.1. Manuals Requirements**

The Manufacturer shall provide the following manuals, with each order of buses:

- One (1) complete set of Operator, Maintenance, and Parts Manuals (in draft format) shall be submitted to the Authority's Project Manager for review and approval, at least six weeks prior to delivery of the first bus. This draft version must contain the Preventive Maintenance Patterns for the bus the Manufacturer is Delivering to the Authority. Electronic download is an acceptable format.
- One (1) complete set of any component or subsystem manuals shall be submitted to the Authority's Project Manager for review and approval, at least six weeks prior to delivery of the first bus. Electronic download is an acceptable format.
- One (1) complete set of Maintenance and Parts Manuals (final version) shall be submitted with the delivery of the second bus. Electronic download is an acceptable format.
- Five (5) complete sets of Air and Electrical Schematics (final version) shall be submitted with the delivery of the second bus. The Wiring Diagrams shall be bound and on large format paper.
- One (1) Operator Manual, per bus, (final version), printed and bound shall be supplied prior to, or at the time of delivery of the buses. The Manufacturer shall also make the Operator Manual available by electron download.

**1.2.2. Standard and Format of Manuals**

The manuals shall meet the standards and be presented in accordance with the format requirements of this Exhibit. The material in all manuals shall be organized and indexed with a standard numbering system in accordance with an approved Manufacturer's outline. Each respective manual shall contain the same number of chapters and each chapter shall cover the same topics. The format of all data contained in each section shall be consistent from section to section. The manuals shall be logically organized with systems and elements considered in descending order of importance. Care shall be taken that all statements are clear, positive and accurate, with no possibility of an incorrect interpretation. The manuals shall be complete, modern and authentic with no extraneous material such as advertisements or irrelevant information. Manuals shall describe the baseline buses. Additional sections shall be added at end of each manual, detailing the differences in each subgroup delivered.

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Operator printed and bound manuals shall be a minimum of 4-1/4 inches wide, 7 inches high, and not more than 1 1/4 inch thick. They shall be bound along the 4 1/4 inch dimension and the pages therein shall be as large as can be accommodated without damage.

All manuals shall be designed for continuous, long-term service. Binder covers shall be resistant to oil, moisture and wear commensurate with their intended use.

Any manuals not meeting the requirements shall be subject to approval by the Authority.

**1.2.3. Maintenance Manuals**

Maintenance manuals shall contain complete data required for routine and periodic maintenance of all parts of the bus, including but not limited to the following:

- A. General operation description
- B. Trouble-shooting guide covering all mechanical, electrical, and electronic components.
- C. Preventive maintenance plan, including detailed schedule of routine maintenance, inspections, lubrication, and adjustment requirements.
- D. Wiring and schematic diagrams and schedules for wire and cable size and ratings, plus locations in the bus, of electrical and electronic components, including propulsion and Energy Storage System components.
- E. Air and hydraulic system diagrams showing locations in the bus of the air and hydraulic components.
- F. Detailed, illustrated procedures for all component change-out and rebuilding, plus servicing, adjusting, testing, and run-in information.
- G. Body and structural information and material specifications for major accident repairs.

**1.2.4. Operator's Manuals**

The operator's manual shall provide information and instructions for all phases of operation of the bus, including but not limited to bus mechanical operation, response to safety alarm systems, lighting system controls, emergency actions, maintenance checks, and turning characteristics of the bus.

**1.2.5. Parts Manuals**

The parts manual shall enumerate and describe every component with its related parts including the Manufacturer's and supplier's part number. Cutaway and exploded drawings shall be used to permit identification of all parts. The drawings shall contain data arranged so that the part numbers can be readily found and identified in the drawing for each system and subsystem component, assembly, subassembly, or piece part, from an orderly breakdown of the complete bus. They shall be indexed by part number and by part name and shall be sufficiently well illustrated to identify items requiring repair, replacement, and storage for use in the maintenance of buses. Isometric exploded views shall be used to identify each piece part.

**1.2.6. Spare Parts**

The Manufacturer shall furnish a recommended spare parts list that includes the Manufacturer's part number, the component supplier's part number, description and estimated annual usage for the quality of buses specified in the contract, along with current pricing at the time of list release. Electronic download is an acceptable format.

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Upon request, the Manufacturer shall provide the manufacturer information and part numbers to meet parts availability.

The Manufacturer shall guarantee the availability of replacement parts for the buses for at least a twelve (12) year period after date of acceptance of buses.

The Manufacturer agrees to give the Authority written permission to purchase direct from the manufacturer(s) any parts or sub-assemblies used in the manufacturing of the buses delivered in accordance with the contract. This right shall include all exclusive agreements that the Manufacturer may have with manufacturers for the exclusive purchase and re-sell of said parts.

**1.2.7. Revisions**

Following the publication of each manual required herein, the Manufacturer shall provide revisions covering any changes, whether required by change of design or procedures or due to error, and these revisions shall be kept current during the warranty period. Manual revisions shall be furnished to the Authority before or coincidental with the arrival of any altered parts or components. Revisions shall be furnished as they occur until the bus is twelve (12) years old.

It shall be the responsibility of the Manufacturer to require its component suppliers to make revisions to their manuals and furnish the revisions to the Authority.

**1.2.8. Service Bulletins, Recall Notices and Field Service Updates**

All bulletins, recall notices and/or field service updates previously issued for the bus model that are applicable shall be provided to the Authority or incorporated into the Maintenance Manuals delivered to the Authority. The Manufacturer shall provide the Authority with all updates as they occur throughout the ownership period of (12) years. Copies shall be sent to designated Quality Assurance Staff and/or Vehicle Maintenance Staff.



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**EXHIBIT F-4 – REVISED-1: WARRANTY PROVISIONS**

EXHIBIT F-4: WARRANTY PROVISIONS

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## 1. Warranty Requirements

### 1.1. Contractor Warranty

Warranties in this document are in addition to any statutory remedies or warranties imposed on the Contractor. Consistent with this requirement, the Contractor warrants and guarantees to the Authority each complete bus and specific subsystems and components as follows. Performance requirements based on design criteria shall not be deemed a warranty item.

#### 1.1.1. Complete Bus

The complete bus, propulsion system, components, major subsystems and body and chassis structure are warranted to be free from Defects and Related Defects for one year or 50,000 miles, whichever comes first, beginning on the date of acceptance of the bus. The warranty is based on regular operation of the bus under the operating conditions prevailing in the Authority's locale.

#### 1.1.2. Body and Chassis Structure

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

Primary load-carrying members of the bus structure, including structural elements of the suspension, are warranted against corrosion failure and/or fatigue failure for a period of 12 years or 500,000 miles, whichever comes first.

#### 1.1.3. Propulsion System

Propulsion system components, including the traction motor(s), traction motor controller(s), transmission, drive motors, drive and non-drive axles, and any other propulsion system-related line replacement components, shall be warranted to be free from Defects and Related Defects for the standard 2 years or 100,000 miles ~~12 years or 500,000 miles~~, whichever comes first.

#### 1.1.4. Energy Storage System

The energy storage system (ESS), including the traction battery, battery management system and any other ESS-related line replacement component, shall be warranted to be free from Defects and Related Defects for six years or 300,000 miles, whichever comes first, beginning on the date of bus acceptance. The ESS shall also be warranted for six years or 300,000 miles, whichever comes first, to remain within warrantable end of life. An optional Extended Warranty of 12 years or 500,000 miles shall be submitted with the proposal. The ESS original specified energy storage capacity and warrantable end of life, as a percentage of the original specified energy capacity, shall be clearly defined by the Proposer. Acceptable methods for measuring or obtaining ESS storage capacity with respect to its original specified capacity shall be clearly identified by the Manufacturer. The Manufacturer will propose the test method and certify that the results are true and accurate. The test will be performed according to a documented test procedure. The Authority is allowed to engage third parties for capacity testing. If applicable, the proposal shall include a comprehensive statement of any additional warranty terms relating to the ESS, including explanation of all disclaimers within the warranty.

#### 1.1.5. Major Subsystems

The following subsystems shall be warranted to be free from Defects and Related Defects for two years or 100,000 miles, whichever comes first:

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- Brake system: Foundation brake components, including advancing mechanisms, as supplied with the axles, excluding friction surfaces
- Destination signs: All destination sign equipment for the front, side and rear signs, power modules and operator control
- Heating, ventilating: Roof and/or rear main unit only, excluding floor heaters and front defroster
- AC unit and compressor: Roof and/or rear main unit only, excluding floor heaters and front defroster
- Door systems: Door operating actuators and linkages
- Air compressor
- Air dryer
- Wheelchair lift and ramp system: Lift and/or ramp parts and mechanical only
- Power Steering System
- Propulsion system cooling systems: Radiator including core, tanks and related framework, including surge tank and transmission cooler
- Power electronics: DC/DC converters, inverters, if supplied
- Passenger seating excluding upholstery

The following subsystems shall be warranted to be free from Defects and Related Defects for ~~12 years or 500,000 miles~~ 3 years or 150,000 miles, whichever comes first:

- Low-voltage and high-voltage electrical wiring and harnesses (~~12 years~~)

**1.1.6. Extension of Warranty**

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

**1.1.7. Voiding of Warranty**

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

**1.1.8. Exceptions and Additions to Warranty**

The warranty shall not apply to the following items:

- scheduled maintenance items
- normal wear-out items
- items furnished by the Authority

Should the Authority require the use of a specific product and has rejected the Contractor's request for an alternate product, then the standard Supplier warranty for that product shall be the only warranty provided to the Authority. This product will not be eligible under "Fleet Defects," below.

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### 1.2. Serial Numbers

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

- Engine or traction motor(s)
- Propulsion system controller/inverter(s)
- Energy storage pack(s) or module(s)
- Power electronics: DC/DC converters, inverters
- Transmission (if applicable)
- HVAC system and major components
- Drive axle
- Power steering unit
- Air compressor
- Wheelchair ramp (if applicable)

The Contractor shall provide updated serial numbers resulting from warranty campaigns. The format of the list shall be approved by the Authority prior to delivery of the first production bus.

### 1.3. Charger Systems

The charger systems base warranties as provided by the charger manufacturer shall be in effect. Extended Warranty options and Service Level Agreements shall be made available to the Authority to consider and the Authority shall be able to separately enter into these options and agreements outside the scope of this contract.

### 1.4. Pass-Through Warranty

Should the Contractor elect to not administer warranty claims on certain components and wish to transfer this responsibility to the sub-suppliers, or to others, the Contractor shall request this waiver.

Contractor shall state in writing that the Authority's warranty reimbursements will not be impacted. The Contractor also shall state in writing any exceptions and reimbursement including all costs incurred in transport of vehicles and/or components. At any time during the warranty period, the Contractor may request approval from the Authority to assign its warranty obligations to others, but only on a case-by-case basis approved in writing by the Authority. Otherwise, the Contractor shall be solely responsible for the administration of the warranty as specified. Warranty administration by others does not eliminate the warranty liability and responsibility of the Contractor.

### 1.5. Superior Warranty

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

## 2. Fleet Defects

### 2.1. Occurrence and Remedy

A Fleet Defect is defined as cumulative failures of twenty-five (25) percent of the same components in the same or similar application in a minimum fleet size of twelve (12) or more buses where such items are covered by warranty. A Fleet Defect shall apply only to the base warranty period in sections entitled “Complete Bus,” “Propulsion System” and “Major Subsystems.” When a Fleet Defect is declared, the remaining warranty on that item/component stops. The warranty period does not restart until the Fleet Defect is corrected.

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

The Contractor shall correct a Fleet Defect under the warranty provisions defined in “Repair Procedures.” After correcting the Defect, the Authority and the Contractor shall mutually agree to and the Contractor shall promptly undertake and complete a work program reasonably designed to prevent the occurrence of the same Defect in all other buses and spare parts purchased under this Contract. Where the specific Defect can be solely attributed to particular identifiable part(s), the work program shall include redesign and/or replacement of only the defectively designed and/or manufactured part(s). In all other cases, the work program shall include inspection and/or correction of all the buses in the fleet via a mutually agreed-to arrangement. The Contractor shall update, as necessary, technical support information (parts, service and operator’s manuals) due to changes resulting from warranty repairs. The Authority may immediately declare a Defect in design resulting in a safety hazard to be a Fleet Defect. The Contractor shall be responsible to furnish, install and replace all defective units.

### 2.2. Exceptions to Fleet Defect Provisions

The Fleet Defect warranty provisions shall not apply to Authority-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.

## 3. Repair Procedures

### 3.1. Repair Performance

The Contractor is responsible for all warranty-covered repair Work. To the extent practicable, the Authority will allow the Contractor or its designated representative to perform such Work. At its discretion, the Authority 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.

### 3.2. Repairs by the Contractor

If the Authority detects a Defect within the warranty periods defined in this section, it shall, within thirty (30) days, notify the Contractor’s designated representative. The Contractor or its designated representative shall, if requested, begin Work on warranty-covered repairs within five calendar days after receiving notification of a Defect from the Authority. The Authority shall make the bus available to complete repairs timely with the Contractor’s repair schedule.

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

### 3.3. Repairs by the Authority

#### 3.3.1. Parts Used

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

#### 3.3.2. Contractor-Supplied Parts

The Authority may require that the Contractor supply parts for warranty-covered repairs being performed by the Authority. Those parts may be remanufactured but shall have the same form, fit and function, and warranty. The parts shall be shipped prepaid to the Authority from any source selected by the Contractor within fourteen (14) days of receipt of the request for said parts and shall not be subject to an Authority handling charge.

#### 3.3.3. Defective Component Return

The Contractor may request that parts covered by the warranty be returned to the manufacturing plant. The freight costs for this action shall be paid by the Contractor. Materials should be returned in accordance with the procedures outlined in "Warranty Processing Procedures."

#### 3.3.4. Failure Analysis

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

#### 3.3.5. Reimbursement for Labor and Other Related Costs

The Authority shall be reimbursed by the Contractor for labor, at a rate of \$90.00 per hour, escalated 3% annually effective from the date of award. If the Authority tows any bus within the warranty period as described in section "Complete Bus", the Contractor will reimburse the Authority at the standard towing rate.

#### 3.3.6. Reimbursement for Parts

The Authority 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 15 percent handling costs. Handling costs shall not be paid if parts are supplied by the Contractor and shipped to the Authority.

#### 3.3.7. Reimbursement Requirements

The Contractor shall respond to the warranty claim with an accept/reject decision including necessary failure analysis no later than sixty (60) days after the Authority submits the claim and defective part(s), when requested. Reimbursement for all accepted claims shall occur no later than sixty (60) days from the date of acceptance of a valid claim. The Authority may dispute rejected claims or claims for which the Contractor did not reimburse the full amount. The parties agree to review disputed warranty claims during the following quarter to reach an equitable decision to permit the disputed claim to be resolved

**CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY**  
**EXHIBIT F-4 – REVISED-1: WARRANTY PROVISIONS**

and closed. The parties also agree to review all claims at least once per quarter throughout the entire warranty period to ensure that open claims are being tracked and properly dispositioned.

**3.3.8. Warranty after Replacement/Repairs**

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

If an item is declared to be a Fleet Defect, then the warranty stops with the declaration of the Fleet Defect. Once the Fleet Defect is corrected, the item(s) shall have three (3) months or remaining time and/or miles of the original warranty, whichever is greater. This remaining warranty period shall begin on the repair/replacement date for corrected items on each bus if the repairs are completed by the Contractor or on the date the Contractor provides all parts to the Authority.

**3.3.9. Warranty Processing Procedures**

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

- bus number and VIN
- total vehicle life mileage at time of repair
- date of failure/repair
- acceptance/in-service date
- Contractor part number and description
- component serial number
- description of failure
- all costs associated with each failure/repair (invoices may be required for third-party costs):
- towing
- road calls
- labor
- materials
- parts
- handling
- troubleshooting time (to be negotiated on a case-by-case basis)

**3.3.10. Forms**

The Authority’s forms will be accepted by the Contractor if all of the above information is included. Electronic submittal may be used if available between the Contractor and the Authority.

**3.3.11. Return of Parts**

When returning defective parts to the Contractor, the Authority shall tag each part with the following:

- bus number and VIN
- claim number
- part number
- serial number (if available)



**CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY**  
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3.3.12. Timeframe

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

3.3.13. Reimbursements

Reimbursements are to be transmitted to the Authority or to the Authority's contracted Service Provider(s), as determined by the Authority.

**EXHIBIT G-1A – REVISED-2**  
**FPR**  
**40-FT: DELIVERY SCHEDULE**

**EXHIBIT G-1A: 40-ft Buses Required Technical Submittal – Delivery Schedule**

Offerors shall list below the number of calendar days for their Proposed Delivery Schedule for 40-foot buses per Exhibit A, Pricing Schedule. Please do not enter dates.

**Note: Desired Delivery Schedule is an evaluation factor stated in Section 10 of Exhibit C.**

**DELIVERY - BASE**

Item	Description	Quantity	Desired Delivery Schedule Not To Exceed	Proposed Calendar Days from NTP
<b>BASE LOT A: 40-ft</b>				
<b>1A</b>	<del>40-ft Battery Electric Bus (PILOT BUS)</del>	<b>1</b>	<del>180 calendar days from date of Notice to Proceed (NTP) for Base - Item 1A</del>	<b>Calendar Days</b>
<b>2A</b>	40-ft Battery Electric Bus	<b>52</b> <del>54</del>	<b>365</b> <del>180</del> calendar days from acceptance of Item 1A (PILOT BUS) and from date of Notice to Proceed (NTP) for Base - Item 2A	553 Calendar Days

**DELIVERY - OPTION 1**

Item	Description	Estimated Quantity	Desired Delivery Schedule Not To Exceed	Proposed Calendar Days from NTP
<b>OPTION 1 LOT A: 40-ft</b>				
<b>1A</b>	40-ft Battery Electric Bus	40	210 calendar days from date of Notice to Proceed (NTP) for Option 1 - Item 1A	405 Calendar Days

**DELIVERY - OPTION 2**

Item	Description	Estimated Quantity	Desired Delivery Schedule Not To Exceed	Proposed Calendar Days from NTP
<b>OPTION 2 LOT A: 40-ft</b>				
<b>1A</b>	40-ft Battery Electric Bus	11	210 calendar days from date of Notice to Proceed (NTP) for Option 2 - Item 1A	365 Calendar Days

**DELIVERY - OPTION 3**

Item	Description	Estimated Quantity	Desired Delivery Schedule Not To Exceed	Proposed Calendar Days from NTP
<b>OPTION 3 LOT A: 40-ft</b>				
<b>1A</b>	40-ft Battery Electric Bus	52	210 calendar days from date of Notice to Proceed (NTP) for Option 3 - Item 1A	425 Calendar Days

**DELIVERY - OPTION 5**

Item	Description	Estimated Quantity	Desired Delivery Schedule Not To Exceed	Proposed Calendar Days from NTP
<b>OPTION 5 LOT A: 40-ft</b>				
<b>1A</b>	40-ft Battery Electric Bus	<b>18</b>	210 calendar days from date of Notice to Proceed (NTP) for Option 5 - Item 1A	375 Calendar Days

**DELIVERY - OPTION 6**

Item	Description	Estimated Quantity	Desired Delivery Schedule Not To Exceed	Proposed Calendar Days from NTP
<b>OPTION 6 LOT A: 40-ft</b>				
<b>1A</b>	40-ft Battery Electric Bus	5	210 calendar days from date of Notice to Proceed (NTP) for Option 6 - Item 1A	345 Calendar Days

# Exhibit G-2A

## 40-ft Vehicle Technical Information

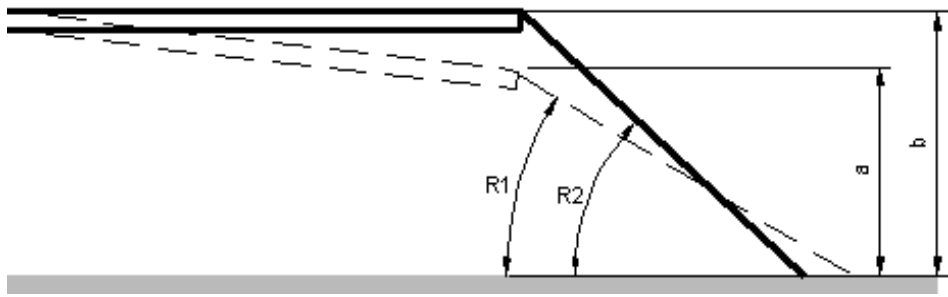
**EXHIBIT G-2A: 40-ft Buses Required Technical Submittal – Vehicle Technical Information**

*The Offeror shall submit for review by the Authority a completely filled-in Vehicle Technical Information form below to confirm his proposed vehicle and components are in compliance with the requirements of Exhibit F-1 Technical Specifications.*

-Do not change the number of rows and columns. -Only add information in the right column. -Please expand rows to add additional information in the right column (see line #1 for reference).		
1.	Bus Manufacturer	
2.	Bus Model	
3.	<b>UNDERSTRUCTURE MANUFACTURER</b>	
4.	Model Number	
5.	<b>BASIC BODY CONSTRUCTION</b>	
6.	<b>BODY</b>	
7.	Type	
8.	Overstructure thickness/dimensions [In]	-
9.	Understructure thickness/dimensions [In]	
10.	<b>SKIN THICKNESS AND MATERIAL</b>	
11.	Roof Thickness [In]	
12.	Roof Material	
13.	Sidewall Thickness [In]	
14.	Sidewall Material	
15.	Skirt Panel Thickness [In]	
16.	Skirt Panel Material	
17.	Front End Thickness [In]	
18.	Front End Material	
19.	Rear End Thickness [In]	
20.	Rear End Material	
21.	<b>BUS DIMENSIONS</b>	
22.	<b>LENGTH</b>	
23.	Bumper to Bumper [Ft]	
24.	Over Body [Ft]	
25.	<b>WIDTH</b>	
26.	Over Body excluding Mirrors [Ft]	
27.	Over Body including Mirrors - driving position [Ft]	
28.	Over Tires - Front Axle [Ft]	
29.	Over Tires - Rear Axle [Ft]	

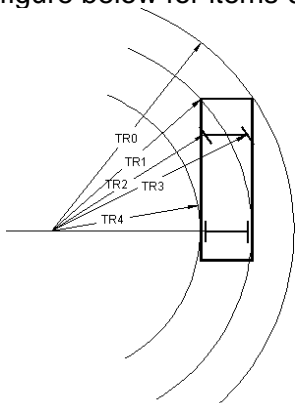
# Exhibit G-2A

## 40-ft Vehicle Technical Information

30.	HEIGHT	
31.	Maximum [Ft]	
32.	Main roof line [Ft]	
33.	ROAD CLEARANCE	
34.	Angle of Approach [Deg.]	
35.	Breakover Angle [Deg.]	
36.	Angle of Departure [Deg.]	
37.	Minimum Ground Clearance (between bus and ground, with bus unkneeled) Excluding Axles [In]	
38.	Minimum Ground Clearance (between bus and ground, with bus unkneeled) Including Axles [In]	
39.	DOORWAY DIMENSIONS	
40.	FRONT DOOR	
41.	Width Between Door Posts [In]	
42.	Door Width Between Panels [In]	
43.	Doorway Height [In]	
44.	Knuckle Clearance [In]	
45.	REAR DOOR	
46.	Width Between Door Posts [In]	
47.	Door Width Between Panels [In]	
48.	Doorway Height [In]	
49.	Knuckle Clearance [In]	
50.	STEP HEIGHT FROM GROUND (MEASURED AT CENTER OF DOORWAY)	
51.	<p>Use figure below for items 52-59</p> 	
52.	KNEELED	
53.	Front Doorway a = [In]	
54.	Ramp Angle R1= [Deg]	
55.	Rear Doorway a = [In]	
56.	UN-KNEELED	
57.	Front Doorway b = [In]	

## Exhibit G-2A

### 40-ft Vehicle Technical Information

58.	Ramp Angle R2= [Deg]	
59.	Rear Doorway b = [In]	
60.	INTERIOR HEAD ROOM (Measured at Center of Aisle)	
61.	At Front Axle [In]	
62.	At Drive axle [In]	
63.	Front door [In]	
64.	Front axle [In]	
65.	TURNING ENVELOP	
66.	<p style="text-align: center;">Use figure below for items 67-73</p> 	
67.	Outside Body Turning Radius, TR0 (including bumper) [Ft]	
68.	Front Inner Corner Radius, TR1 [Ft]	
69.	Front Wheel Inner Turning Radius, TR2 [Ft]	
70.	Front Wheel Outer Turning Radius, TR3 [Ft]	
71.	Inside Body Turning Radius, TR4 (including bumper) [Ft]	
72.	Wheelbase [Ft]	
73.	Overhang, Centerline of Axle Over Bumper at Rear [FT]	
74.	FLOOR	
75.	Floor Interior Length [Ft]	
76.	Floor Interior Width [Ft]	
77.	Total Standee Area [Sq. FT]	
78.	Minimum distance between Wheelhouses at front [Ft]	
79.	Minimum distance between Wheelhouses at Rear [Ft]	
80.	Maximum interior floor slope (from horizontal) [Deg]	
81.	FLOOR COVERING	
82.	Manufacturer	

# Exhibit G-2A

## 40-ft Vehicle Technical Information

83.	Type	
84.	Thickness [In]	
85.	SUB-FLOOR	
86.	Manufacturer	
87.	Material	
88.	Thickness	
89.	FLOOR HEIGHT ABOVE GROUND (Measured at the center of bus)	
90.	At Front Door	
91.	At Front Axle	
92.	At Rear Door	
93.	At Rear Axle	
94.	PASSENGER CAPACITY	
95.	Total Maximum Seating	
96.	Standee Capacity	
97.	Minimum Knee to Hip Room [In]	
98.	Minimum Foot Room [In]	
99.	Aisle Width Between Transverse Seats (minimum) [In]	
100.	WEIGHT OF BUS	
101.	EMPTY BUS - FULL FLUIDS AND FAREBOX	
102.	Weight at the front left Tire [Lbs.]	
103.	Weight at the front Right Tire [Lbs.]	
104.	Total (add Previous two Items) [Lbs.]	
105.	Weight at the Rear left Tire [Lbs.]	
106.	Weight at the Rear Right Tire [Lbs.]	
107.	Total (add Previous two Items) [Lbs.]	
108.	Total bus Weight (add previous two Totals) [Lbs.]	
109.	FULLY SEATED - FULL FLUIDS AND FAREBOX	
110.	Number of people + Driver	
111.	Weight at the front left Tire [Lbs.]	
112.	Weight at the front Right Tire [Lbs.]	
113.	Total (add Previous two Items) [Lbs.]	
114.	Weight at the Rear left Tire [Lbs.]	
115.	Weight at the Rear Right Tire [Lbs.]	
116.	Total (add Previous two Items) [Lbs.]	
117.	Total bus Weight (add previous two Totals) [Lbs.]	
118.	FULLY LOADED STANDEE AND FULLY SEATED - FULL FLUIDS AND FAREBOX	
119.	Number of people + Driver	
120.	Weight at the front left Tire [Lbs.]	
121.	Weight at the front Right Tire [Lbs.]	
122.	Total (add Previous two Items) [Lbs.]	

## Exhibit G-2A

### 40-ft Vehicle Technical Information

123.	Weight at the Rear left Tire [Lbs.]	
124.	Weight at the Rear Right Tire [Lbs.]	
125.	Total (add Previous two Items) [Lbs.]	
126.	Total bus Weight (add previous two Totals) [Lbs.]	
127.	CRUSH LOAD (1.5XFULLY LOADED)	
128.	Number of people	
129.	Weight at the front left Tire [Lbs.]	
130.	Weight at the front Right Tire [Lbs.]	
131.	Total (add Previous two Items) [Lbs.]	
132.	Weight at the Rear left Tire [Lbs.]	
133.	Weight at the Rear Right Tire [Lbs.]	
134.	Total (add Previous two Items) [Lbs.]	
135.	Total bus Weight (add previous two Totals) [Lbs.]	
136.	WEIGHT RATING	
137.	GVWR [Lbs.]	
138.	GAWR – Front Axle [Lbs.]	
139.	GAWR – Rear Axle [Lbs.]	
140.	VEHICLE PERFORMANCE	
141.	Vehicle performance information and graphs to be attached with this form: <ul style="list-style-type: none"> <li>• Vehicle Speed vs Time (Both loaded and unloaded)</li> <li>• Vehicle Speed vs Grade (Both loaded and unloaded)</li> <li>• Acceleration vs Time</li> <li>• Voltage vs SOC</li> <li>• Traction Motor Speed [RPM] vs Vehicle Speed [0-70 MPH]</li> <li>• Output Torque vs Traction Motor speed [RPM]</li> </ul>	
142.	POWER PLANT	
143.	TRACTION MOTOR (S)	
144.	Manufacture(s)	
145.	Type (s)	
146.	Model Number(s)	
147.	Max. Speed [RPM]	
148.	Efficiency for each motor [%]	
149.	Horsepower [HP]/RPM	
150.	Torque [Ft-Lbs.] /RPM	
151.	Motor Weight	
152.	Cooling Type (ex. liquid cooled)	
153.	Coolant required (Type / color/ manufacturer)	-
154.	Operating Voltage	
155.	Traction Motor - Heat exchanger and Fans ( Model / manufacturer)	
156.	MOTOR INVERTER (S)	



## Exhibit G-2A

### 40-ft Vehicle Technical Information

157.	Manufacturer (s)	
158.	Model (s)	
159.	COOLING PUMP	
160.	Manufacturer	
161.	Model	
162.	Efficiency [%]	
163.	Speed Range [RPM]	
164.	Coolant Flow Rate [gpm]	
165.	TRANSMISSION	
166.	Manufacturer	
167.	Type	
168.	Speeds	
169.	Gear Ratios	
170.	Shift Speeds with respect to speed	
171.	Fluid Capacity	
172.	Fluid required (Grade / Manufacturer)	
173.	Transmission- Heat Exchanger/Fan (manufacturer/Model)	
174.	ENERGY STORAGE SYSTEM (ESS)	
175.	HIGH VOLTAGE BATTERIES	
176.	Manufacturer	
177.	Model	
178.	System Total Energy (KWh)	
179.	System Capacity [Ah]	
180.	Warrantable End of Life [%]	
181.	Battery Type (Ex. NMC)	
182.	Estimated End of Life [ Years/Months]	
183.	Number of Cells	
184.	Charge Rate (kW) (J1772)	
185.	Charge Rate (kW) (J3105)	
186.	Usable State of Charge [%]	
187.	Coolant required (Type / color/ manufacturer)	
188.	VEHICLE INLET - CHARGING POINT	
189.	Manufacturer -J1772 connection point	
190.	Model - J1772 connection point	
191.	Manufacturer -J3105 connection point	
192.	Model – J3105 connection point	
193.	HIGH VOLTAGE CONTACTORS	
194.	Manufacturer	
195.	Model	
196.	Type	
197.	BATTERY THERMAL MANAGEMENT	
198.	ELECTRIC HEATERS (BATTERY THERMAL MANAGEMENT)	

## Exhibit G-2A

### 40-ft Vehicle Technical Information

199.	Manufacturer	
200.	Model	
201.	Efficiency [%]	
202.	COOLING PUMP	
203.	Manufacturer	
204.	Model	
205.	Efficiency [%]	
206.	Speed Range [RPM]	
207.	Coolant Flow Rate [gpm]	
208.	ESS HEAT EXCHANGER(S)	
209.	Manufacturer (s)	
210.	Model (s)	
211.	Efficiency (s) [%]	
212.	Material (s)	
213.	AXLES	
214.	AXLE, FRONT	
215.	Manufacturer	
216.	Type	
217.	Model Number	
218.	Gross Axle Weight Rating [Lbs.]	
219.	Axle Load [Lbs.]	
220.	Fluid required (Grade/ manufacturer)	
221.	AXLE, REAR	
222.	Manufacturer	
223.	Type	
224.	Model Number	
225.	Gross Axle Weight Rating [Lbs.]	
226.	Axle Load [Lbs.]	
227.	Fluid required (Grade/ manufacturer)	
228.	DRIVE SHAFT	
229.	Manufacturer	
230.	Type	
231.	Model Number	
232.	SUSPENSION	
233.	FRONT SUSPENSION	
234.	Manufacturer	
235.	Type	
236.	Model	
237.	REAR SUSPENSION	
238.	Manufacturer	
239.	Type	
240.	Model	
241.	FRONT SPRINGS	
242.	Manufacture	
243.	Model	

# Exhibit G-2A

## 40-ft Vehicle Technical Information

244.	REAR SPRINGS	
245.	Manufacture	
246.	Model	
247.	FRONT SCHOCK ABSORBERS	
248.	Manufacturer	
249.	Model	
250.	REAR SCHOCK ABSORBERS	
251.	Manufacturer	
252.	Model	
253.	WHEELS AND TIRES	
254.	WHEELS	
255.	Make	
256.	Model	
257.	Size	
258.	Capacity [lbs.]	
259.	Material	
260.	Finish	
261.	Surface Treatment	
262.	TIRES	
263.	Manufacturer	
264.	Type	
265.	Size	
266.	Load Range [Lbs.]	
267.	Air Pressure [PSI]	
268.	STEERING, POWER	
269.	ELECTRIC MOTOR	
270.	Manufacturer	
271.	Type	
272.	Model	
273.	Voltage Required	
274.	HYDRAULIC PUMP	
275.	Manufacturer	
276.	Model	
277.	Relief Pressure [PSI]	
278.	BOOSTER/GEAR BOX	
279.	Manufacturer	
280.	Type	
281.	Model	
282.	Ratio	
283.	GENERAL INFORMATION	
284.	Power Steering Fluid Capacity [Qts.]	
285.	Fluid required (Grade/ manufacturer)	
286.	Maximum Effort at Steering Wheel [Lbs]]	

## Exhibit G-2A

### 40-ft Vehicle Technical Information

	(unloaded stationary coach on dry asphalt pavement)	
287.	Steering Wheel Diameter [In]	
288.	<b>BRAKES</b>	
289.	Make of Fundamental Brake System	
290.	Brake Operation Effort	
291.	<b>BRAKE CHAMBERS VENDOR'S SIZE &amp; PART NO.</b>	
292.	Front	
293.	Rear	
294.	<b>SLACK ADJUSTER'S VENDOR'S TYPE &amp; PART NO.</b>	
295.	Front Right	
296.	Front Left	
297.	Rear Right	
298.	Rear Left	
299.	Length - Front Take-up [In]	
300.	Length - Rear Take-up [In]	
301.	<b>BRAKE DISCS</b>	
302.	<b>FRONT DISCS</b>	
303.	Manufacturer	
304.	Part Number	
305.	Diameter	
306.	<b>REAR DISCS</b>	
307.	Manufacturer	
308.	Part Number	
309.	Diameter	
310.	<b>BRAKE LINING IDENTIFICATION</b>	
311.	Front Forward	
312.	Front Reverse	
313.	Rear Forward	
314.	Rear Reverse	
315.	<b>BRAKE LINING PER PAD</b>	
316.	Front [In]	
317.	Rear [In]	
318.	<b>BRAKE LINING WIDTHS</b>	
319.	Front [In]	
320.	Rear [In]	
321.	<b>BRAKE LINING LENGTHS</b>	
322.	Front [In]	
323.	Rear [In]	
324.	<b>BRAKE LINING AREA PER AXLE</b>	
325.	Front [sq. in]	
326.	Rear [sq. in]	
327.	<b>BRAKE LINING THICKNESS</b>	
328.	Brake Lining Thickness [In]	

# Exhibit G-2A

## 40-ft Vehicle Technical Information

329.	AIR RESERVOIR CAPACITY	
330.	Supply Reservoir [Cu. In.]	
331.	Primary Reservoir [Cu. In.]	
332.	Secondary Reservoir [Cu. In.]	
333.	Parking Reservoir [Cu. In.]	
334.	Accessory Reservoir [Cu. In.]	
335.	Other Reservoir Type [Cu. In.]	
336.	HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT	
337.	Heating System Capacity [B.T.U.]	
338.	Cooling System Capacity [B.T.U.]	
339.	Ventilating Capacity [CFM]	
340.	Refrigerant Capacity [Lbs.]	
341.	COMPRESSOR	
342.	Manufacturer	
343.	Model	
344.	Operating Speed	
345.	Weight	
346.	Oil Capacity Dry [Qtrs.]	
347.	Oil Capacity Wet [Qtrs.]	
348.	Oil Type (Grade and Manufacturer)	
349.	Maximum Warranted Speed [RPM]	
350.	Operating Speed [RPM]	
351.	Refrigerant (Type)	
352.	CONDENSER	
353.	Manufacturer	
354.	Model	
355.	CONDENSER FAN	
356.	Manufacturer	
357.	Model	
358.	RECEIVER	
359.	Manufacturer	
360.	Model	
361.	CONDENSER FAN DRIVE MOTORS	
362.	Manufacturer	
363.	Model	
364.	Type	
365.	Power [HP]	
366.	Operating Speed [RPM]	
367.	EVAPORATOR FAN DRIVE MOTORS	
368.	Manufacturer	
369.	Model	
370.	Type	
371.	Power [HP]	
372.	Operating Speed [RPM]	
373.	EVAPORATOR(S)	

## Exhibit G-2A

### 40-ft Vehicle Technical Information

374.	Manufacturer (s)	
375.	Model (s)	
376.	Number of Evaporators	
377.	EXPANSION VALVE	
378.	Manufacturer	
379.	Model	
380.	FILTER-DRIER	
381.	Manufacturer	
382.	Model	
383.	HEATER CORES	
384.	Manufacturer (s)	
385.	Model (s)	
386.	Capacity [BTU]	
387.	FLOOR HEATER BLOWERS	
388.	Manufacturer (s)	
389.	Model (s)	
390.	Power [HP]	
391.	VENTILATION	
392.	Type	
393.	CONTROLS	
394.	Manufacturer (s)	
395.	Model (s)	
396.	Type	
397.	ELECTRIC HEATER(S)	
398.	Manufacturer	
399.	Model	
400.	Efficiency [%]	
401.	HEATER PUMP	
402.	Manufacturer	
403.	Model	
404.	Efficiency [%]	
405.	Max speed [Rpm]	
406.	INTERIOR LIGHTING	
407.	Manufacturer	
408.	Type	
409.	Number of Fixtures	
410.	Power Pack	
411.	EXIT/ENTRANCE DOORS	
412.	FRONT DOOR	
413.	Manufacturer of Operating Equipment	
414.	Type of Door	
415.	Type of Operating Equipment	
416.	Dimensions [In]	
417.	Glass type	
418.	Glass Thickness	

## Exhibit G-2A

### 40-ft Vehicle Technical Information

419.	Color Tint -Glass	
420.	Light transmission Glass	
421.	REAR DOOR	
422.	Manufacturer of Operating Equipment	
423.	Type of Door	
424.	Type of Operating Equipment	
425.	Dimensions [In]	
426.	Glass type	
427.	Glass Thickness	
428.	Color Tint -Glass	
429.	Light transmission Glass	
430.	PASSENGER WINDOWS	
431.	Manufacturer	
432.	Model	
433.	Type	
434.	Number of windows – Street Side	
435.	Number of windows – Curb Side	
436.	Number of windows- Rear	
437.	Sizes	
438.	Glazing: Type	
439.	Thickness	
440.	Color of Tint	
441.	Light Transmission	
442.	WINDSHIELD - DRIVER'S WINDOW - QUARTER WINDOW	
443.	WINDSHIELD	
444.	Manufacturer	
445.	Model	
446.	Glazing: Type	
447.	Thickness	
448.	Color of Tint	
449.	Light Transmission	
450.	DRIVER'S WINDOW	
451.	Manufacturer	
452.	Model	
453.	Glazing: Type	
454.	Thickness	
455.	Color of Tint	
456.	Light Transmission	
457.	QUARTER WINDOW	
458.	Manufacturer	
459.	Model	
460.	Glazing: Type	
461.	Thickness	
462.	Color of Tint	
463.	Light Transmission	

## Exhibit G-2A

### 40-ft Vehicle Technical Information

464.	MIRRORS	
465.	RIGHT SIDE EXTERIOR	
466.	Size [In]	
467.	Type	
468.	Manufacturer	
469.	Mfg. Part #	
470.	Model No.	
471.	LEFT SIDE EXTERIOR	
472.	Size [In]	
473.	Type	
474.	Manufacturer	
475.	Mfg. Part #	
476.	Model No.	
477.	CENTER REARVIEW	
478.	Size [In]	
479.	Type	
480.	Manufacturer	
481.	Mfg. Part #	
482.	Model No.	
483.	FRONT ENTRANCE AREA	
484.	Size [In]	
485.	Type	
486.	Manufacturer	
487.	Mfg. Part #	
488.	Model No.	
489.	UPPER-RIGHT HAND CORNER	
490.	Size [In]	
491.	Type	
492.	Manufacturer	
493.	Mfg. Part #	
494.	Model No.	
495.	REAR EXIT AREA	
496.	Size [In]	
497.	Type	
498.	Manufacturer	
499.	Mfg. Part #	
500.	Model No.	
501.	PASSENGER'S SEATS	
502.	Manufacturer	
503.	Model	
504.	Type	
505.	Upholstery material	
506.	Number of Seats	
507.	Seat material(s)	
508.	Weight per seat [lbs.]	



# Exhibit G-2A

## 40-ft Vehicle Technical Information

509.	DRIVER'S SEAT	
510.	Manufacturer	
511.	Model	
512.	Type	
513.	Upholstery material(s)	
514.	Weight [Lbs.]	
515.	PAINT	
516.	Manufacturer	
517.	Model	
518.	Paint Codes	
519.	WHEELCHAIR RAMP EQUIPMENT	
520.	Manufacturer	
521.	Model	
522.	Type	
523.	Load Capacity [Lbs.]	
524.	Width of Platform [In]	
525.	Length of Platform [In]	
526.	Incline Ratio	
527.	System Fluid Capacity [Qts.]	
528.	Fluid Used (Grade/manufacturer)	
529.	Operating Hydraulic Pressure	
530.	Hydraulic Cylinders Size	
531.	Hydraulic Cylinders Number	
532.	Weight [Lbs.]	
533.	WHEELCHAIR SECUREMENT EQUIPMENT	
534.	Manufacturer (s)	
535.	Model (s)	
536.	DESTINATION SIGNS	
537.	FRONT DESTINATION	
538.	Manufacturer	
539.	Model	
540.	Type	
541.	Overall Dimensions [In]	
542.	Character Height	
543.	Number of Characters	
544.	Message Width	
545.	LED color	
546.	FRONT RUN NUMBER	
547.	Manufacturer	
548.	Model	
549.	Type	
550.	Overall Dimensions [In]	
551.	Character Height	
552.	Number of Characters	
553.	Message Width	

## Exhibit G-2A

### 40-ft Vehicle Technical Information

554.	LED color	
555.	SIDE DESTINATION (S)	
556.	Manufacturer (s)	
557.	Model (s)	
558.	Type (s)	
559.	Overall Dimensions [In]	
560.	Character Height	
561.	Number of Characters	
562.	Message Width	
563.	LED color	
564.	REAR ROUTE	
565.	Manufacturer	
566.	Model	
567.	Type	
568.	Overall Dimensions [In]	
569.	Character Height	
570.	Number of Characters	
571.	Message Width	
572.	LED color	
573.	ELECTRICAL	
574.	MULTIPLEX SYSTEM	
575.	Manufacturer	
576.	Model	
577.	12-V BATTERIES	
578.	Manufacturer	
579.	Model	
580.	Type	
581.	Number of batteries	
582.	VOLTAGE EQUALIZER	
583.	Manufacturer	
584.	Model	
585.	Type	
586.	PASSENGER INTERIOR LIGHTING	
587.	Manufacturer	
588.	Model	
589.	COMMUNICATION SYSTEM	
590.	GPS	
591.	Manufacturer	
592.	Model	
593.	P.A. SYSTEM	
594.	Amplifier (Model and Manufacturer)	
595.	Microphone (Model and Manufacturer)	
596.	Int. Speaker (Model and Manufacturer)	

## Exhibit G-2A

### 40-ft Vehicle Technical Information

597.	Ext. Speaker (Model and Manufacturer)	
598.	CELLULAR ROUTER	
599.	Manufacturer	
600.	Model	
601.	Type	
602.	ANTENNAS	
603.	GPS Antenna	
604.	Manufacturer	
605.	Model	
606.	Type	
607.	Cellular Router Antenna	
608.	Manufacturer	
609.	Model	
610.	Type	
611.	WLAN Antenna	
612.	Manufacturer	
613.	Model	
614.	Type	
615.	Radio Antenna	
616.	Manufacturer	
617.	Model	
618.	Type	
619.	VIDEO SURVEILLANCE SYSTEM	
620.	Manufacturer	
621.	Model	
622.	Type	
623.	Number of Cameras (Inside and Outside)	
624.	Cameras (manufacturer and Models)	
625.	Displays (manufacturer and Models)	
626.	KNEELING ALARM	
627.	Manufacturer	
628.	Model	
629.	Type (Piezoelectric/Electromagnetic)	
630.	Noise Level Range (w/ attenuation adjustment) [dBA]	
631.	EVENT DATA RECORDER	
632.	Manufacturer	
633.	Model	
634.	Type	
635.	ON BOARD VALIDATORS	
636.	Manufacturer	
637.	Model	
638.	Type	

## Exhibit G-2A

### 40-ft Vehicle Technical Information

639.	Number of Validators	
640.	ON BOARD DIGITAL DISLAY/ INFOTAINMENT	
641.	Manufacturer	
642.	Model	
643.	Type	
644.	Number of displays	
645.	FAREBOX	
646.	Manufacturer	
647.	Model	
648.	Type	

# Exhibit G-3A: 40-ft Buses

## EXHIBIT G-3A: 40-ft Buses Required Technical Submittal – Required Documentation

The following documentation and/or information shall be submitted as part of the technical proposal in addition to worksheets, certificates, and other information required herein.

NOTE: The offeror may recognize that the Authority has asked for a few duplicated submittals. These duplicated requests are limited to instances where the requested document is required in both Volume 1 and Volume 2, which are distributed to separate groups for evaluation.

### Submitted

<u>Yes</u>	<u>No</u>	
___	___	1. Technical Information Worksheet. Offeror shall complete All information requested.
___	___	2. Submit certification of compliance with applicable required Federal Motor Vehicle Safety Standards (FMVSS) and a description of how buses meet FMVSS, including tests and results of tests.
___	___	3. Submit certification by third party relative to crash worthiness.
___	___	4. Submit certification, for example, copies of Altoona, Ortec, or other test certifications that show that the vehicle offered has been designed, manufactured, assembled, and tested for passenger service and is suitable for extended service in heavy stop-and-go traffic under specified service cycle.
___	___	5. Submit certification that motor vehicle pollution requirements will be met.
___	___	6. Submit certification that the horsepower of the vehicle is adequate for the speed range and terrain in which it will be required to operate and also meet the demands of all auxiliary power equipment.
___	___	7. Submit brake design data, including provisions for compliance with FMVSS No. 121.
___	___	8. Submit drawings showing plan and elevation of the proposed vehicle to include normal location of exterior mirrors.
___	___	9. Submit drawings showing vehicle turning envelope.
___	___	10. Submit drawing(s) showing proposed floor plans, passenger seating layout(s), and locations of all modesty panels. Plans shall include aisles, entrance and exit doors, and operator's platforms. Plans shall include dimensional information.
___	___	11. Submit drawing(s) showing entry, maneuvering, parking, and exiting of wheelchair passengers. Plans shall include dimensional information.
___	___	12. Submit description of wheelchair securement devices to include make, model and method of operation. Include certification that they meet ADA.
___	___	13. Submit drawing(s) Operator Barrier, including dimensions. Plans shall include dimensional information
___	___	14. Submit drawings of operator's workstation and layout. Include consoles, instrument panels, seat positioning, brake and throttle controls, floor mounted turn signals and driver's barriers. Plans shall include dimensional information such as steering wheel tilt limits of travel, operator's seat legroom relative to the foot pedals and foot switches, operator's seat fore and aft adjustment range, height adjustment range, etc.
___	___	15. Submit illustration outlining basic vehicle structure, with color coding and description of materials used.
___	___	16. Describe and furnish all critical dimensions for jacking and hoisting, including axle, tire, and jacking pad locations.
___	___	17. Submit documentation of materials and methods used for corrosion resistance.
___	___	18. Submit Illustration depicting all exterior panels and describe materials used and procedure for replacement of side body panels, minus painting.
___	___	19. Submit illustration depicting location, layout and accessibility of all energy storage and charging systems.
___	___	20. Submit description of all securement devices of service compartment doors, to include engine, transmission, battery, operator storage, etc.
___	___	21. Submit Photographs, prints and engineering data not otherwise submitted which might assist in understanding the performance of the proposed equipment.
___	___	22. Submit illustration(s) of front and rear suspension.

## Exhibit G-3A: 40-ft Buses

- 
- |     |     |     |  |
|-----|-----|-----|--|
| ___ | ___ | 23. | Submit detailed sample of maintenance and inspection schedule.   |
| ___ | ___ | 24. | Submit complete description and drawings of wheelchair ramp system.  |
| ___ | ___ | 25. | Submit detailed information on all Base and Extended Warranty Options, including High Voltage Batteries. delineating items excluded from warranty.   |
| ___ | ___ | 26. | Submit warranty claim filling procedure, including sample form.  |
| ___ | ___ | 27. | Submit electrical system audit procedure, including sample checklist.  |
| ___ | ___ | 28. | Submit list of all unique tools and equipment with description and cost required to maintain, repair and overhaul coaches proposed.  |
| ___ | ___ | 29. | Submit partial sample each: parts manual, operator's manual, maintenance manual, wiring diagram, and technical publications for coaches in production similar to this specification.   |
| ___ | ___ | 30. | Submit complete and detailed description of manufacturing facilities and process, including description of on-line inspection and testing. Explain the processes of monitoring and controlling the quality of production including work by sub-contractors and materials from suppliers. List and describe all testing performed during and after manufacture. Describe the process of correcting discovered defects.  |
| ___ | ___ | 31. | Submit the description of Fire Detection System, including type and location of main components such as sensors, control module, and alert devices. Describe how the system will detect and react to a thermal event.  |
| ___ | ___ | 32. | Submit photographs of the proposed vehicle or of a reasonably similar vehicle for purposes of presenting the aesthetic design and style. At minimum the following photographs are required: <ul style="list-style-type: none"> <li>a.) Exterior Views: both sides, front and rear;</li> <li>b.) Interior Views: facing forward, facing rear, doors entry and exit;</li> <li>c.) View with emphasis on fit and finish: driver's area, windows, stanchion, wheelchair area, rear steps, A/C return air duct, union of floor to walls, and any other views which may help to demonstrate an attention to detail in the fit and finish.</li> </ul> |
| ___ | ___ | 33. | Furnish a complete listing of fleet defects and corrective action taken that your firm has experienced on electric buses.  |
| ___ | ___ | 34. | Submit a complete description of the Driver's Dedicated Air Conditioning System and how it operates, including detailed drawings of components, controls, and air vents.   |
| ___ | ___ | 35. | Submit a description of what is being done or what specific engineering will need to be done to reduce interior ambient noise, especially of that caused by the air conditioning system, air compressor, road noise, and interior finish rattles, squeaks and drumming.  |
| ___ | ___ | 36. | Submit protocol for test method for measuring the ESS system WEOL.   |
| ___ | ___ | 37. | Submit written confirmation from battery manufacturer attesting to the safety of the proposed battery system in the proposed application and charging profile to include full disclosure and discussion of all relevant issues or prior incidents.   |
| ___ | ___ | 38. | Describe battery maintenance requirements, including any periodic charge requirements necessary for cell balancing.  |
| ___ | ___ | 39. | Submit the warranty terms relating to the battery, including explanation of all disclaimers within the warranty.   |
| ___ | ___ | 40. | Describe how the design of the bus minimizes potential exposure to hazardous electrical current in the event of a vehicle accident, and how gassing or fumes from the energy storage system are prevented from entering the interior of the bus.   |
| ___ | ___ | 41. | Describe the High Voltage Battery Disconnect System, including for both scenarios of maintenance and emergency first responder.  |
| ___ | ___ | 42. | Submit a list of all special tools and pricing for maintaining this equipment. This will not be part of the pricing evaluation on the RFP.   |
| ___ | ___ | 43. | Submit the Manufacturer's Standard for: Paint, Interior and Exterior.  |
| ___ | ___ | 44. | Submit the Manufacturer's Standard for: Flooring and Floor Covering Installation.  |
| ___ | ___ | 45. | Submit the Manufacturer's Standard for: Routing and Securement of Electrical Wiring and Harnesses.   |
| ___ | ___ | 46. | Submit the Manufacturer's Standard for: Routing and Securing of Fluid Lines.   |
| ___ | ___ | 47. | Describe options available for Driver Seat.  |
| ___ | ___ | 48. | Describe options available for Driver Barrier.   |
|     |     | 49. | Furnish the following information:   |

## Exhibit G-3A: 40-ft Buses

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Location of nearest technical service representative to Capital Metro:

Name: \_\_\_\_\_

Qualifications: \_\_\_\_\_

Experience: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

Location of nearest proposed service facility to Capital Metro.

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

Location of nearest parts distribution center to Capital Metro.

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

Policy for delivery of parts and components required for service and maintenance:

Regular Method of Shipment: \_\_\_\_\_

Cost to Capital Metro: \_\_\_\_\_

## **E. Required Technical Submittals**

### **iii. G-3A Required Documentation**

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- 1 **Technical Information Worksheet. Offeror shall complete All information requested.**

EXHIBIT G-4A  
40-FT: IT SECURITY VENDOR ASSESSMENT FORM

EXHIBIT G-4A: 40-ft Buses Required Technical Submittal – IT Security Vendor Assessment Form

New Cloud Vendor Assessment Form

*This form is intended to be used by internal customer personnel who are intending to onboard a new cloud-based (data, app, service stored or hosted off-premise) vendor.*

Part 1.1 Data Backup & Recovery

*This section covers standard data backup and recovery concerns.*

Question	Vendor Response (respond to questions that are applicable to the application or service provided)	IT Assessment of Acceptability (responses may include acceptable, more information needed, or N/A -- not applicable)
Do you have a documented process for how system, application and data backups are performed? Describe routine for backups (full, incremental, differential; continuous, daily, weekly, etc.).		
How do you verify that the backup process is functional and that restores work? How often is this done?		
Are all backup media (onsite, offsite, full and/or incremental), rendered unreadable at the end of their useful life? If yes, please describe the method used to render this media unreadable.		
Are procedures in place to fully destroy data contained on back-up media before they are reused? If so, how?		
Are the backups protected from unauthorized access and tampering? If Yes, describe how they are protected.		
Is backup media containing confidential information encrypted and stored in a locked container during transport? Please describe encryption method.		
Do you store backups offsite? a. How do you secure access to offsite media? Please specify the name of any 3rd party service providers. b. How do you secure access to media in transit? Please specify the name of any 3rd party service providers.		
Will any Internet-accessible systems contain data? If so, how is the data on thoses systems protected? Is the data encrypted at rest?		
What type of data will you be exchanging with customer? What type of data will you be processing and/or storing FROM customer? How is data transfer secured?		

**EXHIBIT G-4A**  
**40-FT: IT SECURITY VENDOR ASSESSMENT FORM**

What is your SLA? What are the actual results / metrics vs the SLA for the last 12 months?		
How many outages or failures have you experienced in the past 12 months? What were the shortest and longest durations? What were the fastest and slowest times to recover?		
For each outage or failure in the past 12 months, provide the following: -Type of outage or failure -What time of day it occurred -Duration -Time to recover -Number of customers impacted		
Describe the different operating environments for storing and processing customer data. This list of systems names and purposes will help customer with initial evaluation and possible incident response.		
How is your environment architected with respect to fault tolerance and high availability?		
Will any additional third party vendors have access to customer data via our relationship with your organization? Please include backup and recovery vendors, application and service providers, software and hardware support vendors, etc.		
Is sensitive data (i.e. PII or cardholder) securely disposed of when no longer needed?		
Is it prohibited to store the full contents of any track from the magnetic stripe (on the back of the card, in a chip, etc.) in the database, log files, or point-of-sale products?		
Is it prohibited to store the card-validation code (three-digit value printed on the signature panel of a card) in the database, log files, or point-of-sale products?		
If credit card data is used, are all but the last four digits of the account number masked when displaying cardholder data?		
If credit card data is used, are account numbers (in databases, logs, files, backup media, etc.) stored securely— for example, by means of encryption or truncation?		
If credit card data is used, are account numbers sanitized before being logged in the audit log?		

**EXHIBIT G-4A**  
**40-FT: IT SECURITY VENDOR ASSESSMENT FORM**

Part 1.2 Security Policy and Administration		
<i>This section covers standard information security policy concerns.</i>		
Question	Vendor Response (respond to questions that are applicable to the application or service provided)	IT Assessment of Acceptability (responses may include acceptable, more information needed, or N/A -- not applicable)
Is there one person assigned to lead, manage and be accountable for security?		
Is that person at least at a director level?		
Does your company have a dedicated security team? If so, roughly how many people are on it.		
Does your company have a corporate security policy?		
Are each of the following areas covered in your security policy? -Information Classification -Data privacy -Data-handling (including use, storage and destruction) -Email use and retention -Encryption -Security configuration for network, operating systems, applications and desktops -Change control -Network and User system access -Security incident management -Physical access -External communication -Asset management		
Are your systems subjected to penetration testing? Is testing performed by internal personnel or outsourced? When was the last penetration test? What were the results?		
Which of the policies above have been substantially modified in the past year?		
Are information security policies and other relevant security information disseminated to all system users (including vendors, contractors, and business partners)?		
Are the policies communicated in a way that requires employees to certify their understanding and compliance at least annually?		
Do the security policies apply to contract employees (offsite and onsite), dependent Service Providers, etc.?		

**EXHIBIT G-4A**  
**40-FT: IT SECURITY VENDOR ASSESSMENT FORM**

Is there a security training and awareness program in place for all employees (new, existing, permanent, temporary or contract staff) ? If yes, describe the program and frequency of re-certification or re-education.		
Is there a formal procedure for reporting a suspected security violation?		
Is the identity and background of all your staff servicing customer known based on security background checks? If yes, describe the screening activities performed on job applicants (e.g., credit, drug screening, references, and criminal background checks) and provide a copy of the policy, procedure or checklist.		
Are employees with access to sensitive information prevented from working prior to completion of the background checks?		
Are re-investigations conducted on employees based on job function or length of employment? If yes, describe the re-investigations process performed (e.g., credit, drug screening, references, and criminal background checks).		
Is there a process in place to screen your outside contractors such as security guards, janitorial services, etc.? If yes, describe the process used to screen these individuals (e.g., credit, drug screening, references, and criminal background checks).		
<b>Part 1.3 Secure Software Engineering &amp; Vulnerability Scans</b>		
<i>This section covers vulnerability identification and remediation, vulnerability scans, and software engineering practices. (The Open Web Application Security Project seeks to make software security</i>		
<b>Question</b>	<b>Vendor Response (respond to questions that are applicable to the application or service provided)</b>	<b>IT Assessment of Acceptability (responses may include acceptable, more information needed, or N/A -- not applicable)</b>
Does your organization scan and/or test for vulnerabilities in your service / application, and if so, how quickly are any identified vulnerabilities remediated? Please provide as much detail in your answer as possible.		
Does your organization embrace and incorporate the best practices and recommendations provided in the OWASP Developer's Guide and OWASP Cheat Sheet Series to implement or enhance your secure software engineering? Please provide as much detail in your answer as possible.		
Does your organization utilize the OWASP Testing Guide and/or OWASP Code Review Guide to effectively find vulnerabilities in your service / application (with the intent of remediating identified vulnerabilities)? Please provide as much detail in your answer as possible.		
Can you provide a copy of your most recent vulnerability scan results?		

**EXHIBIT G-4A**  
**40-FT: IT SECURITY VENDOR ASSESSMENT FORM**

Can you provide a scan that identified issue(s), and provide the follow-up scan that shows the issue(s) resolved? Please ensure that dates are clearly listed on each report.		
If you don't scan for vulnerabilities, how do you identify and remediate vulnerabilities? Please provide as much detail in your answer as possible.		
What concerns or considerations would you have, if any, to customer conducting periodic vulnerability scans of your service / application?		
Who can we contact with results of vulnerability scans run against your service / application? Please provide their name, title / role, and contact information.		
<b>Part 1.4 Physical Security of Data</b>		
<i>This section covers standard physical security concerns where customer data is processed or displayed.</i>		
<b>Question</b>	<b>Vendor Response (respond to questions that are applicable to the application or service provided)</b>	<b>IT Assessment of Acceptability (responses may include acceptable, more information needed, or N/A -- not applicable)</b>
How do you secure access to your data facilities where customer data will be stored?		
Are there multiple physical security controls (such as badges, escorts, or mantraps) in place that would prevent unauthorized individuals from gaining access to the facility?		
How are these security controls monitored?		
Are the vendor premises separated into different control areas such as server / computer room, operation areas, loading / delivery areas and others? Please specify how the access controls are in place in each separate area.		
Are multiple tenants occupying this facility? If Yes, please specify how tenants are separated		
Is access to areas where work is performed for customer physically separated from that of other clients? If Yes, describe the separation.		
Is access to the facility controlled by the use of a token-based card access control system? If Yes, describe the authorization process for requesting access, including changes.		
Are visitors required to sign-in, receive ID badge and escorted while on premises?		
Is the facility equipped with surveillance camera(s) 24/7/365?		
Do security cameras cover inside and outside doors and confidential areas?		

**EXHIBIT G-4A**  
**40-FT: IT SECURITY VENDOR ASSESSMENT FORM**

Are precautions taken to prevent the removing of customer information or related assets (checks, credit card information, storage media, hardware) from the premises? Please give details of these precautions.		
Are controls or safeguards in place to prevent unauthorized interception or damage to network, power or telecommunications cabling (e.g., wiring and router closets, etc.)?		
Please describe whether security guards are required to patrol areas that contain network, power or telecommunications cabling (e.g., wiring and router closets, etc.).		
How do you secure access to conduits (e.g., wire, fiber, etc.)?		
How do you secure access to wire closets?		
Has a clear desk, clear screen policy been implemented where necessary to protect information in shared environments?		
How do you secure access to consoles that may display customer or cardholder information?		
<b>Part 1.5 Single Sign-On Integration (SAML 2.0 connector)</b>		
<b>Question</b>	<b>Vendor Response (respond to questions that are applicable to the application or service provided)</b>	<b>IT Assessment of Acceptability (responses may include acceptable, more information needed, or N/A -- not applicable)</b>
Do you support SAML 2.0 for user authentication?		
If Yes: 1) Have you previously partnered with an SSO provider to have your SAML connector added to their catalog? 2) Does your SAML implementation support IdP-initiated or SP-initiated? 3) Do you have a link or document you can provide that explains the setup process to SAML-enable your application?		
If you do not support SAML 2.0 currently, is it on your product road map and if so, when do you plan on having it completed by?		
For automated user provisioning, do you support any of the following: 1) Just-in-time SAML Provisioning 2) User REST or SOAP API, and is it SCIM compliant ( <a href="http://www.simplecloud.info/">http://www.simplecloud.info/</a> ) 3) Bulk uploading using SFTP+CSV (or similar) 4) Other		



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Please provide a URL or other means by which we can access your automated user provisioning documentation.		
<b>Part 1.6 Application &amp; Data Dependencies &amp; Requirements</b>		
<i>In this section we are interested in understanding the logical and functional dependencies and relationships introduced by the addition of a service organization application to customer's internal</i>		
<b>Question</b>	<b>Vendor Response (respond to questions that are applicable to the application or service provided)</b>	<b>IT Assessment of Acceptability (responses may include acceptable, more information needed, or N/A -- not applicable)</b>
Approximately, how often do you upgrade your application? Will these upgrades impact my use of the application, and if so what time of day and for how long will I be affected?		
How and when will you notify me about any scheduled maintenance? How can I contact you to get more information about unscheduled or extended downtime?		
Does application or service's data need to query or update existing customer systems in real-time?		
Does the application or service log logical access and system events, and provide the ability to generate standard reporting on this data?		
What is your permissioning scheme – do all users have access to the entire application or can you customize who has access to what on an individual and by role basis?		
Does the application or service provide appropriate role-based access? (E.g., can date viewing/editing/deleting data, or approving/rejecting changes be restricted or enabled based on a user's role or profile?)		
Does the application or service provide adequate monitoring and escalation via dashboard alerts, email, or other auditable system of communication?		
Does the application or service require additional infrastructure (hardware/software) to be obtained in order to implement the desired functionality?		
If the application or service is intended to run on the Force.com platform, has a Salesforce AppExchange Security Review been completed, and what were the results?		
Is supported integration, or prebuilt integration, available with any other systems?		
Do you offer API access? Are there any extra charges to access API? What form do the APIs take?		
Can you verify that *all* API unit calls are both 1) authenticated (by managed key or OAuth) and 2) encrypted (by 128-bit or greater encryption)?		

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Can I readily export my data in a usable, non-proprietary format? If not, what provisions are in place to quickly gain access to data in a usable, non-proprietary format?		
What are your terms when it comes to ownership of data? How about any metadata I generate while using the application?		
How easy is it to export data from your service when moving to a new service? Do you offer an option to export the data in one of the open data formats like XML or JSON? Are there any extra charges for exporting the data?		
Is data deleted completely when deleted from the application?		
What happens to my data if I discontinue your service – do you delete it immediately? Can I retain access to a read only copy for a fee?		
<b>Part 1.7 Service Organization Controls (SOC) Reports</b>		
<i>The SOC1 Report replaces the standard SAS70 report, regarding design and effectiveness of financial reporting controls. The SOC2 Report focuses on a business's non-financial reporting controls</i>		
<b>Question</b>	<b>Vendor Response (respond to questions that are applicable to the application or service provided)</b>	<b>IT Assessment of Acceptability (responses may include acceptable, more information needed, or N/A -- not applicable)</b>
Can your service organization provide its most recent Service Organization Control (SOC) 1 Report, related to design and effectiveness of financial reporting controls? If so, please forward. A SOC 1 Report is a report on controls at a service organization which are relevant to user entities' internal control over financial reporting.		
Can your organization provide its most recent Service Organization Control (SOC) 2 report, related to design and operating effectiveness of a service organization's controls, performed in accordance with AT 101 and based upon the Trust Services Principles? If so, please forward.		

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<b>Part 1.8 Technical and Customer Support</b>		
<i>Please provide links, description of available technical and customer support resources</i>		
Question	Vendor Response (respond to questions that are applicable to the application or service provided)	IT Assessment of Acceptability (responses may include acceptable, more information needed, or N/A -- not applicable)
Is free customer (tier 1) support included in your standard license agreement?		
What is the customer (tier1) support desk's days / hours of operation?		
Is technical support (tier 2) included in your standard license agreement?		
What is the technical (tier 2) support desk's days / hours of operation?		
Does the application or service include a web-based support site, for answers to technical questions?		
In the event of an interruption of your service, what is your process for notifying customer operations of the circumstances of the interruption or outage and the expected recovery time		
Do you have a transparent, public site where you publish any system issues or outages for everyone to see?		
Is there a disaster recovery strategy in place? How frequently is it tested?		