

**THIS PRINT COVERS CALENDAR ITEM NO.: 11**

**SAN FRANCISCO  
MUNICIPAL TRANSPORTATION AGENCY**

**DIVISION:** Transit

**BRIEF DESCRIPTION:**

Authorizing the Director of Transportation to execute Contract No. SFMTA-2025-23-LOC to procure three 40-ft and three 60-ft battery-electric transit buses from Solaris Bus US, Inc., along with associated spare parts, special tools, manuals, and training through assigned options established under a procurement conducted by King County Metro, for an amount not to exceed \$9,964,706 and a term until December 19, 2027, with options to extend it to December 19, 2029.

**SUMMARY:**



- In 2013, the SFMTA began a transformative fleet replacement program by purchasing 112 40-ft hybrid electric buses which are reaching the end of their 12-year useful life.
- On November 7, 2023, the SFMTA Board of Directors approved the revised Zero Emission Vehicle Policy, which allows for the acquisition of battery electric buses as part of the Zero Emission Rollout Plan.
- Under Administrative Code Section 21.16(b), the SFMTA may utilize procurements conducted by other public agencies to make purchases of commodities or services for the use of the City under the terms established in those procurements.
- On December 20, 2024, King County Metro awarded Contract SOL24-1 to Solaris Bus US, Inc. (Solaris) for the procurement of 40-ft and 60-ft battery-electric buses.
- On July 28, 2025, King County Metro assigned the SFMTA options under its contract with Solaris to purchase three 40-foot and three 60-foot battery-electric transit buses.
- SFMTA staff have negotiated an agreement with Solaris using those options to purchase battery-electric transit buses and related spare parts, special tools, manuals, and training.
- Solaris manufactures the buses in Poland, but is setting up manufacturing facilities in the United States in connection with the King County Metro Contract. The project relies on local funding provided by RM3 (bridge toll), Prop L (sales tax), Low Carbon Fuel Standard (LCSF), and operating funds committed in the prior year.

**ENCLOSURES:**

1. SFMTA Board Resolution
2. July 10, 2025, Piggyback Justification Memo signed by Director of Transportation
3. Contract No. SFMTA-2025-23-LOC with Solaris
4. Assignment Agreement between the SFMTA, King County Metro, and Solaris

**APPROVALS:**

**DATE**

DIRECTOR	 _____	July 30, 2025 _____
SECRETARY	 _____	July 30, 2025 _____

**ASSIGNED SFMTAB CALENDAR DATE:** August 5, 2025

**PURPOSE**

The purpose of this calendar item is to authorize the Director of Transportation to execute Contract No. SFMTA-2025-23-LOC to procure three 40-ft and three 60-ft battery-electric transit buses from Solaris Bus US, Inc., along with associated spare parts, special tools, manuals, and training through assigned options established under a procurement conducted by King County Metro, for an amount not to exceed \$9,964,706 and a term until December 19, 2027, with options to extend it to December 19, 2029.

**STRATEGIC PLAN GOALS AND TRANSIT FIRST POLICY PRINCIPLES**

- Goal 5: Deliver reliable and equitable transportation services.
- Goal 6: Eliminate pollution and greenhouse gas emissions by increasing use of transit, walking, and bicycling.
- Goal 8: Deliver quality projects on-time and on-budget.
- Goal 9: Fix things before they break and modernize systems and infrastructure.
- Goal 10: Position the agency for financial success.

This action supports the following SFMTA Transit First Policy Principles:

1. To ensure quality of life and economic health in San Francisco, the primary objective of the transportation system must be the safe and efficient movement of people and goods.
2. Public transit, including taxis and vanpools, is an economically and environmentally sound alternative to transportation by individual automobiles. Within San Francisco, travel by public transit, by bicycle and on foot must be an attractive alternative to travel by private automobile.
8. New transportation investment should be allocated to meet the demand for public transit generated by new public and private commercial and residential developments.
10. The City and County shall encourage innovative solutions to meet public transportation needs wherever possible and where the provision of such service will not adversely affect the service provided by the Municipal Railway.

**DESCRIPTION**

The SFMTA has been a leader in supporting sustainable, reduced or zero emission revenue transit vehicles. The agency currently operates the largest fleet of zero emission electric trolley vehicles in North America, running on 100% greenhouse gas-free (GHG) electricity, and has replaced 100% of its older diesel buses with cleaner, more efficient diesel electric hybrid vehicles fueled with renewable diesel. These electric hybrid vehicles offer lower fuel consumption, decreased engine idling time while in service, and a substantial reduction in emissions.

On November 7, 2023, the SFMTA Board of Directors approved Resolution No. 231107-092

which established an updated Zero Emission Vehicle Policy which commits to procure zero-emissions vehicles to replace the SFMTA's hybrid electric buses, with a goal of achieving a 100% zero-emission fleet in compliance with the Innovative Clean Transit (ICT) regulation of the California Air Resource Board (CARB).

The SFMTA began a transformative fleet replacement program by purchasing 112 40-ft hybrid electric buses in 2013. These buses are reaching the end of their 12 years of useful life. The original intention was to replace these vehicles with zero-emission vehicles, but project complexities, such as funding and PG&E coordination, delayed progress on the facility upgrades required to charge zero-emission vehicles. As a result, the SFMTA needs to purchase 18 battery-electric vehicles along with the 94 hybrid vehicles to keep the fleet in an overall state of good repair during the transition to a 100% zero-emission fleet.

The 18 battery-electric vehicle procurement will consist of 12 40-ft battery-electric buses (five from Gillig, four from New Flyer of America, and three from Solaris Bus US, Inc. [Solaris]) and six 60-ft battery-electric buses (three from New Flyer of America, and three from Solaris). Buses from New Flyer and Gillig are being procured as part of one fleet project (FT110), whereas buses from Solaris will be procured through a separate fleet project (FT117). The SFMTA will have charging infrastructure available for 18 battery-electric buses by the end of 2026. The three 60-ft New Flyer battery-electric buses will be the SFMTA's first articulated battery-electric buses. The SFMTA intends to incorporate lessons learned from these articulated battery-electric buses in future large-scale procurements. We anticipate procuring a combination of low and zero-emission vehicles through 2031.

On December 20, 2024, King County Metro awarded Contract SOL24-1 to Solaris for the procurement of 40-ft and 60-ft battery-electric buses. The specifications of the buses in the King County Metro agreement are broad enough to allow the SFMTA to use it to purchase vehicles that meet the agency's needs.

Under San Francisco Administrative Code section 21.16(b) and Charter section 8A.102(b)1, the SFMTA may use the procurement process of any other public agency when the Director of Transportation makes a determination that the other agency's procurement process was competitive or the result of a proper sole source award, and the use of the other agency's procurement would be in the City's best interests.

On July 10, 2025, the Director of Transportation signed a Piggyback Justification memorandum determining that King County Metro's procurement was the result of an appropriate sole source award, and the use of that procurement would be in the City's best interests. The Director concluded that the King County Metro agreement achieved a fair and reasonable price for the buses, and using King County Metro's purchasing agreement would significantly reduce the SFMTA's administrative costs for the acquisition by avoiding the cost in money and time of issuing a stand-alone request for proposals for the SFMTA's requirements.

On July 28, 2025, the SFMTA entered into an agreement with King County Metro for the assignment of options under their contract with Solaris. The assignment agreement gave the SFMTA the right to purchase three 40-ft and three 60-ft battery electric buses.

Staff entered negotiations with Solaris and are now recommending the award of the contract to the bus manufacturer for three 40-ft and three 60-ft battery-electric transit buses from Solaris, along with associated spare parts, special tools, manuals, and training. The negotiations included various enhancements to the basic bus, including SFMTA's technology package (e.g., signal priority, video cameras, passenger counters), digital side mirrors, flush-mounted and tinted windows, USB charging ports, an enhanced operator safety barrier, and an upgraded wheelchair ramp. The inclusion of these enhancements did not impact the SFMTA's ability to take advantage of the competitive price for the base model bus established through the King County Metro agreement. The SFMTA's contract with Solaris would expire on December 19, 2027, as this is the expiration date for the original purchasing agreement between Solaris and King County Metro, but also includes two one-year options that could extend the term of the contract to December 19, 2029.

Solaris is a prominent manufacturer of transit buses in Europe, and they have signaled their intent to establish a bus manufacturing facility in the United States, focusing on zero-emission buses, including battery-electric buses and electric trolley buses. It is imperative that the SFMTA identify and establish relationships that can help increase the number of manufacturers who can produce electric trolley buses in the United States, and this proposed procurement could lay the foundation for future procurements of electric trolley buses from Solaris.

## **STAKEHOLDER ENGAGEMENT**

Within the SFMTA, Fleet Engineering staff worked with Transit Operators and Union Leadership, Vehicle Maintenance Personnel, Accessible Services, IT, and Transit Planning. SFMTA received positive feedback from various stakeholders with new flush mounted and tinted windows, spacious seating configuration, operator barrier, and upgraded wheelchair ramp.

## **ALTERNATIVES CONSIDERED**

The alternative to purchasing new buses would be to rehabilitate the existing fleet to extend the lives of 18 diesel-hybrid buses beyond their 12-year useful life. However, this would lead to additional breakdowns and poorer customer experience, along with higher maintenance costs to maintain the equipment. Replacing the buses with zero-emission battery-electric buses also reduces emissions and provides a quiet riding experience for customers.

In view of the above, the best alternative available to the SFMTA is to purchase new battery-electric transit buses to replace its fleet of aging buses.

SFMTA staff considered the alternative of conducting independent procurement for the battery-electric buses. After weighing the benefits and costs of a separate procurement compared to those of placing an order utilizing the King County Metro purchasing agreement, the Director of Transportation determined in July 2025 that using the King County Metro agreement is in the best interests of the SFMTA, as described above.

## **FUNDING IMPACT**

Funding for this project is projected to be provided by capital funds: RM3 (bridge toll), LCFS,

Prop L (sales tax), and operating funds committed in a prior year.

A budget of \$13.9M has been allocated for this project, and sources for the funds have been identified. The budget includes the cost of the buses, spare parts, special tools, manuals, training, and telematics licenses, taxes, project engineering, maintenance support and consultant support.

The following is the detailed project budget and funding sources:

<b>Solaris Contract</b>	<b>Cost</b>
Three 40-ft Battery-Electric Buses	\$4,218,588
Three 60-ft Battery-Electric Buses	\$5,576,118
Spare Parts	\$30,000
Training & Training Kits	\$50,000
Special Tools	\$30,000
Allowance for potential regulatory changes and other vehicle enhancements	\$60,000
<b>Subtotal Solaris Contract</b>	<b>\$9,964,706</b>

<b>Solaris Other Associated Cost Items (estimated)</b>	<b>Cost</b>
Tax (8.625%)	\$855,143
Planning & Preliminary Engineering	\$184,391
Detail Design	\$1,106,348
Construction Management including Onsite Support	\$1,833,399
<b>Other Solaris Subtotal Associated Cost</b>	<b>\$3,979,281</b>

<b>Solaris Total Cost</b>	<b>\$13,943,987</b>
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The total amount of funding for this project is outlined in the table below.

**Financial Plan**

<b>Project Funding Source</b>	<b>Amount</b>
CCSF-LCFS-FY22	\$191,982
MTC RM3 FY24	\$3,702,976
SFCTA Prop L	\$10,000,000
Operating Funds, committed in a prior year	\$49,030
<b>Total Funding for this Project</b>	<b>\$13,943,988</b>

**ENVIRONMENTAL REVIEW**

On July 15, 2025, the SFMTA, under authority delegated by the Planning Department, determined that Contract No. SFMTA-2025-23-LOC is not a “project” under the California Environmental Quality Act (CEQA) pursuant to Title 14 of the California Code of Regulations Sections 15060(c) and 15378(b).

**PAGE 6.**

A copy of the CEQA determination is on file with the Secretary to the SFMTA Board of Directors and is incorporated herein by reference.

**OTHER APPROVALS RECEIVED OR STILL REQUIRED**

The Contract Compliance Office has waived the Local Business Enterprise goal for this project due to the specialized nature of the work and lack of subcontracting opportunities.

This contract will require approval from the Board of Supervisors, as the total anticipated expenditures by the City and County of San Francisco on the contract is over \$10,000,000.

The City Attorney's Office has reviewed this calendar item.

**RECOMMENDATION**

Staff recommends that the SFMTA Board approve the request to authorize the Director of Transportation to execute Contract No. SFMTA-2025-23-LOC to procure three 40-ft and three 60-ft battery-electric transit buses from Solaris Bus US, Inc., along with associated spare parts, special tools, manuals, and training through assigned options established under a procurement conducted by King County Metro, for an amount not to exceed \$9,964,706, and a term until December 19, 2027, with options to extend it to December 19, 2029.

SAN FRANCISCO  
MUNICIPAL TRANSPORTATION AGENCY  
BOARD OF DIRECTORS

RESOLUTION No. \_\_\_\_\_

WHEREAS, In 2013, the SFMTA began a transformative fleet replacement program by purchasing 112 40-ft hybrid electric buses. These buses are reaching the end of their 12 years of useful life; and

WHEREAS, On November 7, 2023, the SFMTA Board of Directors approved Resolution No. 231107-092 which established an updated Zero Emission Vehicle Policy that commits to procure zero-emissions vehicles to replace the SFMTA's hybrid electric buses, with a goal of achieving a 100% zero-emission fleet in compliance with the Innovative Clean Transit (ICT) regulation of the California Air Resource Board (CARB); and

WHEREAS, On December 20, 2024, King County Metro awarded Contract SOL24-1 to Solaris Bus US, Inc. for the procurement of 40-ft and 60-ft battery-electric buses; and

WHEREAS, Under S.F. Administrative Code Section 21.16(b), the SFMTA may utilize the sole-source procurement of any other public agency to make purchases of commodities under the terms established in that agency's procurement process upon a finding that the procurement is in the City's best interests, and the Director of Transportation made that finding on July 10, 2025, about King County Metro's Contract SOL24-1 with Solaris Bus US, Inc.; and

WHEREAS, On July 28, 2025, the SFMTA entered into an assignment agreement with King County Metro that assigned options under their contract with Solaris Bus US, Inc., that gave the SFMTA the right to purchase three 40-ft and three 60-ft battery electric buses; and

WHEREAS, SFMTA staff has negotiated an agreement with Solaris Bus US, Inc. under the King County Metro sole-source purchasing agreement to purchase three 40-ft and three 60-ft battery-electric transit buses, along with associated spare parts, special tools, manuals; and

WHEREAS, Funding for this project will be provided by RM3 (bridge toll), Prop L, LCFS, and General Funds; and

WHEREAS, On July 15, 2025, the SFMTA, under authority delegated by the Planning Department, determined that Contract No. SFMTA-2025-23-LOC, is not a "project" under the California Environmental Quality Act (CEQA) pursuant to Title 14 of the California Code of Regulations Sections 15060(c) and 15378(b); and

WHEREAS, A copy of the CEQA determination is on file with the Secretary to the SFMTA Board of Directors, and is incorporated herein by reference; and

WHEREAS, The Contract Compliance Office (CCO) reviewed the RFP for this Project; due to the specialized nature of the work and lack of subcontracting opportunities, CCO waived the LBE goal; and

WHEREAS, The agreement with Solaris Bus US, Inc. will require approval from the Board of Supervisors, as is the anticipated expenditures on the contract by the City and County of San Francisco are over \$10,000,000; now, therefore, be it

RESOLVED, That the San Francisco Municipal Transportation Agency Board of Directors authorizes the Director of Transportation to execute Contract No. SFMTA-2025-23-LOC with Solaris Bus US, Inc. to three 40-ft and three 60-ft battery-electric transit buses, along with associated spare parts, special tools, manuals, and training through assigned options established under a procurement conducted by King County Metro, for an amount not to exceed \$9,964,706, and a term until December 19, 2027, with options to extend to December 19, 2029.; and, be it further

RESOLVED, That the San Francisco Municipal Transportation Agency Board of Directors commends this matter to the Board of Supervisors for its approval of Contract No. SFMTA-2025-23-LOC.

I certify that the foregoing resolution was adopted by the San Francisco Municipal Transportation Agency Board of Directors at its meeting of August 5, 2025.

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Secretary to the Board of Directors  
San Francisco Municipal Transportation Agency



**City and County of San Francisco  
Municipal Transportation Agency  
One South Van Ness Ave., 7<sup>th</sup> Floor  
San Francisco, California 94103**

**Agreement between the City and County of San Francisco and**

**Solaris Bus US Inc.**

**Contract No. SFMTA-2025-23-LOC**

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**Municipal Transportation Agency  
One South Van Ness Ave., 7<sup>th</sup> Floor  
San Francisco, California 94103**

**Agreement between the City and County of San Francisco, a municipal corporation, acting  
by and through its Municipal Transportation Agency (“SFMTA”)**

**and**

**Solaris Bus US Inc., a Delaware corporation**

**Contract No. SFMTA-2025-23-LOC**

This Agreement is made as of \_\_\_\_\_, in the City and County of San Francisco (“City”), State of California, by and between Solaris Bus US Inc., a Delaware corporation (“Contractor”), and City, a municipal corporation, acting by and through its Municipal Transportation Agency (“SFMTA”).

**Recitals**

**A.** The SFMTA wishes to procure 3 40-foot and 3 60-foot Battery Electric Buses and parts from Contractor; and

**B.** Under San Francisco Administrative Code Section 21.16(b), the SFMTA may utilize the competitive procurement process of any other public agency to make purchases of commodities under the terms established in that agency's competitive procurement process upon a finding that the procurement is in the City’s best interests.

**C.** On December 20, 2024, King County Metro Transit Department (“King County Metro”) and Contractor entered into Contract SOL24-1, Sole Source Solaris Procurement – Manufacture and Delivery of 60’ and 40’ Heavy Duty Electric Buses (“Contract SOL24-1”), which was procured under the procedure authorizing sole source procurements in [ADD REFERENCE TO WA STATUTES AND REGULATIONS]; and

**D.** Contract SOL24-1 at page B-1 contains option quantities to purchase up to six (6) additional 40-foot battery electric buses and up to six (6) additional 60-foot battery electric buses; and

**E.** Contract SOL24-1, Change Order No. 1A was executed on April 23, 2025, which served as an ordering instrument for two (2) 40-foot and two (2) 60-foot battery electric buses.

**F.** King County Metro, the City and the Contractor have entered into a tri-party agreement to transfer option quantities from Contract SOL24-1 to the City to purchase 3 (three) 40-foot and 3 (three) 60-foot Battery Electric Buses; and

**G.** Under the authority of San Francisco Administrative Code section 21.16(b), the SFMTA seeks to exercise those options through the execution of this agreement; and

**H.** The SFMTA has requested various optional features for the buses and has negotiated with Contractor the price for these features on a cost basis, in accordance with Contract SOL 24-



1. Contractor has also agreed to additional terms and conditions as consideration for this Agreement; and

**I.** The SFMTA finds that this procurement is in the City’s best interests; and

**J.** Contractor represents and warrants that it is qualified to deliver the Goods required by City as set forth under this Agreement; and

**K.** The SFMTA has authorized acquisition of the Battery Electric Buses through a sole source procurement; and

**L.** The Local Business Enterprise (LBE) subcontracting participation requirement of Chapter 14B of the San Francisco Administrative Code has been waived for this contract; and

Now, THEREFORE, the parties agree as follows:

### **Article 1      Definitions**

The following definitions apply to this Agreement:

**1.1**      “**Acceptance**” means the formal written acceptance by the City that all Goods and Services, or a specific portion thereof, under the Contract has been satisfactorily completed.

**1.2**      “**Agreement**” or “**Contract**” means this contract document, including all attached appendices, any future amendments, and all applicable City Ordinances and Mandatory City Requirements specifically incorporated into this Agreement by reference as provided herein.

**1.3**      “**Buses**” or “**Coaches**” or “**Vehicles**” means the vehicles procured under this Contract.

**1.4**      “**CCO**” means the SFMTA Contract Compliance Office.

**1.5**      “**City**” or “**the City**” means the City and County of San Francisco, a municipal corporation, acting by and through its Municipal Transportation Agency.

**1.6**      “**City Data**” means that data as described in Article 14 of this Agreement which includes, without limitation, all data collected, used, maintained, processed, stored, or generated by or on behalf of the City in connection with this Agreement. City Data includes, without limitation, Confidential Information.

**1.7**      “**Conditional Acceptance**” means the circumstances in which a Bus has been delivered to the SFMTA and placed in revenue service despite not having met all requirements for Acceptance.

**1.8**      “**Confidential Information**” means confidential City information including, but not limited to, personally-identifiable information (“PII”), protected health information (“PHI”), or individual financial information (collectively, “Proprietary or Confidential Information”) that is subject to local, state or federal laws restricting the use and disclosure of such information, including, but not limited to, Article 1, Section 1 of the California Constitution; the California Information Practices Act (Civil Code § 1798 et seq.); the California Confidentiality of Medical

Information Act (Civil Code § 56 et seq.); the federal Gramm-Leach-Bliley Act (15 U.S.C. §§ 6801(b) and 6805(b)(2)); the privacy and information security aspects of the Administrative Simplification provisions of the federal Health Insurance Portability and Accountability Act (45 CFR Part 160 and Subparts A, C, and E of part 164); and San Francisco Administrative Code Chapter 12M (Chapter 12M).

**1.9** “**Contractor**” means Solaris Bus US, Inc., a Delaware corporation.

**1.10** “**Controller**” means the Controller of the City.

**1.11** “**Correction**” means the elimination of a Defect.

**1.12** “**Day**” (whether or not capitalized) means a calendar day, unless otherwise designated.

**1.13** “**Defect**” means any patent or latent malfunctions or failures in manufacture or design of any component or subsystem.

**1.14** “**Deliverables**” means Contractor’s or its Subcontractors’ work product or Goods, including any partially-completed work product, Goods and related materials, provided by Contractor to City during the course of Contractor’s performance of the Agreement.

**1.15** “**Director of Transportation**” means the Director of Transportation of the SFMTA or his or her designee.

**1.16** “**Effective Date**” means the date upon which the City’s Controller certifies the availability of funds for this Agreement as provided in Section 3.1.1.

**1.17** “**Goods**” or “**Commodities**” means the products, materials, equipment or supplies to be provided by Contractor under this Agreement.

**1.18** “**Mandatory City Requirements**” means those City laws set forth in the San Francisco Municipal Code, including the duly authorized rules, regulations, and guidelines implementing such laws that impose specific duties and obligations upon Contractor.

**1.19** “**Party**” and “**Parties**” mean the City and Contractor either collectively or individually.

**1.20** “**Project Manager**” means the project manager assigned to the Contract for the SFMTA, or his or her designated agent.

**1.21** “**Resident Inspector**” means any inspector or inspectors who may be assigned by the SFMTA Project Manager for the inspection of Goods to be provided under this Contract.

**1.22** “**San Francisco Municipal Transportation Agency**” or “**SFMTA**” means the agency of City with jurisdiction over surface transportation in San Francisco, as provided under Article VIIIA of the City’s Charter.

**1.23** “**Services**” means the work performed by Contractor under this Agreement as specifically described in Appendix A, Contract SOL24-1 By and Between King County Metro

and Solaris Bus US, Inc., including all services, labor, supervision, materials, equipment, actions and other requirements to be performed and furnished by Contractor under this Agreement.

**1.24 “Subcontractor” or “Supplier”** means any firm under contract to the Contractor for services under this Agreement.

**1.25 “Technical Specifications”** means the specifications, provisions, and requirements that detail the Goods and the materials, products (including the assembly and testing), and other requirements relative to the manufacturing and construction of the Goods contained in the following documents:

- Appendix A: Exhibit A-1 – Contract SOL24-1 Technical Specification
- Appendix G: SFMTA’s Technical Specifications
- Appendix H: Solaris Options and Technical Exceptions Accepted by the SFMTA.

**1.26 “Working Days”** means those Days during which regular business is conducted, excluding Saturdays, Sundays, and all Federal, State, and municipal holidays that are observed by the SFMTA during the duration of the Contract.

## **Article 2 Term of the Agreement**

**2.1** The term of this Contract is expected to be until December 19, 2027, subject to the termination clauses contained herein. The City reserves the right to extend the term if determined to be in the best interest of the City. Ability by the City to extend shall be in 1-year increments, not to exceed a total contract timeline of 5 years.

## **Article 3 Financial Matters**

### **3.1 Certification of Funds; Budget and Fiscal Provisions**

**3.1.1 Termination in the Event of Non-Appropriation.** This Agreement is subject to the budget and fiscal provisions of the City’s Charter. Charges will accrue only after prior written authorization certified by the Controller in the form of a Purchase Order, and the amount of City’s obligation hereunder shall not at any time exceed the amount certified for the purpose and period stated in such advance authorization. This Agreement will terminate without penalty, liability or expense of any kind to City at the end of any fiscal year if funds are not appropriated for the next succeeding fiscal year. If funds are appropriated for a portion of the fiscal year, this Agreement will terminate, without penalty, liability or expense of any kind at the end of the term for which funds are appropriated. City has no obligation to make appropriations for this Agreement in lieu of appropriations for new or other agreements. City budget decisions are subject to the discretion of the Mayor and the Board of Supervisors. Contractor’s assumption of risk of possible non-appropriation is part of the consideration for this Agreement.

**THIS SECTION CONTROLS AGAINST ANY AND ALL OTHER PROVISIONS OF THIS AGREEMENT.**

**3.1.2 Guaranteed Maximum Costs.** The City’s payment obligation to Contractor cannot at any time exceed the amount certified by City’s Controller for the purpose and period stated in such certification. Absent an authorized emergency per the City’s Charter or applicable Code, no City representative is authorized to offer or promise, nor is the City required to honor, any offered or promised payments to Contractor under this Agreement in excess of the certified maximum amount without the Controller having first certified the additional promised amount and the Parties having modified this Agreement as provided in Section 11.5 “Modification of this Agreement”.

**3.2 Authorization to Commence Work.** Contractor shall not commence any work under this Agreement until City has issued formal written authorization to proceed, such as a purchase order, task order or notice to proceed. Such authorization may be for a partial or full scope of work.

### **3.3 Compensation**

#### **3.3.1 Calculation of Charges and Contract Not to Exceed Amount.**

Contractor shall provide to the SFMTA an invoice pursuant to the Schedule set out in Appendix J (Payment Milestones). Compensation shall be made for Goods and Services identified in the invoice that the Director of Transportation, or his or her designee, in his or her sole discretion, concludes have been satisfactorily delivered or performed. In no event shall the amount of this Agreement exceed nine million, nine hundred and sixty-four thousand, seven hundred and six Dollars (\$9,964,706), the breakdown of which appears in Appendix B, Calculation of Charges, Schedule 1 – Schedule of Prices. In no event shall the City be liable for interest or late charges for any late payments. City will not honor minimum service order charges under this Agreement.

#### **3.3.2 Tariff-Based Price Adjustment**

**(a) Contractor Notice of Start of Production of the Buses.** After having received the authorization to commence work under Section 3.2 of this Agreement, Contractor shall establish the date when it will begin the manufacture of the Buses to be delivered under this contract, and it will provide notice of that date to City under Section 11.1, Notices to the Parties. If the scheduled start date of production changes after the initial notice, Contractor will provide notice of the new date as soon as practicable after the date changes.

#### **(b) Contractor Request for Tariff-Based Price Adjustment.**

Contractor may request a Tariff-Based Price Adjustment no earlier than 100 Days and no later than 90 Days before the noticed date of the beginning of production. In the request, Contractor will provide the City with the following documentation: (1) a description of any specific tariff that Contractor seeks the City to reimburse Contractor for new tariff(s) through a Tariff-Based Price Adjustment; (2) a description of the history of that tariff from the date of King County Metro’s contract award until the submission of the documentation, and any public announcements of anticipated future changes to that tariff; and (3) documentation, including when possible shipping documents, invoices, receipts, and charges by governmental authorities,

that shows how that tariff has been applied to other Contractor buses during the period after the date this Agreement was awarded.

**(c) Negotiation of the Tariff-Based Price Adjustment.** Based on the information provided in the Contractor request and taking into account market conditions, the likelihood of future tariff changes, and the availability and price of domestically manufactured versions of the buses, the SFMTA and Contractor will enter into negotiations for a Tariff -Based Price Adjustment. A Tariff-Based Price Adjustment may include a change in the price of the contract, or the number of vehicles to be delivered, or both. Any Tariff-Based Price Adjustment will be implemented through a modification under Section 11.5, Modification of this Agreement. If the Parties are unable to reach an agreement on a Tariff Adjustment, the City will terminate this contract for convenience under the provisions of Section 8.1.1, Termination for Convenience, at no cost to either Party.

**3.3.3 Payment Limited to Satisfactory Delivery of Goods and Services.** Contractor is not entitled to any payments until the SFMTA approves the Goods and Services delivered. Payments to Contractor by City shall not excuse Contractor from its obligation to replace the unsatisfactory delivery of Goods and Services, even if the unsatisfactory character was apparent or could have been detected at the time such payment was made. Non-conforming Goods and Services may be rejected by City and in such case must be replaced by Contractor without delay at no cost to the City.

**3.3.4 Withhold Payments.** If Contractor fails to provide Goods in accordance with Contractor's obligations under this Agreement, the City may withhold any and all payments due Contractor until such failure to perform is cured. Contractor shall not stop work as a result of City's withholding of payments, as provided herein.

**3.3.5 Invoice Format.** Invoices submitted by Contractor under this Agreement must be in a form acceptable to the City's Controller and the SFMTA, and include a unique invoice number and a specific invoice date. Payment shall be made by City as specified in Section 3.3.9, or in such alternate manner as the Parties have mutually agreed upon in writing. All invoices must show the PeopleSoft Purchase Order ID Number, PeopleSoft Supplier Name and ID, Item numbers (if applicable), complete description of Goods delivered (including manufacturer name, manufacturer SKU, and product description), sales/use tax (if applicable), unit cost, unit of measure, quantities, extended cost, and contract payment terms. Where Contractor's pricing is based on a percentage mark-up or discount over manufacturer's list price, invoices must also include the manufacturer list price and Contractor's percentage mark-up or discount over manufacturer's list price. Where Contractor's pricing is based on a percentage mark-up over cost, invoices must also include Contractor's cost and Contractor's percentage mark-up over Contractor's cost. Invoices that do not include all required information or contain inaccurate information will not be processed for payment.

**3.3.6 Reserved. (LBE Payment and Utilization Tracking System)**

### **3.3.7 Getting Paid by the City for Goods and Services**

(a) The City utilizes a commercial product through its banking partner to pay City contractors electronically. Contractors shall sign up to receive electronic payments to be paid under this Agreement. To sign up for electronic payments, visit [SF City Partner at sfgov.org](https://sfcitypartner.sfgov.org).

(b) At the option of City, Contractor may be required to submit invoices directly in the City's financial and procurement system. Refer to <https://sfcitypartner.sfgov.org/pages/training.aspx> for more information.

### **3.3.8 Reserved. (Grant Funded Contracts)**

### **3.3.9 Payment Terms**

(a) **Payment Due Date.** Unless the SFMTA notifies the Contractor that a dispute exists, Payment shall be made within 30 Days, measured from (1) the delivery of Goods and Services or (2) the date of receipt of the invoice, whichever is later. Payment is deemed to be made on the date on which City has issued a check to Contractor or, if Contractor has agreed to electronic payment, the date on which City has posted electronic payment to Contractor.

### **(b) Reserved. (Payment Discount Terms)**

**3.4 Audit and Inspection of Records.** Contractor agrees to maintain and make available to the City, to the extent allowed by EU General Data Protection Regulation, during regular business hours, accurate books and accounting records relating to its Goods. Contractor will permit City to audit, examine and make copies of such books and records, and to make audits of all invoices, materials, payrolls, records or personnel and other data related to all other matters covered by this Agreement, whether funded in whole or in part under this Agreement. Contractor shall maintain such data and records in an accessible location and condition for a period of not less than five years after final payment under this Agreement or until after final audit has been resolved, whichever is later. The State of California or any Federal agency having an interest in the subject matter of this Agreement shall have the same rights as conferred upon City by this Section. Contractor shall include the same audit and inspection rights and record retention requirements in all subcontracts.

**3.5 Submitting False Claims.** The full text of San Francisco Administrative Code Section 21.35, including the enforcement and penalty provisions, is incorporated into this Agreement. Any contractor or subcontractor who submits a false claim shall be liable to City for the statutory penalties set forth in that section.

### **3.6 Reserved. (Payment of Prevailing Wages).**

## **Article 4 Goods and Services**

### **4.1 Reserved. (Primary and Secondary Contractors)**

**4.2 Reserved. (Term Agreement – Indefinite Quantities)**

**4.3 Qualified Personnel.** Contractor represents and warrants that it is qualified to deliver the Goods required by City, and that all Goods will be delivered by competent personnel with the degree of skill and care required by current and sound professional procedures and practices. Contractor will comply with the City’s reasonable requests regarding assignment and/or removal of personnel, but all personnel, including those assigned at City’s request, must be supervised by Contractor. Contractor shall commit sufficient resources for timely completion within the project schedule.

**4.4 Independent Contractor.** For the purposes of this Section 4.4, “Contractor” shall be deemed to include not only Contractor, but also any agent or employee of Contractor. Contractor acknowledges and agrees that at all times, Contractor or any agent or employee of Contractor shall be deemed to be an independent contractor and is wholly responsible for the manner in which it delivers the Goods and Services required by this Agreement.

**4.5 Goods**

**4.5.1 Awarded Goods.** The Goods to be provided under this contract are described in the pricing sheets in Appendix B, and are further defined in Contract SOL24-1 By and Between King County Metro and Solaris Bus US, Inc., which is incorporated into this Agreement through Appendix A, SFMTA’s Technical Specifications in Appendix G, and the Solaris Options and Technical Exceptions Accepted by the SFMTA in Appendix H. All Goods provided by the Contractor shall conform with the Technical Specifications in Appendix A as supplemented by Appendices G and H, and shall be delivered according to the Project Delivery Schedule (Appendix I). This Agreement is subject to the terms and conditions of Contract SOL24-1, and is intended to supplement, but not change or otherwise modify the terms and conditions set forth in Appendix A. Officers and employees of the City are not authorized to request, and the City is not required to reimburse the Contractor for, Goods beyond the Goods described in Appendix B and the Technical Specifications unless the Contract is modified as provided in Section 11.5 (Modification of this Agreement).

**4.5.2 Spare Parts.** The total Contract amount includes an allowance of \$30,000 for spare parts, as per Schedule 1 of Appendix B. The City may choose to purchase spare parts from the Contractor at its sole discretion from a list of spare parts to be included in Schedule 1A of Appendix B to be agreed upon before delivery of the first Bus. The pricing of spare parts will be based on Contract SOL24-1 section B.4.06.07.03. The City reserves the right to purchase spare parts that are not included in Schedule 1A from the Contractor. The prices for spare parts listed in Schedule 1A shall be valid for at least two years from the Effective Date. Spare parts shall be delivered within 120 Days after the SFMTA provides written notice of intent to acquire the specified parts.

**4.5.3 Special Tools.** The total Contract amount includes an allowance of \$30,000 for special tools, as per Schedule 1 of Appendix B. The City may choose to purchase

special tools from the Contractor at its sole discretion from a list of special tools to be included in Schedule 1B of Appendix B to be agreed upon before delivery of the first Bus. The pricing of special tools will be based on Contract SOL24-1 section B.4.06.07.03. Proprietary tools and noncompetitive tools will be considered sole source parts requiring cost/price justification. The City reserves the right to purchase special tools that are not included in Schedule 1B from the Contractor. The prices for special tools listed in Schedule 1B shall be valid for at least two years from the Effective Date.

**4.5.4 Cancellation of Goods.** If during the term of the Agreement, a contract item is determined to be unacceptable for a particular use, and such is documented by the SFMTA and as determined by SFMTA Purchasing, Contractor agrees that the item will be canceled and removed from the Agreement without penalty to the City. The City's sole obligation to Contractor is payment for deliveries made prior to the cancellation date. The City shall give Contractor ten Days' notice prior to any cancellation.

**4.5.5 Place of Manufacture.** No article furnished hereunder shall have been made in prison or by convict labor, except Goods purchased for use by City's detention facilities. Exclusively in relation to any article suspected to have been made in prison or by convict labor, the City may require Contractor to provide within seven (7) business days from the date they are requested to do so, information and documentation requested by Purchaser, including but not limited to: sources of supply, distribution, dealership or agency agreements and authorizations from manufacturer(s) they claim to represent, lines of credit with financial institutions for manufacturer(s) they claim to represent, lines of credit with financial institutions and suppliers, numbers of employees, trade references and any other information to determine Contractor's fitness to supply the Agreement requirements. In lieu of the above said documentation, the Contractor shall be allowed to furnish a (sworn) statement from the manufacturer that no Goods have been made in prison or by convict labor, except Goods purchased for use by City's detention facilities.

**4.5.6 Electrical Products.** Goods must comply with all applicable laws, ordinances and other legal requirements, including (among others) the Cal-OSHA regulations in Title 8 of the Code of Regulations and, for electrical products, Sections 110.2 and 110.3 (B) of the S.F. Electrical Code.

**4.5.7 Condition of Goods.** Goods offered and furnished must be new and previously unused, and of manufacturer's latest model, unless otherwise specified herein. Contractor shall establish quality control measures, as applicable to department's operations, and promptly provide documented reports to City of any product defects or premature failures.

**4.5.8 Inspection.** All Goods supplied shall be subject to inspection and acceptance or rejection by Purchasing or any department official responsible for inspection. Non-conforming or rejected Goods may be subject to reasonable storage fees.



**4.5.9 Delivered Duty Paid (DDP).**: DDP to any destination within the City of San Francisco named in a Purchase Order issued by City against this Agreement. *The cost of shipment must be incorporated into the offered unit costs.*

**4.5.10 Failure to Deliver.** If Contractor fails to deliver Goods the City may terminate the Agreement for default.

**4.5.11 Safety Data Sheets.** Where required by law or by City, Contractor will include Safety Data Sheets (SDSs) with delivery for applicable items. Failure to include the SDSs for such items will constitute a material breach of contract and may result in refusal to accept delivery.

**4.5.12 Warranty for Goods.** Contractor warrants to City that the manufacturer's warranty and service will be passed on to the City at the time of delivery.

## **4.6 Services**

**4.6.1 Awarded Services.** Awarded Services are limited exclusively to training. Contractor agrees to perform the Services stated in Appendix A. Officers and employees of the City are not authorized to request and the City is not required to compensate for Services beyond those stated in Appendix A. If, during the term of the Agreement, a contract service is determined to be unacceptable for a particular department, and such is documented by the SFMTA, Contractor agrees that the service will be canceled and removed from the Agreement without penalty to the City. The City's sole obligation to Contractor is payment for Services performed prior to the cancellation date. The City shall give Contractor ten days' notice in writing prior to any cancellation. The City will contract for the required service from any source and in the manner as determined by the SFMTA. Contractor must notify the SFMTA in writing, which can include email, certified mail, or other trackable mail, 30 days in advance of any changes in the Services required in the Agreement.

**4.6.2 Subcontracting.** Contractor may subcontract portions of the Services only upon prior written approval of the City. Contractor is responsible for its subcontractors throughout the course of the work required to perform the Services. All Subcontracts must incorporate the terms of Article 10 "Additional Requirements Incorporated by Reference" of this Agreement, unless inapplicable. Neither Party shall, on the basis of this Agreement, contract on behalf of, or in the name of, the other Party. Any agreement made in violation of this provision shall be null and void.

### **4.6.3 Independent Contractor; Payment of Employment Taxes and Other Expenses**

**(a) Independent Contractor.** For the purposes of this Section 4.6, "Contractor" shall be deemed to include not only Contractor, but also any agent or employee of Contractor. Contractor acknowledges and agrees that at all times, Contractor is an independent contractor and is wholly responsible for the manner and means by which it performs Services

and work required under this Agreement. Contractor, its agents, and employees will not represent or hold themselves out to be employees of the City at any time. Contractor shall not have employee status with the City, nor be entitled to participate in any plans, arrangements, or distributions by the City pertaining to or in connection with any retirement, health or other benefits that the City may offer its employees. Contractor is liable for its acts and omissions. Contractor shall be responsible for all obligations and payments, whether imposed by federal, state or local law, including, but not limited to, FICA, income tax withholdings, unemployment compensation, insurance, and other similar responsibilities related to Contractor's performing Services and work, or any agent or employee of Contractor providing same. Nothing in this Agreement shall be construed as creating an employment or agency relationship between the City and Contractor or any of its agents or employees. Contractor agrees to maintain and make available to the City, upon request and during regular business hours, accurate books and accounting records demonstrating Contractor's compliance with this Section. Should the City determine that Contractor is not performing in accordance with the requirements of this Section, the City shall provide Contractor with written notice of such failure. Within five Working Days of Contractor's receipt of such notice, and in accordance with Contractor policy and procedure, Contractor shall remedy the deficiency. Notwithstanding, if the City believes that an action of Contractor warrants immediate remedial action by Contractor, the City shall contact Contractor and provide Contractor in writing with the reason for requesting such immediate action.

**(b) Reserved. (Payment of Employment Taxes and Other Expenses).**

**4.7 Assignment.** This Agreement may not be directly or indirectly assigned, novated, or otherwise transferred by a Party unless first approved the other Party by written instrument executed and approved in the same manner as this Agreement. Any purported assignment made in violation of this provision shall be null and void.

**4.8 Liquidated Damages.** .By entering into this Agreement, Contractor agrees that in the event the Goods and Services are delayed beyond the delivery schedule stated in Appendix I and in the Technical Specifications of this Agreement, or if Contractor fails to correct fleet defects in accordance with Technical Specifications, the City will suffer actual damages that will be impractical or extremely difficult to determine. Contractor agrees that the sums in the table below per Day for each Day of delay beyond the delivery schedule are not a penalty, but are a reasonable estimate of the loss that the City will incur based on the delay, established in light of the circumstances existing at the time this Agreement was awarded. The City may deduct a sum representing the liquidated damages from any money due to Contractor under this Agreement or any other contract between the City and Contractor. Such deductions shall not be considered a penalty, but rather agreed upon monetary damages sustained by the City because of Contractor's failure to furnish deliverables to the City within the time fixed or such extensions of time permitted in writing by the City. Liquidated damages imposed under this Agreement shall be in addition to any other damages that are recoverable by the City specified elsewhere in the Contract.

Item No.	Milestone	Amount Per Day
1.	Delivery of Pilot Coach	\$100
2.	Delivery of 1st Production Coach	\$100
3.	Delivery of Last Production Coach	\$100

- 4.9 Reserved. (Performance Bond)
- 4.10 Reserved. (Fidelity Bond)
- 4.11 Reserved. (Emergency - Priority 1 Service)
- 4.12 Reserved. (Usage Reports by Contractor)

## Article 5 Insurance and Indemnity

### 5.1 Insurance

**5.1.1 Required Coverages.** Without in any way limiting Contractor’s liability pursuant to the “Indemnification” section of this Agreement, Contractor must maintain in force, during the full term of the Agreement, insurance in the following amounts and coverages:

- (a) Commercial General Liability Insurance with limits not less than \$10,000,000 each occurrence for Bodily Injury and Property Damage, including Contractual Liability, Personal Injury, Products and Completed Operations.
- (b) Commercial Automobile Liability Insurance with limits not less than \$10,000,000 each occurrence, “Combined Single Limit” for Bodily Injury and Property Damage, including Owned, Non-Owned and Hired auto coverage, as applicable.
- (c) Workers’ Compensation Liability Insurance, in statutory amounts, covering workers of Contractor or subcontractor working in the United States, with Employers’ Liability Limits not less than \$1,000,000 each accident, injury, or illness.

### 5.1.2 Additional Insured

(a) The Commercial General Liability Insurance policy must include as Additional Insured the City and County of San Francisco, and its Officers, Agents, and Employees.

(b) Reserved. (Commercial Automobile Liability Insurance Additional Insured Endorsement).

(c) Reserved. (Pollution Auto Liability Insurance Additional Insured Endorsement).

### **5.1.3 Reserved. (Waiver of Subrogation)**

#### **5.1.4 Primary Insurance**

(a) The Commercial General Liability Insurance policy shall provide that such policies are primary insurance to any other insurance available to the Additional Insureds, with respect to any claims arising out of this Agreement, and that the insurance applies separately to each insured against whom claim is made or suit is brought.

(b) Reserved. (Commercial Automobile Liability Insurance Additional Insured).

(c) Reserved. (Pollution Auto Liability Insurance Additional Insured).

#### **5.1.5 Other Insurance Requirements**

(a) Thirty Days' advance written notice shall be provided to the City of cancellation, intended non-renewal, or reduction in coverages, except for non-payment for which no less than 10 Days' notice shall be provided to City. Notices shall be sent to the City address set forth in Section 11.1 "Notices to the Parties." All notices, certificates and endorsements shall include the SFMTA contract number and title on the cover page.

(b) Should any of the required insurance be provided under a claims-made form, Contractor shall maintain such coverage continuously throughout the term of this Agreement and, without lapse, for a period of three years beyond the expiration of this Agreement, to the effect that, should occurrences during the Agreement term give rise to claims made after expiration of the Agreement, such claims shall be covered by such claims-made policies.

(c) Should any of the required insurance be provided under a form of coverage that includes a general annual aggregate limit or provides that claims investigation or legal defense costs be included in such general annual aggregate limit, such general annual aggregate limit shall be double the occurrence or claims limits specified above.

(d) Should any required insurance lapse during the term of this Agreement, requests for payments originating after such lapse shall not be processed until the City receives satisfactory evidence of reinstated coverage as required by this Agreement, effective as of the lapse date. If insurance is not reinstated, the City may, at its sole option, terminate this Agreement effective on the date of such lapse of insurance.

(e) Before the City issues the authorization to commence work under section 3.2 of this Agreement, Contractor shall furnish to City certificates of insurance including

additional insured and waiver of subrogation status, as required, with insurers with ratings comparable to A-, VIII or higher, that are authorized to do business in the State of California, and that are satisfactory to City, in form evidencing the Commercial General Liability Insurance coverage set forth above. Before delivering any Buses, Contractor shall furnish to City certificates of insurance including additional insured and waiver of subrogation status, as required, with insurers with ratings comparable to A-, VIII or higher, that are authorized to do business in the State of California, and that are satisfactory to City, in form evidencing the Commercial Automobile Liability Insurance and Workers' Compensation Liability Insurance coverages set forth above. Approval of the insurance by City shall not relieve or decrease Contractor's liability hereunder.

(f) If Contractor will use any Subcontractor(s) to provide the Goods, Contractor shall require the Subcontractor(s) to provide all necessary insurance and to name the City and County of San Francisco, its officers, agents and employees and the Contractor as additional insureds and waive subrogation in favor of City, where required.

## **5.2 Indemnification**

**5.2.1** Contractor shall indemnify and hold harmless City and its officers, agents and employees from, and, if requested, shall defend them from and against any and all liabilities (legal, contractual or otherwise), losses, damages, costs, expenses, or claims for injury or damages (collectively, "Claims"), arising from or in any way connected with Contractor's performance of the Agreement, including but not limited to, any: (i) injury to or death of a person, including employees of City or Contractor; (ii) loss of or damage to property; (iii) violation of local, state, or federal common law, statute or regulation, including but not limited to privacy or personally identifiable information, health information, disability and labor laws or regulations; (iv) strict liability imposed by any law or regulation; or (v) losses arising from Contractor's execution of subcontracts not in accordance with the requirements of this Agreement applicable to Subcontractors, except to the extent such indemnity is void or otherwise unenforceable under applicable law, and except where such Claims are the result of the active negligence or willful misconduct of City and are not contributed to by any act of, or by any omission to perform some duty imposed by law or agreement on Contractor, its Subcontractors, or either's agent or employee. The foregoing indemnity shall include, without limitation, reasonable fees of attorneys, consultants and experts, and related costs, and City's costs of investigating any claims against the City.

**5.2.2** In addition to Contractor's obligation to indemnify City, Contractor specifically acknowledges and agrees that it has an immediate and independent obligation to defend City from any claim which actually or potentially falls within this indemnification provision, even if the allegations are or may be groundless, false or fraudulent, which obligation arises at the time such claim is tendered to Contractor by City and continues at all times thereafter.

**5.2.3** Contractor shall indemnify and hold City harmless from all loss and liability, including attorneys' fees, court costs and all other litigation expenses for any infringement of the patent rights, copyright, trade secret or any other proprietary right or trademark, and all other intellectual property claims of any person or persons arising directly or indirectly from the receipt by City, or any of its officers or agents, of Contractor's Goods .

**5.2.4** Under no circumstances will City indemnify or hold harmless Contractor.

## **Article 6 Liability of the Parties**

**6.1 Liability of City.** CITY'S PAYMENT OBLIGATIONS UNDER THIS AGREEMENT SHALL BE LIMITED TO THE PAYMENT OF THE COMPENSATION PROVIDED FOR IN SECTION 3.3.1 "CALCULATION OF CHARGES AND CONTRACT NOT TO EXCEED AMOUNT," OF THIS AGREEMENT. NOTWITHSTANDING ANY OTHER PROVISION OF THIS AGREEMENT, IN NO EVENT SHALL CITY BE LIABLE, REGARDLESS OF WHETHER ANY CLAIM IS BASED ON CONTRACT OR TORT, FOR ANY SPECIAL, CONSEQUENTIAL, INDIRECT OR INCIDENTAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOST PROFITS, ARISING OUT OF OR IN CONNECTION WITH THIS AGREEMENT OR THE GOODS AND SERVICES DELIVERED IN CONNECTION WITH THIS AGREEMENT.

**6.2 Liability for Use of Equipment.** City shall not be liable for any damage to persons or property as a result of misuse of any equipment used by Contractor, or any of its subcontractors, or by any of their employees, even though such equipment is furnished, rented or loaned by City.

**6.3 Liability for Incidental and Consequential Damages.** Contractor shall be responsible for incidental and consequential damages resulting in whole or in part from Contractor's acts or omissions.

**6.4 Liability of Contractor.** NOTWITHSTANDING ANY OTHER PROVISION OF THIS AGREEMENT, CONTRACTOR'S CUMULATIVE DAMAGE LIABILITY UNDER THIS AGREEMENT, SHALL BE LIMITED TO THE VALUE OF THE CONTRACT. CONTRACTOR'S LIABILITY LIMIT SET FORTH HEREIN SHALL NOT APPLY TO (1) DAMAGES CAUSED BY CONTRACTOR'S GROSS NEGLIGENCE, RECKLESS CONDUCT OR WILLFUL ACTS OR OMISSIONS, (2) LIMIT CLAIMS OR GENERAL DAMAGES THAT FALL WITHIN THE INSURANCE COVERAGE REQUIRED UNDER THIS AGREEMENT, (3) STATUTORY FINES, EXPENSES, DAMAGES CAUSED BY CONTRACTOR'S VIOLATION OF FEDERAL, STATE AND/OR LOCAL LAWS, IN PARTICULAR THOSE INCLUDED IN THIS AGREEMENT AND REGARDING PRIVACY AND/OR HEALTH INFORMATION, (4) CONTRACTOR'S OBLIGATIONS TO INDEMNIFY AND DEFEND CITY PURSUANT TO THE GENERAL INDEMNIFICATION CLAUSE AND FOR INTELLECTUAL PROPERTY INFRINGEMENT, (5) CONTRACTOR'S

WARRANTIES UNDER THIS AGREEMENT, AND (6) WRONGFUL DEATH CAUSED BY CONTRACTOR.

## **Article 7 Payment of Taxes**

**7.1 Contractor to Pay All Taxes.** Except for any applicable California sales and use taxes charged by Contractor to City, Contractor shall pay all taxes, including possessory interest taxes levied upon or as a result of this Agreement, or the Goods delivered pursuant hereto. Contractor shall remit to the State of California any sales or use taxes paid by City to Contractor under this Agreement. Contractor agrees to promptly provide information requested by the City to verify Contractor's compliance with any State requirements for reporting sales and use tax paid by City under this Agreement.

**7.2 Possessory Interest Taxes.** Contractor acknowledges that this Agreement may create a "possessory interest" for property tax purposes. Contractor accordingly agrees on behalf of itself and its permitted successors and assigns to timely report on behalf of City to the County Assessor the information required by San Francisco Administrative Code Section 23.39, as amended from time to time, and any successor provision. Contractor further agrees to provide such other information as may be requested by City to enable City to comply with any reporting requirements for possessory interests that are imposed by applicable law.

**7.3 Withholding.** Contractor agrees that it is obligated to pay all amounts due to the City under the San Francisco Business and Tax Regulations Code during the term of this Agreement. Pursuant to Section 6.10-2 of the San Francisco Business and Tax Regulations Code, Contractor further acknowledges and agrees that City may withhold any payments due to Contractor under this Agreement if Contractor is delinquent in the payment of any amount required to be paid to the City under the San Francisco Business and Tax Regulations Code. Any payments withheld under this paragraph shall be made to Contractor, without interest, upon Contractor coming back into compliance with its obligations.

## **Article 8 Termination and Default**

### **8.1 Termination for Convenience**

**8.1.1** City shall have the option, in its sole discretion, to terminate this Agreement, at any time during the term hereof, for convenience and without cause. City shall exercise this option by giving Contractor written notice of termination ("Notice of Termination"). The notice shall specify the date on which termination of the Agreement shall become effective ("Termination Date").

**8.1.2** Upon receipt of the Notice of Termination, City and the Contractor shall commence and perform, with diligence, all actions necessary on the part of Contractor to affect the termination of this Agreement on the Termination Date and to minimize the liability of Contractor and City to third parties as a result of termination. All such actions shall be subject to

the prior approval of City. Such actions may include any or all of the following, without limitation:

- (a) Completing delivery of all Goods and Services that the SFMTA requires Contractor to complete prior to the Termination Date.
- (b) Halting the delivery of all Goods and Services on and after the Termination Date unless such Goods and Services were ordered prior to the Termination Date.
- (c) Canceling all existing orders and subcontracts by the Termination Date, and not placing any further orders or subcontracts for materials, Goods and Services, equipment or other items.

**8.1.3** Within 30 Days after the Termination Date, Contractor shall submit to the SFMTA an invoice, which shall set forth the cost of all Goods and Services ordered prior to the SFMTA's Termination Date that Contractor has fully delivered. The SFMTA's payment obligation pursuant to this Subsection 8.1.3 shall be subject to Section 3.3.3 of this Agreement. If City is required to pay regularly scheduled monthly fees under this Agreement, in no event will the amount due for the month in which termination occurred be greater than the pro-rated scheduled monthly fee for that month. Upon approval and payment of this invoice by City, City shall be under no further obligation to Contractor monetarily or otherwise.

**8.1.4** In no event shall City be liable for costs incurred by Contractor or any of its Subcontractors after the Termination Date.

**8.1.5** In arriving at the amount due to Contractor under this Section, the SFMTA may deduct: (i) all payments previously made by the SFMTA for Goods covered by Contractor's final invoice; and (ii) any claim which the SFMTA may have against Contractor in connection with this Agreement.

**8.1.6 Payment Obligation.** City's payment obligation under this Section shall survive termination of this Agreement

## **8.2 Termination for Default; Remedies**

**8.2.1** Each of the following shall constitute an immediate event of default (Event of Default) under this Agreement:

(a) Contractor fails or refuses to perform or observe any term, covenant or condition contained in any of the following Sections of this Agreement:

- 3.5 Submitting False Claims
- 4.7 Assignment
- Article 5 Insurance and Indemnity
- Article 7 Payment of Taxes
- 10.10 Alcohol and Drug-Free Workplace
- 11.10 Compliance with Laws



## Article 14 Data and Security

**(b)** Contractor fails or refuses to perform or observe any other term, covenant or condition contained in this Agreement, including any obligation imposed by ordinance or statute and incorporated by reference herein, and such default is not cured within 10 Days after written notice thereof from the SFMTA to Contractor. If Contractor defaults a second time in the same manner as a prior default cured by Contractor, the SFMTA may in its sole discretion immediately terminate the Agreement for default or grant an additional period not to exceed five Days for Contractor to cure the default.

**(c)** Contractor (i) is generally not paying its debts as they become due; (ii) files, or consents by answer or otherwise to the filing against it of a petition for relief or reorganization or arrangement or any other petition in bankruptcy or for liquidation or to take advantage of any bankruptcy, insolvency or other debtors' relief law of any jurisdiction; (iii) makes an assignment for the benefit of its creditors; (iv) consents to the appointment of a custodian, receiver, trustee or other officer with similar powers of Contractor or of any substantial part of Contractor's property; or (v) takes action for the purpose of any of the foregoing.

**(d)** A court or government authority enters an order (i) appointing a custodian, receiver, trustee or other officer with similar powers with respect to Contractor or with respect to any substantial part of Contractor's property, (ii) constituting an order for relief or approving a petition for relief or reorganization or arrangement or any other petition in bankruptcy or for liquidation or to take advantage of any bankruptcy, insolvency or other debtors' relief law of any jurisdiction or (iii) ordering the dissolution, winding-up or liquidation of Contractor.

**8.2.2 Default Remedies.** On and after any Event of Default, City shall have the right to exercise its legal and equitable remedies, including, without limitation, the right to terminate this Agreement or to seek specific performance of all or any part of this Agreement. In addition, where applicable, City shall have the right (but no obligation) to cure (or cause to be cured) on behalf of Contractor any Event of Default; Contractor shall pay to City on demand all costs and expenses incurred by City in effecting such cure, with interest thereon from the date of incurrence at the maximum rate then permitted by law. City shall have the right to offset from any amounts due to Contractor under this Agreement or any other agreement between City and Contractor: (i) all damages, losses, costs or expenses incurred by City as a result of an Event of Default; and (ii) any liquidated damages levied upon Contractor pursuant to the terms of this Agreement; and (iii), any damages imposed by any ordinance or statute that is incorporated into this Agreement by reference, or into any other agreement with the City.

**8.2.3** All remedies provided for in this Agreement may be exercised individually or in combination with any other remedy available hereunder or under applicable laws, rules and regulations. The exercise of any remedy shall not preclude or in any way be

deemed to waive any other remedy. Nothing in this Agreement shall constitute a waiver or limitation of any rights that City may have under applicable law.

**8.2.4** Any notice of default must be sent in accordance with Article 11.

**8.3 Non-Waiver of Rights.** The omission by either Party at any time to enforce any default or right reserved to it, or to require performance of any of the terms, covenants, or provisions hereof by the other Party at the time designated, shall not be a waiver of any such default or right to which the Party is entitled, nor shall it in any way affect the right of the Party to enforce such provisions thereafter.

**8.4 Rights and Duties upon Termination or Expiration**

**8.4.1** This Section and the following Sections of this Agreement listed below, shall survive termination or expiration of this Agreement:

- 3.3.3 Payment Limited to Satisfactory Delivery of Goods and Services
- 3.4 Audit and Inspection of Records
- 3.5 Submitting False Claims
- Article 5 Insurance and Indemnity
- 6.1 Liability of City
- 6.3 Liability for Incidental and Consequential Damages
- 6.4 Liability of Contractor
- Article 7 Payment of Taxes
- 8.1.6 Payment Obligation
- 8.2.2 Default Remedies
- 11.6 Dispute Resolution Procedure
- 11.7 Agreement Made in California; Venue
- 11.8 Construction
- 11.9 Entire Agreement
- 11.10 Compliance with Laws
- 11.11 Severability
- Article 13 SFMTA Specific Terms
- Article 14 Data and Security

**8.4.2** Subject to the survival of the Sections identified in Section 8.4.1, above, if this Agreement is terminated prior to expiration of the term specified in Article 2, this Agreement shall be of no further force or effect. Contractor shall transfer title to City, and deliver in the manner, at the times, and to the extent, if any, directed and paid for by City, any work in progress, completed work, supplies, equipment, and other materials produced as a part of, or acquired in connection with the performance of this Agreement, and any completed or partially completed work which, if this Agreement had been completed, would have been required to be furnished to City.

## **Article 9 Rights In Deliverables**

### **9.1 Reserved. (Ownership of Results)**

### **9.2 Reserved. (Works for Hire)**

## **Article 10 Additional Requirements Incorporated by Reference**

**10.1 Laws Incorporated by Reference.** The full text of the laws listed in this Article 10, including enforcement and penalty provisions, are incorporated by reference into this Agreement. The full text of the San Francisco Municipal Code provisions incorporated by reference in this Article and elsewhere in the Agreement (“Mandatory City Requirements”) are available at [http://www.amlegal.com/codes/client/san-francisco\\_ca/](http://www.amlegal.com/codes/client/san-francisco_ca/).

**10.2 Conflict of Interest.** By executing this Agreement, Contractor certifies that it does not know of any fact which constitutes a violation of Section 15.103 of the City’s Charter; Article III, Chapter 2 of City’s Campaign and Governmental Conduct Code; Title 9, Chapter 7 of the California Government Code (Section 87100 *et seq.*), or Title 1, Division 4, Chapter 1, Article 4 of the California Government Code (Section 1090 *et seq.*), and further agrees promptly to notify the City if it becomes aware of any such fact during the term of this Agreement.

**10.3 Prohibition on Use of Public Funds for Political Activity.** In delivering the Goods and Services, Contractor shall comply with San Francisco Administrative Code Chapter 12G, which prohibits funds appropriated by the City for this Agreement from being expended to participate in, support, or attempt to influence any political campaign for a candidate or for a ballot measure. Contractor is subject to the enforcement and penalty provisions in Chapter 12G.

**10.4 Consideration of Salary History.** Contractor shall comply with San Francisco Labor and Employment Code Article 141, the Consideration of Salary History Ordinance or “Pay Parity Act.” Contractor is prohibited from considering current or past salary of an applicant in determining whether to hire the applicant or what salary to offer the applicant to the extent that such applicant is applying for employment to be performed on this Agreement or in furtherance of this Agreement, and whose application, in whole or part, will be solicited, received, processed or considered, whether or not through an interview, in the City or on City property. The ordinance also prohibits employers from (1) asking such applicants about their current or past salary or (2) disclosing a current or former employee’s salary history without that employee’s authorization unless the salary history is publicly available. Contractor is subject to the enforcement and penalty provisions in Article 141. Information about and the text of Article 141 is available on the web at <https://sfgov.org/olse/consideration-salary-history>. Contractor is required to comply with all of the applicable provisions of Article 141, irrespective of the listing of obligations in this Section.

### **10.5 Nondiscrimination Requirements**

**10.5.1 Contractor Shall Not Discriminate.** In the performance of this contract, Contractor agrees not to discriminate on the basis of the fact or perception of a person’s race,

color, creed, religion, national origin, ancestry, age, sex, sexual orientation, gender identity, domestic partner status, marital status, disability or Acquired Immune Deficiency Syndrome or HIV status (AIDS/HIV status) against any employee of, any City employee working with, or applicant for employment with Contractor, in any of Contractor's operations within the United States, or against any person seeking accommodations, advantages, facilities, privileges, services, or membership in all business, social, or other establishments or organizations operated by Contractor.

**10.5.2 Nondiscrimination in Contracts.** Contractor shall comply with the provisions of San Francisco Labor and Employment Code Articles 131 and 132. Contractor shall incorporate by reference in all subcontracts the provisions of Sections 131.2(a), 131.2(c)-(k), and 132.3 of the San Francisco Labor and Employment Code and shall require all Subcontractors to comply with such provisions. Contractor is subject to the enforcement and penalty provisions in Articles 131 and 132.

**10.5.3 Nondiscrimination in the Provision of Employee Benefits.** San Francisco Labor and Employment Code Article 131.2 applies to this Agreement. Contractor does not as of the date of this Agreement, and will not during the term of this Agreement, in any of its operations in San Francisco, on real property owned by San Francisco, or where work is being performed for the City elsewhere in the United States, discriminate in the provision of employee benefits between employees with domestic partners and employees with spouses and/or between the domestic partners and spouses of such employees, subject to the conditions set forth in San Francisco Labor and Employment Code Article 131.2.

**10.6 Local Business Enterprise and Non-Discrimination in Contracting Ordinance.** Contractor shall comply with all applicable provisions of Chapter 14B. Contractor is subject to the enforcement and penalty provisions in Chapter 14B.

**10.7 Reserved. (Minimum Compensation Ordinance)**

**10.8 Reserved. (Health Care Accountability Ordinance)**

**10.9 First Source Hiring Program.** [if Purchase Order is greater than \$50,000 and if Contractor has an office in Alameda, San Francisco or San Mateo counties] Contractor must comply with all of the applicable provisions of the First Source Hiring Program, Chapter 83 of the San Francisco Administrative Code, that apply to this Agreement, and Contractor is subject to the enforcement and penalty provisions in Chapter 83.

**10.10 Alcohol and Drug-Free Workplace.** City reserves the right to deny access to, or require Contractor to remove from, City facilities personnel of any Contractor or Subcontractor who City has reasonable grounds to believe has engaged in alcohol abuse or illegal drug activity which in any way impairs City's ability to maintain safe work facilities or to protect the health and well-being of City employees and the general public. City shall have the right of final approval for the entry or re-entry of any such person previously denied access to, or removed from, City facilities. Illegal drug activity means possessing, furnishing, selling, offering,

purchasing, using or being under the influence of illegal drugs or other controlled substances for which the individual lacks a valid prescription. Alcohol abuse means possessing, furnishing, selling, offering, or using alcoholic beverages, or being under the influence of alcohol.

**10.11 Limitations on Contributions.** By executing this Agreement, Contractor acknowledges its obligations under Section 1.126 of the City’s Campaign and Governmental Conduct Code, which prohibits any person who contracts with, or is seeking a contract with, any department of the City for the rendition of personal services, for the furnishing of any material, supplies or equipment, for the sale or lease of any land or building, for a grant, loan or loan guarantee, or for a development agreement, from making any campaign contribution to (i) a City elected official if the contract must be approved by that official, a board on which that official serves, or the board of a state agency on which an appointee of that official serves, (ii) a candidate for that City elective office, or (iii) a committee controlled by such elected official or a candidate for that office, at any time from the submission of a proposal for the contract until the later of either the termination of negotiations for such contract or twelve months after the date the City approves the contract. The prohibition on contributions applies to each prospective party to the contract; each member of Contractor’s board of directors; Contractor’s chairperson, chief executive officer, chief financial officer and chief operating officer; any person with an ownership interest of more than 10% in Contractor; any Subcontractor listed in the bid, proposal or contract; and any committee that is sponsored or controlled by Contractor. Contractor certifies that it has informed each such person of the limitation on contributions imposed by Section 1.126 by the time it submitted a proposal for the contract, and has provided the names of the persons required to be informed to the City department with whom it is contracting.

**10.12 Reserved. (Slavery Era Disclosure)**

**10.13 Reserved. (Working with Minors)**

**10.14 Consideration of Criminal History in Hiring and Employment Decisions**

**10.14.1** Contractor agrees to comply fully with and be bound by all of the provisions of Article 142, “City Contractor/Subcontractor Consideration of Criminal History in Hiring and Employment Decisions”, of the San Francisco Labor and Employment Code (Article 142), including the remedies provided, and implementing regulations, as may be amended from time to time. The provisions of Article 142 are incorporated by reference and made a part of this Agreement as though fully set forth herein. The text of the Article 142 is available on the web at <http://sfgov.org/olse/fco>. Contractor is required to comply with all of the applicable provisions of Article 142, irrespective of the listing of obligations in this Section. Capitalized terms used in this Section and not defined in this Agreement shall have the meanings assigned to such terms in Article 142.

**10.14.2** The requirements of Article 142 shall only apply to a Contractor’s or Subcontractor’s operations to the extent those operations are in furtherance of the performance of this Agreement, shall apply only to applicants and employees who would be or are performing

work in furtherance of this Agreement, and shall apply when the physical location of the employment or prospective employment of an individual is wholly or substantially within the City of San Francisco. Article 142 shall not apply when the application in a particular context would conflict with federal or state law or with a requirement of a government agency implementing federal or state law.

## **10.15 Nonprofit Contractor Requirements**

**10.15.1 Good Standing.** If Contractor is a nonprofit organization, Contractor represents that it is in good standing with the California Attorney General’s Registry of Charitable Trusts and will remain in good standing during the term of this Agreement. Contractor shall immediately notify City of any change in its eligibility to perform under the Agreement. Upon City’s request, Contractor shall provide documentation demonstrating its compliance with applicable legal requirements. If Contractor will use any subcontractors to perform the Agreement, Contractor is responsible for ensuring they are also in compliance with the California Attorney General’s Registry of Charitable Trusts for the duration of the Agreement. Any failure by Contractor or its subcontractors to remain in good standing with applicable requirements shall be a material breach of this Agreement.

### **10.15.2 Reserved. (Public Access to Nonprofit Records and Meetings)**

**10.16 Food Service Waste Reduction Requirements.** Contractor shall comply with the Food Service Waste Reduction Ordinance, as set forth in San Francisco Environment Code Chapter 16, including but not limited to the remedies for noncompliance provided therein.

### **10.17 Reserved. (Distribution of Beverages and Water)**

#### **10.17.1 Reserved. (Sugar-Sweetened Beverage Prohibition)**

#### **10.17.2 Reserved. (Packaged Water Prohibition)**

**10.18 Tropical Hardwood and Virgin Redwood Ban.** Pursuant to San Francisco Environment Code Section 804(b), the City urges Contractor not to import, purchase, obtain, or use for any purpose, any tropical hardwood, tropical hardwood wood product, virgin redwood or virgin redwood wood product. Contractor shall comply with San Francisco Environment Code Chapter 8, which provides that except as expressly permitted by the application of Sections 802(b) and 803(b) of the San Francisco Environment Code, Contractor shall not provide any items to the City in performance of this Purchase Order which are tropical hardwoods, tropical hardwood wood products, virgin redwood or virgin redwood wood products. Contractor is subject to the penalty and enforcement provisions of Chapter 8.

### **10.19 Reserved. (Preservative Treated Wood Products)**

### **10.20 Reserved. (Sweat Free Procurement)**

### **10.21 Environment Code Chapter 5, Resource Conservation Ordinance**

#### **10.21.1 Reserved. (Printing Services and/or Writing Paper Products)**

**10.21.2 Reserved. (Collection of Recyclable Materials)**

**10.22 Use of City Opinion.** Contractor shall not quote, paraphrase, or otherwise refer to or use any opinion of City, its officers or agents, regarding Contractor or Contractor's performance under this Agreement without prior written permission of the SFMTA.

**Article 11 General Provisions**

**11.1 Notices to the Parties.** Unless otherwise indicated in this Agreement, all written communications sent by the Parties may be by U.S. mail or e-mail, and shall be addressed as follows:

To City: Marley Miller  
[Marley.miller@sfmta.com](mailto:Marley.miller@sfmta.com)  
700 Pennsylvania Avenue, San Francisco CA 94107

To Contractor: Tomasz Lasota  
Obornicka 46, 62-005 Owińska, Poland  
[Tomasz.lasota@solarisbus.com](mailto:Tomasz.lasota@solarisbus.com)

Any notice of default must be sent by certified mail or other trackable written communication, and also by email, with the sender using the receipt notice feature. Either Party may change the address to which notice is to be sent by giving written notice thereof to the other Party at least ten (10) days prior to the effective date of such change. If email notification is used, the sender must specify a receipt notice.

**11.2 Compliance with Americans with Disabilities Act.** Contractor acknowledges that, pursuant to the Americans with Disabilities Act (ADA), programs, services and other activities provided by a public entity to the public, whether directly or through an agent such as a contractor, must be accessible to people with disabilities. Contractor shall provide the Goods specified in this Agreement in a manner that complies with the ADA and any and all other applicable federal, state and local disability rights legislation. Contractor agrees not to discriminate against people with disabilities in providing Goods, benefits or activities under this Agreement and further agrees that any violation of this prohibition on the part of Contractor, its employees, agents or assigns will constitute a material breach of this Agreement.

**11.3 Incorporation of Recitals.** The matters recited above are hereby incorporated into and made part of this Agreement.

**11.4 Sunshine Ordinance.** Contractor acknowledges that this Agreement and all records related to its formation, Contractor's delivery of the Goods, and City's payment are subject to the California Public Records Act, (California Government Code §7920 et. seq.), and the San Francisco Sunshine Ordinance, (San Francisco Administrative Code Chapter 67). Such

records are subject to public inspection and copying unless exempt from disclosure under federal, state or local law.

**11.5 Modification of this Agreement.** This Agreement may not be modified, nor may compliance with any of its terms be waived except by written instrument executed and approved by the Parties.

#### **11.6 Dispute Resolution Procedure**

**11.6.1 Negotiation; Alternative Dispute Resolution.** The Parties will attempt in good faith to resolve any dispute or controversy arising out of or relating to the delivery of the Goods under this Agreement. Disputes will not be subject to binding arbitration. The status of any dispute or controversy notwithstanding, Contractor shall proceed diligently with the performance of its obligations under this Agreement in accordance with the Agreement and the written directions of the City. Neither Party will be entitled to legal fees or costs for matters resolved under this Section.

**11.6.2 Government Code Claim Requirement.** No suit for money or damages may be brought against the City until a written claim therefor has been presented to and rejected by the City in conformity with the provisions of San Francisco Administrative Code Chapter 10 and California Government Code Section 900, et seq. Nothing set forth in this Agreement shall operate to toll, waive or excuse Contractor's compliance with the California Government Code Claim requirements set forth in San Francisco Administrative Code Chapter 10 and California Government Code Section 900, et seq.

#### **11.6.3 Reserved. (Health and Human Service Contract Dispute Resolution Procedure)**

**11.7 Agreement Made in California; Venue.** The formation, interpretation and performance of this Agreement shall be governed by the laws of the State of California. Venue for all litigation relative to the formation, interpretation and performance of this Agreement shall be in San Francisco.

**11.8 Construction.** All paragraph captions are for reference only and shall not be considered in construing this Agreement.

**11.9 Entire Agreement.** This contract, including appendices, sets forth the entire Agreement between the Parties, and supersedes all other oral or written provisions. This Agreement may be modified only as provided in Section 11.5 "Modification of this Agreement."

**11.10 Compliance with Laws.** Contractor shall keep itself fully informed of the City's Charter, codes, ordinances and duly adopted rules and regulations of the City and of all state, and federal laws in any manner affecting the performance of this Agreement, and must at all times comply with such local codes, ordinances, and regulations and all applicable laws as they may be amended from time to time. Notwithstanding anything to the contrary contained herein, the Contractor and/or subcontractors shall not be held to any requirements of the Buy America Build



America or Buy American Acts as these vehicles are approved by the City to be built in the European Union.

**11.11 Severability.** Should the application of any provision of this Agreement to any particular facts or circumstances be found by a court of competent jurisdiction to be invalid or unenforceable, then (i) the validity of other provisions of this Agreement shall not be affected or impaired thereby, and (ii) such provision shall be enforced to the maximum extent possible so as to effect the intent of the Parties and shall be reformed without further action by the Parties to the extent necessary to make such provision valid and enforceable.

**11.12 Cooperative Drafting.** This Agreement has been drafted through a cooperative effort of City and Contractor, and both Parties have had an opportunity to have the Agreement reviewed and revised by legal counsel. No Party shall be considered the drafter of this Agreement, and no presumption or rule that an ambiguity shall be construed against the Party drafting the clause shall apply to the interpretation or enforcement of this Agreement.

**11.13 Order of Precedence.** Contractor agrees to furnish the Goods and perform the Services described herein in accordance with the terms and conditions of this Agreement. This Agreement is subject to the terms and conditions of Contract SOL24-1, and is intended to supplement, but not change or otherwise modify the terms and conditions set forth in Appendix A. Contractor agrees, except for technical specifications, that in the event of conflicting language between the City's terms and Contract SOL24-1, the City's terms in this Agreement shall take precedence. For Technical Specifications, Appendix H-2 "Technical Exceptions and Approved Equals" shall take precedence over Appendix G "SFMTA's Technical Specifications". Notwithstanding the foregoing, the Parties shall negotiate to resolve any dispute concerning conflicting terms under Section 11.6 Dispute Resolution Procedure.

**11.14 Time of Essence.** Time is of the essence in this Agreement.

**11.15 Notification of Legal Requests.** Contractor shall immediately notify the SFMTA upon receipt of any subpoenas, service of process, litigation holds, discovery requests and other legal requests ("Legal Requests") related to all City Data under this Agreement, and in no event later than 24 hours after Contractor receives the request. Contractor shall not respond to Legal Requests related to City without first notifying City other than to notify the requestor that the information sought is potentially covered under a non-disclosure agreement. Contractor shall retain and preserve City Data in accordance with the City's instruction and requests, including, without limitation, any retention schedules and/or litigation hold orders provided by the City to Contractor, independent of where the City Data is stored.

## **Article 12 Deliveries and Acceptance**

The delivery and acceptance requirements in this Article supplement the requirements contained in Appendix A,

### **12.1 Deliveries**

**12.1.1 Pre-delivery Tests and Inspections.** Pre-delivery tests and inspections shall be performed prior to shipment to the SFMTA. Such tests and inspections shall be performed in accordance with the procedures defined in Test Requirements and Commissioning (Section 12.2 of the Technical Specifications), and they may be witnessed by the SFMTA Resident Inspector. When a Coach passes these tests and inspections, the Resident Inspector shall authorize release of the Coach for shipment. Such authorization does not imply Acceptance of the Vehicle by the SFMTA.

**12.1.2 Delivery Procedure.** Delivery shall be determined by signed receipt of the SFMTA Acceptance division at the point of delivery and may be preceded by a cursory inspection of the Vehicle. The point of delivery shall be:

<b>40-ft and 60-ft Battery Electric Buses</b>
Bus Acceptance 1399 Marin Street San Francisco, CA 94124

Contractor shall deliver Coaches during weekday working hours at a time mutually agreeable to the SFMTA and Contractor, or as otherwise specified in writing by the SFMTA. Contractor shall provide at least five Working Days notice to the SFMTA prior to delivery. Delivery of the Coaches shall be D.D.P. point of delivery, freight pre-paid and allowed. Contractor shall ensure that all Coaches are fully operable when they are delivered. Contractor shall deliver a maximum of three Coaches per week.

**12.1.3 Condition of Coaches.** Drivers shall keep a complete and accurate maintenance log enroute, which shall be delivered to the SFMTA Project Manager/ Representative with the Coach. The log shall show the driver's compliance with the tire manufacturer's highway operating procedures. If the Coaches are towed, the rear axle shafts shall be removed during the towing and re-coupled by the Contractor after arrival at the point of delivery. Contractor shall deliver each Coach with a full tank of fuel and fully cleaned (exterior, interior, underside, and topside) prior to presentation for inspection. Also, if the Coaches are towed from the Contractor's facility to the SFMTA, highway-type tires shall be installed. Upon arrival at an SFMTA maintenance facility or within the City/County of San Francisco, Contractor, at its expense, shall install city-type tires.

**12.1.4 Spare Parts Delivery Procedure.** Composition of spare parts is subject to SFMTA approval. Contractor shall provide the SFMTA with one-week advance notice before shipment of spare parts. Such notice shall include a packing list clearly identifying all parts and their quantity in the shipment.

Delivery of spare parts shall be acknowledged by signed receipt of the SFMTA representative at the point of delivery and may be preceded by a cursory inspection of the parts. Within 20 Days of delivery, the SFMTA will issue a notification of Acceptance, non-

Acceptance, or Conditional Acceptance of the spare parts. The point of delivery shall be the location for the applicable Coach provided in Section 12.1.2.

Delivery of spare parts shall be D.D.P. point of delivery, freight pre-paid and allowed.

## **12.2 Acceptance of Vehicles**

### **12.2.1 Procedure**

(a) Contractor shall ensure that the Coach's underside is washed and cleaned prior to being presented to SFMTA for Acceptance.

(b) After arrival at the designated point of delivery, each Coach shall undergo pre-Acceptance and Acceptance tests by the SFMTA as defined in the Quality Assurance Section of the Technical Specifications. The SFMTA shall make a good faith effort to complete post-delivery inspections within 20 Days after delivery of each Coach, provided that Contractor has completed all onboard system commissioning. If the Contractor is not notified by the SFMTA of non-acceptance within 20 calendar days after delivery of each Coach, acceptance of the Coach by the SFMTA shall be deemed to have occurred on the 20<sup>th</sup> day after delivery. When a Coach passes all tests, the SFMTA will provide written Acceptance of the Coach to the Contractor. Contractor shall transfer title to the Coach to the City on the day of Acceptance, or Conditional Acceptance, if the Coach is not fully Accepted. Acceptance of one Coach does not imply Acceptance of any other delivered Coaches.

(c) If a Coach fails the Acceptance tests, the Coach shall not be Accepted until the repair procedures defined in Section 12.3, of this Agreement have been carried out and the Coach has been retested and passes all applicable tests. All deliveries of Coaches shall be halted whenever five or more Coaches have failed or have not been Accepted or Conditionally Accepted and are awaiting repairs or Corrections.

(d) After completion of post-delivery testing, the SFMTA will issue a notification of Acceptance, non-Acceptance or Conditional Acceptance.

**12.2.2 Conditional Acceptance.** If a Coach does not meet all requirements for Acceptance, the SFMTA may, at its exclusive option, "conditionally accept" the Coach and place it into revenue service, pending receipt of Contractor-furnished materials and/or labor necessary to effectuate corrective action for Acceptance. For any Conditionally Accepted Vehicle, payments shall be made as provided in Section 3.3.1 above.

**12.2.3 Assumption of Risk of Loss.** Prior to delivery as described in Section 12.1 of this Agreement, and regardless whether title has passed to the City, the Contractor shall bear risk of loss of the Coach, including any damage sustained during transportation to the delivery site. Risk of loss will pass to the SFMTA upon delivery of each Coach except that loss or damage to the Coach resulting from acts or omissions of the Contractor shall be the responsibility of the Contractor until Acceptance of the Vehicle.

**12.2.4 Title.** Upon acceptance, Contractor shall provide the SFMTA Project Manager with adequate documents for securing the title for the Coach in the State of California. Unless full unencumbered title transfers earlier under Section 3.3.2, upon Payment under Section 3.3.7 (a) for each Coach, title to each Coach shall pass to the City, which title Contractor warrants shall be free and clear of all liens, mortgages and encumbrances, financing statements, security agreements, claims, and demands of any character.

**12.3 Repairs Prior To Acceptance.** The SFMTA Project Manager may require the Contractor, or its designated representative, to perform repairs after non-Acceptance or Conditional Acceptance, or the Contractor may request that the repairs be done by SFMTA personnel with reimbursement by the Contractor. Contractor shall inform the SFMTA in advance of any modifications made to the Coach during the Acceptance period.

**12.3.1 Repairs by Contractor.** If the SFMTA Project Manager requires the Contractor to perform repairs after non-Acceptance or Conditional Acceptance of the Vehicle, the Contractor's representative must begin the repair within ten Days after receiving notification from the SFMTA Project Manager of failure of Acceptance tests.

The Contractor shall provide, at its own expense, all spare parts, tools, and labor required to complete the repairs. At the SFMTA Project Manager's option, the Contractor may be required to remove the Coach from SFMTA property while repairs are being effected. The Contractor shall then provide a space to complete the repairs, shall diligently pursue the repairs, and shall assume risk of loss while the Coach is under its control.

**12.3.2 Repairs by the SFMTA**

(a) If the SFMTA Project Manager agrees to a request by the Contractor for the SFMTA to perform repairs on a Contractor-owned Coach prior to SFMTA Acceptance, the SFMTA shall correct or repair the Defect using parts supplied by the Contractor specifically for this repair. Monthly, or at a period to be mutually agreed upon, reports of all repairs covered by this procedure shall be submitted by the SFMTA Project Manager to the Contractor for actual cost reimbursement of parts. The Contractor shall provide forms for these reports.

(b) If the Contractor supplies parts for repairs being performed by the SFMTA before Acceptance of the Coach, Contractor shall deliver these parts prepaid to the SFMTA within 10 Working Days after receipt of the request for the parts. The Contractor may request that Defective components covered by this provision be returned to the manufacturing plant. Contractor shall bear all expenses for supplying such parts and for any associated costs.

(c) Contractor shall reimburse the SFMTA for all costs of labor and materials (including taxes) for repairs made or caused to be made by the SFMTA. If the SFMTA performs the repairs itself, the amount shall be determined by multiplying the number of person-hours actually required to Correct the Defect by the current technician's hourly overtime wage rate, which includes fringe benefits and overhead, plus the cost of towing the Coach if such

action was necessary. If the SFMTA requires the service of an outside repair facility, Contractor shall reimburse the SFMTA for all such repair invoices. Contractor shall also reimburse the SFMTA for administrative costs incurred in performing the repairs. The use of SFMTA labor will not relieve the Contractor from the responsibility to ensure that repairs are carried out in accordance with proper procedures.

(d) The SFMTA may deduct the cost of repairs from any monies due or that may become due to the Contractor under the Agreement, or if such monies are insufficient, the Contractor or its surety shall pay to the SFMTA any deficiency.

## **12.4 Force Majeure**

**12.4.1** The term "force majeure" shall include, without limitation by the following enumeration: acts of nature, acts of civil or military authorities, fire, accidents, acts of terrorism, shutdowns for purpose of emergency repairs, strikes, and any other industrial, civil, or public disturbances that are not reasonably within the control of a party, causing the inability to perform the requirements of this Contract. If any party is rendered unable, wholly or in part, by a force majeure event, to perform or comply with any obligation or condition of this Contract, then, upon giving notice and reasonably full particulars to the other party, such obligation or condition shall be suspended for the time and to the extent reasonably necessary to allow for performance or compliance and to restore normal operations. During the continuance of the inability to perform or comply, such party shall be temporarily relieved of its obligation to perform or comply and shall suffer no prejudice for failure to perform or comply the same during such period. In the event Contractor ceases to be excused pursuant to this provision, then the City shall be entitled to exercise any remedies otherwise provided for in this Contract, including the termination for default.

**12.4.2** The granting of any such extensions pursuant to the force majeure provision set forth at Section 12.4.1 shall not be considered a waiver of the requirement of timely completion or deemed to affect the importance of timely completion.

## **Article 13 SFMTA Specific Terms**

**13.1 Third Party Beneficiaries.** No third parties are intended by the Parties hereto to be third party beneficiaries under this Agreement, and no action to enforce the terms of this Agreement may be brought against either Party by any person who is not a party hereto.

### **13.2 Large Vehicle Driver Safety Training Requirements**

**13.2.1** Contractor agrees that before any of its employees and Subcontractors drive large vehicles within the City and County of San Francisco, those employees and Subcontractors shall successfully complete either (a) the SFMTA's Large Vehicle Urban Driving Safety training program or (b) a training program that meets the SFMTA's approved standards for large vehicle urban driving safety. The SFMTA's approved standards for large vehicle urban

driving safety is available for download at [www.SFMTA.com/largevehicletrainingstandards](http://www.SFMTA.com/largevehicletrainingstandards). This requirement does not apply to drivers providing delivery services who are not employees or Subcontractors of the Contractor. For purposes of this section, “large vehicle” means any single vehicle or combination of vehicle and trailer with an unladen weight of 10,000 pounds or more, or a van designed to carry 10 or more people.

**13.2.2** By entering into this Agreement, Contractor agrees that in the event the Contractor fails to comply with the Large Vehicle Driver Safety Training Requirements, the City will suffer actual damages that will be impractical or extremely difficult to determine; further, Contractor agrees that the sum of up to One Thousand Dollars (\$1,000) per employee or Subcontractor who is permitted to drive a large vehicle in violation of these requirements is not a penalty, but is a reasonable estimate of the loss that City will incur based on the Contractor’s failure to comply with this requirement, established in light of the circumstances existing at the time this Contract was awarded. City may deduct a sum representing the liquidated damages from any money due to Contractor. Such deductions shall not be considered a penalty, but rather agreed monetary damages sustained by City because of Contractor’s failure to comply.

## **Article 14 Data and Security**

### **14.1 Nondisclosure of Private, Proprietary or Confidential Information**

**14.1.1 Protection of Private Information.** If this Agreement requires City to disclose “Private Information” to Contractor within the meaning of San Francisco Administrative Code Chapter 12M, Contractor and Subcontractor shall use such information only in accordance with the restrictions stated in Chapter 12M and in this Agreement and only as necessary in delivering the Goods. Contractor is subject to the enforcement and penalty provisions in Chapter 12M.

**14.1.2 City Data; Confidential Information.** In the delivery of the Goods, Contractor may have access to, or collect on City’s behalf, City Data, which may include proprietary or Confidential Information that if disclosed to third parties may damage City. If City discloses proprietary or Confidential Information to Contractor, or Contractor collects such information on City’s behalf, such information must be held by Contractor in confidence and used only in performing the Agreement. Contractor shall exercise the same standard of care to protect such information as a reasonably prudent contractor would use to protect its own proprietary or Confidential Information.

### **14.2 Reserved. (Payment Card Industry (PCI) Requirements)**

### **14.3 Reserved. (Business Associate Agreement)**

### **14.4 Management of City Data**

**14.4.1 Use of City Data.** Contractor agrees to hold City Data received from, or created for, or collected on behalf of, City, in strictest confidence. Contractor shall not use or disclose City Data except as permitted or required by the Agreement or as otherwise authorized

in writing by the City. Any work by Contractor or its authorized subcontractors using, or sharing or storage of, City Data outside the United States is prohibited, absent prior written authorization by the City. Access to City Data must be strictly controlled and limited to Contractor's staff assigned to this project on a need-to-know basis only. City Data shall not be distributed, repurposed or shared across other applications, environments, or business units of Contractor. Contractor is provided a limited non-exclusive license to use the City Data solely for performing its obligations under the Agreement and not for Contractor's own purposes or later use. Nothing herein shall be construed to confer any license or right to the City Data, by implication, estoppel or otherwise, under copyright or other intellectual property rights, to any third-party. Unauthorized use of City Data by Contractor, subcontractors, or other third parties is prohibited. For purpose of this requirement, the phrase "unauthorized use" means the data mining or processing of data and/or machine learning from the data, stored or transmitted by the service, for unrelated commercial purposes, advertising or advertising-related purposes, or for any purpose analysis that is not explicitly authorized other than security or service delivery.

**14.4.2 Disposition of City Data.** Upon request of City or termination or expiration of this Agreement, Contractor shall promptly, but in no event later than 30 calendar Days, return all City Data given to, or collected or created by Contractor on City's behalf, which includes all original media. Once Contractor has received written confirmation from City that City Data has been successfully transferred to City, Contractor shall within 10 Working Days clear or purge all City Data from its servers, any hosted environment Contractor has used in performance of this Agreement, including its Subcontractors' environment(s), work stations that were used to process the Data or for production of the Data, and any other work files stored by Contractor in whatever medium. Contractor shall provide City with written certification that such purge occurred within five Working Days of the purge. Secure disposal shall be accomplished by "clearing," "purging" or "physical destruction," in accordance with National Institute of Standards and Technology (NIST) Special Publication 800-88 or most current industry standard.

**14.4.3 Protected Health Information.** Where applicable, Contractor, all subcontractors, all agents and employees of Contractor and any subcontractor shall comply with all federal and state laws regarding the transmission, storage and protection of all private health information, if any, disclosed to Contractor by City in the performance of this Agreement. Contractor agrees that any failure of Contractor to comply with the requirements of federal and/or state and/or local privacy laws shall be a material breach of the Agreement. In the event that City pays a regulatory fine, and/or is assessed civil penalties or damages through private rights of action, based on an impermissible use or disclosure of protected health information given to Contractor or its subcontractors or agents by City, Contractor shall indemnify City for the amount of such fine or penalties or damages, including costs of notification. In such an event, in addition to any other remedies available to it under equity or law, the City may terminate the Agreement.

**14.5 Ownership of City Data.** The Parties agree that as between them, all rights, including all intellectual property rights, in and to the City Data and any derivative works of the City Data is the exclusive property of the City.

**14.6 Loss or Unauthorized Access to City’s Data; Security Breach Notification.** Contractor shall comply with all applicable laws that require the notification to individuals in the event of unauthorized release of PII, PHI, or other event requiring notification. Contractor shall notify City of any actual or potential exposure or misappropriation of City Data (any “Leak”) within twenty-four (24) hours of the discovery of such, but within twelve (12) hours if the Leak involved PII or PHI. Contractor, at its own expense, will reasonably cooperate with City and law enforcement authorities to investigate any such Leak and to notify injured or potentially injured parties. The remedies and obligations set forth in this subsection are in addition to any other City may have. City shall conduct all media communications related to such Leak.

## **Article 15 MacBride And Signature**

**15.1 MacBride Principles -Northern Ireland.** The provisions of San Francisco Administrative Code §12F are incorporated herein by this reference and made part of this Agreement. By signing this Agreement, Contractor confirms that Contractor has read and understood that the City urges companies doing business in Northern Ireland to resolve employment inequities and to abide by the MacBride Principles, and urges San Francisco companies to do business with corporations that abide by the MacBride Principles.



IN WITNESS WHEREOF, the Parties hereto have executed this Agreement on the day first mentioned above.

<p><b>CITY</b></p> <p><b>San Francisco Municipal Transportation Agency</b></p> <hr/> <p><b>Julie Kirschbaum</b> Director of Transportation 1 South Van Ness, 7<sup>th</sup> Floor, San Francisco, CA 94103</p> <p>Authorized By:</p> <p><b>Municipal Transportation Agency Board of Directors</b></p> <p>Resolution No: _____</p> <p>Adopted: _____</p> <p>Attest: _____ Christine Silva, Secretary</p> <p><b>Board of Supervisors</b></p> <p>Resolution No: _____</p> <p>Adopted: _____</p> <p>Attest: _____ Clerk of the Board</p> <p>Approved as to Form: <b>David Chiu</b> City Attorney</p> <p>By: _____ <b>David F. Innis</b> Deputy City Attorney</p>	<p><b>CONTRACTOR</b></p> <p><b>Solaris Bus US, Inc.</b></p> <hr/> <p><b>Agata Halina Standa</b> <b>Director</b></p> <p>City Supplier Number: 0000057466</p>
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Appendices:

- A: Bus Options Assignment Agreement by and among King County Metro Transit Department and The City and County of San Francisco and Solaris Bus US, Inc.
- Agreement dated December 20, 2024, between King County Metro and Contractor
  - SOL24-1 Change Order 1A dated February 20, 2025
  - Attachment P-2 Training Pricing
  - Solaris 40ft Technical Sheet
  - Solaris 60ft Technical Sheet
- B: Calculation of Charges for Contract No. SFMTA-2025-23-LOC
- Schedule 1 – Schedule of Prices
  - Schedule 1A – Spare Parts List
  - Schedule 1B – Special Tools List
- C: Reserved. (Regulatory and Compliance Requirements)
- D: Reserved. (HIPAA Business Associate Agreement)
- E: Reserved. (Form P-12U-C and 12-UI)
- F: Reserved. (Grant Terms: FTA Requirements for Procurement Contracts)
- G: SFMTA's Technical Specifications
- H: Solaris Options and Technical Exceptions Accepted by the SFMTA
- Exhibit H-1 – Price Change Detail
  - Exhibit H-2 – Technical Exceptions and Approved Equals
- I: Project Delivery Schedule
- J: Payment Milestones

## **Appendix A**

Bus Options Assignment Agreement by and among King County Metro Transit Department and The City and County of San Francisco and Solaris Bus US, Inc.

## **BUS OPTIONS ASSIGNMENT AGREEMENT**

**by and among**

**King County Metro Transit Department and**

**The City and County of San Francisco and**

**Solaris Bus US, Inc.**

THIS BUS OPTIONS LIMITED ASSIGNMENT OF RIGHTS AND ASSUMPTION OF DUTIES AGREEMENT (the “Bus Options Assignment Agreement”) is made as of July 28, 2025, in San Francisco, California, by and among King County, a home rule charter county and political subdivision of the State of Washington, by and through its Metro Transit Department (“County”, “Metro Transit”, or “Assignor”), and the City and County of San Francisco, a municipal corporation of the State of California, by and through its Municipal Transportation Agency (“City”, “SFMTA”, or “Assignee”), and Solaris Bus US, Inc., a Delaware corporation (“Solaris” or “Contractor”), any of which entities may be referred to individually as “Party” or collectively as “Parties.”

### **Recitals**

WHEREAS, the County and Solaris are parties to a contract, dated December 20, 2024, and identified as Contract SOL24-1 ("Manufacture and Delivery of 60' and 40' Heavy Duty Electric Buses"), for the procurement of certain transit buses detailed therein (the "Bus Procurement Contract"), attached to this Bus Options Assignment Agreement as Appendix A; and

WHEREAS, the Description of Work on page B-1 the Bus Procurement Contract established a base quantity of two 40-foot battery electric buses plus option quantities of up to six additional 40-foot battery electric buses over a three-year period, extendable by the County to five years; and

WHEREAS, the Description of Work on page B-1 the Bus Procurement Contract established a base quantity of two 60-foot battery electric buses plus option quantities of up to six additional 60-foot battery electric buses over a three-year period, extendable by the County to five years; and

WHEREAS, Section B2.07.01 of the Bus Procurement Contract allows the County to assign its rights or obligations under the Contract with the prior written permission of Solaris; and

WHEREAS, the Assignee desires to acquire a number of additional buses for its transit fleet and has asked the County to assign part of the available option quantity to the Assignee; and

WHEREAS, the County has determined that it has sufficient capacity in the combined base quantity and remaining option quantity available to it through the Bus Procurement Contract to

meet its own bus procurement needs over the remaining term of the Bus Procurement Contract;  
and

WHEREAS, Solaris has been informed of the Assignee's desire to acquire up to three 40-foot battery electric buses and up to three 60-foot battery electric buses via an assignment of a portion of the option quantity of buses available to the County through the Bus Procurement Contract;  
and

WHEREAS, Solaris agrees to the County assigning a portion of the available option quantity of buses to the Assignee;

NOW, THEREFORE, in consideration of the promises and the mutual covenants contained in this Assignment, and for other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the Parties agree as follows:

### **Article 1 Purpose**

The purpose of this Bus Options Assignment Agreement is to set forth the terms and conditions upon which the County will assign to the Assignee a portion of the option quantity of buses available to the County through the Bus Procurement Contract.

### **Article 2 Assignor's Limited Assignment of Right to Options to Purchase Buses**

Pursuant to Section B2.07.01 of the Bus Procurement Contract and the terms and conditions of this Bus Options Assignment Agreement, the County hereby assigns to the Assignee the right to purchase from the Contractor three 40-foot battery electric buses of the option quantity of up to six additional 40-foot battery electric buses and three 60-foot battery electric buses of the option quantity of up to six additional 60-foot battery buses available to the County as provided for in the Description of Work on Page B-1 of the Bus Procurement Contract.

### **Article 3 Assignee's Compliance with Contract Terms and Assumption of Contractual Duties**

In consideration of the County's foregoing assignment to the Assignee, the Assignee hereby accepts the foregoing assignment, and agrees to assume the County's applicable contractual duties and responsibilities as provided for in the Bus Procurement Contract associated with the exercise of its right to purchase buses from the Contractor via this Bus Options Assignment Agreement. The parties acknowledge that Assignee and Contractor intend to enter into a separate agreement for purchase of the said buses based on this Bus Options Assignment Agreement.

#### **Article 4 Reversion of Options**

In the event the Assignee fails, within 36 months from the date this Bus Options Assignment Agreement is signed by all the Parties hereto, to exercise the right assigned to it pursuant to this Bus Options Assignment Agreement to purchase from the Contractor up to three 40-foot battery electric buses and up to three 60-foot battery electric buses from the option quantity provided for in the Bus Procurement Contract, the unexercised option quantity shall revert back to the County.

#### **Article 5 Contractor's Acknowledgment of and Consent to Assignment**

The Contractor hereby acknowledges and consents to the County's assignment to the Assignee, pursuant to Section B2.07.01 of the Bus Procurement Contract and the terms and conditions of this Bus Options Assignment Agreement, of the right to purchase up to three 40-foot battery electric buses and up to three 60-foot battery electric buses of the option quantity of buses available to the County as provided for in the Bus Procurement Contract.

#### **Article 6 Indemnification and Hold Harmless**

Both the Assignee and the Contractor hereby agree to indemnify and hold harmless the County, its elected officials, officers, employees, agents and representatives from any and all claims, actions, judgments, liabilities, proceedings and costs, including reasonable attorneys' fees and other costs of defense and damages, arising out of the separate agreement for purchase of the assigned buses between the Assignee and the Contractor referred to in Article 3 above, , including any acts or omissions associated therewith, whether contractual or otherwise,

#### **Article 7 General Provisions**

7.1 **Entire Agreement.** This Assignment sets forth the entire agreement between the Contractor, Assignor and Assignee relating to the Agreement and supersedes all other oral or written provisions.

7.2 **Severability.** Should the application of any word, phrase, clause, sentence, paragraph and/or provision of this Assignment to any particular facts or circumstances be found by a court of competent jurisdiction to be invalid or unenforceable, then (i) the validity of other words, phrases, clauses, sentences, paragraphs and/or provisions of this Assignment shall not be affected or impaired thereby and (ii) such words, phrases, clauses, sentences, paragraphs and/or provisions shall be enforced to the maximum extent possible so as to effect the intent of Assignor, Assignee and Contractor.

IN WITNESS WHEREOF, each of the Parties hereto accepts the terms and conditions provided for herein and has caused this Assignment Agreement to be signed and executed by a duly authorized representative.

**ASSIGNOR**

**KING COUNTY  
METRO TRANSIT DEPARTMENT**

By: William Haber  
**William Haber**  
**Superintendent, Transit Fleet Procurement & Contract Management**

Date: July 18, 2025

**ASSIGNEE**

**CITY AND COUNTY OF SAN FRANCISCO  
MUNICIPAL TRANSPORTATION AGENCY**

By: Julie Kirschbaum  
**Julie Kirschbaum**  
**Director of Transportation**

Date: July 28, 2025

Approved as to Form:  
David Chiu, City Attorney

By: David F. Innis  
**David F. Innis**  
**Deputy City Attorney**

**CONTRACTOR:**

**SOLARIS BUS US, INC.**

By: Agata Halina Standa  
**Agata Halina Standa**  
**Director**

Date: July 23, 2025

Appendices:

- A: Agreement dated December 20, 2024, between County and Contractor
- B: SOL24-1 Change Order 1A dated February 20, 2025
- C: Attachment P-2 Training Pricing
- D: Solaris 40ft Technical Sheet
- E: Solaris 60ft Technical Sheet



## **Appendix A**

**Agreement dated December 20, 2024, between County and Contractor**

# **Sole Source Solaris Procurement**

**Manufacture and Delivery of 60' and 40' Heavy  
Duty Electric  
Buses**

**Contract SOL24-1**

**Dec 20, 2024**

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**King County  
Metro Transit Department**

**Legal and Procedural Documents  
Terms and Conditions**



*We'll Get You There*

### **Administration**

This Contract is between the County and the Contractor Solaris Bus US, Inc., a Delaware corporation. Each of the County and Contractor may be referred to as "party" or collectively as "parties". Contractor shall be responsible for providing the goods or services described herein. The County is not party to defining the division of work between the Contractor and its Subcontractors. The Contractor represents that it has or shall obtain all duly licensed or qualified personnel, materials, and equipment required to perform work hereunder. The Contractor's performance under this Contract may be monitored and reviewed by a Contract Administrator appointed by the County. Reports and data required to be provided by the Contractor shall be delivered to the Contract Administrator or Project Manager. Questions by the Contractor regarding interpretation of the terms, provisions, and requirements of this Contract shall be addressed to the Contract Administrator for response.

### **Contract Amendments**

No oral order or conduct by the County shall constitute a Contract Amendment. Contract Amendments shall only be effective upon written notification by the County. The County reserves the right to amend the Contract to add or delete goods or services within the intended scope of this Contract. This may include, but is not limited to approval of replacements for discontinued items, add items of like function, or similar in nature or purpose to the originally listed products; the provision of ancillary services in response to minor changes in County needs; extend the Contract to include optional terms. Cost or Price Analysis may be required by the County for the evaluation of contract modifications, terminations, revision to contract requirements or other circumstances as determined by the County.

### **Invoices and Payment**

The Contractor shall submit properly certified invoices to King County. The invoice(s) shall contain the following information: The purchase order/contract number, item numbers, description of supplies or services, quantities, unit prices, extended totals, and discounts, if applicable. For services, identify specific deliverables, and/or hourly rates, hours worked, total hours or related fees.

The Contractor shall bill to the address on the purchase order.

When a purchase order is issued against this Contract, separate invoices shall be generated for each completed payment milestone and/or delivery accepted by the County.

Upon Acceptance by the County of a vehicle in Seattle, WA, terms of payment will be Net 30 days and 100% of vehicle price, subject to an invoice being provided which conforms to King County's invoicing requirements. Upon acceptance of payment, the Contractor waives any claims for the goods or services covered by the Invoice. King County will not be bound by prices contained in an invoice that are higher than those in the currently approved price list. If a price increase has not been accepted in writing by King County, the invoice may be rejected and returned to the Contractor for a correction.

### **Scope of Work**

The price for the work is defined in Attachment P-1 "Price Schedule"

### **Description of Work**

Prior to execution of a Notice to Proceed, the contractor shall meet the requirement listed below.

- Business license(s), state and municipality specific to the planned production facility for North American buses for future contracts

#### **40-foot all battery electric buses**

A minimum base quantity of two (2) 40-foot battery electric buses plus option quantities of up to six (6) additional 40-foot battery electric buses.

#### **60-foot all battery electric buses**

A minimum base quantity of two (2) 60-foot battery electric buses plus option quantities of up to six (6) additional 60-foot battery electric buses.

### **Contract Term (term contracts only)**

The term of this Contract is expected to be three (3) years, subject to the termination clauses contained herein. King County reserves the right to extend the term if determined to be in the best interest of the County. Ability by the County to extend shall be in 1-year increments, not to exceed a total contract timeline of 5 years.

Contracts or purchase orders will be issued by the County. Contract amendments or change orders issued by the County may reflect modification(s) of contract terms, funding, or other matters.

The Contractor will have the sole, exclusive right to fill all of the County's requirements for the goods or services procured under this Contract.

### **Shipping Charges**

All prices shall include freight FOB to the designated delivery point. The County and the Contractor will negotiate in good faith should there be a need to seek additional compensation for unforeseen freight related cost increases.

### **Rejection of Goods Or Services**

After execution, the Buyer or authorized County representative shall have the option of rejecting or refusing delivery of any and all goods or services which are not in conformity with the requirements of the specification and the bid. All rejected goods or services shall be promptly replaced or re-performed and be subject to approval by the County. All replacement goods and services shall be provided at the Contractor's own expense.

### **Taxes, Licenses, and Certificate Requirements**

This Contract and any of the work provided hereunder is contingent and expressly conditioned upon the ability of the Contractor to provide the specified goods or services consistent with applicable federal, state, or local laws and regulations. If, for any reason, the Contractor's required compliances are terminated, suspended, revoked, or in any manner modified from their status at the time this Contract becomes effective, the Contractor shall notify the County immediately of such condition in writing.

The Contractor and subcontractor(s) shall maintain and be liable for all taxes (except sales/use taxes), fees, licenses, permits, and costs as may be required by applicable federal, state, or local laws and regulations as applicable to the work under this Contract.

### **Other Public Agency Orders**

Other federal, state, county, and local entities may utilize the terms and conditions established by this Contract if agreeable to all parties. The County does not accept any responsibility or involvement in the purchase orders or contracts issued by other public agencies.

### **Incorporation of Documents**

The contract between Contractor and King County shall include all documents mutually entered into at the time of contract execution, specifically including this contract document. King County shall not be bound nor obligated to enter into or sign additional agreements and or documents other than those required by law.

#### **A1.07.02**

If a Proposer considers any portion of any record provided to the County under this RFP, whether in electronic or hard copy form, to be protected under law, the Proposer shall clearly identify each such portion with words such as "CONFIDENTIAL", "PROPRIETARY", or "BUSINESS SECRET". Such portions of the proposal shall be submitted separately in a sealed envelope.

If a request is made for disclosure of such portion, the County will determine whether the material should be made available under the Act. If the County determines that the material is subject to disclosure, the County will notify the Proposer of the request and allow the Proposer ten (10) business days to take whatever action it deems necessary to protect its interests. If the Proposer fails or neglects to take such action within said period, the County will release the portions of record(s) deemed by the County to be subject to disclosure. The County shall not be liable to the Proposer for inadvertently releasing records pursuant to a disclosure request not clearly identified by the Proposer as "CONFIDENTIAL", "PROPRIETARY", or "BUSINESS SECRET".

#### **A1.07.03**

Pursuant to Washington State law, if a member of the public or a vendor requests to review those portions of the proposals, BAFOs, information, and/or material marked according to the procedure set forth in Section A1.07.02, the County will notify the affected Proposer prior to releasing such portions. The Proposer may then take such legal actions as it deems necessary to protect its interests. If the Proposer has not commenced such actions within ten (10) business days after receipt of the notice from the County of a demand to review

such portions of its proposals, BAFOs, information, and/or material and provided the County written notice of the actions, the County may make such portions available for review and copying by the public.

**A1.07.04**

The Proposer asserting that portions of its proposals, BAFOs, information, and/or material are legally protectable shall bear all costs of defending such assertion, including reimbursing the County for its administrative, expert, and legal costs, including attorney's fees, involved in defending itself in actions arising from such assertions by the Proposer. By submitting proposals, BAFOs, information, and/or material with portions marked "CONFIDENTIAL", "PROPRIETARY", or "BUSINESS SECRET" the Proposer has thereby agreed to the provisions of this Section A1.07, including the defense and reimbursement obligations of this Subsection A1.07.04.

**A1.1 Communications**

**A1.1**

Communications by or on behalf of any person or firm regarding this procurement with County staff, King County Council members, consultants, and/or employees other than those listed below are prohibited and shall be cause for the person or firm involved to be subject to disqualification by the County.

Written and or verbal inquiries concerning the requirements set forth in this Contract shall be directed to the office listed below.

William Haber, Superintendent  
Transit Fleet Procurement and Contract Management  
King County, Metro Transit Department  
MS/KSC-TR-0342  
201 S. Jackson St.  
Seattle, WA 98104-3856  
Phone: (206) 477-6126  
Email: [William.Haber@kingcounty.gov](mailto:William.Haber@kingcounty.gov)

No responses to inquiries shall be binding on the County unless confirmed in writing by the County.

**A1.2 Financing Options**

**A1.2**

The County reserves the right to utilize whatever financing options may be available to it in the procurement of the bus/buses to be delivered under the Contract. These options could include, but are not limited to, cross-border leasing, certificates of participation, capital leasing, etc. The use of any of these or other financing methods may require the submission of additional information by the Contractor, the presence of the Contractor at meetings, the execution by the Contractor of various documents in connection with such financing and other reasonable forms of cooperation and assistance. By agreeing to this Contract, Contractor agrees to provide reasonable support in the event the County uses any of the financing options available to it and to fully cooperate in the implementation of such options for the County's benefit at no additional cost to the County.

**Section A2 – Federal, State, and County Requirements**

**A2.01 Not Used**

**A2.02 Not Used**

**A2.03 Not Used**

**A2.04 Not Used**

**A2.05 Energy Conservation Requirements**

**42 U.S.C. § 6321 et seq.**

**49 CFR Part 622**

**Energy Conservation –**

For the activities carried out in Washington State, the Contractor shall comply with mandatory standards and policies relating to energy efficiency that are contained in the state energy conservation plan issued in

compliance with the Energy Policy and Conservation Act. The Contractor shall include this clause in all subcontracts execution under this Contract.

**A2.06 Clean Air Act and Federal Water Pollution Requirements**

**33 U.S.C. §§ 1251-1389  
42 U.S.C. §§ 7401-7671q  
2 C.F.R. Part 200, Appendix II(G)**

**Clean Air and Water –**

The Contractor shall:

- (1) Comply with all applicable Federal standards, orders; or regulations, including but not limited to those issued pursuant to the Clean Air Act, as amended (42 U.S.C. § 7401 et seq.), and with those issued pursuant to the Federal Water Pollution Control Act, as amended (33 U.S.C. § 1251 et seq.);
- (2) Comply with the inspection and other requirements of the Federal standards, orders, or regulations, including but not limited to, the Clean Air Act, as amended (42 U.S.C. §§ 7401-7671q), and the Federal Water Pollution Control Act, as amended (33 U.S.C. §§ 1251-1387);
- (3) Not use any violating facilities that violate any Federal standards, orders, or regulations, including both the Clean Air Act or the Federal Water Pollution Control Act;
- (4) Report the use of facilities placed on or likely to be placed on the U.S. EPA "List of Violating Facilities";
- (5) Report violations of use of prohibited facilities to the FTA, EPA, or any Federal agency with jurisdiction, with a copy to the County.

A2.07 Intentionally Deleted

A2.08 Intentionally Deleted

**A2.09 Compliance with Federal Lobbying Policy**

**31 U.S.C. § 1352  
2 CFR § 200.450  
2 CFR Part 200 Appendix II (I)  
49 CFR Part 20**

**Lobbying Amendment –**

Contractors who apply or propose for an execution of \$100,000 or more shall file the certification required by 49 CFR Part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other execution covered by 31 U.S.C. § 1352(b)(5). Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or execution covered by 31 U.S.C. § 1352. Such disclosures are forwarded from tier to tier up to the recipient.

This certification must be completed and submitted with all proposals. Proposals that are not accompanied by a completed lobbying certification must be rejected as non-responsive.

**A2.10 Access to Records and Reports**

**49 U.S.C. § 5325  
18 CFR § 18.36(i)  
49 CFR § 633.15  
2 CFR § 200.334**

**Access to Records –**

The following access to records requirements apply to this Contract:

**Record Retention.** The Contractor shall, and will require all of its subcontractors of all tiers to retain complete and readily accessible records related to the whole of this contract, including but not limited to, data,

documents, reports, statistics, sub-agreements, leases, subcontracts, arrangements, other third part agreements of any type, and supporting materials related to those records.

**Retention Period.** The Contractor shall comply with the record retention requirements in accordance with 2 CFR § 200.334. The Contractor shall maintain all books, records, accounts, and reports required under this contract for a period of not less than three (3) years after the date of termination or expiration of this Contract, except in the event of litigation or settlement of claims arising from the performance of this Contract, in which case Contractor shall maintain same until the County, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims, or exceptions related thereto. Reference 49 CFR § 18.39(i)(11).

**Access to Records.** In accordance with 49 CFR § 18.36(i), the Contractor shall provide the County, FTA and its contractors, the Comptroller General of the United States, or any of their authorized representatives sufficient access to inspect and audit any books, documents, papers, records, and information related to performance of this Contract as may be reasonably required.

**Access to the Sites of Performance.** Contractor shall, pursuant to 49 CFR § 633.15 provide FTA and its authorized representatives and contractors access to Contractor's records and sites of performance under this Contract, as may be required.

The Contractor shall permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

#### **A2.11 Federal Funding, Incorporation of Federal Terms, and Federal Changes 49 CFR Part 18**

The preceding provisions include, in part, certain standard terms and conditions required by the United States 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 or its successors, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this agreement. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any County requests that would cause the County to be in violation of the FTA terms and conditions.

The Contractor shall at all times comply with all applicable FTA regulations, policies, procedures, and directives, including without limitation those listed directly or by reference in the Master Agreement between the County and 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.

The FTA Master Agreement is available at: <http://www.fta.dot.gov/documents/20-Master.pdf>.

#### **A2.12 Recycled Products 42 U.S.C. § 6962 40 CFR Part 247**

##### **Recovered Materials –**

The Contractor shall provide for a preference for those products and services that conserve natural resources, protect the environment, and are energy efficient by complying with and facilitating compliance with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. § 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

#### **A2.13 Employee Protections**

##### **Prevailing Wage and Anti-Kickback –**

For all prime construction, alteration, or repair contracts in excess of \$2,000 execution by FTA, the Contractor shall comply with the Davis-Bacon Act and the Copeland "Anti-Kickback" Act. Under 49 U.S.C. § 5333(a), prevailing wage protections apply to laborers and mechanics employed on FTA assisted construction, alteration, or repair projects. The Contractor will comply with the Davis-Bacon Act, 40 U.S.C. §§ 3141-3144, and §§ 3146-3148 as supplemented by DOL regulations at 29 C.F.R. Part 5 "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction." In accordance with the statute, the Contractor shall pay wages to laborers and mechanics at a rate not less than the prevailing wages

specified in a wage determination made by the Secretary of Labor. In addition, the Contractor agrees to pay wages not less than once a week (40 U.S.C. § 3145). The Contractor shall also comply with the Copeland "Anti-Kickback" Act (18 U.S.C. § 1874), as supplemented by DOL regulations at 29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States." The Contractor is prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled.

#### **A2.14 No Government Obligation to Third Parties**

##### **No Obligation by the Federal Government –**

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

#### **A2.15 Program Fraud and False or Fraudulent Statements and Related Acts**

**31 U.S.C. § 3801 et seq.  
49 CFR Part 31  
18 U.S.C. § 1001  
49 U.S.C. § 5307  
49 U.S.C. § 5323(l)(1)**

##### **Program Fraud and False or Fraudulent Statements or Related Acts –**

- (1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. §§ 3801 et seq. and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 CFR Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying Contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying Contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.
- (2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally execution by FTA under the authority of 49 U.S.C. Chapter 53, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5323(l) on the Contractor, to the extent the Federal Government deems appropriate.
- (3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the Subcontractor who will be subject to the provisions.

**A2.16 Termination  
49 U.S.C. Part 18  
FTA Circular 4220.1F**

See Section B6.10 for contract termination provisions.



**A2.17 Government-Wide Debarment And Suspension  
49 CFR Part 29  
Executive Order 12549**

**Suspension and Debarment –**

The Contractor shall comply and facilitate compliance with U.S. DOT regulations, "Non-procurement Suspension and Debarment," 2 CFR Part 1200, which adopts and supplements the U.S. Office of Management and Budget (U.S. OMB) "Guidelines to Agencies on Governmentwide Debarment and Suspension (Non-procurement)," 2 CFR Part 180. These provisions apply to each contract at any tier that must be approved by an FTA official irrespective of the contract amount. As such, the Contractor shall verify that its principals, affiliates, and subcontractors are eligible to participate in this federally funded contract and are not presently declared by any Federal department or agency to be:

- a. Debarred from participation in any federally assisted Execution;
- b. Suspended from participation in any federally assisted Execution;
- c. Proposed for debarment from participation in any federally assisted Execution;
- d. Declared ineligible to participate in any federally assisted Execution;
- e. Voluntarily excluded from participation in any federally assisted Execution; or
- f. Disqualified from participation in any federally assisted Execution.

By signing and submitting this Contract, the Contractor certifies as follows:

The certification in this clause is a material representation of fact relied upon by the County. If it is later determined that the Contractor knowingly rendered an erroneous certification, in addition to remedies available to the County, the Federal government may pursue available remedies, including but not limited to suspension and/or debarment. The Contractor agrees to comply with the requirements of 2 CFR Part 180, Subpart C, as supplemented by 2 CFR Part 1200, while this Contract is valid. The Contractor further agrees to include a provision requiring such compliance in its lower tier covered transactions.

The certification at Form EA2.22 must be completed and submitted with the Contract.

**A2.18 Civil Rights and Equal Opportunity  
29 U.S.C. § 623, 42 U.S.C. § 2000e et seq.  
42 U.S.C. § 6102, 42 U.S.C. § 12112  
42 U.S.C. § 12132, 49 U.S.C. § 5332  
29 CFR Part 1630, 41 CFR Chapter 60**

**Equal Opportunity –**

The County is an Equal Opportunity Employer. As such, the County complies with all applicable Federal civil rights laws and implementing regulations. Apart from inconsistent requirements imposed by Federal laws or regulations, the County complies with the requirements of 49 USC § 5323(h)(3) by not using any Federal assistance execution by FTA to support procurements using exclusionary or discriminatory specifications.

The Contractor shall at all times comply with the following requirements and shall include these requirements in each subcontract entered into as part thereof.

- (1) **Nondiscrimination** – In accordance with Federal transit law at 49 U.S.C. § 5332, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, creed, religion, national origin, sex, age, or disability. In addition, the Contractor shall comply with applicable Federal implementing regulations and other implementing requirements the FTA may issue.
  - (a) **Race, Color, Creed, National Origin, Sex** – In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e et seq., and Federal transit laws at 49 U.S.C. § 5332, the Contractor shall comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 CFR Chapter 60, and Executive Order No. 11246, "Equal Employment Opportunity in Federal Employment," September 24, 1965, 42 U.S.C. § 2000e note, as amended by any later Executive Order that amends or supersedes it, referenced in 42 U.S.C. § 2000e note. 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, religion, national origin, or sex (including sexual orientation and gender identity). Such action shall include, but not be limited to, the following: employment, promotion, demotion or transfer, recruitment or recruitment

advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor shall comply with any implementing requirements FTA may issue.

- (b) **Age** – In accordance with the Age Discrimination in Employment Act of 1967, 29 U.S.C. §§ 621-634, U.S. Equal Employment Opportunity Commission (U.S. EEOC) regulations "Age Discrimination in Employment Act," 29 CFR Part 1625, the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6101 et seq., U.S. Health and Human Services regulations, "Nondiscrimination on the Basis of Age in Programs or Activities Receiving Federal Financial Assistance," 45 CFR Part 90, and Federal transit law at 49 U.S.C. § 5332, the Contractor shall refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor shall comply with any implementing requirements FTA may issue.
  - (c) **Disabilities** – In accordance with Section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. § 794, the Americans with Disabilities Act of 1990, as amended, 42 U.S.C. § 12101 et seq., the Architectural Barriers Act of 1968, as amended, 42 U.S.C. § 4151 et seq., and Federal transit law at 49 U.S.C. § 5332, the Contractor shall not discriminate against individuals on the basis of disability. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.
- (2) The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

#### **A2.19 Disadvantaged Business Enterprise (DBE) 49 CFR Part 26**

It is the policy of the County and the United States Department of Transportation ("DOT") that Disadvantaged Business Enterprises ("DBEs"), as defined herein and in the Federal regulations published at 49 CFR Part 26, shall have an equal opportunity to participate in DOT-assisted contracts. It is also the policy of the County to:

1. Ensure nondiscrimination in the execution and administration of DOT-assisted contracts;
  2. Create a level playing field on which DBEs can compete fairly for DOT-assisted contracts;
  3. Ensure that the DBE program is narrowly tailored in accordance with applicable law;
  4. Ensure that only firms that fully meet 49 CFR Part 26 eligibility standards are permitted to participate as DBEs;
  5. Help remove barriers to the participation of DBEs in DOT-assisted contracts;
  6. Promote the use of DBEs in all types of federally assisted contracts and procurement activities; and
  7. Assist in the development of firms that can compete successfully in the marketplace outside the DBE program.
- a. This Contract is subject to the requirements of Title 49, Code of Federal Regulations, Part 26; Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs. Therefore, the Contractor must satisfy the requirements for DBE participation as set forth herein. These requirements are in addition to all other equal opportunity employment requirements of this Contract. The County shall make all determinations with regard to whether or not the Contractor is in compliance with the requirements stated herein. In assessing compliance, the County may consider during its review the Contractor's documented history of non-compliance with DBE requirements on previous contracts with the County.
- The Contractor shall maintain compliance with "DBE Approval Certification" throughout the period of Contract performance.
- b. The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. The Contractor shall comply with and carry out applicable requirements of 49 CFR Part 26 (see section 9 – Forms & Certifications, CER 3 – DBE Approval Certification) in the execution and administration of this DOT-assisted Contract. Failure by the Contractor to carry out these requirements is a material breach of this Contract, which may result in the termination of this Contract or such other remedy as the County deems appropriate. Each subcontract the Contractor signs with a Subcontractor must include the assurance required by 49 CFR § 26.13(b).
- c. The Contractor is required to report its DBE participation obtained through race-neutral means throughout the period of performance.

- d. The Contractor is required to pay its subcontractors performing work related to this Contract for satisfactory performance of that work no later than 30 days after the Contractor's receipt of payment for that work from the County.
- e. The Contractor must promptly notify the County whenever a DBE subcontractor performing work related to this Contract is terminated or fails to complete its work, and must make good faith efforts to engage another DBE subcontractor to perform at least the same amount of work. The Contractor may not terminate any DBE subcontractor and perform that work through its own forces or those of an affiliate without prior written consent of the County.
- f. Each transit vehicle manufacturer (TVM), as a condition of being authorized to propose on federally assisted transit vehicle procurements, must certify that it has complied with the requirements of 49 CFR Part 26.
- g. The certificate at EA2.28 must be completed and submitted with the Contract.

**A2.20 Access Requirements for Individuals with Disabilities  
FTA Circular 4220.1F**

The Contractor shall comply with all applicable requirements of the Americans with Disabilities Act of 1990 (ADA), 42 USC § 12101, et seq.; Section 504 of the Rehabilitation Act of 1973, as amended, 29 USC § 794; and 49 USC § 5301(b)(6), and the following regulations and any amendments thereto:

- A. U.S. Department of Transportation regulations, "Transportation Services for Individuals with Disabilities (ADA)," 49 CFR Part 37;
- B. U.S. Department of Transportation regulations, "Nondiscrimination on the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance," 49 CFR Part 27;
- C. U.S. Department of Transportation regulations, "Americans With Disabilities Act (ADA) Accessibility Guidelines for Transportation Vehicles," 36 CFR Part 1192 and "Americans With Disabilities Act (ADA) Accessibility Specifications for Transportation Vehicles," 49 CFR Part 38;
- D. U.S. Department of Justice (DOJ) regulations, "Nondiscrimination on the Basis of Disability in State and Local Government Services," 28 CFR Part 35;
- E. DOJ regulations, "Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities," 28 CFR Part 36;
- F. U.S. General Services Administration regulations, "Accommodations for the Physically Handicapped", 41 CFR Subpart 101-19;
- G. U.S. Equal Employment Opportunity Commission (EEOC) "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 CFR Part 1630;
- H. U.S. Federal Communications Commission regulations, "Telecommunications Relay Services and Related Customer Premises Equipment for Persons with Disabilities," 47 CFR Part 64, Subpart F;
- I. FTA regulations, "Transportation for Elderly and Handicapped Persons," 49 CFR Part 609;
- J. U.S. Architectural and Transportation Barriers Compliance Board (ATBCB) regulations, "Information and Communication Technology Standards and Guidelines," 36 CFR Part 1194;
- K. Any implementing requirements the FTA may issue; and
- L. The certificate at Form EA2.32 shall be completed and submitted with the Contract.

**A2.21 Contract Work Hours and Safety Standards Act**

**A2.21.01 Overtime Requirements:**

For all contracts in excess of \$100,000 that involve the employment of mechanics or laborers, the Contractor shall comply with the Contract Work Hours and Safety Standards Act (40 U.S.C. §§ 3701-3708), as

supplemented by the DOL regulations at 29 CFR Part 5. Under 40 U.S.C. § 3702 of the Act, the Contractor shall compute the wages of every mechanic and laborer, including watchmen and guards, on the basis of a standard workweek of 40 hours. Work in excess of the standard workweek is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the workweek. The requirements of 40 U.S.C § 3704 are applicable to construction work and provide that no laborer or mechanic be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous. These requirements do not apply to the purchase of supplies or materials or articles ordinarily available on the open market or to contracts for the transportation or transmission of intelligence.

**A2.21.02 Violation; liability for unpaid wages; liquidated damages:**

In the event of any violation of the clause set forth in paragraph 1 of this section, the Contractor and any Subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph 1 of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 1 of this section.

**A2.21.03 Withholding for unpaid wages and liquidated damages:**

The County shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the Contractor or Subcontractor under any such contract or any other Federal contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or Subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 2 of this section.

**A2.21.04 Subcontracts:**

The Contractor or Subcontractor shall insert in any subcontracts the clauses set forth in paragraphs 1 through 4 of this section and also a clause requiring the Subcontractor to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for compliance by any Subcontractor or lower-tier Subcontractor with the clauses set forth in paragraphs 1 through 4 of this section.

**A2.22 Washington State Requirements**

**A2.22.02**

The Contractor shall provide evidence to the County that the Contractor is duly registered with the Washington State Secretary of State and the Washington State Department of Revenue. See Attachment 27 for a copy of a Department of Revenue information sheet.

**A2.22.03**

The Contractor's name on the required Washington State registration and licensure documents, the Contractor's name on the Contract Agreement, and the Contractor's name on invoices must be the same.

**A2.23 King County Requirements**

**A2.23.01 Conflicts of Interest – Current and Former Employees and Non-Competitive Practices**

- A. **Conflict of Interest** – By entering into this Contract to perform Work, the Contractor represents that it has no direct or indirect pecuniary or proprietary interest, and that it shall not acquire any such interest, that conflicts in any manner or degree with the Work required to be performed under this Contract. The Contractor shall not employ any Person or agent having any conflict of interest. In the event that the Contractor or its agents, employees, or officers hereafter acquires such a conflict of interest, it shall immediately disclose such conflict to the County. The County shall require that the Contractor take immediate action to eliminate the conflict.
- B. **Contingent Fees and Gratuities** – By entering into this Contract to perform Work, the Contractor represents that:
  - 1. No Persons except as designated by the Contractor shall be employed or retained to solicit or secure this Contract with an agreement or understanding that a commission, percentage, brokerage, or contingent fee would be paid.

2. No gratuities, in the form of entertainment, gifts, or otherwise, were offered or given by the Contractor or any of its officers, agents, employees, or representatives, to any official, member, or employee of the County or other governmental agency with a view toward securing this Contract or securing favorable treatment with respect to the execution or amending, or the making of any determination with respect to the performance of this Contract.
3. Any Person having an existing contract with the County or seeking to obtain a contract who willfully attempts to secure preferential treatment in his or her dealings with the County by offering any valuable consideration, thing, or promise, in any form to any County official or employee shall have his or her current contracts with the County canceled and shall not be able to bid on any other County contracts for a period of two (2) years.

**C. Disclosure of Current and Former County Employees – To avoid any actual or potential conflict of interest or unethical conduct:**

1. County employees or former County employees are prohibited from assisting with the preparation of proposals or contracting with, influencing, advocating, advising, or consulting with a third party, including the Contractor, while employed by the County or within one (1) year after leaving County employment if he/she participated in determining the Work to be done or process to be followed while a County employee.
2. The Contractor shall identify at the time of offer current or former County employees involved in the preparation of proposals or the anticipated performance of Work if execution the Contract. Failure to identify current or former County employees involved in this Contract may result in termination of this Contract.
3. After Contract execution the Contractor is responsible for notifying the County of current or former County employees who may become involved in the Contract at any time during the term of the Contract.

**A2.23.02 Nondiscrimination and Equal Employment Opportunity**

**A. Nondiscrimination in Employment and Provision of Services –**

During the performance of this Contract, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of the employee or applicant's sex, race, color, marital status, national origin, religious affiliation, disability, sexual orientation, gender identity or expression, status as a family caregiver, military status or status as a veteran who was honorably discharged or who was discharged solely as a result of the person's sexual orientation or gender identity or expression, or age except by minimum age and retirement provisions, unless based on a bona fide occupational qualification.

**B. Equal Employment Opportunity Efforts –**

The Contractor will undertake equal employment opportunity efforts to ensure that applicants and employees are treated, without regard to their sex, race, color, marital status, national origin, religious affiliation, disability, sexual orientation, gender identity or expression, status as a family caregiver, military status or status as a veteran who was honorably discharged or who was discharged solely as a result of the person's sexual orientation or gender identity or expression, or age except by minimum age and retirement provisions, unless based on a bona fide occupational qualification. The Contractor's equal employment opportunity efforts shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment advertising; layoff or termination; rates of pay or other forms of compensation or benefits; and selection for training, including apprenticeships. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices setting forth this nondiscrimination clause. In accordance with KCC 12.16.010.J, "equal employment opportunity efforts" shall mean active efforts to ensure equal opportunity in employment that is free from all forms of discrimination.

**C. Nondiscrimination in Subcontracting Practices –**

During the solicitation, execution and term of this Contract, the Contractor shall not create barriers to open and fair opportunities to participate in County contracts or to obtain or compete for contracts and subcontracts as sources of supplies, equipment, construction, and services. In considering offers from and doing Business with subcontractors and suppliers, the Contractor shall not discriminate against any person on the basis of sex, race, color, marital status, national origin, religious affiliation, disability, sexual orientation, gender identity or expression, status as a family caregiver, military status or status as a veteran who was honorably discharged or who was discharged solely as a result of the person's sexual

orientation or gender identity or expression, or age except by minimum age and retirement provisions, unless based upon a bona fide occupational qualification.

**D. Compliance with Laws and Regulations –**

The Contractor shall comply fully with all applicable Federal, state, and local laws, ordinances, executive orders, and regulations that prohibit discrimination. These laws include, but are not limited to, King County Charter Section 840, RCW Chapter 49.60, Titles VI and VII of the Civil Rights Act of 1964, the American with Disabilities Act, and the Restoration Act of 1987. In addition, King County Code chapters 12.16, 12.17, 12.18, and 12.19 are incorporated herein by reference and the requirements in these code sections shall specifically apply to this Contract. The Contractor shall further comply with any equal opportunity requirements set forth in any Federal regulations, statutes, or rules included or referenced in this Contract.

**E. Sanctions for Violations –**

Any violation of the mandatory requirements of the provisions of this section shall be a material breach of this Contract, for which the Contractor may be subject to damages, withholding payment, and any other sanctions provided for by this Contract and by applicable law.

**F. Record-keeping Requirements and Site Visits –**

The County may, at any time, visit the project site or Contractors' and Subcontractors' offices to review records related to the solicitation, utilization, and payment to subcontractors and suppliers in compliance with <https://www.dol.gov/agencies/ofccp/executive-order-11246> Federal Register :: Document Search Results for 'EO 11246' as amended by [Executive Order 11375](#). This provision includes compliance with any other requirements of this section. The Contractor shall provide all reasonable assistance requested by King County during such visits. The Contractor shall maintain, for six (6) years after completion of all Work under this Contract, the following:

1. Records, including written quotes, bids, estimates, or proposals submitted to the Contractor by all Business seeking to participate on this Contract, and any other information necessary to document the actual use of and payment to subcontractors and suppliers in this Contract.
2. The Contractor shall make the foregoing records available to King County for inspection and copying upon request. Any violation of the mandatory requirements of the provisions of this subsection shall be a material breach of this Contract, which may result in termination of this Contract or such other remedy as the County deems appropriate, including but not limited to damages or withholding payment.

**G. Discrimination In Contracting –**

[King County Code Chapter 12.17 Title 12 - PUBLIC PEACE, SAFETY AND MORALS \(kingcounty.gov\)](#) is incorporated by reference as if fully set forth herein and such requirements apply to this Contract. During the performance of this Contract, neither Contractor nor any party subcontracting under the authority of this Contract shall discriminate or engage in unfair contracting practices prohibited by KCC 12.17.

**A2.23.03**

The Equal Benefits – Worksheet and Declaration Form at EA2.36 must be completed and submitted per section B5.01.01.

**A2.23.04**

Internal Revenue Service Form W-9 - Request for Taxpayer Identification and Certification Form at EA2.36 must be completed and submitted per Section B5.01.01.

**A3.0 Contract Requirements and Variations**

**A3.0**

By signing the Contract, the Contractor shall be deemed to have accepted without reservation or amendment all Contract requirements set forth or referenced in this Sole Source Contract. In the event the Contractor includes variations from requirements, which are not material to the Contract as set forth or referenced in this Sole Source Contract, the County may, if it desires to accept such variations, conduct discussions with the Contractor to make definite an understanding on final Contract terms and conditions. If the County does not accept a variation and the Contractor can demonstrate to the satisfaction of the County that the non-accepted variation is such a material factor that the Contractor's performance of the Contract would be significantly and adversely affected, the County will allow the Contractor to terminate this Contract.

### **A3.1 Alterations, Errors, or Mistakes**

No verbal, electronic, or telephonic or modifications will be considered, unless specifically authorized by the County.

## **A4.0 Price Proposal and Delivery**

### **A4.0 Unit Price Contract**

The County intends to execute a unit price contract as outlined in P1 – Price Schedule. Price proposals shall include all items necessary for design, testing, manufacture, and acceptance testing of the bus, for the preparation and delivery of other materials and information required in the specifications, and for compliance with all other requirements in the Contract. Prices shall be quoted in United States dollars and shall include all customs charges, royalties, license fees, taxes, and governmental charges as applicable, except as noted specifically below.

### **A4.1 Washington State Sales Tax and Federal Excise Tax**

Except as otherwise provided herein, prices shall not include any allowance for Washington State retail sales or use tax (Chapters 82.08 and 82.12 Revised Code of Washington) or Federal excise tax. Payment of State sales and use tax shall be made pursuant to Section B7.11. Exemption from Federal excise tax shall be pursuant to Section B5.09. Any other taxes which the Contractor may be required to pay related to the Contract, including, but not limited to, retail sales/use taxes on equipment and supplies used or consumed within the State of Washington in performing work under the Contract, Washington State, King County, or city business and occupation taxes, income taxes, etc. shall be included in the Contractor's proposed prices. No adjustments will be made in the amount to be paid by the County under the Contract because of any misunderstanding or any lack of knowledge of the Contractor as to liability for, or the amount of, any taxes or assessments which the Contractor may be liable or responsible for by law or under the Contract.

### **A4.3 Delivery Schedule**

Provide a proposed schedule for delivery of the bus as noted below. The schedule shall be the most cost effective for the Contractor so as to result in the lowest possible prices. The proposed delivery schedule must be supported with evidence that the bus can be built at the times stated given the Contractor's backlog of actual and potential orders.

The Contractor shall include the following information in the delivery schedule:

1. Proposed date of delivery of the first production bus.
2. Proposed date of delivery of the last bus

## **A5 Not Used**

### **B1.01 Definitions**

#### **B1.01.01**

##### Acceptance, Accepted, Accepts

A bus shall be considered to be accepted when, after the successful completion of Pre-Acceptance testing, the County provides the Contractor with a written Notice of Acceptance.

##### Approval, Approve, Approved

Any time these words are used it means that the County must approve, in writing, the specific part, design, process, etc. referred to. This includes those approvals routinely sought by the Contractor during the design or pilot review process.

##### Approved Equal

When referring to Requests for Deviation or RFP references to specific manufacturer's items, Approved Equal means that the County has provided an affirmative written response to a bus builder's request to use an unspecified manufacturer's product.

##### 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.

Bus Assembly Inspector

Same as Revenue Fleet Inspector

Calendar Day or Day

A calendar day of 24 hours that may be any day of the week, including a business day, a Saturday, Sunday, or holiday.

Capacity Load

An operating condition of the bus with 130 percent of a Seated Load, but not to exceed GAWRs.

Change Order (C.O.)

A written agreement entered into between the Contractor and the County to supplement, clarify, or alter the plans, specifications, or Contract, or to otherwise provide for unforeseen or additional work, and other matters not contemplated by or completely provided for in the Specifications.

Component

A subsystem, constituent element, or end item part of a bus.

Contract or Contract Documents

The written documents and specifications for this bus procurement Contract embodying the legally binding obligations between the County and the Contractor, including Sections A, B, and C, addenda thereto (Part D), forms (Part E), BAFO, and the documents, information, or materials required therein, and Change Orders.

Contract Officer

The Contract Officer for the County is the Superintendent of Transit Fleet Procurement and Contract Management.

Contract Administrator

The point of contact in the County for all communication from the Contractor. The Contract Administrator will be designated at the time of Contract execution and may change at the County's discretion.

Contractor

The individual, firm, company, joint venture, or corporation which is solely responsible for satisfying all of the requirements of the Contract Documents pursuant to an execution of the Contract by the County.

County

King County, a home rule charter county of the State of Washington.

Decibel (dB)

A unit of measure of relative sound intensity. See "sound pressure level" and "noise level".

Defect

Patent or latent malfunction or failure in material, workmanship, manufacture, or design of a bus or of any component of a bus.

Delivery, Delivered

A bus shall be considered to be delivered when the County's representative at the Contractor's manufacturing site has provided the Contractor with a signed Notice of Approval for delivery, and the Contractor or its agent places the vehicle with the County at the County's designated delivery location for acceptance testing as evidenced by the signing of the common carrier's manifest by an authorized representative of the County.

Design Objective

A requirement that the Contractor design for and include the specified feature into the buses to the best extent practicable. The Contractor shall submit information and documentation for the County's review and approval demonstrating that the feature is being supplied or that an adequate design effort was made to meet the requirements of the Contract Documents.



Design Operating Profile

This duty cycle consists of three (3) phases to be repeated in sequence: a central business district (CBD) phase of 2 miles with 7 stops per mile and a top speed of 20 mph, an arterial route phase of 2 miles with 2 stops per mile and a top speed of 40 mph, and a commuter phase of 4 miles with 1 stop and a maximum speed of 55 mph and a 5 minute idle phase.

Phase	Stops/ Mile	Top Speed (mph)	Miles	Accel. Dist. (ft.)	Accel. Time (s)	Cruise Dist. (ft.)	Cruise Time (s)	Decel. Rate (fpsps)	Decel. Dist. (ft.)	Decel. Time (s)	Dwell Time (s)	Cycle Time (min-s)	Total Stops
CBD	7	20	2	155	10	540	18.5	6.78	60	4.5	7	9-20	14
Idle	-	-	-	-	-	-	-	-	-	-	-	5-0	-
Arterial	2	40	2	1035	29	1350	22.5	6.78	255	9	7	4-30	4
CBD	7	20	2	155	10	510	18.5	6.78	60	4.5	7	9-20	14
Arterial	2	40	2	1035	35	1350	22.5	6.78	255	9	7	4-30	4
CBD	7	20	2	155	10	510	18.5	6.78	60	4.5	7	9-20	14
Commuter	1 stop for phase	Max. or 55	4	5500	90	2 miles + 4580 ft.	188	6.78	480	12	20	5-10	1
Total			14									47-10	51
Average Speed = 17.8 mph													

The bus shall be loaded to SLW and shall average approximately 18 mph while operating on this duty cycle. Operation shall continue regardless of the ambient temperature or weather conditions. The passenger doors shall be opened and closed at each stop, and the bus shall be knelt at each stop during the CBD phase. The braking profile shall be:

- 16 percent of the stops at 3 ft/sec/sec
- 50 percent of the stops at 6 ft/sec/sec
- 26 percent of the stops at 9 ft/sec/sec
- 8 percent of the stops at 12 ft/sec/sec

These percentages of stops shall be evenly distributed over the three phases of the duty cycle. For scheduling purposes, the average deceleration rate is assumed. **This Design Operating Profile is not intended as a simulation of the Metro Transit route structure.**

Desired

Preferred but not mandatory.

Directed

"Directed", "designated", "permitted", "required", and "accepted" and words of like import wherever and whatever manner used means as directed, designated, permitted, required, and accepted by the County unless otherwise specifically indicated or a contrary meaning is required by the context.

General Manager Director

Unless otherwise provided in the Contract Documents, the Director shall be the Director of the King County Metro Transit Department.

Down Time

The total time during which a bus is not in acceptable operating condition and is not available for revenue service as reasonably determined by the County.

Drive Away

The trip between the bus builder's final assembly site and the designated delivery point of the transit system. For motor buses, the bus builder provides (or contracts with) a driver to drive the bus between the two points.

Driver

The employee required to operate a bus in revenue service. Synonymous with "operator".

Execute the Contract

To do all things required in the Contract Documents for the formation of the Contract between a Contractor and the County.

FMVSS

Federal Motor Vehicle Safety Standards, a regulation by the U.S. Department of Transportation. There are several such standards, identified by number, e.g., FMVSS 108.

FR

The Federal Register.

FTA

Federal Transit Administration of the United States Department of Transportation (formerly the Urban Mass Transportation Administration).

File or Submit

Refers to the date of receipt by Department of Transportation.

Financial Interest

A direct and substantial economic interest.

Fleet Number

The number assigned to a bus by the County.

GAWR

Gross axle weight rating.

GVWR

Gross vehicle weight rating.

General Manager

Unless otherwise specified in the Contract, the General Manager of the King County Metro Transit Department.

Herein

"Herein," "hereinafter," and words of similar import shall refer to the Contract Documents.

Hotel Loads

Auxiliary loads on a bus such as heating and lights.

HV

High Voltage (>50V)

Inspector

Same as Revenue Fleet Inspector

KCC

King County Code

Low Floor Bus

A bus with a floor height above the ground of 14 to 16 inches at both doorways. No stairs are necessary to reach the aisle floor. The floor will be essentially level, but the rear of the bus will be at a higher level reached by not more than two (2) steps. No wheelchair lift is allowed; instead, a deployable ramp is provided at the front door.

Maintenance Personnel Skill Levels

APTA's Standard Bus Procurement Guidelines provide the following maintenance personnel skill levels. Approximate County equivalents are noted.

**5M:** Specialist Mechanic or Class A Mechanic Leader - Lead Mechanic at the County.

**4M:** Journeyman or Class A Mechanic – Mechanic at the County.

**3M:** Service Mechanic or Class B Servicer – No equivalent at the County.

**2M:** Mechanic Helper or Bus Servicer – Closest at the County is Equipment Service Worker.

**1M:** Cleaner, Fueler, Oiler, Hostler, or Shifter – Closest at the County is Utility Service Worker.

May

"May," wherever and in whatever manner used is permissive.

Metro or Metro Transit

The Metro Transit Department.

Month

Calendar month or the period between the same numbered days of consecutive months, e.g., four months after March 15 is July 15.

Noise Level (dBA)

The weighted sound pressure level in decibels measured using a Type A frequency weighting network as defined in ANSI Specification S1.4 or IEC Publication 179. Where the unit "dBA" is used, it refers to such a measurement. See "sound pressure level".

OEM

Original equipment manufacturer.

Operator

Synonymous with "driver".

Percent Grade

Percent grade is defined as the vertical rise in feet per 100 feet of horizontal distance.

Person

Any individual, partnership, corporation, association, governmental subdivision or unit thereof, or public or private organization or entity of any character.

Pre-Acceptance Testing

Pre-Acceptance Testing is defined as the inspection sheets used by the Bus Assembly Inspectors. These inspection sheets will be supplied to the builder beforehand and are used at the main assembly plant along with the service center or delivery location where PDI will take place. Forms are titled "Plant Inspection Sheets Solaris 24-1" and "Service Center Sheet Solaris 24-1"

Preferred

Desirable, but not mandatory.

Procurement

Buying, purchasing, renting, leasing, or otherwise acquiring any equipment, material, supply, nonprofessional and professional services, and capital construction projects.

Procurement Officer

Unless otherwise provided in the Contract, the Supervisor, Transit Fleet Procurement and Contract Management of the Metro Transit Department.

Pilot

The first bus in a requirement of buses. This bus is built several months before the start of assembly of any subsequent buses in a requirement, in order to allow the County to review the bus at a County facility and make any design changes to the requirement of buses.

Provide

To supply complete and installed without additional charge.

Purchaser  
Synonymous with "the County".

RCW  
Revised Code of Washington.

Requirement  
FTA term for a specific order of buses purchased under a five-year contract.

Related Defect  
Damage inflicted on any component as a direct result of a Defect.

Revenue Fleet Inspector, Bus Assembly Inspector, or Inspector  
The representative(s) of the County, appointed by the Contract Administrator, who is/are authorized to witness tests, review and approve inspections, approve vehicle acceptance documentation, etc., at the Contractor's plant and at County facilities.

Safety  
Ensuring, to the maximum extent possible, freedom from conditions that cause, or create a risk of, injury or death to persons or damage to or loss of equipment or property, including, but not limited to, compliance with all laws, regulations, and codes related to public and employee health and safety.

SCAANS  
A computer simulation of bus performance, utilizing the physical and mechanical characteristics of a specific bus, usually performed by the Electronic drive motor manufacturer.

Seated Load, Seated Load Weight ("SLW")  
An operating condition of a bus with every seat occupied, a driver aboard, all tanks filled, and all equipment installed. Each person is assumed to weigh 150 pounds (68 kg) and each mobility aid device 600 pounds (45 kg) when occupied.

Service Life  
FTA policy from Circular 5010.1D:

- a. Large, heavy-duty transit buses including over the road buses (approximately 35'- 40', and articulated buses): at least **12 years** of service or an accumulation of at least 500,000 miles.
- b. Small heavy duty transit buses (approximately 30'): at least **10 years** of service or an accumulation of at least 350,000 miles.
- c. Medium, medium-duty transit buses (approximately 25'-35'): at least **7 years** of service or an accumulation of at least 200,000 miles.
- d. Medium, light-duty transit buses (approximately 25-35'): at least **5 years** of service or an accumulation of at least 150,000 miles.
- e. Other light-duty vehicles such as small buses and regular and specialized vans: at least **4 years** of service or an accumulation of at least 100,000 miles.
- f. Trolleys, a fixed guideway electric trolley-bus with rubber tires obtaining power from overhead catenary: at least **15 years** of service.

Shall or Will  
"Shall" or "will" whenever used to stipulate anything means shall or will be done or performed by either the Contractor or the County. The act required is mandatory, not optional.

Slope  
Defined as "n:n" where the first number equals the rise in inches from 90 degrees true horizontal and the second number equals the distance in inches.

Singular  
Singular words or abbreviations include the plural.

Sound Pressure Level

Twenty (20) times the logarithm to the base ten (10) to the ratio of the root mean square sound pressure to the reference pressure, 0.00002 Newtons per square meter, expressed in decibels. See "noise level".

Specifications

The requirements set forth in Section C of the Contract.

Specified

"Specified", "described", or "noted" wherever and in whatever manner used means as specified, described, or noted in the Contract Documents.

Standard Floor Bus

A bus with a floor height above the ground of 30 to 36 inches, an essentially level floor, and doorways with two (2) or three (3) steps. A wheelchair lift is necessary to board mobility aid devices and persons with disabilities.

Subcontractor

An individual, firm, company, corporation, or other entity acting for or on behalf of the Contractor in performance of all or any part of the Contract.

Submitted

"Submitted" wherever and in whatever manner used means submitted to the County.

Sufficient

"Sufficient", "necessary", or "proper", "acceptable", "satisfactory", "desirable", and words of like import wherever and in whatever manner used mean sufficient, necessary, properly, acceptable, satisfactory, and desirable in relation to the Contract Documents as determined by the County.

Vendor

Any sub-supplier to the Contractor.

VIN

Vehicle Identification Number, as assigned by the vehicle manufacturer in accordance with Federal regulations.

Wet Weight

The weight of a complete bus with all equipment installed and all tanks filled but without passengers or driver.

Wheelchair

Includes mobility aids belonging to any class of three-or more-wheeled devices, usable indoors, designed or modified for and used by individuals with mobility impairments, whether operated manually or powered.

Work, the Work

Work or "the Work" means and includes anything and everything necessary or appropriate to be done for the setting out, execution, completion, and fulfillment of the Contract.

Work Day or Working Day

A 24-hour period extending from midnight to midnight. This term shall apply to local time at the location of the party to be notified or to whom an item is delivered, and it shall exclude Saturdays, Sundays, and holidays observed by the County.

**B1.02 Abbreviations**

**B1.02.01**

Whenever the following abbreviations are used, the intent and meaning shall be interpreted as follows. The list may not be exhaustive. The intent of the County has been to use abbreviations in a manner that is clear and in conformance with general engineering practice; however, all persons are urged to request clarification from the County in any case where the meaning of an abbreviation is in doubt as no claims of misinterpretation of abbreviations used or referenced in the Contract will be entertained after the execution of the Contract.

<b>approx.</b>	Approximate
<b>A</b>	Ampere
<b>ac</b>	Alternating current
<b>C</b>	Degrees Celsius
<b>cfm</b>	Cubic feet per minute
<b>cm</b>	Centimeter
<b>dBA</b>	Decibel, "A" scale
<b>dc</b>	Direct current
<b>F</b>	Degrees Fahrenheit
<b>ft</b>	Foot
<b>g</b>	Gravity
<b>Hz</b>	Hertz
<b>in</b>	Inch
<b>kg</b>	Kilogram
<b>km</b>	Kilometer
<b>km/h</b>	Kilometers per hour
<b>kWh</b>	Kilowatt hour
<b>l</b>	Liter
<b>lb</b>	Pound
<b>l/min</b>	Liters per minute
<b>m</b>	Meter
<b>mA</b>	Milliampere
<b>max.</b>	Maximum
<b>mi.</b>	Mile
<b>min.</b>	Minimum
<b>mm</b>	Millimeter
<b>mpg</b>	Miles per gallon
<b>mph</b>	Miles per hour
<b>no.</b>	Number
<b>psi</b>	Pounds per square inch
<b>r.m.s.</b>	Root mean square
<b>rpm</b>	Revolutions per minute
<b>s</b>	Second
<b>V</b>	Volt
<b>x</b>	Multiplied by

### **B1.03 Footnotes**

#### **B1.03.01**

Footnotes are used for convenience in some places but such use is not exhaustive. Use of footnotes or footnoting some sections and failing to footnote others that may have application shall not be considered to emphasize some sections over others or to amend or modify the import or meaning of the Contract Documents in any way.

### **B1.04 Dimensions**

#### **B1.04.01**

Where two dimensions are given, e.g., 10 in (254 mm), the first stated shall control in case of dispute.

### **B2.01 Performance of the Work**

#### **B2.01.01**

The performance of the Work shall be done in complete conformance with the Contract Documents, and consistent with the best standards within the industry for the manufacture of the transit buses referenced in Section A1.01.

It is expressly stipulated, however, that these Specifications and other Contract Documents do not purport to control the means or methods of performing the Contractor's Work. The Contractor assumes the entire responsibility for planning, design, and testing and for methods of manufacturing and assembling the buses.

The Work performed and the buses delivered to the County shall demonstrate the Contractor's consistent adherence to the best industry standards of design, manufacture, and assembly.

The County supports the Standard Bus Procurement Guidelines published by the American Public Transportation Association (APTA) in August 2022.

## **B2.02 County Representatives**

### **B2.02.01**

Following contract execution, the Contract Officer if deemed appropriate shall appoint a Contract Administrator who is the County's designated representative for all contacts by the Contractor and this person's name, address, phone number, and email address will be given to the Contractor.

### **B2.02.06**

If English is not the prevalent language used at the worksite, an interpreter fluently proficient in the other language(s) used and in English shall be available to the Inspector during all working hours. All documentation shall be supplied in English including, but not limited to, design drawings, inspection reports, and any other Contract documentation. Any and all costs associated with interpreting and translating of documents shall be borne entirely by the Contractor.

### **B2.02.07**

In the event the County's Inspector or a delegate is or becomes unacceptable to the Contractor, the Contractor will notify the County's Contract Administrator. The County and the Contractor will promptly discuss the matter. Replacement of any County Inspector shall be at the full discretion of the County.

## **B2.03 Contractor's Appointed Representative(s)**

### **B2.03.01**

At the time of execution of the Contract, the Contractor shall appoint a representative as a point of contact for the County. The Contractor shall immediately supply the name, address, phone number, fax number, and email address of this person to the County's Contract Administrator. This representative shall be the contract liaison agent through whom the County will communicate with the Contractor. The Contractor shall respond to all written communications from the County's Contract Officer, Contract Administrator or designee within seven (7) working days from receipt.

### **B2.03.02**

The Contractor shall also appoint a representative who will be the contact point in the Contractor's plant for the County's Inspector. The Contractor's plant representative shall be the contract liaison agent through whom the County's Inspector will communicate with the Contractor. Correspondence from the Contractor's representative will be binding on the Contractor.

The Inspector and the Contractor will jointly establish in a timely manner the procedure to be followed relating to identification and control of letters of transmittal, telephone memoranda, reports, e-mails, and drawings, and the Contractor shall comply with such procedure. The Contractor shall answer or give progress updates to all written communications from the County's Inspector within seven (7) working days from issuance.

### **B2.03.03**

In the event a Contractor's appointed plant representative is or becomes unacceptable to the County, the Contractor shall promptly discuss and consider the matter with the County and attempt to arrive at a mutually satisfactory solution. If no such solution is developed, within 90 days, the Contractor shall replace the plant representative with a person acceptable to the County.

## **B2.04 Paragraph Headings**

### **B2.04.01**

Headings to parts, sections, forms, articles, and sub-articles are inserted for convenience of reference only and shall not affect the interpretation of these Contract Documents.

## **B2.05 Successor's Obligation**

### **B2.05.01**

All grants, covenants, provisos, and claims, rights, powers, privileges, and liabilities contained in the Contract Documents shall be read and held as made by and with and granted to and imposed upon the Contractor and the County and their respective heirs, executors, administrators, successors, and assigns.

## **B2.06 Contractor's Plant, Equipment and Employees**

### **B2.06.01**

The Contractor alone shall at all times be responsible for the availability, adequacy, efficiency, and sufficiency of its and its subcontractor's plant, equipment, and employees.

## **B2.07 Assignment of Contract**

### **B2.07.01**

Neither party will assign or subcontract its rights or obligations under the Contract without the prior written permission of the other party, and no such assignment or subcontract will be effective until approved in writing by the other party. Involuntary assignment of the Contract caused by the Contractor being adjudged bankrupt, assignment of the Contract for the benefit of Contractor's creditors, or appointment of a receiver on account of Contractor's insolvency shall all be considered as a failure to comply with the provisions of the Contract and subject to the termination for default provisions contained herein.

## **B2.08 Subcontracts**

### **B2.08.01**

The Contractor shall perform, with its own organization, not less than one third of the Work and shall not sublet to one subcontractor or supplier more than one half of the Work without the previous written consent of the County. No subcontractor or supplier will be recognized as having a contract with the County and all persons engaged in the Work will be considered employees of the Contractor or subcontractor. All subcontractor and supplier Work shall be subject to the provisions of the Contract through the terms and provisions of their subcontract that shall comply, in all pertinent respects, with the Contract Documents. No provision herein is intended to allocate or determine liability or responsibility between the Contractor and its subcontractors and suppliers. The provisions herein allocate or determine liability and responsibility only between the Contractor and the County.

The Contractor will provide to auditors representing or designated by the County, the name, address, phone number, fax number, and email address of any subcontractor or supplier who is engaged in the Work or supplying parts for the Contractor as it relates to this Contract. If such Work or parts information is needed for the specific purpose of certifying the Buy America requirements of 49 CFR Parts 661 and 663 or any other requirements of this Contract, or if otherwise reasonably required, the County reserves the right to audit or otherwise inspect the subcontractor's facilities, equipment, and records.

## **B2.09 Service of Notices**

### **B2.09.01**

Any notice, order, direction, request, or other written communication given by the County to the Contractor under the Contract shall be deemed to be well and sufficiently given to the Contractor if delivered to the Contractor's appointed representative, or if hand carried or sent by mail or e-mail to the Contractor at the address designated as that of the Contractor's appointed representative with receipt thereof acknowledged. Notice shall also be deemed to be well and sufficiently given three (3) days after mailing said notice by registered mail and/or electronic mail to the Contractor's last known place of Business.

## **B2.10 Deviation from Contract**

### **B2.10.01**

The Contractor shall not make any alterations or variation in or addition to or deviation or omission from the terms of this Contract without the prior written consent of the County.

## **B2.11 Suggestions to Contractor**

### **B2.11.01**

Any plan or method of work suggested by the County to the Contractor, but not specified or required in writing under the Contract, if adopted or followed by the Contractor in whole or part shall be used at the risk and responsibility of the Contractor, and the County shall assume no responsibility, therefore.

## **B2.12 Wages and Benefits of Employees**

### **B2.12.01**

Pursuant to the requirements of the Revised Code of Washington, Chapter 39.12, (as amended or supplemented), the Contractor and each subcontractor or other Person doing the whole or any part of the Work to be performed under the Contract in the State of Washington shall pay if required by said statutes each employee working in the State of Washington an amount not less than the general prevailing rate of wage as specified by the Industrial Statistician of the Department of Labor and Industries of Washington State, paid in the vicinity of the Work to be performed under the Contract for the particular trade or occupation of each employee.



Any employee whose type of work is not covered by any of the classified wage rates specified by the Industrial Statistician of the Department of Labor and Industries of the State of Washington shall be paid not less than the rate of wage listed for the classification that most nearly corresponds to the type of work to be performed. In the event that any dispute arises as to who is to be paid and what are the prevailing rates of wages for work of a similar nature which cannot be adjusted by the parties in interest, including labor and management representatives, the matter shall be referred for arbitration to the Director of the Department of Labor and Industries of the State of Washington, whose decision therein shall be final and conclusive and binding on all parties involved in the dispute.

The Contractor will be held responsible for paying the prevailing wages and for taking any other actions required to comply with Chapter 39.12 RCW.

As may be required by law, the Contractor on or before the date of commencement of the Work shall file a statement under oath with the County and with the Director of the Department of Labor and Industries certifying the rate of hourly wage to be paid to each classification of laborers, workmen, or mechanics employed upon the Work in the State of Washington by the Contractor or subcontractor, which shall be not less than the prevailing rate of wage. Such statement and any supplemental statements that may be necessary shall be filed in accordance with the practices and procedures required by the Department of Labor and Industries.

#### **B2.12.02 Workers' Benefits**

The Contractor shall make all payments required for unemployment compensation under the Revised Code of Washington Title 50 and for industrial insurance and medical aid required under RCW Title 51. The Contractor shall also obey all applicable Federal, state, and local laws, ordinances, and regulations establishing safety standards for the protection of employees. If any payment required by RCW Title 50 or Title 51 is not made when due, the County may retain such payments from any money due the Contractor and pay the same into the appropriate fund. The Public Works Contract Division of the Department of Labor and Industries will provide the Contractor with applicable industrial insurance and medical aid classification and premium rates <https://lni.wa.gov/licensing-permits/public-works-projects/prevailing-wage-policies>. Before release of any funds retained according to Section B7.09, the Contractor shall complete a "Request for Release" form and submit such form to the Department of Labor and Industries for approval for the purpose of obtaining a release with respect to the payments of industrial insurance and medical aid premiums. Such approved form shall be submitted to the County.

Under certain circumstances a Contractor whose entire operations are outside the State of Washington may not be required to make workers' benefits payments under Washington State law. If the Contractor has determined this to be the case, the Contractor will provide the County with a signed statement to this effect no later than 30 days after Notice to Proceed.

#### **B2.12.03 Compliance with All Laws**

The Contractor shall give the notices, file information, and pay taxes, deductions, and premiums as may be required by law and shall at all times comply with all applicable Federal, state, and local laws, ordinances, permit requirements, rules, and regulations pertaining to the conduct of the Work, including but not limited to the contractual provisions required by the FTA and set forth in Section A2. The Contractor shall be liable for violations of same in connection with Work provided by the Contractor, and the Contractor shall cooperate with all governmental entities regarding inspection of the Work and compliance with such requirements.

#### **B2.12.04 Audits**

The County may inspect or audit the Contractor's wage and payroll records. The Contractor agrees to maintain all books, records, accounts, and reports required under this Contract for a period of not less than six (6) 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 the Contractor agrees to maintain same until the County, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of such litigation, appeals, claims, or exceptions related thereto. The Contractor will ensure that wage and payroll records of all its subcontractors and agents shall be open to similar inspection and auditing for the same period of time. The County will give the Contractor reasonable notice of the starting date if an audit will begin more than 60 days after the Contract acceptance date.

## **B2.13 Contractor Variations**

### **B2.13.01**

In the event the Contractor is a joint venture of two or more contractors, all grants, covenants, provisos, and claims, rights, powers, privileges, and liabilities of the Contract shall be construed and held to be several as well as joint. Any notice, order, direction, request, or other communications required to be or that may be given by the County to the Contractor under this Contract shall be well and sufficiently given to the joint venture if given to the Contractor's appointed representative. Any notice, request, or other communication to the County under this Contract shall be deemed to have been given to the County if signed by the Contractor's liaison or other designated contact.

### **B2.13.02**

In the event that the Contractor is not the bus-manufacturer, then the manufacturer of the proposed bus shall be a party to this Contract for the purpose of guaranteeing full and complete performance in the event of default by the Contractor and providing the County with information and documentation necessary to assure the Contractor's complete performance and preserve all of the County's rights under the Contract. The manufacturer shall be bound by all grants, covenants, provisos, and claims, rights, powers, and liabilities of the Contract. In the event of default by the Contractor, the County shall have the absolute right to require the manufacturer to fully perform under the terms of the Contract. Such right shall be in addition and not in lieu of any rights under the performance bond.

## **B2.14 Waiver of Rights by the County**

### **B2.14.01**

No action or want of action on the part of the County at any time to exercise any rights or remedies conferred upon it under this Contract shall be deemed to be a waiver on the part of the County of any of its rights or remedies. The County shall be deemed to have waived a right or remedy only if issued or confirmed in writing as a waiver by the County. No waiver of one right or remedy shall act as a waiver of any other right or remedy or as a subsequent waiver of the same right and remedy.

## **B2.15 Dispute Resolution**

### **B2.15.01**

All claims, counterclaims, disputes, or other matters, arising out of the performance of this Contract that cannot be resolved by the Contract Officer and the General Manager shall be referred to the King County Executive's office or designee for final resolution. The Director or designee shall make a determination within 30 days of such referral, provided the Director is given all facts, data, and contentions which relate to the referral, and all other information and material necessary for its resolution. Such referral and determination by the Director or designee shall be a condition precedent to the commencement of a civil action to adjudicate such dispute.

## **B2.16 Units of Measure**

### **B2.16.01**

The Contractor may use either standard units of measure as used in the United States or metric units of measure in the conduct of the Work. If metric units are used, the standard equivalent shall be shown immediately adjacent to it. The chosen units of measure shall be applied consistently in all drawings and documentation. The County must approve any exception.

## **B2.17 Errors and Omissions**

### **B2.17.01**

If the Contractor in the course of the Work becomes aware of any errors or omissions in the Contract Documents or in the data as given in the instructions or if it becomes aware of any discrepancies in the Contract Documents, the Contractor shall immediately inform the County. Any Work done after such discovery until the Contractor has delivered written notification thereof to the County and one Work Day has elapsed, will be done at the Contractor's risk and expense.

## **B3.01 Engineering Drawings**

### **B3.01.01 General**

Buses shall be manufactured according to the requirements of the Contractor's engineering drawings which shall completely describe and define the buses, consistent with both the requirements and the intent of the Contract Documents and all applicable Federal, state, and local laws, regulations, rules, executive orders, and codes. The Contractor shall submit such additional or revised drawings, diagrams, calculations, test

results, and demonstrative evidence as the County deems necessary to confirm the completeness and accuracy of the Contractor's engineering drawings.

**B3.01.02 Distribution**

One (1) copy of all design drawings, engineering process sheets, and other bus manufacturing documentation, including latest revisions, shall be supplied to the Contract Administrator as they are produced.

The County's inspectors shall have access to design drawings, engineering process sheets, and other bus manufacturing documentation, including latest revisions. The method for providing this information shall be approved by the Contract Administrator.

Copies of all design drawings and other bus manufacturing documentation, including latest revisions, shall be supplied to the Contract Administrator as they are produced.

**B3.01.03 Standards**

The drawings shall reference various engineering standards or standard specifications, as appropriate, which shall control material quality, assembly techniques, and fabrication of the buses and components on them. English language copies of these standards shall be available to the Inspector.

**B3.02 Not Used**

**B3.03 English Language**

**B3.03.01**

All schedules, drawings, manufacturing documentation, manuals, parts lists, and any other written material or other communication required in the performance of the Contract shall be prepared using the English language as used in the U.S. throughout, so that the documents will be readily understood when in use in the maintenance facilities and by the staff members of the County, in King County, Washington. Drawings and diagrams of electrical or electronic circuits shall use symbols and notation as used in the U.S. electronics industry. The English language as used in the U.S. shall be used for all oral, written, or other communications.

**B3.04 Design Review**

**B3.04**

Any failure by the County to detect any Defects or omissions in any design, material, method, or program shall in no way relieve the Contractor from fully complying with the requirements and intent of the Contract Documents.

**B3.04.01**

The County participation in design or engineering drawing reviews or acceptance of any schedule, change proposal or drawing or any information shall not relieve the Contractor of its commitment and responsibility for compliance with the Specifications. The Contractor shall at its own expense remedy any deficiencies and Defects that may develop even though prior tests have seemingly indicated compliance with the Specifications.

**B3.05 Compliance Testing**

**B3.05.01 Not Used**

**B3.05.02**

The County shall be informed at least fourteen (14) days prior to any test or analysis used for verification of Contract compliance and may witness each such test or analysis. Certified results of tests not conducted strictly for this Contract may be submitted in lieu of conducting additional tests, if the Contractor can demonstrate to the County that the proposed test results are relevant and applicable.

**B4.01 General Quality**

**B4.01.01**

Material and equipment shall be new and of a quality equal to that specified or accepted as the best industry practice in Europe. Mechanical, electrical, and electronic equipment and components shall be the products of manufacturers of established good reputations regularly engaged in the fabrication of such equipment and components.

The Work shall be executed in conformity with the best accepted standard practice of the trade so as to contribute to maximum efficiency of operation, accessibility, pleasing appearance, and minimum cost of maintenance.

The fit and finish of exterior and interior components shall be to the best industry standards of the automotive trade.

#### **B4.01.02**

Whenever under the Contract Documents it is provided that the Contractor shall furnish materials or manufactured components or shall do Work for which no detailed specifications are set forth, the Work performed shall be in full conformity and harmony with the intent to secure the best standards of manufacture in the Work as a whole or in part. No advantage shall be taken by the Contractor in the omission of any part or detail which goes to make the BUS complete and ready for service, even though such part or detail is not mentioned in the Specifications or in the Contractor's approved design.

#### **B4.01.03 Proprietary Rights/Rights in Data**

The term "subject data" used in this clause means recorded information, whether or not copyrighted, that is delivered or specified to be delivered under the Contract. It includes the proprietary rights of the following:

- Shop drawings and working drawings
- Technical data including manuals or instruction materials, computer or microprocessor software
- Patented materials, equipment, devices, or process
- License requirements

The County shall protect proprietary information provided by the Contractor and Subcontractors to the fullest extent of the law. The Contractor shall grant an exclusive license to allow the County to utilize such information in order to maintain the vehicles. The Contractor agrees to include the requirements of this clause, modified as necessary to identify the affected parties, in each subcontract and supply order placed under the Contract.

#### **B4.03 Proof of Compliance with Contract**

##### **B4.03.01**

In order that the County may attempt to determine whether the Contractor has complied with the requirements of the Contract Documents not readily determinable through inspection and test of equipment, components, or materials utilized in the Work, the Contractor shall, at any time when requested, submit to the County properly authenticated test results, design documents, or other satisfactory proof as to its compliance with such requirements.

#### **B4.04 Defective Workmanship and Materials**

##### **B4.04.01**

When and as often as the County determines that the Work done or being done under the Contract, or the kind or quality of components, equipment, or materials supplied in connection therewith, is not fully and completely in accordance with any requirement of the Contract Documents, it may give notice of such noncompliance to the Contractor in writing, and the Contractor shall immediately upon receipt of such notice do all things required to remedy such noncompliance at no additional cost to the County.

##### **B4.04.02**

While under the warranty period the Contractor assumes sole responsibility for the product provided under this Contract and agrees to pay for repair or replacement at the County's discretion.

#### **B4.05 Warranty**

##### **B4.05.01**

The Contractor warrants and guarantees to the County each complete bus and specific components as follows:

1. **COMPLETE BUS:** The complete bus, as supplied by the Contractor, is warranted and guaranteed by the Contractor to be free from Defects due to design or workmanship for one year or 50,000 miles, whichever comes first, beginning on the in-service date for each bus. During this warranty

period the bus shall maintain its structural integrity. The warranty is based on normal operation of the bus under the operating conditions prevailing in the service area of the County.

2. **COMPONENTS:** Specific components are warranted and guaranteed by the Contractor to be free from Defects and Related Defects for the following times (beginning on the same date of the Complete Bus Warranty) or mileages:

ITEM	(WHICHEVER OCCURS FIRST)	
	YEARS	MILEAGE
Battery Packs/Energy Storage	6	300,000
Propulsion/Drive Gear Reduction Unit	2	100,000
Drive Axle	2	100,000
Brake System (excluding friction material)	1	50,000
Heating and Air Conditioning System	2	Unlimited
Basic Body Structural Integrity and Corrosion	12	Unlimited

**B4.05.02**

Warranties in this Contract are specifically agreed to and in addition to any remedies or warranties imposed on the Contractor by statute or otherwise by law.

The Contractor shall ensure in its procurement arrangements that the warranty requirements of this Contract are enforceable through and against the Contractor's suppliers, Vendors, material men, and subcontractors. Any inconsistency or difference between the warranties extended to the County by the Contractor and those extended to the Contractor by its suppliers, Vendors, material men, and subcontractors, shall be at the risk and expense of the Contractor. Such inconsistency or difference will not excuse the Contractor's full compliance with its obligations under the Contract Documents.

Upon request of the County, the Contractor shall promptly provide to the County complete copies of all written warranties or guarantees and of documentation of any other arrangement relating to such warranties or guarantees extended by the Contractor's suppliers, sub suppliers, Vendors, material men, and subcontractors covering parts, components, and systems utilized in the bus.

The Contractor shall ensure that such suppliers, sub suppliers, Vendors, material men, and subcontractors satisfactorily perform warranty related work.

**B4.05.03**

These warranty requirements do not apply to normal wear and tear. Parts such as incandescent bulbs, brake linings, filters, belts, and wiper blades are not warranted unless they fail due to defective manufacture, improper installation by the Contractor, or Defects in the design, manufacture, or installation of the part or the system within which the part functions.

**B4.05.04**

All repairs to the buses, including warrantable repairs, shall be performed by the County and the County's costs therefore shall be reimbursed by the Contractor. Repairs by the County will be made by the method which, in the reasonable judgment of the County, is most practicable given the existing conditions unless the County and the Contractor have agreed to a specific repair. Warranty labor rate charged to the Contractor will be the day shift hourly wage rate of a Mechanic, Step E, plus 62% fringes plus 125% overhead. The wage rate, and therefore the warranty labor rate, are subject to adjustment once each year. As of February 3, 2023, the warranty rate is \$129.59/hour, based on the Mechanic wage rate of \$43.46/hour. The County shall maintain records of warranty repairs and such records shall be available to the Contractor to verify warranty claims.

**B4.05.05**

The Contractor will reimburse the County for the cost of parts used in a warranty repair. The reimbursement shall be at the price indicated on the Contractor's master price list at the time of repair including taxes where applicable and shipping to the County. When the Contractor can prove that a replacement OEM part for a given failure was purchased from a source other than the Contractor, the County will submit the warranty claim to the Contractor for those repair parts reflecting the County's actual cost for the replacement parts. The Contractor shall pay the total cost to return defective components covered by warranty to the factory. The County will not consider a parts exchange program.

During the warranty period, the County shall perform repairs of defects using parts purchased in the SOLARIS distribution network. If the parts needed to perform the repair are not available in the SOLARIS network, the County may purchase the part on the local market.

Warranty claims submitted to the Contractor for their sub-supplier warranty-covered failures which are short paid to the Contractor shall not be at the loss of the County. The Contractor will be held financially responsible for full payment to the County for all unpaid/short paid claims.

#### **B4.05.06**

The warranty will include the cost of towing the bus or a coach change if either is necessary because of a failure of a warranted part. The cost of a coach change will consist of the warranty labor rate in Section B4.05.04 above for the actual number of mechanics sent (one or two), plus a charge for a tow truck, if used, of \$115/hour.

#### **B4.05.07**

At its sole discretion, the County may require the Contractor or its designated representative to perform warranty-covered repairs which cannot be easily accommodated in the County's facilities or which require the specialized skill of the Contractor or its subcontractors or suppliers. If the County requires the Contractor to perform warranty-covered repairs, the Contractor's representative must begin, within ten (10) Working Days after receiving notification of a Defect from the County, any Work necessary to effect repairs in a proper and timely manner. Whenever the Contractor makes warranty repairs, it shall use new parts, subcomponents, and subsystems unless the repair of original parts is authorized in writing by the County. The County shall make the bus available to complete repairs timely with the Contractor's repair schedule. The Contractor shall provide at its own expense all spare parts, labor, tools, and space required to complete repairs. In the event the Contractor or a sub-supplier of the Contractor performs warranty repairs, all repair parts, if utilized from the County inventory, must be replaced or reimbursed to the County through the warranty process. The Contractor shall reimburse the County for all expenses incurred shuttling buses between the County's facilities and Contractor's work site or the facilities of its subcontractors or suppliers. At the County's option, the Contractor may be required to remove the bus from the County's property while repairs are being effected. If the bus is removed from the County's property, repair procedures must be diligently pursued by the Contractor's representative. The schedule and scope of the repairs shall be approved in advance by the County. Components of drive system (traction battery, propulsion, traction motor) will be repaired, not replaced for new ones.

In case of repairs of drive components, SBC consent is required to undertake repairs (traction battery, propulsion, traction motor).

The County shall follow established warranty approval procedures agreed to between County and Contractor, prior to commencing warranty work.

#### **B4.05.08 Complete or Partial Replacement**

In the event of any Defect in design, material, or workmanship of a component or an assembly under warranty, the County shall consider whether the component or assembly is to be changed in its entirety or whether the component or assembly is to be repaired and the defective parts replaced. The County's decision as to which alternative will be used will be based upon minimizing down time; total repair costs of the vehicle; whether or not the failure of the component might be detrimental to the life of the assembly; public safety; and convenience considerations. Solaris' consent is required to undertake repairs of drive components such as traction battery, propulsion container, electric motors, etc.

#### **B4.05.09 Fleet Defects (Not Used)**

#### **B4.05.10 Warranty Extension**

In the event that, during the warranty period, repairs or modifications made necessary by defective design, material, or workmanship are not completed within specified period required by contract due to lack of material or inability to provide the proper repair, the delay running beyond the end of the warranty period, such delay shall not be considered in computing the warranty period. The same warranty will remain in effect as if the repair or modification was still within the warranty period, said warranty being extended day for day by the period of delay.

#### **B4.05.11 Service Personnel**

The Contractor shall provide qualified factory authorized service personnel at the facilities of the County for five (5) days per week for sixty (60) days from the time the first bus is delivered and on request support afterwards within 48 hours. Maintenance or repair instructions or suggestions from these representatives affecting warranty shall be in writing. The Contractor shall authorize its service personnel to accept and approve warranty claims and make timely decisions to repair or cure Defects.

#### **B4.05.12 Warranty Claims**

The County shall submit the warranty claim in Contractor's warranty system and according to procedures agreed between the County and Contractor. The claim has to be submitted within 60 days from the date of completion of the repair. Defective parts will be returned to the Contractor's local representative within thirty (30) days of the claim date. In the event the Contractor has no local representative, the County will return defective parts to the determined Contractor's location within forty-five (45) days of the claim date. Filing is understood to mean sending an e-mail, filing claims within the Contractor's electronic claim processing system, or putting a letter into the U.S. Postal Service via regular first class mail. The County will add a handling charge to defray warranty processing costs. The handling charge shall be fifteen percent (15%) of the total cost of the warranty repair not to exceed \$250.00 per claim.

The Contractor will verify County's warranty claims and provide a decision within 60 days from claim's online submission through Contractor's warranty claiming system or within 60 days from parts return in case defective parts have been requested. Based on accepted claims by the Contractor, the County shall issue an invoice for accepted claims. The County will issue an invoice with 60 days payment term. Denials of the claims must be written and must contain the reason(s) for denial.

#### **B4.05.13 Not Used**

### **B4.06 Spare Parts**

#### **B4.06.01 General**

Parts shall be available both as separate components and built-up assemblies. Parts or rebuild kits shall be offered for all repairable or rebuildable components on the bus.

The County may relieve the Contractor of a portion of the responsibility for providing spare parts once the established warranty periods have ended. If the Contractor desires to reduce its responsibility for providing spare parts, it shall establish direct purchasing by the County from the Contractor's subcontractors and suppliers or from open market distributors. Such direct purchasing may take the form of agreements between the County and various spare parts suppliers facilitated by the Contractor in compliance with all applicable regulations.

When parts are shipped to the County, the Contractor will include priced packing slips with all shipments, and the Contractor will ensure the County part number is printed on all packing slips and invoices.

The County is interested in purchasing directly from subcontractors, suppliers, and/or open market distributors spare parts included in the following bus systems:

1. Traction Motor
2. Brake System
3. Axles
4. Suspension (wear items)
5. Seating
6. Air System
7. Bearings
8. Wheelchair Ramp Parts
9. Flat Glass
10. Electrical Components
11. HVAC
12. Battery packs/ESS

After the execution of this Contract, a separate parts contract may be negotiated between the Contractor and the County.

#### **B4.06.02 Initial Parts Order**

The Contractor shall make a good faith effort to send to the County an initial suggested stocking list for every major system and subsystem, to include propulsion, Electronic drive motor, suspension, axles, brakes, electrical, and body parts, and their location in the parts catalog, at least ten (10) weeks, and in no event less than six (6) weeks before the delivery of the first production bus. The suggested stocking list of parts shall contain all of the information on the parts that is required. The County will return completed orders within four (4) weeks of receiving the suggested list, price list, and a draft parts catalog.

The Contractor will make a good faith effort to supply 100 percent (100%) of the County's initial order, taken from the Contractor's suggested parts stocking list, upon delivery of the first production bus.

Failure by the Contractor to ship, or to make a documented good faith effort to ship, all or a significant part of the initial order of parts within Ten (10) weeks from receipt and acceptance of the initial purchase order at the Contractor's warehouse, shall entitle the County to collect liquidated damages of \$200.00 per day for each day of late delivery. The \$200.00 per day late delivery damages charge may be waived by agreement between the Contractor and the County in those cases where an alternative source is available and the Contractor purchases and arranges shipment on behalf of the County.

#### **B4.06.03 Parts Availability Guarantee**

The Contractor hereby agrees to provide, within reasonable periods of time, the spare parts, software, and all equipment necessary to maintain and repair the buses supplied under this Contract for a period equal to the twelve years (12) after the date of acceptance of the last bus in the order, and preferably for two (2) additional years. Parts shall be interchangeable with the original equipment and be manufactured in accordance with the quality assurance provisions of this Contract. Prices shall not exceed the Contractor's then current published catalog prices.

#### **B4.06.04 Returned Parts**

The County shall be able to return parts purchased from the Contractor according to the terms and conditions set forth in separate spare parts contract(s) the County may negotiate with the Contractor per Section B4.06.01. apart from excluded parts mentioned on the list of non-returnable parts below.

- Any kind of glue (including SIKA)
- Any rubber parts (v-belts, tyers, hoses)
- Any body parts that have been manufactured only for this contract
- Any control units programmed for this contract (based on VIN)

#### **B4.06.05 Consumables**

A list of consumable items shall be discussed during design review and made available preferably from U.S. suppliers

#### **B4.06.06 Not Used**

#### **B4.06.07 Pricing of Spare Parts**

##### **B4.06.07.01 Not Used**



**B4.06.07.02**

Competitive pricing is defined as the circumstances in which the County could obtain bids or proposals from alternative sources for the same parts. Proprietary parts and noncompetitive parts will be considered sole source parts requiring cost/price justification.

**B4.06.07.03**

The Contractor shall maintain records related to pricing of spare parts as required by Section B5.12. The County shall have access to such records for audit purposes as provided in Section B5.13.

## SECTION B5 – LEGAL RESPONSIBILITY, SAFETY, AND INSURANCE

### **B5.01 Execution of Contract Agreements**

**B5.01.01**

The Contract Documents shall be executed in duplicate on the forms provided. The awarded Contractor shall return the signed Contract forms at EB5.01 together with the Performance or Payment Security form at EB5.02, required County forms in Section EA2.36, and evidence of insurance (see Section B5.11), within ten (10) days after receiving written notice of the execution of Contract. After receipt of the executed Contract Documents from the Contractor, the Contract will be executed for the County by a duly authorized officer. The date of execution by the County shall be deemed to be the date of execution of the Contract. After execution by the County, one (1) fully executed copy will be returned to the Contractor.

The Contractor shall not begin work until after receipt of Notice to Proceed (NTP). NTP shall be issued by the County within ten (10) days of execution of the Contract by the County.

### **B5.02 Not**

### **B5.03 Indemnification and Defense**

**B5.03.01 –**

To the maximum extent permitted by law and except to the extent caused by the sole negligence of the County, the Contractor shall indemnify and hold harmless the County, its officers, agents and employees, from and against any and all suits, claims, actions, losses, costs, penalties and damages of whatsoever kind or nature arising out of, in connection with, or incident to the Work provided by or on behalf of the Contractor. This indemnification obligation shall include, but is not limited to, all claims against the County by an employee or former employee of the Contractor or its Subcontractors, and the Contractor, by mutual negotiation, expressly waives all immunity and limitation on liability, as respects the County only, under any industrial insurance act, including Title 51 RCW, other Worker's Compensation act, disability benefit act, or other employee benefit act of any jurisdiction which would otherwise be applicable in the case of such claim. In addition, the Contractor shall protect and assume the defense of the County and its officers, agents and employees in all legal or claim proceedings arising out of, in connection with, or incidental to such Work; and shall pay all defense expenses, including reasonable attorney's fees, expert fees and costs incurred by the County on account of such litigation or claims. In the event that the County incurs any judgment, award and/or expense or cost, including attorney fees, arising from the provisions of this Section B5.03.01, or to enforce the provisions of this Section B5.03.01, any such judgment, award, fees, expenses and costs shall be recoverable from the Contractor.

The indemnification, hold harmless, protection and defense obligations contained herein shall survive the expiration, abandonment or termination of this Contract.

Nothing contained within this Section B5.03.01 shall affect and/or alter the application of any other section contained within this Contract.

#### **B5.04 Liability of Contractor**

##### **B5.04.01**

The mention of any specific duty or liability imposed upon the Contractor shall not be construed as a limitation or restriction of any general liability or duty imposed upon the Contractor by law or by the Contract, the reference to any specific duty or liability being made herein is merely for the purpose of explanation. The Contractor shall be completely and solely responsible for the health and safety of its employees, subcontractors, and suppliers engaged in the performance of the Work. The Contractor shall maintain all Work sites and perform all Work so as to comply with all applicable Federal, state, and local laws, codes, and safety regulations.

No provision herein is intended to allocate or determine liability between the Contractor and its subcontractors and suppliers. The provisions herein allocate or determine liability only between the Contractor and the County.

#### **B5.05 Damage to Work**

##### **B5.05.01**

The Contractor shall bear the risk of loss or damage to each bus until the bus has been delivered to the County. The County shall assume risk for buses only after acceptance paperwork is signed and buses are fully under King County Metro control. If any loss or damage occurs to the bus for which the Contractor is responsible hereunder, the Contractor shall immediately repair or replace and make good any such loss or damage, and in the event of the Contractor refusing or neglecting to do so, the County may itself or by the employment of some other person repair or replace and make good any such loss or damage, and the cost and expense of so doing shall be charged to the Contractor. The Contractor shall reimburse the County such costs within thirty (30) days of written demand from the County. If the Contractor refuses or fails to pay these costs within thirty (30) days, the County may withhold said costs from any payments then due or to become due to the Contractor.

#### **B5.06 Laws, Regulations, and Permits**

##### **B5.06.01**

The Contractor shall give all notices required by law and comply with all applicable Federal, state, and local laws, ordinances, rules, and regulations relating to the conduct of the Work. The Contractor shall be liable for all violations of the law in connection with Work furnished by the Contractor and its subcontractors, suppliers, and Vendors.

##### **B5.06.02**

Unless otherwise specified herein, permits and licenses which are necessary for and during the manufacture and Delivery and until acceptance of each bus pursuant to Section B6.08 shall be secured and paid for by the Contractor. Permits and licenses which are necessary after acceptance of each bus pursuant to Section B6.08 will be secured and paid for by the County. Prior to the Delivery of each bus, the Contractor shall provide a Manufacturer's Statement of Origin ("MSO") for the bus. The County will use the MSO and other documents to apply for legal title and registration of the bus and secure proper license plates from the Washington State Department of Licensing.

#### **B5.07 Patent and Royalties**

##### **B5.07.01**

The Contractor shall indemnify, defend, and hold harmless the County and its elected officials, officers, agents, and employees against liability, including costs, for infringement of any United States patent arising out of or in any way connected with the design, manufacture, Delivery, or repair of buses under this Contract.

##### **B5.07.02**

The County will inform the Contractor as soon as is practicable of any claim, suit, or other action alleging infringement of patent rights and shall give the Contractor authority, assistance, and information at the Contractor's expense for the defense or settlement of same.

**B5.07.03**

Should the Contractor, or the County, or their elected officials, officers, agents, or employees, or any of them, be enjoined from furnishing or using any item supplied or required to be supplied under the Contract, the Contractor shall either:

1. Substitute as soon as is practicable other non-infringing items of equivalent type and quality satisfactory to the County; or
2. Pay such royalties and secure such licenses as may be requisite and necessary for the Contractor to furnish, and the County, its elected officials, officers, agents, and employees to use, such items without being disturbed or in any way interfered with by any proceeding in law or equity on account thereof.

**B5.07.04**

Should the Contractor neglect or refuse to make the substitution within a reasonable time or to pay such royalties or secure such licenses as may be necessary for the County to use or dispose of the item, then in that event, the County shall after thirty (30) days of giving written notice to the Contractor have the right to make such substitution or pay such royalties and secure such licenses and charge and recover the amount from the Contractor, even though final payment under the Contract may have been made. The Contractor shall reimburse the County such costs within thirty (30) days of written demand from the County. If the Contractor refuses or fails to pay these costs within thirty (30) days, the County may withhold said costs from any payments then due or to become due to the Contractor.

**B5.08 Workers' Compensation Insurance,  
Industrial Insurance, and Medical Aid Premiums**

**B5.08.01**

As to any portion of the Work performed by the Contractor and its subcontractors in the State of Washington, the Contractor shall maintain workers' compensation insurance in the amount and type required by law for all employees employed under this Contract who may come within the protection of workers' compensation laws, and the Contractor shall make all payments arising from the performance of this Contract due the State of Washington pursuant to Titles 50 and 51 of the Revised Code of Washington.

**B5.09 Federal Excise Tax Exemption**

**B5.09.01**

Buses purchased by the County are not subject to Federal Excise Tax.

**B5.10 Applicable Law, Forum, and Consent to Jurisdiction**

**B5.10.01**

Except as herein specifically provided, this Contract shall be governed by and construed according to the laws of the State of Washington, without giving effect to its conflicts of law rules or choice of law provisions.

**B5.10.02**

In the event that any litigation may be filed between the parties respecting any matter of fact or law relating to the Contract, the County and the Contractor agree that venue shall rest in the King County Superior Court, situated in Seattle, Washington, and by entering into this Contract the Contractor has thereby consented to personal and subject matter jurisdiction by the King County Superior Court.

**B5.11 Insurance**

**B5.11.01 Evidence and Cancellation of Insurance**

Within six (6) months of execution of the Contract, the Contractor shall file with the County evidence of insurance and endorsements from the insurer(s) certifying to the coverage of all insurance required herein. All evidence of insurance shall be certified by a properly authorized officer, agent, general agent, or qualified representative of the insurer(s) and shall certify the name of the insured, the type and amount

of insurance, the location and operations to which the insurance applies, the expiration date, and that the County received notice at least forty-five (45) days prior to the effective date of any cancellation, lapse, or material change in the policy.

The Contractor shall, upon demand of the County, deliver to the County all such policies of insurance, and all endorsements and riders, and the receipts for payment of premiums thereon, in the event of a loss.

Failure to provide such insurance in a timeframe acceptable to the County shall enable the County to suspend or terminate the Contractor's Work hereunder in accordance with Contract provisions regarding "Termination for Convenience/Default/Non-appropriation." Suspension or termination of this Contract shall not relieve the Contractor from its insurance obligations hereunder.

### **B5.11.02 Insurance Requirements**

#### **B5.11.02.01**

The Contractor shall obtain and maintain the minimum insurance set forth below. By requiring such minimum insurance, the County shall not be deemed or construed to have assessed the risks that may be applicable to the Contractor under this Contract. The Contractor shall assess its own risks and, if it deems appropriate and/or prudent, maintain greater limits and/or broader coverage.

Nothing contained within these insurance requirements shall be deemed to limit the scope, application, and/or limits of the coverage afforded, which coverage shall apply to each insured to the full extent provided by the terms and conditions of the policy(ies). Nothing contained with this provision shall affect and/or alter the application of any other provision contained with this Contract.

#### For all coverages:

Each insurance policy shall be written on an "occurrence" form; excepting that insurance for professional liability, errors and omissions when required, may be acceptable on a "claims made" form.

If coverage is approved and purchased on a "claims made" basis, the Contractor warrants continuation of coverage, either through policy renewals or the purchase of an extended discovery period, if such extended coverage is available, for not less than three (3) years from the date of completion of the Work which is the subject of this Contract.

#### **B5.11.02.02 Minimum Scope of Insurance**

Coverage shall be at least as broad as:

1. General Liability

Insurance Services Office form number (CG 00 01) covering COMMERCIAL GENERAL LIABILITY

2. Automobile Liability

Insurance Service form number (CA 00 01) covering BUSINESS AUTO COVERAGE, symbol 1 "any auto"; or the combination of symbols 2, 8 and 9.

3. Not Used

4. Workers' Compensation

Workers' Compensation coverage, as required by the Industrial Insurance Act of the State of Washington, as well as any similar coverage required for this Work by applicable Federal or 'Other States' state law.

5. Employers Liability or "Stop Gap"

The protection provided by the Workers' Compensation Policy Part 2 (Employers Liability) or, in states with monopolistic state funds, the protection provided by the 'Stop Gap' endorsement to the General Liability policy.

#### **B5.11.02.03 Minimum Limits of Insurance**

The Contractor shall maintain limits **no less than the following**, for:

1. General Liability: \$5,000,000 combined single limit per occurrence for bodily injury, personal injury, property damage including products, and for those policies with aggregate limits, a \$5,000,000 aggregate limit.
2. Automobile Liability: \$1,000,000 combined single limit per accident for bodily injury and property damage.
3. Professional Liability, Errors and Omission: Not used.
4. Workers' Compensation: Statutory requirements of the state of residency.
5. Employers Liability Stop Gap: \$1,000,000.  
The protection provided by the Workers' Compensation Policy Part 2 (Employers Liability) or, in states with monopolistic state funds, the protection provided by the 'Stop Gap' endorsement to the General Liability policy.

#### **B5.11.02.04 Deductibles and Self-insured Retentions**

Any deductibles or self-insured retentions shall be declared to, and approved by, the County. The deductible and/or self-insured retention of the policies shall not limit or apply to the Contractor's liability to the County and shall be the sole responsibility of the Contractor.

#### **B5.11.02.05 Other Insurance Provisions**

The insurance policies required in this Contract are to contain, or be endorsed to contain the following provisions:

1. Liability Policies:
  - a. The County, its officers, officials, employees, and agents are to be covered as additional insureds as respects liability arising out of activities performed by or on behalf of the Contractor in connection with this Contract. Use the above exact language on the Endorsement Form.
  - b. The Contractor's insurance coverage shall be the primary insurance as respects the County, its officers, officials, employees, and agents as respects liability arising out of activities performed by or on behalf of the contractor in connection with this contract. Any insurance and/or self-insurance maintained by the County, its officers, officials, employees, or agents shall not contribute with the insurance or benefit the Contractor in any way to liabilities assumed by the Contractor under the terms of this Contract.

- c. The Contractor's insurance shall apply separately to each insured against whom a claim is made and/or lawsuit is brought, except with respect to the limits of the insurer's liability.

**B5.11.02.06 Acceptability of Insurers**

Unless otherwise approved by the County:

Insurance is to be placed with insurers with an AM Best rating of no less than A:VIII, or, if not rated with AM Best, with minimum surpluses the equivalent of AM Best's surplus size VIII.

If at any time one of the foregoing policies shall be or become unsatisfactory to the County, as to form or substance, or if a company issuing any such policy shall be or become unsatisfactory to the County, the Contractor shall, upon notice to that effect from the County, promptly obtain a new policy, and shall submit the same to the County, with the appropriate certificates and endorsements, for approval.

**B5.11.02.07 Subcontractors**

The Contractor shall include all subcontractors as insureds under its policies, or shall furnish separate certificates of insurance and policy endorsements for each subcontractor. Insurance coverages provided by subcontractors as evidence of compliance with the insurance requirements of this Contract shall be subject to all of the requirements stated herein.

**B5.11.02.08 Work Site Safety**

The Contractor shall have the "right to control" and bear the sole responsibility for the job site conditions and job site safety. The Contractor shall comply with all applicable Federal, state, and local safety regulations governing the job site, employees, and subcontractors. The Contractor shall be responsible for the subcontractor's compliance with these provisions.

**B5.11.02.09 Endorsements**

Endorsement must be included with insurance form, i.e., standard industry forms: CG 20 10 11/85 or its equivalent. The County requires this endorsement to complete the Contract.

**B5.12 Retention of Records**

**B5.12.01**

The Contractor agrees to maintain all books, records, accounts, and reports pertinent to this Contract for a period of not less than three (3) years after the date of termination or expiration of this Contract, except in the event of litigation or settlement of claims arising from the performance of this Contract, in which case the Contractor agrees to maintain same until the County, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of such litigation, appeals, claims, or exceptions related thereto. The Contractor's and subcontractors' accounting systems shall conform to generally accepted accounting principles.

The Contractor shall maintain all financial information, data, and records used to prepare and support the Contractor's Proposal and Best and Final Offer for this Contract and all records pertaining to the performance of the Work under this Contract, including portions of the Work performed under Change Orders and contracts and agreements with subcontractors for said period.

**B5.12.02**

The Contractor shall ensure each of its subcontractors, suppliers, and vendors maintains and retains for said period all records pertaining to the performance by the subcontractors of their portions of the Work under this Contract.

**B5.13 Audit Access**

**B5.13.01**

The County, the FTA, the Comptroller General of the United States, and their authorized representatives and designees shall have access to all records maintained and retained by the Contractor and its subcontractors pursuant to Section B5.12 of this Contract for the purposes of inspection, cost/price

analysis, Audits, or other reasonable purposes related to this Contract. The County, the FTA, the Comptroller General of the United States, and their authorized representatives and designees shall have access to all records and be able to copy such records during the Contractor's normal business hours. The Contractor shall provide proper facilities for such access, inspection, and copying.

**B5.13.02**

In addition to audits conducted after the date of initial acceptance of Contract Work, audits may be conducted before execution of Contract, such as cost/price analysis per Sections A2.08 and A6.07, during or after the Contract period for purposes of evaluating a claim by or payments to the Contractor and for any other reason deemed appropriate and necessary by the County. Audits will be conducted by auditors selected and paid for by the County. Audits conducted under this Section B5.13 shall be in accordance with applicable standards such as Generally Accepted Auditing Standards (GAAS), and the County and FTA guidelines. The Contractor shall fully cooperate with the County or its auditor(s) during audits and inspections, and provide all requested documentation.

**B5.13.03**

If an audit is commenced more than sixty (60) days after the date of final acceptance of Contract Work, the County will give reasonable notice to the Contractor of the date on which the audit will begin.

## SECTION B6 – PROGRESS AND COMPLETION

### **B6.01 Contract Time**

**B6.01.01**

The Contractor shall promptly begin the Work under the Contract. All portions of the Contract shall be begun and prosecuted so that the buses shall be delivered and ready for full use as set forth in the Contractor's Proposal, Best and Final Offer (BAFO) or change order, as applicable.

### **B6.02 Delivery Schedule**

**B6.02.01**

The delivery schedule stated by the Contractor as part of its Proposal or BAFO, as applicable, shall remain in effect unless modified in writing by the Contractor and approved by the County. Beginning sixty (60) days after Notice to Proceed and every month thereafter until all buses are Delivered, the Contractor will send to the County a current production and delivery schedule showing buses at major milestones during production, and deliveries per week. The schedule shall include subcontractor and supplier activities, if necessary, and shall reflect a detailed breakdown of Work activities that represents the Contractor's plan for completing and delivering the buses within the required Contract time. The schedule shall show the interdependence of planned Work activities and shall provide a logical sequence of the Work to be accomplished.

Failure of the Contractor to update and submit the production and delivery schedule on a monthly basis as required shall entitle the County to withhold ten percent (10%) of all payments owed to the Contractor until an accurate and updated schedule is submitted to the County.

Duration shall be in days, and weekends and holidays over the duration of the Contract should be accounted for. The critical path shall be shown on the production and delivery schedule.

Thirty (30) days shall be used for submittal review by the County unless otherwise specified.

**B6.02.02 Changes in Delivery Schedule**

If the Contractor foresees that delays will occur in delivering buses, it shall immediately notify the County of the delay in writing. The Contractor may, at that time or subsequently, submit a proposed, revised schedule of delivery for consideration by the County. If, in its sole judgment and discretion, the County

determines a new schedule to be justified by delays which were beyond the reasonable control of the Contractor and could not have been anticipated or avoided by the Contractor's efforts or precautions, it may issue a Change Order accepting the new schedule as of the date of the Change Order or such other extended date as may be set forth in the Change Order. Changes to the delivery schedule as a result of certain delays beyond the control of the Contractor will be made pursuant to Section B6.13.

### **B6.03 Damages for Delay / Liquidated Damages**

#### **B6.03.01**

Buses shall be delivered according to the delivery schedule stated by the Contractor. The County and Contractor acknowledge that Contractor's failure to deliver any bus within the time specified in the Contract Documents, unless a written extension of time has been granted by the County, will result in damage to the County.

Because of the difficulty in computing the actual material loss and disadvantage to the County caused by delay, it is determined in advance and agreed by the parties hereto that the Contractor will pay the County the amount of \$200.00 per day of delay per bus delayed, limited to a maximum of five percent (5%) of the value of the buses on order, as damages representing a reasonable forecast of the actual damages which the County will suffer by the failure of the Contractor to deliver buses within the stipulated time.

The County further reserves the right to claim such damages as they occur during the Contract as charges against the Contract. If the Contractor refuses or fails to pay the charges within thirty (30) days of receipt of a written demand from the County which sets forth the basis for charge, the County may deduct costs associated with damages from any payments then due or to become due to the Contractor.

Nothing in this section will affect the County's right to terminate the Contract if delivery cannot be remedied to the County's satisfaction.

### **B6.04 Not Used**

### **B6.05 Inspection of Completed Buses**

#### **B6.05.01**

The County's Inspector shall have the authority to make the initial determination as to the quality or acceptability of Work under the requirements of the Contract Documents. The Inspector's determinations shall be subject to review by the County's Contract Administrator upon written objection by the Contractor.

#### **B6.05.02**

The Contractor shall conduct a complete and comprehensive visual inspection, mechanical inspection, and road test of the first production bus to check and verify the quality of workmanship and check for mechanical and other malfunctions in all systems throughout each bus. A written report of these checks and/or inspections shall be supplied to the County's Inspector. Thereafter, each complete bus shall be inspected by the Inspector at the Contractor's facility prior to Delivery. Prior to the start of this inspection, the Contractor shall supply a digital list of the serial numbers of all major components on the bus, including tires to the inspector. The serial numbers shall be verified during the inspection and any discrepancies shall be corrected by the contractor prior to any signatures for delivery. This inspection shall include but not be limited to a visual and mechanical inspection utilizing an appropriate checklist system developed by the County to verify the assembly of the bus consistent with the requirements of the Contract. This inspection shall also include a test drive with the inspectors operating the bus during this test drive.

The Contractor shall submit procedures for the final inspection checks to the Inspector for approval at least thirty (30) days prior to the inspection of the first production bus.



The Contractor will supply, and the County will approve, the list of serialized components prior to completion of the first production bus.

**B6.05.03**

The Inspector, upon successful completion of such inspection and test for each bus, will provide the Contractor with a signed notice of approval for delivery. The notice will identify each bus by VIN.

After notice of approval for delivery is given to the Contractor for each specific bus, the Contractor shall refrain from making any modifications, adjustments, or part installations/removals to the bus without prior approval of the County's Contract Administrator in writing. Failure of the Contractor to get this approval may result in rescinding the approval for delivery notice.

**B6.05.04**

Neither the inspection of the bus at the factory, the approval for delivery, nor any act of the Inspector will constitute acceptance of the bus by the County. Acceptance of buses shall be based only upon inspection and tests occurring after delivery of the completed bus to the County, as described herein and only after the County provides the Contractor with a written Notice of Acceptance.

**B6.06 Shipment and Delivery of Buses**

**B6.06.01**

Buses provided under this Contract shall be shipped at the Contractor's expense by a qualified and experienced common or contract carrier who is properly licensed and insured. The Contractor shall make all arrangements for shipment.

Upon Metro Inspection approval for delivery all production buses shall be shipped to 12119 East Marginal Way South, Tukwilla, Wa 98168.

**B6.06.02**

All buses shall have a minimum of 300 driven miles (805 km) before delivery to the County. This mileage can be accumulated during the drive away trip. During the drive away trip, the speed and operation in route shall be controlled to conform to the recommendations of the system suppliers and tire supplier so as to prevent damage to any part of the bus.

At the time of Delivery, a written report shall be submitted to the County by the Contractor listing all incidents during the trip. In the event the delivery trip of any bus is interrupted, for any reason, the Contractor shall immediately notify the Contract Administrator, include in the report a description of the nature of the service or repair, and the cause and restoration, if any, required to continue the trip. Failure to submit this written report will result in the County not accepting delivery of the bus.

Each bus shall be tested on the Counties charge equipment and shall only be accepted upon completion of a successful charge session on each type of charger operated by the County.

The County is not obligated to provide transportation for delivery drivers in the Seattle-King County area.

**B6.06.03**

Buses shall be delivered fully charged and clean inside and out. For any bus not meeting this requirement, the Contractor will be assessed \$300.00. When buses are delivered, certificates or releases signed by representatives of the County shall simply acknowledge receipt of the buses, and shall not constitute acceptance by the County of the condition of the bus, or its conformance with the terms of the Contract. Acceptance by the County shall be understood to occur only subsequent to final inspection by responsible assigned employees of the County and only after the County provides the Contractor with a written Notice of Acceptance.

Receipt of the Manufacturer's Statement of Origin for a bus is a condition precedent to acknowledgment of receipt of that bus by the County.

### **B6.07 Risk of Loss by Casualty**

#### **B6.07.01**

The County will assume the risk of loss by casualty to individual buses by casualty, commencing at the time and date of Delivery of the bus to the County's designated delivery point. The Contractor shall have full responsibility for all such risks of loss prior to receiving the delivery acknowledgment referenced in Section B6.06.03. The County shall assume risk for buses only after acceptance paperwork is signed and buses are fully under King County Metro control.

### **B6.08 Acceptance of Buses**

#### **B6.08.01**

As buses are received, the County will perform such inspections and tests as deemed necessary by the County to determine if each bus conforms with all Contract requirements both as to configuration and performance parameters. This includes validation of the overhead charge capacity of each bus prior to acceptance. This validation shall be completed using King County Metro's overhead chargers at the time of the final test drive of each unit pending acceptance. Some inspection procedures may be performed on a sampling basis, and others may be performed only on buses which give indication of problem areas. Representatives of the Contractor may witness acceptance inspections and testing if so requested by the Contractor.

The County retains the right to complete as thorough an inspection as deemed necessary by the County to assure all language and requirements of the Contract have been satisfied. Representatives of the Contractor may witness acceptance inspections and testing if so requested by the Contractor. The Contractor's Field Representative shall coordinate and manage the Contractor's post-delivery inspection process and notify the County's Contract Administrator of scheduling and availability of buses ready for pre-acceptance inspection. The Contractor's Field Representative shall also coordinate all supplier, sub-supplier, and/or subcontractor completed post-delivery inspections and repairs generated during the County's pre-acceptance inspection process. It is a requirement of the County Contract that a representative of the HVAC manufacturers will complete a post-delivery inspection of their specific supplied components. These inspection steps shall be completed following the delivery to King County Metro and prior to the County's acceptance of any unit. Prior to acceptance all communication regarding this process shall be directed solely to the County Contract Administrator. If during the above outlined inspection process a Defect, issue, or concern is discovered specific to the bus or propulsion system and the vendor is needed for repairs or assistance, then the Contractor shall commission a vendor representative to be on site within three (3) days of a formal request made by the County.

#### **B6.08.02**

When acceptance tests and inspections for a given bus have been completed, the County will provide the Contractor with a notice, informing it that the County accepts or does not accept the bus. The notification will also detail deficiencies found, which may be major and a cause for non-acceptance or which may be minor and suitable for repair after the bus has been accepted. A principal criterion for acceptance is the suitability of the bus for revenue service, excepting items supplied by the County. The County may refuse to accept buses if it has not been furnished necessary operating and maintenance documentation or received initial stocking order of spare parts. All and any acceptances are subject to warranty, and any and all deficiencies discovered during acceptance testing or subsequent to testing shall be corrected as provided in the Contract Documents within a reasonable time period prescribed by the County after consultation with the Contractor.

Notification of acceptance or non-acceptance will be in writing and will be sent to the Contractor within seventeen (17) days of delivery of the bus. Buses will not be placed in revenue service until accepted by the County. Liquidated damages shall start for each bus which fails acceptance upon the 17<sup>th</sup> day.

## **B6.09 Suspension of Deliveries by the County**

### **B6.09.01**

The County may at any time direct the Contractor in writing to suspend shipment of buses if five (5) or more buses on the property of the County have failed to pass acceptance tests or have passed acceptance testing but have subsequently failed and are unfit or unsafe for service. Prior to giving such notice, the County shall advise the Contractor (and the County's Inspector) of the problem and give the Contractor a reasonable period of time as determined by the County to make the buses acceptable. Buses at the Contractor's plant will also be repaired or redesigned to solve the problem. The Contractor may, at its own option and risk, continue to ship buses to the King County area after receipt of a written suspension notice, but the County will not be obligated to receive, store, protect, inspect, or accept any bus shipped after receipt of notice to suspend.

The Contractor shall resume shipments within ten (10) days after receipt of written notice ending the suspension from the County. Suspension of shipments shall expire in thirty (30) days unless renewed by the County.

## **B6.10 Termination of Contract**

### **B6.10.01**

The following provisions shall govern termination of the Contract by the County.

### **B6.10.02 Termination for Convenience**

The County may terminate this Contract for convenience and without cause, in whole or in part, at any time by written notice to the Contractor specifying the termination date. The Contractor shall immediately take all practical steps to minimize its costs to terminate the Work. The Contractor shall be paid its actual, necessary, and verifiable costs to effect termination directly related to this Contract including contract close-out costs, and a reasonable profit on work performed satisfactorily up to the date of termination. Only those costs specifically allowed by Federal Acquisition Regulations pertaining to termination for convenience may be claimed by the Contractor. The Contractor shall promptly submit to the County its termination claim supported by detailed documentation of each cost item claimed in a form satisfactory to the County. The County reserves the right to review all claims submitted and accept, reject, or require additional information. If the Contractor has any materials, equipment, or property in its possession belonging to or funded by the County, the Contractor will account for the same, and promptly return it to the County or otherwise dispose of it in the manner the County directs. The Contractor further agrees in the event of such termination to allow a complete audit of the Contractor's records, including costs, markups, and revenues for the Work by an auditor selected by the County.

#### **B6.10.02.01 Non-Appropriation**

If expected or actual funding for this Contract is withdrawn, reduced, or limited in any way prior to the payment for the last bus Accepted, the County may, upon written notice to the Contractor, terminate this Contract in whole or in part.

If the Contract is terminated as provided in this subsection: (1) the County will be liable only for payment in accordance with the terms of this Contract for Work performed satisfactorily up to the date of termination and materials on order that cannot be canceled; and (2) the Contractor shall be released from any obligation to provide additional buses as are affected by the termination.

### **B6.10.03 Termination for Default**

#### **B6.10.03.01**

If the Contractor does not deliver buses, equipment, and materials in accordance with the Contract delivery schedule, or, if the Contractor fails to perform services in the manner called for in the Contract, or if the Contractor fails to comply with any other material provisions of the Contract, the County may terminate this Contract for default if, thirty (30) days after the date of the County's written notice to the Contractor, the failure of the performance of the Contractor has not been completely cured or the Contractor has not made reasonable progress, as determined by the County, to cure the failure. Termination shall be effected by serving a notice of termination on the Contractor's representative or agent in the State of Washington or shall be deemed served three (3) days after mailing said notice by

registered mail to the Contractor's last known address. Such notice shall set forth the manner in which the Contractor is in default. The Contractor will only be paid the Contract prices for buses, equipment, and materials Delivered and Accepted, or services satisfactorily performed in accordance with the manner of performance set forth in the Contract; and any other costs shall be borne by the Contractor. The Contractor shall assume and bear all termination and contract close-out costs, including those of subcontractors, suppliers, and Vendors.

In the event of a default termination, the County shall be entitled to withhold from any payments then due or to become due to the Contractor, reasonable amounts for damages suffered by the County as a result of the Contractor's default and to exercise any other rights or remedies available to the County at law.

#### **B6.10.03.02**

If it is later determined by the County that the Contractor was not in default, the County, after establishing a new delivery schedule, may, in its sole discretion, allow the Contractor to continue Work without increase in the Contract prices, or treat the termination as a termination for convenience.

The Contractor agrees to allow a complete audit of the Contractor's records, costs, markups, and revenue for the Work in the event the County deems such necessary to effect termination under this provision. Such audit would be performed by an auditor selected and paid for by the County.

In the event this termination for default is overturned for any reason, then the termination shall become a termination for convenience in accordance with Section B6.10.02, Termination for Convenience.

#### **B6.10.03.03**

Separate negotiations may be entered into, at the sole discretion of the County, after Contract termination concerning the disposition of materials, supplies, and equipment acquired by the Contractor for the requirements of the Contract. The termination of the Contract for default shall in no way relieve the Contractor from any of its covenants, undertakings, duties, and obligations under this Contract, nor limit the rights and remedies of the County hereunder in any manner whatsoever.

#### **B6.10.04 Warranty**

The Contractor shall not be relieved by the termination of the Contract of its warranty responsibility on those buses that have been accepted by the County.

### **B6.11 Claims**

#### **B6.11.01 Determination by the County's assigned Contract Administrator**

Questions regarding the meaning and intent of the Contract or claims for cost or time impacts arising from this Contract shall be referred by the Contractor in writing to the County's Contract Administrator for decision within twenty (20) days of the date in which the Contractor knows of the question or claim. The Contract Administrator will ordinarily respond to the Contractor in writing with a decision, but absent such written response, the question or claim shall be deemed denied upon the tenth (10<sup>th</sup>) working day following receipt by the Contract Administrator of the question or claim or supporting documentation. If the Contractor believes that any act or omission by the County caused an increase to the cost of the Work or the time required for the Work, the Contractor shall submit a detailed description of the basis for the claim and complete supporting documentation for cost and time increases to the County within twenty (20) days of the initial notice of claim. Failure by the Contractor to both timely file and document a claim shall constitute a complete waiver of the Contractor's right thereafter to pursue that claim in any forum. Pending final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the Contract and in accordance with the direction of the County.

#### **B6.11.02 Appeals**

In the event the Contractor disagrees with any determination or decision of the Contract Officer, the Contractor shall, within fifteen (15) days of the date of such determination or decision, appeal the determination or decision in writing to the General Manager. Such written notice of appeal shall include all documents and other information necessary to substantiate the appeal. The General Manager or

designee will review the appeal and will transmit a decision in writing to the Contractor within thirty (30) days from the date of receipt of the appeal, or the appeal will be deemed denied on the thirty-first (31<sup>st</sup>) day. The decision of the General Manager shall be final and conclusive on the claim and appeal. Failure of the Contractor to appeal the decision or determination of the Contract Officer within said 15-day period will constitute a waiver of the Contractor's right to thereafter assert any claim resulting from such determination or decision. Appeal to the General Manager shall be a condition precedent to litigation.

#### **B6.11.03 Jurisdiction and Venue**

All claims, counterclaims, disputes, and other matters in question between the County and the Contractor that are not resolved between the General Manager and the Contractor, or waived, will be decided in the King County Superior Court in Seattle, Washington, which shall have exclusive jurisdiction and venue over such claims, counterclaims, disputes, and other matters. This Contract shall be interpreted and construed in accordance with the laws of the State of Washington, without giving effect to its conflicts of law rules or choice of law provisions.

### **B6.12 Changes in Governmental Regulations**

#### **B6.12.01**

In the event local, state, or Federal laws or regulations that were not announced or enacted at the time of the Proposal or BAFO submittal, as applicable, become effective before Delivery of the buses and such laws or regulations make standards more stringent or compliance verifiably more costly under this Contract, the County shall reimburse the Contractor for its reasonable, necessary, and documented expenses, if any, and grant an extension of time for unavoidable delay, if any, caused by compliance with such laws or regulations; provided, that the Contractor notified the County in writing of such laws or regulations and their effect(s) on the bus pricing or delivery schedule promptly after the Contractor first became aware of the laws and regulations and prior to incurring any such expenses. The County's reimbursement obligation shall not extend to any performance otherwise required of the Contractor by the Contract Documents. Such reimbursement shall be paid on a "per bus" basis at such time and in such manner as the price of the bus is paid. To determine the amount of such reimbursement per bus the Contractor shall comply with provisions for "Changes" and "Change Orders" in Section B7.

In order to claim an extension, the Contractor shall follow the notice and documentation procedures described in Section B6.11.

The Contractor shall be deemed to have had notice of any Federal law or regulation announced or enacted at the time of Proposal or BAFO submittal, even though such law or regulation did not take effect or become operative until some date after the Proposal or BAFO submittal.

The Contractor shall not be held to any requirements of the Buy America Act as these vehicles are approved by the County to be built in the European Union.

#### **B6.12.02**

The Contractor shall, immediately upon becoming aware of any such imposition or change of requirement, provide the County with full and detailed particulars of the changes required in the buses and of costs involved therein, or shall be deemed to have waived any rights under this section. In the event any governmental requirements are removed, relaxed, or changed in any way after the date of Proposal or BAFO submittal so as to make the Contractor's performance less expensive, or less difficult, then the County shall have the option either to require the Contractor to perform pursuant to the more rigorous requirements or to receive a reduction in the price of the buses affected for all savings in direct costs which may be realized by the Contractor by reason of such change and appropriate adjustments in deductions for overhead and profit made so as to reflect actual savings made by the Contractor. The County's Contract Administrator shall give the Contractor notice of the County's determination, and anticipated savings.

### **B6.13 Force Majeure**

#### **B6.13.01**

The term "force majeure" shall include, without limitation by the following enumeration: acts of nature, acts of civil or military authorities, fire, accidents, acts of terrorism, shutdowns for purpose of emergency repairs, strikes, and any other industrial, civil, or public disturbances that are not reasonably within the control of a party, causing the inability to perform the requirements of this Contract. If any party is rendered unable, wholly or in part, by a force majeure event, to perform or comply with any obligation or condition of this Contract, then, upon giving notice and reasonably full particulars to the other party, such obligation or condition shall be suspended for the time and to the extent reasonably necessary to allow for performance or compliance and to restore normal operations. During the continuance of the inability to perform or comply, such party shall be temporarily relieved of its obligation to perform or comply and shall suffer no prejudice for failure to perform or comply the same during such period. In the event Contractor ceases to be excused pursuant to this provision, then the County shall be entitled to exercise any remedies otherwise provided for in this Contract, including the termination for default.

#### **B6.13.02**

The granting of any such extensions pursuant to the force majeure provision set forth at Section B6.13.01 shall not be considered a waiver of the requirement of timely completion or deemed to affect the importance of timely completion.

## **SECTION B7 – MEASUREMENT AND PAYMENT**

### **B7.01 Contractor's Invoices and Documentation for Title**

#### **B7.01.01**

All invoices for buses and documentation necessary to secure title, i.e., Manufacturer's Statement of Origin (MSO), shall be furnished at least ten (10) days prior to Delivery of each bus. Billing address is given in Attachment 31.

### **B7.02 Payment Procedures**

#### **B7.02.01**

Within thirty (30) days after receipt of an approved invoice, the County will pay the Contractor pursuant to its invoice as adjusted according to additions and deletions explained under "Retained Percentage" herein and to charges by the County under the Contract. Funds withheld and processed pursuant to these provisions shall not give rise to any rights in the Contractor for additional payments because funds were not received within thirty (30) days after Acceptance of each bus.

Amounts withheld from earlier payments that become releasable according to the Contract Documents will be paid within thirty (30) days after the date the amounts become releasable.

Joint Contractors shall designate one payee, to whom the County shall make all payments required by this Contract. Any payment made to the designated payee shall discharge the County's obligation to make payment to all parties constituting the Joint Contractor.

Progress Payments: Until such time as the vehicles are manufactured in the United States and meet Buy America, the County shall not consider Progress Payments.

### **B7.03 Change Orders**

#### **B7.03.01**

The County may at any time, by written order, and without notice to the sureties, if any, make changes within the general scope of this Contract including, but not limited to, the following: (1) Specifications; (2) method of shipment; and (3) place of delivery, subject to the procedures defined in Section B7.04.

If any such change causes an increase or decrease in the cost of, or the time required for, performance of any part of the Work under this Contract, whether or not changed by the order, the County shall make an equitable adjustment in the Contract Price, the delivery schedule, or both, and shall modify the Contract.

The Contractor must submit any proposal for adjustment under this Section B7.03.01 within thirty (30) days from the date of receipt of the written order. Failure to submit a proposal within the thirty-day period shall constitute a waiver of any right to an equitable adjustment in Contract Price or in delivery schedule. The proposal shall fully document in detail the basis for the adjustment and provide complete supporting documentation for any requested adjustment in the Contract Price or delivery schedule. If the County decides that the facts justify it, the County may receive and act upon a proposal for adjustment submitted before final payment under the Contract.

All proposals for adjustment are subject to cost/price analysis conducted by the County per Section B5.13.

If the Contractor's proposal for adjustment includes the cost of property made obsolete or excess by the change, the County shall have the right to prescribe the manner of the disposition of the property.

Failure to agree to any adjustment shall be a dispute under Section B6.11. However, nothing in this Section B7.03.01 shall excuse the Contractor from proceeding with the Contract as changed.

#### **B7.04 Change Order Procedure**

##### **B7.04.01**

Within thirty (30) days after receipt of a Contract change by the County, the Contractor shall submit to the County a detailed price and schedule proposal for the Work to be performed or omitted. The price proposal shall consist of the elements of the estimated costs supported by cost or pricing data along with a certification that, to the best of the Contractor's knowledge and belief, the data are accurate, complete, and current at the time the Change Order proposal is submitted. The Contractor (and the manufacturer, if the two are not the same) shall provide detailed component, labor, and other cost data to King County Metro's Auditor for all Change Order items. The County shall at any time have the right to a price adjustment to exclude any sum by which the price was increased because the Contractor submitted data that were not accurate, complete, and current as certified. This proposal shall be accepted or modified by negotiations between the Contractor and the County. The agreed modification shall be described in detail and executed in writing by both parties. If an agreed modification cannot be reached by negotiation, then the County shall have the right to direct the Work be accomplished on a time and materials basis with a single markup only on the Contractor's actual direct costs of twenty percent (20%) to cover all profit, overhead, and any other indirect or consequential impacts, superintendence costs, and damages. The payment on any Change Order shall constitute full and final compensation for such change including all impact costs or other damages.

If Work is directed as described above, the time and materials basis shall consist of the following:

(a) Craft labor costs: These are the labor costs determined by multiplying the actual additional number of craft hours needed to perform the change in the Work by the hourly costs. Craft hours should cover all direct labor. The hourly costs shall be based on the following:

- (1) Basic wages and benefits: Hourly rates and benefits.
- (2) Workers' insurance: Direct contributions for industrial insurance; medical aid; and supplemental pension.
- (3) Federal insurance: Direct contributions required by the Federal Insurance Compensation Act; Federal Unemployment Tax Act; and the State Unemployment Compensation Act.

- (4) Safety: Cost incurred due to Industrial Safety and Health Act; which shall be a reasonable percentage not to exceed two percent (2%) of the sum of the amounts calculated in (1), (2), and (3) above.

(b) **Material costs:** This is an itemization of the quantity and cost of materials needed to perform the change in the Work. Material costs shall be developed from actual known costs, supplier quotations, or standard industry pricing guides. Material costs shall consider all available discounts. Freight cost, express charges, or special delivery charges, shall be itemized.

#### **B7.04.02**

If an agreed modification cannot be reached by negotiation, the County shall have the right to immediately audit all of the Contractor's records and accounts to establish the actual direct costs of the Work and the Contractor shall fully cooperate to provide access to such records and accounts in whatever form they may exist, including computerized information. The audit will be performed by an auditor selected and paid for by the County. Failure to cooperate in such an audit shall constitute a material breach of this Contract.

### **B7.05 No Waiver of Warranty**

#### **B7.05.01**

Payments, tests, inspections, or Acceptance by the County shall not constitute a waiver, modification, or exclusion of the warranties applicable to the buses for the periods specified or a waiver of the requirements of the Contract Documents.

### **B7.06 Contractor's Payment Obligations**

#### **B7.06.01**

The Contractor shall pay any and all accounts for labor including, to the extent applicable, workers' compensation premiums, state unemployment, and Federal social security payments and all other wage and salary deductions required by law, for services and material used by the Contractor and its subcontractors during the fulfillment of the Contract as and when such accounts become due and payable.

#### **B7.06.02**

The Contractor shall indemnify, defend, and hold the County harmless from any liability or expense, including legal expenses (including attorneys' fees, expert fees, and costs) arising out of claims of subcontractors, materialmen, or others on accounts for labor, services, and material used by the Contractor during the fulfillment of the Contract.

### **B7.07 Charges to Contractor**

#### **B7.07.01**

Charges which are the obligation of the Contractor under the terms of the Contract shall be paid by the Contractor to the County on demand and may be deducted by the County from any money due or to become due to the Contractor under the Contract, and may be recovered by the County from the Contractor or its surety.

### **B7.08 Certificates of Payment and Compliance**

#### **B7.08.01**

Upon the completion of the Work for each order of buses, the Contractor shall submit an affidavit certifying that the Contractor is in compliance with all terms and conditions of the Contract and that all obligations to the State of Washington have been met. The affidavit shall be certified and signed by the Contractor's duly authorized official and shall contain the following items:

- (1) Certification that all payments due the Washington State Department of Labor and Industries and the Employment Security Department for portions of the Work, if any, performed in Washington State have been made;
- (2) Certification that all taxes due or to become due with respect to the Contract have been paid or duly provided for to the State of Washington Department of Revenue;



- (3) Certification that all applicable prevailing wage requirements of the Washington State Department of Labor and Industries have been met for portions of the Work, if any, performed in Washington State by the Contractor and any of its subcontractors;
- (4) Certification that no claims or notices of lien have been filed with respect to the Contract; and
- (5) Certification that the Contractor is in compliance with all terms and conditions of the Contract.

**B7.09 Not Used**

**B7.10 Not Used**

**B7.11 Washington State Sales Tax**

**B7.11.01**

At initiation of each order placed by the County, clarity of Washington State Sales Tax exemption shall be validated via a letter signed by the County and the builder acknowledging tax exempt status.

**B7.12 Price Adjustments**

**B7.12.01**

This indefinite delivery/indefinite quantity unit price contract is for the purchase of buses and optional equipment items as specified, and is effective for a five (5) year period from the date of execution of this contract. The quantities of buses and optional equipment items represent estimates only. All buses and optional equipment items to be furnished under the contract shall be ordered by issuance of a purchase order accompanied by a Bus Order Form (Form E6), and a Notice to Proceed. The ordering process will conform to the process outlined on Process Flow for Bus Orders (Form E7).

The County reserves the right to order buses plus optional equipment items over the five-year period commencing with the date of contract execution. The base unit prices of such buses and optional equipment items shall be set and remain firm at the base unit selling price(s) negotiated pursuant to this RFP for any purchase orders issued by the County within a period of one year of contract execution. The base unit prices of any buses and optional equipment items ordered by the County after the initial one-year firm/fixed price period has expired shall be subject to price adjustment in accordance with this section.

The base unit selling price and optional equipment items shall be adjusted in accordance with the percentage change of the index stated below as published by the U.S. Department of Labor/Bureau of Labor Statistics, and referred to hereinafter as the index:

Series ID:	WPU 1413 – Not Seasonally Adjusted
Group:	Transportation Equipment
Item:	Truck and Bus Bodies
Base Date:	198212

The percentage change in the index will be used to adjust the base bus unit selling price for future orders of buses and optional equipment items (for those orders placed after the initial one-year firm/fixed price period has expired). The base unit selling price(s) of the buses and optional equipment items shall be adjusted annually, and the adjustment shall be calculated using the final index for the anniversary month of the Contract execution date for each succeeding year of the contract. Adjusted unit selling prices shall remain firm for all units ordered in the ensuing twelve (12) months. The adjusted unit selling price may go up or down depending on the fluctuations of the index. However, in no event shall any adjusted unit selling price increase exceed three and one half percent (3.5%) of the previous year's base unit selling price. Should an adjustment above this 3.5% be needed, the Contractor shall provide documentation providing justifications and the agency will negotiate in good faith on the additional costs.

An example of a price adjustment utilizing the index and the methodology described herein is provided below.

**B7.12.02**

The Annual Adjustment Month index will be divided by the Base Order Month index. The result (calculated to the nearest hundredth of a percent) will be multiplied by the base unit selling price, and the product will be the percentage change in dollars. The sum of the base unit selling price and the percentage change in dollars will yield the adjusted unit selling price for the ensuing 12-month period.

Sample calculation using the index--

PPI Annual Adjustment Month Index	May 2008	210.0
<i>Divided by:</i>		
PPI Base Order Month Index	May 2007	205.2
<i>Equals:</i>		
Percentage Change in PPI Factor WPU 1413		+2.34%
Base Unit Selling Price	\$719,000	
Percentage Change in PPI Factor	2.34%	
Percentage Change in Dollars	<u>\$16,819</u>	
Adjusted Unit Selling Price (PPI)	\$735,819	

Base Order Month – the month and year in which the Contract is executioned.

Annual Adjustment Month – the anniversary month of the Contract execution month in which the County calculates the annual unit price adjustment.

**B7.12.03**

Calculations shall use the latest version of the PPI data published as of the date of the execution. Because the preliminary index for a given month is not available until the following month, and the final index for a month is not available until four months later, an additional calculation for an order group will be made when the final index for the execution month is published. If Contractor invoicing occurs before the final index is available, the Contractor may send a supplemental invoice, or refund excess funds, depending on the results of the final calculation. In the event that the index specified above is discontinued or unavailable for a period of time, a replacement index shall be selected by mutual agreement.

Change Orders – Any change order items adding or deleting equipment or components or otherwise modifying the structure of the bus that are to be included in any succeeding bus order shall be priced in accordance with Section B7.03 - Change Orders and Section B7.04 Change Order Procedures.

Contract change orders shall be subject to the same method of price adjustment in the years following the initial year the change order is first executed. The "Annual Adjustment Month" for change orders will be the same as for the rest of the Contract.

Each Bus Order Form issued by the County will list the number of buses required, the optional equipment items required for each bus and the previously executed change order items applicable to each bus order.

**B7.13 Acceptance of Contract Work**

**B7.13.01**

the County shall provide written notice of Acceptance of the buses required to be manufactured and delivered pursuant to an order of buses under this Contract. Such notice of Acceptance shall not revise or extinguish any obligations and liabilities of the Contractor related to warranties, spare parts, and other post-delivery provisions of this Contract. All such obligations and liabilities shall continue as provided in this Contract and by law.

## SECTION B8 – QUALITY ASSURANCE

### **B8.01 Overall Program**

#### **B8.01.01**

The provisions of this section describe, in general terms, the elements deemed necessary by the County to ensure that each bus shall be built in conformance with the Contract Documents. The County's Contract Officer and Contract Administrator must be satisfied that an adequate quality assurance program exists and is functioning.

The Contractor shall have a functioning overall transit bus quality assurance program containing elements including:

1. Fully complete, "producible" and "inspectable" engineering documentation, including design drawings;
2. Written and detailed in-house materials procurement and testing specifications;
3. Written and detailed procedures for transmission of the Contractor's quality requirements and minimum standards to subcontractors and suppliers and contractual and other means to assure subcontractor compliance with these quality requirements;
4. Adequate and detailed testing and inspection procedures to assure product conformity with engineering design requirements; and
5. Total control over the manufacturing process to assure buses meet the design, Contract, Specifications and inspection requirements of the Contract.

### **B8.02 Quality Assurance Documentation**

#### **B8.02.01 Design and Production**

Adequate documentation shall be maintained by the Contractor to provide evidence of quality and accountability. These records shall include the methods used to determine and the results of the following activities:

1. Production inspections by station or specific location;
2. Incoming material inspections and sampling methods used;
3. Tests on materials, manufacturing techniques, and critical tools;
4. Certification of manufacturing processes and specialized personnel skills; and
5. Complete tracking on discrepant materials (including disposition).

The Contractor shall provide documentation to the County when requested.

#### **B8.02.02 General Quality Program**

The Contractor shall have complete written procedures defining the quality assurance system. These procedures shall be specific to bus design and manufacturing. The procedures shall encompass all design and production phases including, but not limited to: control of suppliers; receiving inspection; production and process control; functional test; discrepancy control; measuring and test equipment calibration and certification; drawing control; quality assurance records; shipping inspection; and any other quality provisions necessary to meet the requirements of the Contract.

Management responsibility and staff assignments for the quality assurance system shall be shown on an organizational chart that shall be provided to the County. The Contractor shall ensure that staff assigned to quality assurance tasks are technically competent, experienced with the role, and delegated sufficient authority to effect necessary changes in the manufacturing process. The responsibility for the quality

assurance system shall be so placed that schedules and costs will not compromise quality. If the Contractor does not provide an adequately skilled person of contact to assist the County in its inspection program, then the County can request a replacement with staff that are qualified to properly assist the County in its on-site inspection program. The Contractor will make every effort to keep the same quality assurance contact through the full Contract.

The Contractor shall provide copies of the quality assurance program and organizational charts to the County when requested, and shall include all phases of the build.

If the need should arise for County inspectors to return to a worksite after hours at the behest of the Contractor, then this shall be a voluntary sub-assignment which shall be paid for by the Contractor including any and all travel time associated with it. In all cases, scheduling shall be the responsibility of the Contractor. Missing parts and other priorities shall not compromise the production schedule to the extent practicable.

#### **B8.02.03**

The County's Inspector shall be afforded full access to all fabrication, manufacturing, and assembly areas, and all research and development facilities related to the Work, whether located at the Contractor's facilities or at its subcontractors' or suppliers' facilities. The Contractor shall provide the Inspector with any information, test results, or analysis requested in connection with inspection of the Work and administration of the Contract regardless of location of work completed by the contractor or subcontractor(s).

#### **B8.02.04**

At no time will the County's inspectors be exposed to any hazardous materials, fumes, or dangerous situations without proper documentation (MSDS sheets) or safety training if required for a particular situation. It will be at the sole discretion of the County to have the inspectors stay at the worksite if a hazardous, hostile, or dangerous situation arises and is not handled properly by the builder.

### **B8.03 External Materials**

#### **B8.03.01 Control of Subcontractors**

The Contractor shall have in-place methods to be used for the selection and control of subcontractors. These methods shall identify the means for:

1. Selection of qualified materials and/or component sources;
2. Evaluation and assessment of each subcontractor's quality assurance system;
3. Transmission of all design and quality requirements to procurement sources;
4. Monitoring of subcontractor quality performance; and
5. Verification of procured articles against purchase order and quality requirements.

#### **B8.03.02 Receiving Inspection**

The Contractor's receiving inspection shall provide for the inspection of all incoming materials. Inspection shall be by a valid statistical sampling plan or one hundred percent (100%) inspection. These plans and results of the plans shall be recorded as required by Section B8.02.01. The Contractor shall preserve all material certifications and test reports used as the basis for receiving and acceptance of materials. The Contractor shall implement a material identification system to ensure that wrong materials are not used in the manufacture of the buses.

## **B8.04 Enforced Procedures**

### **B8.04.01**

The Contractor's quality assurance system shall provide enforcement procedures for the proper inspection of products to assure completion of manufacturing prior to shipment. All shipments shall be packed and marked as required to preclude damage during shipment to destination.

## **B8.05 Inspection and Testing**

### **B8.05.01**

The Contractor shall be responsible for ensuring that the buses as built, fully comply with the Contract requirements. The Contractor shall be responsible for inspecting and testing of the component parts of the Work, including its suppliers', sub-suppliers', and subcontractors' Work. The Contractor shall provide all inspection and testing required to ensure the completed bus meets all of the requirements of the Contract Documents. The Contractor shall provide inspection and testing reports in the format and at the times requested by the County's Inspector.

The Inspector shall be entitled to be present at all locations where Contractor or its subcontractors are engaged in the performance of the Work, at any and all times, to review and inspect all aspects of the performance of the Work and to perform or witness tests.

No rework shall be performed by the Contractor at any location or step in the manufacturing, delivery, or acceptance process without first notifying the County's Inspector. The Inspector must be notified of rework in advance that will allow time to determine if the rework must be overseen or inspected after completion. This decision will be at the sole discretion of the County. The County's Inspector shall be notified by phone during normal business hours and by email after hours. Normal business hours shall be considered 7am-3pm at location of the affected bus(s).

Inspection or non-inspection, or witnessing or non-witnessing, by the Inspector shall not be construed as Acceptance of any part of the Work or an assumption of risks or liability by the County nor as relieving Contractor of its responsibilities for compliance with the Contract.

In connection with the specific inspections or tests required by the Inspector pursuant to this Contract, any labor or materials necessary for the safe and efficient performance of such inspections or tests shall be provided at no additional cost to the County.

All coaches will be fully assembled and all work completed prior to being presented to the Inspector for final inspection. Final inspection shall be in a designated area which allows for inspections of all areas of the coach (e.g., underbody, roof, and function). The Inspector will be allowed to road test and fully function test all coaches during final inspection and prior to shipment to the County. Any deviations from this standard must be approved by the County before production starts.

### **B8.05.02**

Work rejected by the Inspector shall be corrected by the Contractor at the Contractor's expense subject to claims by the Contractor in accordance with Section B6.11. The Contractor shall proceed with the correction to ensure completion of the Work in accordance with the delivery schedule.

If the Inspector requests to witness certain inspections or tests, Contractor shall advise Inspector of said inspection or test sufficiently in advance (but in any event no later than three (3) Working Days prior to the date thereof) to enable the Inspector to attend.

### **B8.05.03**

In cases where compliance with Contract requirements for materials to be incorporated in the Work requires laboratory examination or special testing, the Contractor shall provide a written report to the Inspector on the results of such examination or testing if requested. Such test analysis and examinations shall be made before the time at which it is desired to incorporate the material into the Work.

In cases where compliance of materials or equipment to requirements in the Contract Documents are not determinable through inspection and tests, the Contractor shall, at the direction of the Inspector provide properly authenticated documents, certificates, or other satisfactory proof of compliance. Such documents, certifications, and evidence shall include performance characteristics, materials of construction, and the physical and chemical characteristics of materials. All costs associated with such certification shall be paid by the Contractor.

**B8.05.04**

Materials and equipment incorporated in the bus shall be stored in accordance with the supplier's or manufacturer's recommendation, so as to ensure the preservation of their quality and fitness for the Work. Stored equipment and materials shall be located so as to facilitate inspection by the County's Inspector. The Contractor shall be responsible for damages that occur in connection with the care and protection of stored materials and equipment. Manufactured articles, material, and equipment shall be transported, stored, applied, installed, connected, erected, adjusted, tested, operated, and maintained as recommended by the supplier or manufacturer, unless the Contractor determines that alternate procedures are required to improve the quality, reliability, or appearance of the bus.

**B8.05.05**

If an issue continues to be unresolved by the Contractor in relation to an issue brought up the Inspector, the County will write a "speed letter" requiring an answer from the Contractor within seven (7) days of receipt. The response from the Contractor will be returned to the Inspector and the Contract Administrator.

**B8.05.06**

If the Contractor fails to follow notification requirements or fails to make a documented good faith effort to follow requirements, then the County shall be entitled to collect liquidated damages of \$200.00 per occurrence, per bus, for each bus affected after a third occurrence. The \$200.00 per bus late delivery damages charge may be waived by agreement between the Contractor and the County in those cases where an alternative source is available and the Contractor purchases and arranges shipment on behalf of the County.

Upon the first instance of major rework taking place where the Inspector is not notified prior to rework, a written warning/reminder shall be sent to the Contractor.

Upon the second instance, approval for delivery and acceptance activities shall immediately stop until such time as the Contractor can assure the County the issue is resolved and will not take place again.

Upon the third instance, a penalty of liquidated damages (per bus) shall take effect for all subsequent instances of major rework taking place without prior notification to the Inspector.

## Deliverables and Approvals List

**Contractor Representative**

Error! Reference source not found.

**Initial Parts Order**

Error! Reference source not found.

**Out Of State Contractor**  
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**Training**

The Contractor shall provide the following training to King County staff. All training provided to King County maintenance staff shall be delivered and instructed by trainer(s) certified by the manufacturer of the bus. All training shall be considered as certification level training for King County maintenance staff. The training shall be conducted at King County locations and will be scheduled at a time mutually agreeable with the Contractor and King County and not later than forty-five (45) days after training has been requested.

- A. Training sessions for ten (10) King County staff members will cover the theory of operation, preventive maintenance procedures, and troubleshooting of the bus. Trainees shall each be provided one (1) printed manual during the training documenting all maintenance and troubleshooting procedures. The training manuals shall also include complete electrical schematics and parts diagrams listing all parts of the electric engine cooling fan system.
  
- B. Onsite training sessions covering the complete installation process for the electric engine cooling fan system shall be provided. This hands-on training shall be provided at the King County Transit bus maintenance facility performing the retrofit (Atlantic Base). Class size will be limited to four (4) people per session to ensure hands-on participation.

FORM EA2.10 CERTIFICATION REGARDING LOBBYING

The undersigned [Contractor] certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person or organization for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification thereof.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person or organization for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure of Lobbying Activities," to the Contract Officer.

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

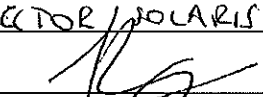
This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. § 1352. Any person who fails to file the required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

Note: Pursuant to 31 U.S.C. § 1352(c)(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such expenditure or failure.


The Contractor, Solaris Bus US Inc, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. 3801 et seq. apply to this certification and disclosure, if any.

**Contractor**  
**Solaris Bus US Inc**

Name of Contractor's  
Authorized Official: JAVIER IRIARTE IBÁÑEZ

Title: DIRECTOR SOLARIS BUS US, INC  
Authorized  
Signature: 

Date: 12/20/2024

**King County Metro**  
By:   
General Manager, Metro Transit Department

Date: 12/20/2024





ATTACHMENT 27:  
OUT OF STATE VEHICLE CONTRACT BIDDERS

**WA State information for Out-of-State bidders can be found here:**

**[http://dor.wa.gov/content/doingbusiness/BusinessTypes/doingBus\\_OutOfStBus.aspx](http://dor.wa.gov/content/doingbusiness/BusinessTypes/doingBus_OutOfStBus.aspx)**

ATTACHMENT 29:

VEHICLE DEALER LICENSING



**STATE OF WASHINGTON**  
**DEPARTMENT OF LICENSING**

A vehicle dealer license is required if you engage in the business of buying, selling, listing, exchanging, offering, brokering, leasing with an option to purchase, auctioning, soliciting, or advertising the sale of new or used vehicles, or arranging or offering or attempting to solicit or negotiate on behalf of others, a sale, purchase, or exchange of an interest in new or used motor vehicles, or if you distribute or transfer for resale vehicles, or if you are in any other way engaged in dealer activity, irrespective of whether you own the motor vehicles. RCW 46.70.011(17); RCW 46.70.021.

A vehicle dealer license is required if you display a vehicle for sale, unless you are the registered owner or legal owner of the vehicle, or hold a notarized power of attorney for the vehicle owner. RCW 46.70.021.

Buying and offering for sale, or buying and selling five or more vehicles in a twelve-month period without holding a vehicle dealer license, or in any other way engaging in dealer activity without holding a vehicle dealer license, constitutes a gross misdemeanor which can result in a criminal fine of up to five thousand dollars for each violation and up to three hundred sixty-four days in jail. A second offense is a class C felony punishable under chapter 9A.20 RCW. RCW 46.70.021.

Violation of RCW 46.70.021 is a per se violation of the Consumer Protection Act, chapter 19.86 RCW and is considered a deceptive practice.

**VEHICLE MANUFACTURERS**

Vehicle manufacturers build or assemble new and unused vehicles.

**LICENSE FEES:**

\$975.00 for the original license.  
\$325.00 for annual renewal.

**PLATES:**

\$43.00 per year.

These plates may be used:

To move a vehicle to or from the place of business of a Washington Dealer.  
To test a vehicle for repair (if there is a preexisting, identifiable problem known to the manufacturer before the testing is begun).

**CONTACT**

Write: Department of Licensing, Dealer Services, PO Box 9039, Olympia, WA 98507-9039  
Phone: 360-664-6466  
Fax: 360-586-0479  
Office Hours 8 a.m. to 5 p.m. (Pacific Standard Time), Monday through Friday  
Web: <http://www.dol.wa.gov/forms/430038.pdf>

ATTACHMENT 30:

A INSPECTION Examples

**6,000 MILES**

40' LF  
6,000 MILES

Consumables:  
Propulsion Oil \_\_\_\_\_qts Trans Fluid \_\_\_\_\_qts Coolant \_\_\_\_\_qts

**AIR & BRAKE**

- Verify Hill Holder Operation
- Test Parking Brake
- Check Air Dryer
- Drain Wet Tank and Ensure the Brake Reservoirs Hold Pressure
- Drain All Air Tanks (Including Ping Tank)
- Check Air Pressure Supply Time (85-100 psi in Less than 30 Seconds at Full Throttle)
- Measure and Record Governor Cut out Pressure \_\_\_\_\_psi
- Check for Air Leaks
- Check Brakes
- Check Slack Adjuster Angle and Alignment
- Measure and Record Push Rod Travel: RF \_\_\_\_\_ LF \_\_\_\_\_ RR \_\_\_\_\_ LR \_\_\_\_\_

**WHEELCHAIR RAMP**

- Clean Ramp
- Check Ramp Operation
- Check for Leaks and Fluid Level

**PROPULSION**

- Change Propulsion Oil and Filter
- Check Belts and Idler Pulley
- Check Cooling System (Hoses, Clamps, Rad., etc.)
- Check Exhaust System (Leaks, Hardware, etc.)
- Drain the Water from the Fuel Filter

**EXTERIOR**

- Check Lights (Head, Marker, Tail, Turn, Back-up, Brake, Boarding, Destination Signs, etc.)
- Check Tires, Wheels and Lug Nuts
- Visual Check for Body Damage

**FIRE SUPPRESSION & ALARM SYSTEMS**

- Check Circuit Monitor for Green Status Light
- Check Activation Switch for Secure Mounting, Safety Ties, Pull-pins and Obstructions
- Check Agent Cylinder for Secure Mounting and Proper Pressure
- Check All Sensors, Hoses, Wiring and Nozzles for Secure Mounting, Damage and Obstructions
- Check that Operating Labels are Clean, Legible and Unobstructed

**GENERAL**

- Check for Excessive Fluid Leaks
- Lube all Fittings
- Correct all Fluid Levels
- Check Batteries (Corrosion, Chafing, Cleanliness, Lube Tracks)

- Check Battery Cables for Corrosion and Chaffing
- Check for Rubbing Hoses and Lines
- Inspect Undercarriage (Broken, Worn, Loose Parts)
- Inspect Bike Rack for Damage and Operation
- Test Wipers-Washers (Service Washers)
- Check Doors (Alignment, Seals, Hinges, Sensitive Edge, Interlock, etc.)

#### HEATING & AIR CONDITIONING

- Check Refrigerant lines for Signs of Deterioration, Leaks or Chafing
- Check Drivers Heater/Defroster Fans Operation
- Check the Evaporator/Condenser Fans Operation
- Adjust clutch air gap (tighten 3 adjustment screws and back out each 1-1/2 turn)
- Check Heater and Defroster Filter (Replace if Necessary)
- Check the Evaporator Filter (Replace if Necessary)

#### INTERIOR

- Check Alarms, Lights, Gauges (Gen, Oil, Low Air, Back-up, Propulsion Fire, etc.)
- Check Reflectors and Wheel Blocks
- Check Lights (Dome, Map, Farebox, Entry Way, etc.)
- Check Driver's Seat Operation, (Pneumatic, Mechanical and Cushion)
- Check Fire Extinguisher Mount, Pressure and Date.
- Replace Fire Extinguisher if Over 11 Months Old (Use Code 35-SJ-S05)
- Test Horn
- Check Roof Escape Hatch
- Check Stop Request (Operation, Chime, Cord, etc.)
- Check Interior for Loose or Broken Parts
- Check PA System, Including ALL Speakers

#### STEERING & SUSPENSION

- Inspect Steering System for Damaged or Loose Parts
- Check Air Bags for Excessive Wear, Leaks or Damage
- Check Shocks for Leaks, Damage or Worn Bushings
- Check for Loose or Damaged Suspension, Mounting Bolts or Parts

#### Electronic drive motor & AXLE

- Check Electronic drive motor Fluid Level
- Check Propeller Shaft and U-Joints

## B INSPECTION 12,000 Miles

40' LF  
12,000 Miles

### Consumables:

Propulsion Oil \_\_\_\_\_ qts Trans Fluid \_\_\_\_\_ qts Coolant \_\_\_\_\_ qts

### AIR & BRAKE

- Verify Hill Holder Operation
- Test Parking Brake
- Check Air Dryer
- Drain Wet Tank and Ensure the Brake Reservoirs Hold Pressure
- Drain All Air Tanks (Including Ping Tank)
- Check Air Pressure Supply Time (85-100 psi in Less than 30 Seconds at Full Throttle)
- Measure and Record Governor Cut out Pressure \_\_\_\_\_ psi
- Check for Air Leaks
- Check Brakes
- Check Slack Adjuster Angle and Alignment
- Measure and Record Push Rod Travel: RF \_\_\_\_\_ LF \_\_\_\_\_ RR \_\_\_\_\_ LR \_\_\_\_\_
- Lube Slack Adjusters and S-Cams

### WHEELCHAIR RAMP

- Clean Ramp
- Check Ramp Operation
- Check for Leaks and Fluid Level

### PROPULSION

- Change Propulsion Oil and Filter
- Take Oil Sample Before Changing Oil
- Check Belts and Idler Pulley
- Check Cooling System (Hoses, Clamps, Rad., etc.)
- Check Exhaust System (Leaks, Hardware, etc.)
- Change the Fuel Filter
- Check Coolant Condition (Freeze Point, PH, etc.)
- Test Nalcool Concentration and Add if Necessary
- Check Propulsion Mounts for Cracks, Damage & Proper Bolt Tightness
- Check Propulsion Air Filter (if Air Filter is Replaced Use Code 35-SJ-S03)

### EXTERIOR

- Check Lights (Head, Marker, Tail, Turn, Back-up, Brake, Boarding, Destination Signs, etc.)
- Check Tires, Wheels and Lug Nuts
- Visual Check for Body Damage
- Check Headlight Alignment
- Check Tail Lights for Cloudiness and Moisture
- Check Destination Signs, Operation and Legibility

### FIRE SUPPRESSION & ALARM SYSTEMS

- Check Circuit Monitor for Green Status Light
- Check Activation Switch for Secure Mounting, Safety Ties, Pull-pins and Obstructions
- Check Agent Cylinder for Secure Mounting and Proper Pressure
- Check all Sensors, Hoses, Wiring and Nozzles for Secure Mounting, Damage and Obstructions
- Check that Operating Labels are Clean, Legible and Unobstructed

#### GENERAL

- Check for Excessive Fluid Leaks
- Lube all Fittings
- Correct all Fluid Levels
- Check Batteries (Corrosion, Chafing, Cleanliness, Lube Tracks)
- Check Battery Cables for Corrosion and Chaffing
- Check for Rubbing Hoses and Lines
- Inspect Undercarriage (Broken, Worn, Loose Parts)
- Inspect Bike Rack for Damage and Operation
- Test Wipers-Washers (Service Washers)
- Check Doors (Alignment, Seal, Hinges, Sensitive Edge, Interlock, etc.)
- Lube Spherical Bearings with Light Oil (LPS ok)
- Measure and Record Charge Rate \_\_\_\_\_Volts

#### HEATING & AIR CONDITIONING

- Check Refrigerant lines for Signs of Deterioration, Leaks or Chafing
- Check Drivers Heater/Defroster Fans Operation
- Check the Evaporator/Condenser Fans Operation
- Adjust clutch air gap (tighten 3 adjustment screws and back out each 1-1/2 turn)
- Check Heater and Defroster Filter (Replace if Necessary)
- Check the Evaporator Filter (Replace if Necessary)
- Lube Compressor Clutch with 2-3 pumps of Exxon Unirex N2 Grease
- Check Boost Pump for Leaks and Operation

#### INTERIOR

- Check Alarms, Lights, Gauges (Gen, Oil, Low Air, Back-up, Propulsion Fire, etc.)
- Check Reflectors and Wheel Blocks
- Check Lights (Dome, Map, Farebox, Entry Way, etc.)
- Check Driver's Seat Operation, (Pneumatic, Mechanical and Cushion)
- Check Fire Extinguisher Mount, Pressure and Date.
- Replace Fire Extinguisher if Over 11 Months Old (Use Code 35-SJ-S05)
- Test Horn
- Check Roof Escape Hatch
- Check Stop Request (Operation, Chime, Cord, etc.)
- Check Interior for Loose or Broken Parts
- Check PA System, Including ALL Speakers
- Inspect Wheelchair Securing System (Belts, Retractors, Personal Seat Belt)
- Check Treadle Peddles (Pads, Free Movement, Obstructions)

#### STEERING& SUSPENSION

- Inspect Steering System for Damaged or Loose Parts
- Check Air Bags for Excessive Wear, Leaks or Damage
- Check Shocks for Leaks, Damage or Bad Bushings
- Check for Loose or Damaged Suspension, Mounting Bolts or Parts
- Check Brace Rods
- Check Kneeling (Operation and Leaks)

#### Electronic drive motor & AXLE

- Check Electronic drive motor Fluid Level
- Take Electronic drive motor Oil Sample
- Check Propeller Shaft and U-Joints
- Check Differential Fluid Level
- Clean Breather

## C INSPECTION 24,000 Miles

40' LF  
24,000 Miles

### Consumables:

Propulsion Oil \_\_\_\_\_ qts. Trans Fluid \_\_\_\_\_ qts. Coolant \_\_\_\_\_ qts.

### AIR & BRAKE

- Verify Hill Holder Operation
- Test Parking Brake
- Check Air Dryer
- Drain Wet Tank and Ensure the Brake Reservoirs Hold Pressure
- Drain All Air Tanks (Including Ping Tank)
- Check Air Pressure Supply Time (85-100 psi in Less than 30 Seconds at Full Throttle)
- Measure and Record Governor Cut out Pressure \_\_\_\_\_ psi
- Check for Air Leaks
- Check Brakes
- Check Slack Adjuster Angle and Alignment
- Measure and Record Push Rod Travel, RF \_\_\_\_\_ LF \_\_\_\_\_ RR \_\_\_\_\_ LR \_\_\_\_\_
- Measure and Record Hill Holder Pressure, \_\_\_\_\_ psi

### WHEELCHAIR RAMP

- Clean Ramp
- Check Ramp Operation
- Check for Leaks and Fluid Level

### PROPULSION

- Change Propulsion Oil and Filter
- Take Oil Sample Before Changing Oil
- Check Belts and Idler Pulley
- Check Cooling System (Hoses, Clamps, Rad., etc.)
- Check Exhaust System (Leaks, Hardware, etc.)
- Check Coolant Condition (Freeze Point, PH, etc.)
- Test Nalcool Concentration and Add if Necessary
- Change Water Filter
- Check Propulsion Mounts for Cracks, Damage & Proper Bolt Tightness
- Check Propulsion Air Filter (if Air Filter is Replaced Use Code 35-SJ-S03)
- Check Condition of Air Filter Restriction Indicator
- Change Fuel Filter

### EXTERIOR

- Check Lights (Head, Marker, Tail, Turn, Back-up, Brake, Boarding, Destination Signs, etc.)
- Check Tires, Wheels and Lug Nuts
- Visual Check for Body Damage
- Check Headlight Alignment
- Check Tail Lights for Cloudiness and Moisture
- Check Destination Signs, Operation and Legibility
- Torque Lug Nuts (425 +/- 15 psi)

### FIRE SUPPRESSION & ALARM SYSTEMS

- Check Circuit Monitor for Green Status Light
- Check Activation Switch for Secure Mounting, Safety Ties, Pull-pins and Obstructions
- Check Agent Cylinder for Secure Mounting and Proper Pressure



- Check all Sensors, Hoses, Wiring and Nozzles for Secure Mounting, Damage and Obstructions
- Check that Operating Labels are Clean, Legible and Unobstructed

#### GENERAL

- Check for Excessive Fluid Leaks
- Lube all Fittings
- Correct all Fluid Levels
- Check Batteries (Corrosion, Chafing, Cleanliness, Lube Tracks)
- Check Battery Cables for Corrosion and Chaffing
- Check for Rubbing Hoses and Lines
- Inspect Undercarriage (Broken, Worn, Loose Parts)
- Inspect Bike Rack for Damage and Operation
- Test Wipers-Washers (Service Washers)
- Check Doors (Alignment, Seal, Hinges , Sensitive Edge, Interlock , etc.)
- Lube Spherical Bearings with Light Oil (LPS ok)
- Measure and Record Charge Rate \_\_\_\_\_Volts

#### HEATING & AIR CONDITIONING

- Check Refrigerant lines for Signs of Deterioration, Leaks or Chafing
- Check Drivers Heater/Defroster Fans Operation
- Check the Evaporator/Condenser Fans Operation
- Adjust clutch air gap (tighten 3 adjustment screws and back out each 1-1/2 turn)
- Check Heater and Defroster Filter (Replace if Necessary)
- Check the Evaporator Filter (Replace if Necessary)
- Lube Compressor Clutch with 2-3 pumps of Exxon Unirex N2 Grease
- Check Boost Pump for Leaks and Operation

#### INTERIOR

- Check Alarms, Lights, Gauges (Gen, Oil, Low Air, Back-up, Propulsion Fire, etc.)
- Check Reflectors and Wheel Blocks
- Check Lights (Dome, Map, Farebox, Entry Way, etc.)
- Check Driver's Seat Operation, (Pneumatic, Mechanical and Cushion)
- Check Fire Extinguisher Mount, Pressure and Date.
- Replace Fire Extinguisher if Over 11 Months Old (Use Code 35-SJ-S05)
- Test Horn
- Check Roof Escape Hatch
- Check Stop Request (Operation, Chime, Cord, etc.)
- Check Interior for Loose or Broken Parts
- Check PA System, Including ALL Speakers
- Inspect Wheelchair Securing System (Belts, Retractors, Personal Seat Belt)
- Check Treadle Peddles (Pads, Free Movement, Obstructions)
- Check and Lube Emergency Exit Windows
- Check Drivers Window and Felts

#### STEERING AND SUSPENSION

- Inspect Steering System for Damaged, or Loose Parts
- Check Air Bags for Excessive Wear, Leaks or Damage
- Check Shocks for Leaks, Damage or Worn Bushings
- Check for Loose or Damaged Suspension, Mounting Bolts or Parts
- Check Brace Rods
- Check Kneeling Operation
- Check Angle Drive Fluid Level
- Check Brace Rod Bushings and Mounting Bolts for Proper Torque
- Check Air Suspension Height and Adjust as Necessary
- Check Steering Wheel Free Play
- Change Hydraulic Filter

**ATTACHMENT 31: KING COUNTY METRO TRANSIT ADDRESSES RELATED TO BUS CONTRACTS**

<b>Invoicing for buses</b>	
Invoice To:	King County Metro Transit
Address:	Transit Fleet Procurement and Contract Management MS: KSC-TR-0342 201 S. Jackson St. Seattle, WA 98104-3856
Contact:	William Haber Superintendent, Transit Fleet Procurement and Contract Management
Contact Telephone:	(206) 735-1959
<b>ADDRESS FOR OVERNIGHT DELIVERY SERVICES ONLY</b>	King County Metro Transit Transit Fleet Procurement and Contract Management KSC TR 0342 201 S. Jackson St. Seattle, WA 98104-3856
<b>Delivery (BUSES Only)</b>	
Address:	Builder's Service Center
• Special Instructions: Days, Time, etc.	Mon. – Fri. 8 am - 3 pm (Pacific Standard Time (PST)) except KC Metro holidays
<b>Delivery (Manuals, Special Tools, Test Equipment)</b>	
Address:	KC Metro Fleet Engineering 12119 East Marginal Way South Seattle, WA 98168
Contact Name:	Zac Drenkel, "Acting" Superintendent, Fleet Engineering
Contact Telephone:	(206)477-6874
• Special Instructions: Days, Time, etc.	Mon. – Fri. 8 am - 3 pm PST except KC Metro holidays
<b>Manufacturer's Statement of Origin</b>	
Registered Owner: Legal Name	King County Metro Transit
Address:	201 S. Jackson St. Seattle, WA 98104-3856
Contact:	William Haber Superintendent, Transit Fleet Procurement and Contract Management
Contact Address:	Transit Fleet Procurement and Contract Management MS: KSC-TR-0342 201 S. Jackson St. Seattle, WA 98104-3856
Contact Telephone:	(206) 735-1959
Special Instructions:	Print "Washington State Sales Tax Is Being Collected By (bus builder)" on each Statement of Origin
<b>Ship-Loose Bus Contract Parts &amp; Manufacturer Service Representative Parts</b>	
Address:	KC Metro Component Supply Center 12200 East Marginal Way South Seattle, WA 98168
Contact Name:	Joe Salgado, "Acting" Warranty Chief

Electronic drive motor & AXLE

- Check Electronic drive motor Fluid Level
- Take Electronic drive motor Oil Sample
- Check Propeller Shaft and U-Joints
- Check Differential Fluid Level
- Clean Breather

**ATTACHMENT 31: KING COUNTY METRO TRANSIT ADDRESSES RELATED TO BUS CONTRACTS**

Contact Telephone:	(206)848-0521
• Special Instructions: Days, Time, etc.	Mon. – Fri. 8 am – 3 pm PST except KC Metro holidays

ATTACHMENT 31: King County Metro Transit Addresses Related to Bus Contracts

<b>Invoicing for Buses</b>	
Invoice to:	King County Metro Transit
Address:	Transit Fleet Procurement and Contract Management MS:KSC-TR-0342 201 S. Jackson St Seattle WA 98104-3856
Contact:	William Haber Superintendent, Transit Fleet Procurement and Contract Management
Contact Telephone:	(206) 684-1640
ADDRESS FOR OVERNIGHT	Transit Fleet Procurement and Contract Management MS:KSC-TR-0342 201 S. Jackson St Seattle WA 98104-3856
<b>Delivery (Buses Only)</b>	
Address:	KC Metro Fleet Engineering 12119 East Marginal Way South Seattle, WA 98168
Special Instructions: Days, Time, etc.	Mon. – Fri. 8 am - 3 pm (Pacific Standard Time (PST)) except KC Metro holidays
<b>Delivery (Manuals, Special Tools, Test Equipment)</b>	
Address:	KC Metro Fleet Engineering 12119 East Marginal Way South Seattle, WA 98168
Contact Name:	Zac Drenkel, "Acting" Superintendent, Fleet Engineering
Contact Telephone:	(206)477-6874
Special Instructions: Day, Time, etc	Mon. – Fri. 8 am - 3 pm PST except KC Metro holidays
<b>Manufacturer's Statement of Origin</b>	
Registered Owner: Legal Name	King County Metro Transit
Address:	201 S. Jackson St. Seattle, WA 98104-3856
Contact:	William Haber Superintendent, Transit Fleet Procurement and Contract Management
Contact Address:	Transit Fleet Procurement and Contract Management MS: KSC-TR-0342 201 S. Jackson St. Seattle, WA 98104-3856
Contact Telephone:	(206) 735-1959
Special Instructions:	Print "Washington State Sales Tax Is Being Collected By (bus builder)" on each Statement of Origin
<b>Ship-Loose Bus Contract Parts &amp; Manufacturer Service Representative Parts</b>	
Address:	KC Metro Component Supply Center 12200 East Marginal Way South Seattle, WA 98168
Contact Name:	Joe Salgado, "Acting" Warranty Chief
Contact Telephone:	(206)848-0521
Special Instructions: Days, Time, etc.	Mon. – Fri. 8 am – 3 pm PST except KC Metro holidays

FORM EA2.36  
Forms Available on King County Web Site

Reference Section A2.23 – King County and IRS Forms Required Prior to Execution of the Contract

1. **Equal Benefits – Worksheet and Declaration Form** (Ref Section A2.23.03)
2. **Internal Revenue Service Form W-9 [Request for Taxpayer Identification and Number Certification]** (Ref Section A2.23.04)

These forms may be found at:

[http://www.kingcounty.gov/operations/procurement/Forms/Goods\\_and\\_Services.aspx](http://www.kingcounty.gov/operations/procurement/Forms/Goods_and_Services.aspx)

FORM EB5.01  
CONTRACT AGREEMENT

**Page 1 of 2**

THIS AGREEMENT, made this 20th \_\_\_\_\_ day of December \_\_\_\_\_, 2024  
\_\_\_\_\_, is by and between King County, a home rule charter  
county of the State of Washington, hereinafter called 'the County' and  
Solaris Bus US Inc.,  
hereinafter called the 'Contractor'.

WITNESSETH:

WHEREAS, the County has caused specifications, drawings, and other contract documents to be prepared for certain work as described therein, Contract SOL24-1, MANUFACTURE AND DELIVERY OF 40 and 60 FOOT HEAVY DUTY LOW FLOOR BATTERY ELECTRIC BUSES; and

WHEREAS, the Contractor has offered to perform the proposed Work in accordance with the terms of the Contract;

NOW, THEREFORE, in consideration of the mutual covenants and agreements of the parties herein contained and to be performed, the Contractor hereby agrees to complete the Work at the prices and on the terms and conditions herein contained, and the County agrees to pay the Contractor the contract prices provided herein for the fulfillment of the Work and the performance of the covenants set forth herein.

The number of buses to be furnished, the optional equipment to be provided on each bus, and the total contract price, computed from the Best and Final Offer of the Contractor, shall be as follows:

A base quantity of 4 buses with the following optional equipment: Additional battery pack selected for 60' Battery BUS for \$80,350 and Vapor Doors \$1960 per 40' vehicle and \$2,940 per 60' vehicle\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

, for a Total Contract Price of \$ 5,770,500 (THIS TOTAL CONTRACT PRICE DOES NOT INCLUDE WASHINGTON STATE SALES TAX)\_\_\_\_\_

for all buses, subject to any adjustment by the County after selection of options for variations in quantity.

The County may order additional buses per Sections B5.02.01, and B7.12 as part of this multi-year procurement.

The further terms, conditions, and covenants of the Contract are set forth in the following exhibit parts, each of which is attached hereto and by this reference made a part hereof:

1. Section A - Legal and Procedural Requirements for Proposers
2. Section B - Legal and Procedural Post-Award Contract Requirements
3. Section E - Forms
4. The P1 "Price Schedule", as applicable, of the Contractor including all attachments complying precisely with the contract specifications.

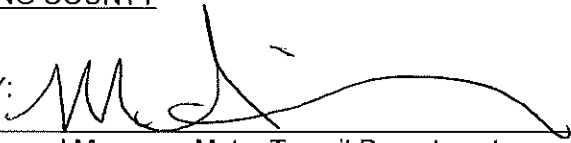
**FORM EB5.01  
CONTRACT AGREEMENT  
Page 2 of 2**

IN WITNESS WHEREOF,

this agreement has been executed in duplicate this 20 day of December, 20 24.

KING COUNTY

BY:



General Manager, Metro Transit Department

APPROVED AS TO FORM:

Deputy Prosecuting Attorney

CONTRACTOR

BY: JAVIER IRIARTE IBAÑEZ



ITS: DIRECTOR SOLARIS BUS US, INC

State of DELAWARE

County of NEWCASTLE

I certify that I know or have satisfactory evidence that Michelle Allison + Javier Ibañez

is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she was authorized to execute the instrument and acknowledged it as the \_\_\_\_\_

of \_\_\_\_\_ to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated: 12/20/24



Signature

(Seal or Stamp)

Title

My appointment expires





**King County King County Metro Audit Services**

**FORM E4 – CONTRACT CHANGE ORDER PROPOSAL PRICING**

NAME OF OFFEROR		SUPPLIES AND/OR SERVICES TO BE FURNISHED			
HOME OFFICE ADDRESS (including Zip Code)					
DIVISION(S) AND LOCATIONS(S) WHERE WORK IS TO BE PERFORMED		TOTAL AMOUNT OF PROPOSAL		SOLICITATION NO.	
<b>DETAILED DESCRIPTION OF COST ELEMENTS</b>					
1. DIRECT MATERIAL (attach itemized schedule)		EST. COST		TOTAL EST. COST	REFERENCE
a. PURCHASED PARTS					
b. SUBCONTRACTED ITEMS					
c. OTHER - (1) RAW MATERIAL					
(2) YOUR STANDARD COMMERCIAL ITEMS					
(3) INTERDIVISIONAL TRANSFER (At other than cost)					
<b>TOTAL DIRECT MATERIAL</b>					
2. MATERIAL OVERHEAD (RATE % X \$ BASE)					
3. DIRECT LABOR (Specify by job classification)		ESTIMATED HOURS	HOURLY RATE	EST. COST	
<b>TOTAL DIRECT LABOR</b>					
4. LABOR OVERHEAD (Specify department or cost center)		O.H.RATE	XBASE=	EST.COST	
<b>TOTAL LABOR OVERHEAD</b>					
5. SPECIAL TESTING				EST.COST	
<b>TOTAL SPECIAL TESTING</b>					
6. SPECIAL EQUIPMENT (if direct charge) (attach itemized schedule)					
7. TRAVEL (If direct charge) (attach itemized schedule)				EST.COST	
a. TRANSPORTATION					
b. PER DIEM OR SUBSISTENCE					
<b>TOTAL TRAVEL</b>					
8. CONSULTANTS (Identify--purpose--rate) (attach itemized schedule)				EST.COST	
<b>TOTAL CONSULTANTS</b>					
9. OTHER DIRECT COSTS (attach itemized schedule)					
10. TOTAL DIRECT COST AND OVERHEAD					
11. GENERAL AND ADMINISTRATIVE EXPENSE (Rate % of cost element Nos. )					
12. ROYALTIES					
<b>TOTAL ESTIMATED COST</b>					
14. FEE OR PROFIT					
15. CUSTOMS OR DUTIES					
<b>TOTAL ESTIMATED COST AND FEE OR PROFIT</b>					
16. This proposal is submitted for use in connection with and in response to (Describe R.F.P. etc.)					

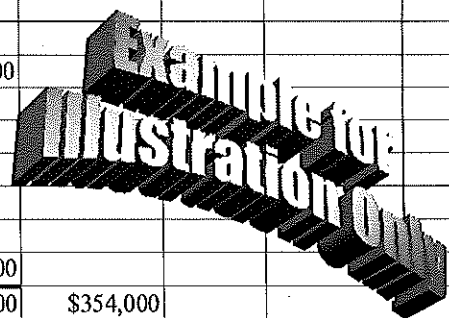
and reflects our best estimates as of this date, in accordance with the instructions to offerors.

TYPED NAME AND TITLE	SIGNATURE
NAME OF FIRM	DATE OF SUBMISSION

**FORM E5 – Not Used**

FORM E6

King County Metro Transit			
Contract MB 08-1			
MANUFACTURE AND DELIVERY OF 40 FT HYBRID AND STANDARD DRIVE MOTOR BUSES			
BUS CONTRACT ORDER FORM E-6			
<b>BUS TYPE:</b>			40' Diesel
<b>BUS MODEL:</b>			MB40D
<b>ORDER QUANTITY</b>			50
<b>PURCHASE ORDER #</b>			KCM-40-001
<b>DELIVERY DATE last bus in order must be delivered by:</b>			1-Jul-10
<b>BASE PRICE:</b>			\$350,000
<b>OPTIONAL EQUIPMENT</b>			
	Farebox	\$2,000	
	Adjustable Pedals	800	
	Camera System	1,200	
	subtotal optional equipment		4,000
	<b>BASE UNIT SELLING PRICE</b>		\$354,000
			\$354,000
<b>PRICE ADJUSTMENT CALCULATION</b>			
	PPI WPU 1413		
	Start Date	May-07	201.5
	End Date	May-08	210.0
	raw change		8.5
	% change		4.22%
	max % change allowable		3.50%
	subtotal price adjustment		3.50%
			12,390
	<b>BASE UNIT SELLING PRICE Adjusted for PPI</b>		\$366,390
			\$366,390
<b>CHANGE ORDERS applied from previous Order(s)</b>			
	C/O #1A	6/30/2008	\$5,000
<b>CHANGE ORDERS new items applied to this Order</b>			
	new item #1	11/30/2008	610
	new item #2	11/30/2008	1,000
	new item #3	11/30/2008	2,000
	subtotal new change orders		\$3,610
<b>ADJUSTED UNIT SELLING PRICE</b>			\$375,000
	includes Optional Equipment; PPI; Change Orders		
<b>QUANTITY of BUSES for this Order</b>			50
<b>TOTAL VALUE of this Order before WSST</b>			\$18,750,000
	Washington State Sales Tax	9.30%	\$1,743,750
<b>TOTAL VALUE of this Order including WSST</b>			\$20,493,750
Ordered By:		Date:	
Title:			



FORM E7

**KING COUNTY METRO BUS PROCUREMENTS**  
*Placing Orders under a Multi-Year Requirements Contract*  
**SAMPLE PROCESS FLOW for BUS ORDERS**

Establish the need – the need is expressed via the Fleet Plan [Service Development establishes bus quantities, types, passenger capacities, and service startup dates].

Confirm quantities and desired delivery dates with Service Development.

Obtain written confirmation from Transit Budget Office that Budget Authority exists for each Order.

Notify Contractor of the County's forthcoming order for additional buses.

Specify optional equipment selections, and any change order items from previous orders that are to be included in the new order.

Determine if any new change orders to bus equipment/configuration are required.

IF NEW CHANGES ARE REQUIRED, THEN:

- Finalize specifications for changes to equipment/bus configuration.
- Prepare Independent Cost Estimate (ICE) for change items.
- Request price proposal from Contractor for any equipment/configuration changes from previous order – via letter and/or e-mail to Contractor.
- Contractor submits pricing for equipment/configuration changes – pricing and complete supporting documentation submitted by Contractor.
- Conduct Cost Analysis for equipment/configuration changes – Metro Audit Services conducts analysis & files report with KCM Contract Administrator.
- Negotiate the Price for equipment/configuration changes

Calculate the Adjusted Unit Selling Price of the bus in accordance with the Economic Price Adjustment clause in Section B7.12 plus or minus the negotiated cost(s) of any equipment/configuration changes.

Issue Change Order to Modify Contract Amount if required

Issue Statement of Intent to Issue NTP to Contractor & Request Contractor to provide the contractually required documents for each order of buses:

- Evidence of Insurance
- Performance Security
- Certificate of Current Cost & Pricing Data
- Production & Delivery Schedule

Requisition the Purchase Order – submit requisition to Dept. of Finance – Procurement Section (Change Order signed by GM with transmittal letter serves as the requisition).

Issue Notice to Proceed (NTP), Purchase Order & Bus Contract Order Form - Upon receipt of compliant documents called for above; issue the NTP, Purchase Order, and Bus Order Form to Contractor.

# Attachment P-1

## Vehicle Pricing

Solaris will provide vehicles conforming to the Scope of Work at the following prices:

- A. Battery Electric Bus, 40' long, with 3 battery packs of HE176 per attached Technical Description:  
\$1,220,000.00
- Optional: Vapor doors instead of Ventura doors: +1,960 USD per vehicle.
- B. Battery Electric Bus, 60' long, with 3 battery packs of HE176 per attached Technical Description:  
\$1,580,000.00
- Optional: one additional battery pack of HE176: +80,350 USD per vehicle.
  - Optional: Vapor doors instead of Ventura doors: +2,940 USD per vehicle.
- C. Training classes will be available on demand per the attached pricing. See Attachment P-2.

## **Appendix B**

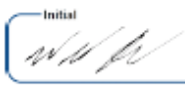

**Amendment SOL24-1 Change Order 1A dated February 20, 2025**

DocuSign Envelope ID: 8CEE6E6A-3740-456F-8A82-49E0CD599317



### Internal Routing Form (IRF)

Date: April 21, 2025  
Subject: SOL24-1: Change Order 1A and Order Letter

Route To	Action	Initial + Date <i>Please initial &amp; date to indicate concurrence</i>
William Haber Superintendent <a href="mailto:William.Haber@kingcounty.gov">William.Haber@kingcounty.gov</a>	Initial & Date	 Initial 4/21/2025
Mark Ellerbrook Director, Capital Division <a href="mailto:maellerbrook@kingcounty.gov">maellerbrook@kingcounty.gov</a>	Initial & Date	 Initial 4/21/2025
Michelle Allison General Manager <a href="mailto:metrogmoffice@kingcounty.gov">metrogmoffice@kingcounty.gov</a>	Sign & Date	<i>Sign enclosed documents</i>

#### Summary

Attached for Michelle's review and signature are:

1. SOL24-1 Order Letter
  - a. The Sole source contract for the purchase of Battery Electric Transit Vehicles, and related services as described in the Solicitation SOL 24-1. The contract has been made available for use by all Washington state agencies and authorized parties to our Master Contract, including institutions of higher education, cities and counties, other political subdivisions or special districts, and nonprofit corporations.
  - b. This document serves as King County Metro's ordering instrument for Solaris 40' and 60' model buses available under the contract.
2. Two (2) letters of Change Order # 1A for KCM Contract SOL24-1 between KCM and Solaris BUS US, INC.
  - a. Administrative changes that will not change the unit price on the 4 buses.
  - b. The Changer Order has been reviewed and approved by Transit Fleet Procurement & Contract Management.



DocuSign Envelope ID: 8CEE8E6A-3740-456F-8A82-49E0CD599317



*Moving forward together*

**Capital Division**  
*Capital Planning & Portfolio Management*  
201 S. Jackson Street  
KSC-TR-0342  
Seattle, WA 98104-3856

February 20, 2025

Antonio Torcia  
Executive Vice President  
Solaris BUS US, INC

**Re: Change Order # 1A for KCM Contract SOL24-1**

Dear Mr. Torcia:

Enclosed are two sets of originals of Change Order No. 1A to our contract SOL24-1. The unit price for these 4 buses will not be adjusted from the following administrative changes.

Removed section A 2.19 Disadvantaged Enterprise (DBE)

Removed section A2.23.03 Equal Benefits form

Removed requirement for EA2.36 form under A2.23.04 and B5.01

Please sign each set of originals and return them to me. King County Metro will sign and date both sets of originals, and return one signed set to you. Thank you for your assistance.

Sincerely,  
William Haber  
Superintendent  
Transit Fleet Procurement and Contract Management

Enclosures

cc: Sophon "Denny" Ly, Metro Transit  
Joshua Alexander, Metro Transit  
Kevon Johnson, Metro Transit  
Xu Li, Metro Transit

DocuSign Envelope ID: 8CEE6E6A-3740-456F-8A82-49E0CD599317



*Moving forward together*

**Capital Division**  
*Capital Planning & Portfolio Management*  
201 S. Jackson Street  
KSC-TR-0342  
Seattle, WA 98104-3856

**KING COUNTY METRO TRANSIT**  
**201 S. Jackson KSC-TR-0342**  
**SEATTLE, WASHINGTON 98104**

**CONTRACT NO. SOL24-1 CHANGE ORDER NO. 1A**

TITLE: Heavy-Duty Public Transit Vehicles

CONTRACTOR: SOLARIS BUS US, INC

DESCRIPTION OF CHANGE: Per attached descriptions.

REASON FOR CHANGE: Per attached descriptions.

CONTRACT TIME:  Extends Completion Date  
 Does Not Extend Completion Date

COST DATA:  Additive  Deductive  No Change  
 Unit Price  Lump Sum Cost: **\$0**

APPROVED BY:

KING COUNTY  
Metro Transit Department

DocuSigned by:  
*Michelle Allison*  
CFAFB29C7D8F4A1...

Michelle Allison, General Manager,

Date: 4/23/2025

APPROVED BY:

SOLARIS BUS US, INC.  
Contractor



Signed by /  
Podpisano przez:  
Javier Iriarte  
Ibañez  
Date / Data:  
2025-02-26 23:57

Javier Iriarte Ibañez, Director

Date: February 26, 2025

DocuSign Envelope ID: 8CEE8E6A-3740-456F-8A82-49E0CD599317



*Moving forward together*

**Capital Division**

*Capital Planning & Portfolio Management*

201 S. Jackson Street

KSC-TR-0342

Seattle, WA 98104-3856

February 20, 2025

Antonio Torcia  
Executive Vice President  
Solaris BUS US, INC

Re: Change Order # 1A for KCM Contract SOL24-1

Dear Mr. Torcia:

Enclosed are two sets of originals of Change Order No. 1A to our contract SOL24-1. The unit price for these 4 buses will not be adjusted from the following administrative changes.

Removed section A 2.19 Disadvantaged Enterprise (DBE)

Removed section A2.23.03 Equal Benefits form

Removed requirement for EA2.36 form under A2.23.04 and B5.01

Please sign each set of originals and return them to me. King County Metro will sign and date both sets of originals, and return one signed set to you. Thank you for your assistance.

Sincerely,  
William Haber  
Superintendent  
Transit Fleet Procurement and Contract Management

Enclosures

cc: Sophon "Denny" Ly, Metro Transit  
Joshua Alexander, Metro Transit  
Kevon Johnson, Metro Transit  
Xu Li, Metro Transit

DocuSign Envelope ID: 8CEE8E8A-3740-456F-8A82-49E0CD599317



*Moving forward together*

**Capital Division**  
*Capital Planning & Portfolio Management*  
201 S. Jackson Street  
KSC-TR-0342  
Seattle, WA 98104-3856

**KING COUNTY METRO TRANSIT  
201 S. Jackson KSC-TR-0342  
SEATTLE, WASHINGTON 98104**

**CONTRACT NO. SOL24-1 CHANGE ORDER NO. 1A**

TITLE: Heavy-Duty Public Transit Vehicles

CONTRACTOR: SOLARIS BUS US, INC

DESCRIPTION OF CHANGE: Per attached descriptions.

REASON FOR CHANGE: Per attached descriptions.

CONTRACT TIME:  Extends Completion Date  
 Does Not Extend Completion Date

COST DATA:  Additive  Deductive  No Change  
 Unit Price  Lump Sum Cost: **\$0**

APPROVED BY:

KING COUNTY  
Metro Transit Department

DocuSigned by:  
*Michelle Allison*  
CFAFB29C7DBF4A1

Michelle Allison, General Manager,

Date: 4/23/2025

APPROVED BY:

SOLARIS BUS US, INC.  
Contractor

Signed by /  
Podpisano przez:  
*Javier Iriarte Ibañez*  
Date / Data:  
2025-02-26 23:58

Javier Iriarte Ibañez, Director

Date: February 26, 2025

DocuSign Envelope ID: 8CEE6E6A-3740-456F-8A82-49E0CD599317



*Moving forward together*

**Capital Division**  
*Capital Planning & Portfolio Management*  
201 S. Jackson Street  
KSC-TR-0342  
Seattle, WA 98104-3856

## ***Transit Fleet Procurement and Contract Management***

April 2, 2025

Antonio Torcia  
General Manager  
Solaris North America  
300 E 18<sup>th</sup> ST  
Elmira, NY 14903-1333

SUBJECT: KCM Contract No. SOL24-1

- Order for 2 40ft Battery Electric Buses
- Order for 2 60ft Battery Electric Articulated Buses
- Request for Documents Required to Implement Orders

Dear Mr. Torcia,

The Sole source contract for the purchase of Battery Electric Transit Vehicles, and related services as described in the Solicitation SOL 24-1. The contract has been made available for use by all Washington state agencies and authorized parties to our Master Contract, including institutions of higher education, cities and counties, other political subdivisions or special districts, and nonprofit corporations.

This document serves as King County Metro's ordering instrument for Solaris 40' and 60' model buses available under the contract.

DocuSign Envelope ID: 8CEE6E6A-3740-456F-8A82-49E0CD599317

Mr. Torcia  
Date: April 2, 2025  
Page 2

*Bus Configuration and Quantities*

The bus configuration and quantities are as follows:

**Order #1- Quantity of 2 Solaris 40' and 2 60' Solaris (Non-BRT) model buses configured as follows:**

- 40' Two curbside doors for passenger entry/exit
- 60' Three curbside doors for passenger entry/exit
- Interior colors and fabrics per Solaris
- Electrically controlled and operated doors
- ADA forward facing securement systems (curbside and streetside)

The bus specification and requirements shall be modified by BOM 1 and agreed to formally between Solaris and King County Metro during final design review at Solaris Bolechowo, Poland. Planned for the first week of June.

*Bus Price*

The unit price for this order of Solaris 2 40' (Non-BRT) model buses shall be set at \$1,221,960.

The unit price for this order of Solaris 2 60' (Non-BRT) model buses shall be set at \$1,663,290

The bus unit price shall be based on the P1 pricing and as modified by SOL 24-1 signed Dec 20<sup>th</sup> 2024.

Bus pricing is subject to changes as outlined in the contract and through finalization of the BOM.

*Delivery Location*

Solaris shall deliver all buses to the KCM Fleet Engineering located at 12119 East Marginal Way South, Tukwila, Washington USA 98168.

Please indicate your acceptance by signing and returning a copy of this letter bearing your original signature. After our General Manager has signed, we will provide Solaris a copy. Please direct any questions and/or correspondence to me. I can be reached at 206.477.6126 or e-mail:

William.Haber@kingcounty.gov

Once all required documents are received, reviewed, and deemed compliant, King County Metro will issue a Notice to Proceed for the order listed above.


KCM Contract No. SOL 24-1

- Order #1 for 2 40' and 2 60' Solaris Low Floor Battery Electric Buses-(Non-BRT)


DocuSign Envelope ID: 8CEE6E6A-3740-456F-8A82-49E0CD599317

Mr. Torcia  
Date: April 2, 2025  
Page 3

ACCEPTED ON BEHALF OF SOLARIS

Signature:  Signed by /  
Podpisano przez:  
Title: Javier Iriarte  
~~Haber~~  
Date: 2025-04-07 05:46  
~~2025-04-07 05:46~~

ACCEPTED ON BEHALF OF KING COUNTY METRO

DocuSigned by:  
  
Signature: Michelle Allison  
~~CEAER29C7DBE4A1~~  
Title: General Manager  
Date: 4/23/2025

If you have any questions, please do not hesitate to contact me. We look forward to building on our partnership with this project and working with you and your staff at Solaris.

Sincerely,  
William Haber  
Superintendent, Transit Fleet Procurement and Contract Management  
King County Metro Transit Department

Cc: Antonio Torcia, General Manager, Solaris North America  
Michelle Allison, General Manager, King County Metro Transit  
Ernest Kandilige, Deputy General Manager, King County Metro Transit  
Mark Ellerbrook, Capital Division Director, King County Metro Transit  
William Haber, TFPCM, King County Metro Transit  
Joshua Alexander, TFPCM, King County Metro Transit  
Sophon "Denny" Ly, TFPCM, King County Metro Transit  
Kevon Johnson, TFPCM, King County Metro Transit

## **Appendix C**

### **Attachment P-2 Training Pricing**



# **Attachment P-2**

## **Training Price**

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## 1. Available training modules

1. Urbino electric introduction
2. HV propulsion system level 1 (basic)
3. HV propulsion system level 1+2 (advanced)
4. HV battery system level 1 (basic)
5. HV battery system level 1+2 (advanced)
6. HV battery system level 1+2+3 (professional)
7. Traction motor
8. Door system
9. Articulation system
10. Advanced diagnostics
11. Air conditioning system
12. Battery Thermal Management System (BTMS)
13. Operators training
14. Warranty, spare parts, reporting issues (online)

## 2. Form of training

Trainings are carried out in two parts (except online trainings):

- Theoretical introduction in the lecture hall, with the presentation of training materials in the form of a multimedia presentation;
- Practical part, conducted in the bus, in the form of presentation of components, systems, principle of operation, maintenance, systems diagnostics, faults simulation.

## 3. Training modules details

**1. Urbino electric introduction: 4 days, group of max. 8 people, 22600 USD**

- Construction and principle of operation of an electric bus;
- Technical documentation;
- Maintenance procedures;
- Safety rules, procedures in emergency situations;
- Introduction to HV components;
- HV disconnection and measurements;
- 24V electric installation;
- Pneumatic installation;
- Heating, ventilation and air conditioning system;
- Basic vehicle diagnostics.

**2. HV propulsion system level 1 (basic): 1 day, group of max. 8 people, 13300 USD**

- Construction of devices supplied by MEDCOM;
- Principle of operation of devices;
- Safety rules;
- Device diagnostics;
- Terms of maintenance and service.

**3. HV propulsion system level 1+2 (advanced): 2 days, group of max. 8 people, 26600 USD**

- HV propulsion system level 1 scope;
- Faults simulation;
- Troubleshooting.

4. HV battery system level 1 (basic): 1 day, group of max. 8 people, 17400 USD

- Construction of traction batteries;
- Principle of operation of the battery system;
- Safety rules;
- Device diagnostics, acquiring log files, uploading software.

5. HV battery system level 1+2 (advanced): 2 days, group of max. 8 people, 22300 USD

- HV battery system level 1 scope;
- Opening the Battery Pack;
- Assembling/disassembling of the HV power circuit;
- Replacement of basic internal components.

6. HV battery system level 1+2+3 (professional): 3 days, group of max. 8 people, 27200 USD

- HV battery system level 1 scope;
- HV battery system level 2 scope;
- Assembling/disassembling of the cooling circuit;
- Assembling/disassembling of the module blocks;
- Cooling plates replacement;
- Modules replacement.

**7. Traction motor: 3 days, group of max. 8 people, 63400 USD**

- Maintenance;
- Main inspection;
- Fault diagnosis;
- Disassembly and assembly of the traction motor;
- Assessment of wear;
- Checking and reconditioning of components.

**8. Door system: 2 days, group of max. 8 people, 8200 USD**

- Principle of operation;
- Adjustments and controls;
- System diagnostics..

**9. Articulation system: 1 day, group of max. 8 people, 12900 USD**

- Principle of operation;
- Adjustments;
- Components replacement and repairs;
- System diagnostics.

**10. Advanced diagnostics: 3 days, group of max. 8 people, 21500 USD**

- LV electrical installation diagnostics;
- HV systems diagnostics and faults interpretation;
- Faults simulation;
- Troubleshooting.

**11. Air conditioning system: 1 day, group of max. 8 people, 13800 USD**

- Construction of the system;
- Principle of operation;
- Components replacement;
- Maintenance.

**12. Battery Thermal Management System (BTMS): 4 days, group of max. 4 people, 18900 USD**

- Construction of the system;
- Principle of operation;
- Maintenance;
- Service;
- Diagnostics.

**13. Operators training: 1 day, group of max. 4 people, 8900 USD**

- Construction and principles of economic operation of an electric bus;
- Components location;
- Driver's workplace;
- Safety and emergency procedures;
- Charging;
- Test drive.

**14. Warranty, spare parts, reporting issues (online): 1 day, 1800 USD**

- Overview of Solaris solutions of online systems for warranty claims, spare parts ordering and reporting issues.

The above prices are based on traveling out to location. If multiple classes of each topic are put together, there will be some savings – total price will be lower than individual prices added together.

Trainings prices include training materials (presentations, documentation).

Trainings scope can be adjusted according to King County Metro needs.

Additional trainings can be offered upon request.

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## **Appendix D**

### **Solaris 40ft Technical Sheet**



# CONFIDENTIAL



## Solaris CPQ Configurator

Contract name:	40ft Seattle BEB	Specification date created	11/6/2024 9:40
Country:	USA		
City:	Seattle		
Client:	Seattle		
Delivery Year:			
Vehicle type:	NAe40		
Quantity:			
Specification status:	Primary specification		
Revision	3	Specification revision date created:	12/5/2024
Technical Bidding Manager			
Commercial Bidding Manager		Product ID:	FJ

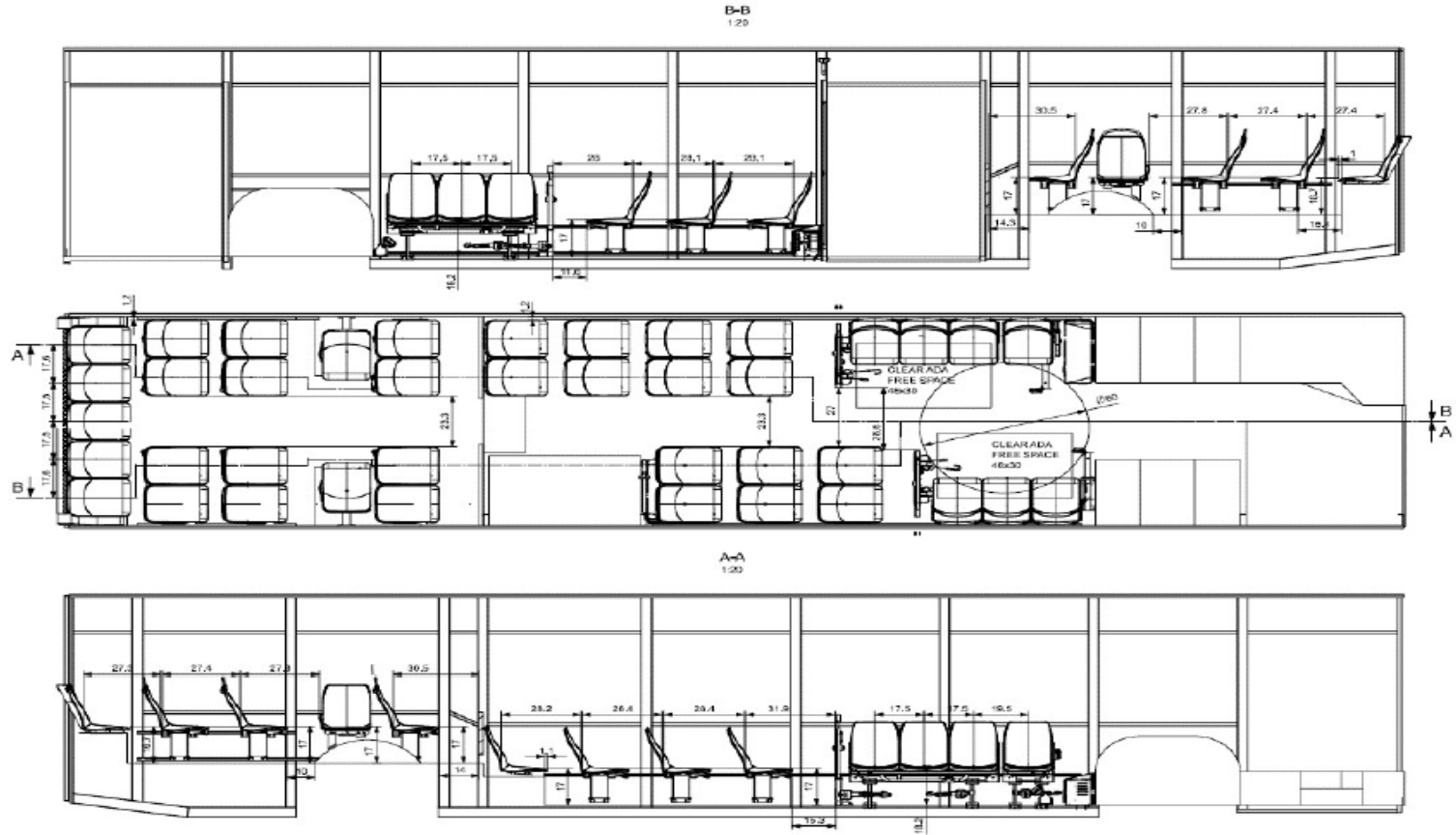
ID	Option	Value	KSW Producer	Processing
<b>01 Basic information</b>				
01.02	Number of passengers			
01.02.001.001	Number of passengers	40 seated, 19 standee		
01.04	Vehicle's size			
01.04.001.001	Length (with bumpers)	41.9 ft		
01.04.002.001	Width (without side mirrors)	102 in.		
01.04.003.N00	Height	135 in.		
01.04.004.001	Angle of attack	8,6°		
01.04.005.001	Departure angle	8,6°		
01.05	Smart city systems			
01.05.001	Telematics			
01.05.001.001	OnePlatform telematics system	Yes		
<b>02 Running gear</b>				

<b>02.01</b>	<b>Front axle</b>			
02.01.001.018	Front axle manufacturer and type	ZF RL 82 A (beam axle) with a stabilizer		
<b>02.02</b>	<b>Drive axle</b>			
02.02.001.N00	Drive axle manufacturer and type	ZF A133 with stabilizer		
02.02.002.N00	Ratio	6.13		
<b>02.08</b>	<b>Suspension levelling system</b>			
02.08.001.N00	Suspension levelling system	ECAS with front axle kneeling function and level adjustment		
02.08.002.N00	Entrance height of doors	13.19 in		
02.08.003.N00	Lifting the vehicle	15.5 in		
02.08.006.N00	Kneeling	10.25 in		
<b>02.09</b>	<b>Pneumatic system</b>			
02.10.020.N00	Air compressor	Knorr Bremse 600V		
<b>02.10</b>	<b>Brakes</b>			
02.10.001.001	Brakes	EBS - ABS + ASR (ATC)	Wabco ZF	
<b>02.11</b>	<b>Wheels</b>			
02.11.001.N00	Wheels (all axes)	305/70 22,5"		
02.11.005.002	Wheel rims	Steel Aluminium (option)		
02.11.005.003	Tires	Michelin		
<b>03 Drivetrain</b>				
<b>03.01</b>	<b>Engine Battery Charging System</b>			
03.01.015.N00	Drive unit manufacturer	MEDCOM Mitsubishi BAE Systems (option)		
03.01.017.N00	Traction motor	TSA HD.T3+ GPM-12 (option)		
03.01.018.017	Energy storage system	Solaris LFP HE (528 kWh)		
03.01.029.N00	PLUG-IN charging	CCS1 HPC 250A		
31.01.043.002	Number of charging sockets	2 pcs.		
03.01.030.002	Charging receptacle location	Rear of the bus - curb side		
03.01.045.N00	Charging receptacle location	Rear of the bus - road side		
03.01.032.009	Pantograph charging	Charging rails		
<b>03.06</b>	<b>Anti - fire protection</b>			
03.06.001.N00	Anti - fire protection	Fire extinguishing system in propulsion compartment	Amerex	
<b>04 Electrical system</b>				
<b>04.01</b>	<b>Speed</b>			
04.01.002.004	Speed, Vmax. [mph]	65		
<b>04.02</b>	<b>Batteries</b>			
04.02.001.N01	24V batteries	4x Odyssey Extreme AGM ODX-AGM31		
<b>04.03</b>	<b>External lighting</b>			
04.03.001.002	Technology	LED		
<b>04.07</b>	<b>Telematics system</b>			
04.07.001	Bus telematics	INIT		
<b>04.07.001</b>	<b>Destination displays</b>			
04.07.002.010	Destination displays, manufacturer	HANOVER		
04.07.004.002	Front display	PN G4.086C.I24.000		

04.07.005.002	Right side display	PN G4.004A.124.000		
04.07.011.002	Rear display, type	PN G4.142A.124.000		
04.07.016.006	Interior STOP request display	Yes		
<b>04.08</b>	<b>Microphones</b>			
04.08.001.002	Microphone for the driver	Yes		
<b>04.09</b>	<b>Loudspeakers</b>			
04.09.006.003	Loudspeakers quantity in pcs.	6		
04.09.013.N00	External loudspeaker	1pc above the first door; 1pc in front of the second door		
<b>04.10</b>	<b>Electric sockets</b>			
04.10.001.003	Batteries charging socket	Anderson SB350		
<b>04.11</b>	<b>Ticketing</b>			
04.11.003.001	Farebox	Provision for farebox		
<b>04.12</b>	<b>STOP signalling</b>			
04.12.001.001	"STOP" request	Buttons or pull cords		
<b>05 Exterior</b>				
<b>05.01</b>	<b>Rear wall</b>			
05.01.011.N01	Rear bumper	Romeo Rim		
<b>05.02</b>	<b>Front wall</b>			
05.02.015.001	Front bumper	Romeo Rim + provision for bike rack		
<b>05.04</b>	<b>Windscreen</b>			
05.04.001.001	Type of the windscreen	One - piece		
<b>05.06</b>	<b>Door - type and arrangement</b>			
05.07.001.002	Manufacturer	VENTURA		
05.07.001.002	Manufacturer	VAPOR (option)		
<b>05.07</b>	<b>DOOR I</b>			
05.07.002.001	Type	IST (inward glider)		
<b>05.08</b>	<b>DOOR II</b>			
05.08.002.001	Type	IST (inward glider)		
<b>05.11</b>	<b>External mirrors</b>			
05.11.001.N00	Type of external mirrors	Electrically controlled		
<b>05.12</b>	<b>Rearview mirrors</b>			
05.12.009.N00	Rear-view mirror	Manually controlled		
<b>06 Interior arrangement</b>				
<b>06.01</b>	<b>Access ramp for disabled person</b>			
06.01.011.002	Wheelchair ramp type at front door	Electric flip-out (ADA approved) Lift-U LU11		
<b>06.05</b>	<b>Roof hatches</b>			
06.05.001.N00	Emergency roof hatch	In the back part of the roof (1 piece)		
<b>07 Driver's cabin</b>				
<b>07.01</b>	<b>Driver's dashboard</b>			
07.01.001.N00	Driver dashboard screen	MVP Continental		
07.01.002.N00	Steering wheel adjustment	Yes		
<b>07.02</b>	<b>Driver's seat</b>			
07.02.001.007	Manufacturer and type of driver's seat	USSC Q91		
07.02.001.007	Manufacturer and type of driver's seat	Recaro Ergo 384 (option)		

<b>08 Passenger seats, railings and grab handles</b>				
<b>08.01</b>	<b>Passenger seats</b>			
08.01.001.002	Passenger seats	USSC Gemini		
08.01.001.002	Passenger seats	American Seating (option)		
08.01.007.021	Number of seats/layout number	41 (40 +1 driver)		
<b>09.02</b>	<b>Air-conditioning - passengers compartment</b>			
09.02.001.N00	Air-conditioning - passengers compartment	Thermoking rooftop unit		
<b>09.04</b>	<b>Auxiliary heating system</b>			
09.04.001.004	Heating source	Electric heater		
<b>10 Tools and accessories</b>				
<b>10.01</b>	<b>Tools and accessories</b>			
10.01.001.N00	First aid kit box	Yes		
10.01.003.001	Fire extinguisher	1 pc.		
10.01.006.002	Towing adapter	Yes		
<b>11 Paint</b>				
<b>11.01</b>	<b>Paint</b>			
11.01.001.002	Colour RAL	To be confirmed during design review		

# CONFIDENTIAL



# CONFIDENTIAL



## **Appendix E**

### **Solaris 60ft Technical Sheet**

# CONFIDENTIAL



## Solaris CPQ Configurator

Contract name:	60ft Seattle BEB	Specification date created:	11/6/2024 9:40
Country:	USA		
City:	Seattle		
Client:	Seattle		
Delivery Year:			
Vehicle type:	NAe60		
Quantity:			
Specification status:	Primary specification		
Revision	3	Specification revision date created:	12/5/2024
Technical Bidding Manager			
Commercial Bidding Manager		Product ID:	FJ

ID	Option	Value	KSW Producer	Processing
<b>01 Basic information</b>				
01.02	Number of passengers			
01.02.001.001	Number of passengers	up to 61 seated, up to 62 standee		
01.04	Vehicle's size			
01.04.001.001	Length (with bumpers)	max 62 ft		
01.04.002.001	Width (without side mirrors)	102 in.		
01.04.003.N00	Height	135 in.		
01.04.004.001	Angle angle	8,6°		
01.04.005.001	Departure angle	8,6°		
01.05	Smart city systems			
01.05.001	Telematics			
01.05.001.001	OnePlatform telematics system	Yes		
<b>02 Running gear</b>				
02.01	Front axle			
02.01.001.018	Front axle manufacturer and type	ZF RL 82 A (beam axle) with a stabilizer		
02.02	Central axle			
02.01.001.019	Central axle manufacturer and type	ZF AV133		
02.03	Drive axle			
02.02.001.N00	Drive axle manufacturer and type	ZF A133 with stabilizer		
02.02.002.N00	Ratio	6.13		
02.08	Suspension levelling system			
02.08.001.N00	Suspension levelling system	ECAS with front axle kneeling function and level adjustment		
02.08.002.N00	Entrance height of doors	13.19 in		
02.08.003.N00	Lifting the vehicle	15.5 in		
02.08.006.N00	Kneeling	10.25 in		
02.09	Pneumatic system			
02.10.020.N00	Air compressor	Knorr Bremse 600V		
02.10	Brakes			
02.10.001.001	Brakes	EBS - ABS + ASR (ATC)	Wabco ZF	
02.11	Wheels			
02.11.001.N00	Wheels (all axes)	305/70 22,5"		
02.11.005.002	Wheel rims	Steel Aluminium (option)		
02.11.005.003	Tires	Michelin		
<b>03 Drivetrain</b>				
03.01	Engine Battery Charging System			
03.01.015.N00	Drive unit manufacturer	MEDCOM Mitsubishi		
03.01.015.N00	Drive unit manufacturer	BAE Systems (option)		
03.01.017.N00	Traction motor drive axle	TSA HD.T3 GPM-12 (option)		
03.01.017.N01	Traction motor central axle	TSA HD.T3 GPM-12 (option)		
03.01.018.017	Energy storage system	Solaris LFP HE (528 kWh)		
03.01.018.017	Energy storage system	Solaris LFP HE (704 kWh) - option		
03.01.029.N00	PLUG-IN charging	CCS1 HPC 250A		
31.01.043.002	Number of charging sockets	2 pcs.		



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03.01.030.002	Charging receptacle location	Rear of the bus - curb side	
03.01.045.N00	Charging receptacle location	Rear of the bus - road side	
03.01.032.009	Pantograph charging	Charging rails	
03.06	Anti - fire protection		
03.06.001.N00	Anti - fire protection	Fire extinguishing system in propulsion compartment	Amerex
<b>04 Electrical system</b>			
04.01	Speed		
04.01.002.004	Speed, Vmax. (mph)	65	
04.02	Batteries		
04.02.001.N01	24V batteries	4x Odyssey Extreme AGM ODX-AGM31	
04.03	External lighting		
04.03.001.002	Technology	LED	
04.07	Telematics system		
04.07.001	Bus telematics	INIT	
04.07.001	Destination displays		
04.07.002.010	Destination displays, manufacturer	HANOVER	
04.07.004.002	Front display	PN G4.086C.124.000	
04.07.005.002	Right side display	PN G4.004A.124.000	
04.07.011.002	Rear display, type	PN G4.142A.124.000	
04.07.016.006	Interior STOP request display	Yes	
04.08	Microphones		
04.08.001.002	Microphone for the driver	Yes	
04.09	Loudspeakers		
04.09.006.003	Loudspeakers quantity in pcs.	6	
04.09.013.N00	External loudspeaker	1pc above the first door, 1pc in front of the second door	
04.10	Electric sockets		
04.10.001.003	Batteries charging socket	Anderson SB350	
04.11	Ticketing		
04.11.003.001	Farebox	Provision for farebox	
04.12	STOP signalling		
04.12.001.001	"STOP" request	Buttons or pull cords	
<b>05 Exterior</b>			
05.01	Rear wall		
05.01.011.N01	Rear bumper	Romeo Rim	
05.02	Front wall		
05.02.015.001	Front bumper	Romeo Rim + provision for bike rack	
05.04	Windscreen		
05.04.001.001	Type of the windscreen	One - piece	
05.06	Door - type and arrangement		
05.07.001.002	Manufacturer	VENTURA	
05.07.001.002	Manufacturer	VAPOR (option)	
05.07	DOOR I		
05.07.002.001	Type	IST (inward glider)	
05.08	DOOR II		
05.08.002.001	Type	IST (inward glider)	
05.09	DOOR III		
05.09.002.001	Type	IST (inward glider)	
05.11	External mirrors		
05.11.001.N00	Type of external mirrors	Electrically controlled	
05.12	Rearview mirrors		
05.12.009.N00	Rear-view mirror	Manually controlled	
<b>06 Interior arrangement</b>			
06.01	Access ramp for disabled person		
06.01.011.002	Wheelchair ramp type at front door	Electric flip-out (ADA approved) Lift-U LU11	
06.05	Roof hatches		
06.05.001.N00	Emergency roof hatch	In the back part of the roof (1 piece)	
<b>07 Driver's cabin</b>			
07.01	Driver's dashboard		
07.01.001.N00	Driver dashboard screen	MVP Continental	
07.01.002.N00	Steering wheel adjustment	Yes	
07.02	Driver's seat		
07.02.001.007	Manufacturer and type of driver's seat	USSC Q91	
07.02.001.007	Manufacturer and type of driver's seat	Recaro Ergo 384 (option)	
<b>08 Passenger seats, railings and grab handles</b>			
08.01	Passenger seats		
08.01.001.002	Passenger seats	USSC Gemini	
08.01.001.002	Passenger seats	American Seating (option)	
08.01.007.021	Number of seats/layout number	Up to 61	
08.02	Air-conditioning - passengers compartment		
08.02.001.N00	Air-conditioning - passengers compartment	Thermoking rooftop unit	
08.04	Auxiliary heating system		
08.04.001.004	Heating source	Electric heater	
<b>09 Articulation</b>			
09.04.001.004			
<b>10 Tools and accessories</b>			

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<b>10.01</b>	<b>Tools and accessories</b>			
10.01.001.N00	First aid kit box	Yes		
10.01.003.001	Fire extinguisher	1 pc.		
10.01.006.002	Towing adapter	Yes		
<b>11 Paint</b>				
<b>11.01</b>	<b>Paint</b>			
11.01.001.002	Colour RAL	To be confirmed during design review		

## **Appendix B**

Calculation of Charges for Contract No. SFMTA-2025-23-LOC

**Schedule 1 – Schedule of Prices**

The City is exempt from federal excise taxes. State, local sales, and use taxes are not to be included in these prices.

<b>No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Unit Price</b>	<b>Total Price</b>
1a	3	40-ft Low Floor Battery Electric Transit Buses	\$1,406,196	\$4,218,588
1b	3	60-ft Low Floor Battery Electric Transit Buses	\$1,858,706	\$5,576,118
2	1	Spare Parts Allowance (To be determined)	N/A	\$30,000
3	1	Training	N/A	\$50,000
4	1	Operating, Maintenance and Parts Manuals	Included	Included
5	1	Special Tools (from Schedule 1B)	N/A	\$30,000
6	1	ViriCiti Telematics License for 5 years.	Included	Included
7	1	Allowance for regulatory mandated changes, requested passenger enhancements and system modifications resulting from changes to project interface	N/A	\$60,000
<b>Grand Total</b>				<b>\$9,964,706</b>

## **Schedule 1A – Spare Parts List**

Recommended Spare Parts List (provided by Contractor) to be determined after the final configuration of the vehicles.

## **Schedule 1B – Special Tools List**

Recommended Special Tools List (provided by Contractor) to be determined after the final configuration of the vehicles.

**Appendix C [RESERVED]**  
**Regulatory and Compliance Requirements**

**Appendix D [RESERVED]**  
HIPAA Business Associate Agreement



**Appendix E [RESERVED]**

Form P-12U-C and 12-UI

**Appendix F [RESERVED]**

Grant Terms: FTA Requirements for Procurement Contracts

**Appendix G**  
SFMTA's Technical Specifications

**CITY AND COUNTY OF SAN FRANCISCO  
SAN FRANCISCO MUNICIPAL TRANSPORTATION AGENCY**

**TECHNICAL SPECIFICATIONS**

**FOR**

**THE PROCUREMENT OF  
40-FOOT AND 60-FOOT, LOW FLOOR,  
BATTERY ELECTRIC BUSES**

**CONTRACT NO. SFMTA-2025-23-LOC**

**August 5, 2025**

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## 1 OVERALL REQUIREMENTS

### 1.1 SCOPE

These specifications detail the technical requirements for the construction of new heavy-duty 40-foot and 60-foot, Low Floor Battery Electric Buses for the San Francisco Municipal Transportation Agency (SFMTA). The new Coaches are intended to provide superior performance in the unique San Francisco operating environment with improved reliability and reduced emissions compared to existing SFMTA equipment. These Coaches are intended for the widest possible spectrum of passengers, including children, adults, seniors, and the ADA community.

The Coach shall be designed to operate in transit service for at least 12 years or 500,000 miles, and shall deliver an average of 160 miles of range on a full charge on all SFMTA routes (see Section 6.1.1, Operating Range).

The Contractor shall be responsible for designing, fabricating, assembling, testing, and finishing transit Buses, which are in all respects compliant with the requirements of the Contract Documents. Included with these requirements are specified components, equipment, and systems often accompanied by the phrase “or approved equal.” Such components, equipment and systems, or deviations and substitution items specifically approved by the SFMTA shall be provided as part of the completed Coaches by the Contractor.

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 Agency shall identify subcomponent vendors that shall submit installation/application approval documents with the completion of a pilot or lead Bus.

The Contractor shall not make any substantive or material changes that would differentiate one Bus from another Bus. If the Contractor identifies a change during the manufacturing process that would materially improve the design, safety and/or performance of the Bus, this change must (a) be discussed with the Agency and (b) be considered as a retrofit (if possible) to any previous Bus(es) manufactured or assembled. Any such changes must be approved by the Agency in accordance with the communication requirements of this Contract.

#### 1.1.1 Background Information

The SFMTA has committed to operating a zero-emissions bus fleet by the year 2040 and has recently concluded its pilot program to test 40-ft battery electric buses from multiple OEMs. The SFMTA now plans to conduct a 60-ft battery electric bus pilot program and has used many of the findings of its 40-ft battery electric bus pilot program to inform these technical specifications.

San Francisco currently operates the largest fleet of zero emission electric trolley vehicles in North America, with 278 vehicles in revenue service. The SFMTA plans to transition all routes that are currently served by diesel hybrid buses to battery electric buses using the knowledge

obtained from their 40-ft and 60-ft pilot programs. The Buses obtained from this procurement will be compared to the SFMTA's current fleet of diesel hybrid and trolley buses on their environmental impact, quality of service, and performance characteristics.

### 1.1.2 Definitions

The following are definitions of special terms used in the Technical Specifications:

Ambient Temperature – The temperature of the surrounding air. Unless otherwise specified, ambient temperature shall be between 16°C (50°F) and 38°C (100°F).

Approach Angle – The angle is measured between a line tangent to the front tire static loaded radius and the initial point of structural interference forward of the front tire to the ground.

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

BMS (Battery Management System) – Monitors energy, as well as temperature, individual 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.

Break over Angle – 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 Coach can roll.

Bus – The term refers to the bus specified for procurement in this contract, unless otherwise specified.

Capacity (electrical energy storage device) – Two levels of capacity shall be defined: gross and useable. Gross Capacity shall be the capacity energy (kWh) of the entire battery pack and shall include usable, unusable, and/or reserve capacity energy. Useable Capacity shall be the capacity available for use by the operator in normal operation of the bus.

Charging Station – Location that houses the charging equipment that is connected to a utility's high voltage service, to provide electricity to a vehicle's battery system through a charging interface.

Curb Weight – Weight of Vehicle, including oil, and coolant, and all equipment required for operation and required by this specification, but without passengers or operator.

dBA – Decibels with reference to 002 microbar as measured on the "A" scale.

DC to DC Converter – A module that converts a source of direct current from one voltage level to another. In a battery electric bus, this typically converts high voltage from the drive train battery

system to 12/24VDC in lieu of a conventional engine driven alternator. May also be referred to as a “converter”.

Defect(s) – Patent or latent malfunctions or failure in manufacture or design of any component or subsystem.

Departure Angle – The angle measured between a line tangent to the rear tire static loaded radius and the initial point of structural interference rearward of the rear tire to the ground.

Electric Drive System – Traction motor, system controller, propulsion cooling system, and all related electronic and mechanical components.

Energy Density - The relationship between the mass of an energy storage device and its energy capacity in units of watt-hours per kilogram (W\*h/kg).

Energy Storage System (ESS) - A component or system of components that stores energy and for which its supply of energy is re-chargeable by an off-vehicle electric energy source.

EAM (Enterprise Asset Management) – SFMTA’s computerized maintenance system by Hexagon which is utilized for tracking Vehicle history including but not limited to labor, parts, warranty, vendor activity, in addition to inventory of parts and supplies.

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

Fire-Resistant - Materials that have a flame spread index less than 150 as measured in a radiant panel flame test per ASTM-E 162-75.

Free Floor Space - Floor area available to standees, excluding stepwells, area under seats, area occupied by feet of seated passengers, area outboard of the exit door standee line, and the vestibule area forward of the standee line. Floor area of 1.5 square feet shall be allocated to be occupied by the feet of each standee.

Gross Axle Weight Rating (GAWR) – 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 pounds for every designed passenger seating position, for the operator, and for each 1.5 square feet of free floor space.

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

Gross Vehicle Weight Rating (GVWR) - The maximum total weight, as determined by the Vehicle manufacturer, at which the Vehicle can be safely and reliably operated for its intended purpose. The GVWR shall be greater than or equal to GVW.

High Voltage – Electrical potential of 50 volts or greater (AC and DC).

Heating, Ventilation, and Air Conditioning (HVAC) – The on-board system which keep the bus properly heated, cooled, and ventilated.

Illustrated Parts Catalog (IPC) – Layout drawings containing essential parts and part numbers which make up an assembly. These documents include the original manufacturers' names, part numbers, part quality, part quantities, and sub-part and vendor information.

Intelligent Transportation Systems (ITS) – A secured cabinet that accommodates all onboard electronic equipment, including the mobile radio/AVL equipment and third-party auxiliary equipment.

J1708 & J1939 – SAE standards defining bi-directional, serial communication links among control modules containing microcomputers in heavy-duty Vehicle applications.

Low Floor - Bus configuration primarily identified by the lack of steps at the front and rear doors.

Low Voltage – Under 50 volts (AC and DC).

Major Component - A complete system that is an essential part of the vehicle. Major Components include, but are not limited to, the Vehicle chassis, destination signs, customer information system, automatic passenger counter, Propulsion System, Telematics, Onboard Charging System(s), suspension, power steering system, braking system, axles, computer-aided dispatch and voice annunciation system, door system, wheelchair ramp, fire suppression system, HVAC system, fare collection system, and video surveillance system.

Mean Distance Between Failures (MDBF): Average distance between any incident, malfunction, intermittent condition, or failure of equipment or hardware which causes a delay in revenue service or under normal operating conditions would cause passengers to be transferred to another Vehicle.

Overhead Charging – A charging system that includes overhead rails located on the forward roof area of the Vehicle and is compatible with an inverted overhead pantograph charging system compliant with the SAE J3105 standard for overhead charging.

Propulsion Control System (PCS) - The PCS regulates the amount of energy, (DC power in the case of batteries and capacitors), that is transferred (or converted to AC power by the inverter in AC motors) for acceleration. It also ensures that voltage is maintained within the specifications required for operating the motor(s). An electronic controller can also recover electrical energy by switching the motor(s) to a generator to capture the Vehicle's kinetic energy through regenerative braking. The controller also ensures that the regenerative current does not overcharge the energy storage system and that regenerative energy is otherwise safely dissipated when not captured.

Propulsion System - System that provides propulsion for the Vehicle in an amount proportional to what the driver commands. Includes the ESS and system controllers, including all wiring and any converter or inverter.

Regenerative Braking - Deceleration of the Bus caused by operating an electric motor-generator system. This act returns energy to the Vehicle propulsion system and provides charge to the Energy Storage System.

Related Defect(s) – Damages inflicted on any component or subsystem as a direct result of a Defect.

Seated Load – Bus loading of 150 pounds for every designed passenger seating position and for the operator.

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

Smart Charging – The practice of managing charging for electric vehicles via standardized data connections between vehicle and charger. Smart charging may be used to reduce peak charging loads or limit the wear on the energy storage system of the vehicle due to charging.

Standee Line - A line designating an area outward of which a passenger may not stand while the Bus is moving. The front standee line refers to the line marked across the Coach aisle in line with the front curbside modesty panel. The rear standee line refers to the line marked adjacent to the exit door.

State of charge (SOC) - Quantity of electric energy remaining in a battery relative to the maximum rated capacity of the battery expressed in percent. This is a dynamic measurement used for the energy storage system. 100% SOC indicates that the energy storage system cannot accept further charging from external sources. An absolute SOC is based on the total battery capacity at the beginning of a battery's life. A relative SOC is based on the total degraded capacity at the time of measurement.

Structure – The basic bus body, including floor deck material and installation, load-bearing external panels, structural components, axle mounting provisions, suspension beams, attachment points, and any other significant load-bearing component.

Telematics – Vehicle data monitoring system for electric vehicles. Provides tools for energy management, vehicle battery statistics, automated reports, real time vehicle position, data management, diagnostics, and automated fault reporting. Integrates with APC, CAD/AVL, and fixed route scheduling system.

Warrantable End of Life (WEOL) – WEOL is a measure of battery degradation determined as the point at which the batteries can no longer provide the energy or power required to meet the design operating profile. It is expressed as a percentage of remaining battery capacity as compared to 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. This measure shall be a percentage of remaining useful capacity based on degradation from the beginning capacity (i.e., kWh) and is used in the overall calculation of available range. WEOL shall be used as a condition for the battery's state of health and replacement and to potentially initiate warranty claims.

Wheelchair - Mobility aid belonging to any class of three or four-wheel devices, usable indoors, designed for and used by individuals with mobility impairments, whether operated manually or powered. A "common wheelchair" is such a device, which does not exceed 30 inches in width and 48 inches in length measured two inches above the ground and does not weigh more than 600 pounds when occupied.

Working Day - All 24-hour periods beginning and ending at midnight, Monday through Friday inclusive.

### 1.1.3 Acronyms

The following is a list of acronyms used in the Technical Specifications:

<u>A/C</u>	Air Conditioning
<u>ABS</u>	Anti-Lock Braking System
<u>AC</u>	Alternating Current
<u>ADA</u>	Americans with Disabilities Act
<u>Ah</u>	Amp hour
<u>ANSI</u>	American National Standards Institute
<u>APC</u>	Automatic Passenger Counter
<u>API</u>	Application Programming Interface
<u>APTA</u>	American Public Transportation Association
<u>ASHRAE</u>	American Society of Heating, Refrigerating, and Air Conditioning Engineers
<u>ASTM</u>	American Society for Testing and Materials
<u>AVL</u>	Automatic Vehicle Location
<u>AWS</u>	American Welding Society
<u>BMS</u>	Battery Management System
<u>CAD</u>	Computer-Aided Dispatch
<u>CCR</u>	California Code of Regulations
<u>CCTV</u>	Closed-Circuit Television
<u>CFR</u>	Code of Federal Regulations
<u>dB</u>	Decibel

<u>DC</u>	Direct Current
<u>DDU</u>	Driver Display Unit
<u>DR</u>	Diagnostic Reader
<u>DTE</u>	Diagnostic Test Equipment
<u>DVAS</u>	Digital Voice Annunciation System
<u>DVD</u>	Digital Versatile Disc
<u>EMC</u>	Electromagnetic Compatibility
<u>EMF</u>	Electromagnetic Force
<u>EMI</u>	Electromagnetic Interference
<u>EPA</u>	Environmental Protection Agency
<u>EPU</u>	Emergency Propulsion Unit
<u>ESS</u>	Energy Storage System
<u>FCC</u>	Federal Communications Commission
<u>FEA</u>	Finite Element Analysis
<u>FEMA</u>	Failure Mode Effects Analysis
<u>FSRP</u>	Field Service Repair Procedure
<u>FMCSR</u>	Federal Motor Carrier Safety Regulations
<u>FMVSS</u>	Federal Motor Vehicle Safety Standards
<u>FTA</u>	Federal Transit Administration
<u>GAWR</u>	Gross Axle Weight Rated
<u>GPS</u>	Global Positioning System
<u>GVW</u>	Gross Vehicle Weight
<u>GVWR</u>	Gross Vehicle Weight Rating
<u>HVAC</u>	Heating, Ventilation and Air Conditioning
<u>IEEE</u>	Institute of Electrical and Electronics Engineers
<u>IPC</u>	Illustrated Parts Catalog
<u>IP</u>	Internet Protocol
<u>ISO</u>	International Organization for Standardization
<u>JIC</u>	Joint Industrial Council
<u>kWh</u>	Kilowatt-Hours
<u>LED</u>	Light Emitting Diode
<u>MIL-STD</u>	Military Standard



<u>NEC</u>	National Electrical Code
<u>NFPA</u>	National Fire Protection Association
<u>NHTSA</u>	National Highway Traffic Safety Administration
<u>NTSC</u>	National Television System Committee
<u>OCU</u>	Operator Control Unit
<u>OEM</u>	Original Equipment Manufacturer
<u>PA</u>	Public Address
<u>PCB</u>	Printed Circuit Board
<u>PLC</u>	Programmable Logic Controller
<u>PPU</u>	Primary Propulsion Unit
<u>psi</u>	Pounds per Square Inch
<u>RFI</u>	Radio Frequency Interference
<u>SAE</u>	Society of Automotive Engineers
<u>SPI</u>	Society of the Plastics Industry
<u>SDTS</u>	Self Diagnostic Testing Software
<u>SLW</u>	Seated Load Weight
<u>UL</u>	Underwriters Laboratories
<u>USDOT</u>	United States Department of Transportation
<u>VDC</u>	Volts of Direct Current

#### **1.1.4 Legal Requirements**

- A. The Bus shall meet all applicable FMVSS in effect at the date of manufacture. The Bus and equipment must comply with all applicable federal, state, and local regulations. Local regulations are defined as those below the state level. In the event of any conflict between the requirements of these specifications and any applicable legal requirement, the legal requirement shall prevail.
- B. Manufacturer shall certify to SFMTA that the Bus complies with 49 U.S.C. § 5323l and FTA implementing regulations at 49 CFR Part 665 concerning Coach testing.
- C. Manufacturer shall test the prototype Bus at the Altoona, PA Testing Facility and shall provide copies of all testing reports. If the Bus design proposed by the manufacturer has already been tested successfully at the Altoona, PA Testing Facility, then re-test of the prototype will not be necessary, subject to the SFMTA’s approval of the test results.
- D. Manufacturer shall certify that the proposed Bus meets the specifications set forth in the ADA.

**1.2 DIMENSIONS**

With the exceptions of exterior mirrors, marker and signal lights, flexible portions of the bumpers, and fender skirts, the Bus shall have the following overall general dimensions:

**TABLE 1.2 – Bus Requirements**

	40' Bus	60' Bus
Length, excluding bumpers	41' +/- 2'	60' +/- 2'
Width, exterior, excluding mirrors	102" max	102" max
Overall height without roof-mounted HVAC system	134" max	134" max
Overall height with roof-mounted HVAC system, as applicable	140" max	140" max
Seating capacity	32 min	44 min
Overall passenger capacity	56 min	89 min
Seat width (one passenger)	18" min	18" min
Seat width (two passengers)	35" min	35" min
General aisle width	22" min	22" min
Headroom along center aisle, at front axle wheelhouse	79" min	79" min
Headroom along center aisle, at rear axle wheelhouse	73" min	73" min
Front door height from ground (normal)	15.3" max	15.3" max
Front door height from ground (kneeled)	13" max	13" max
Rear door height from ground (normal)	15.3" max	15.3" max
Approach angle, with/without over-raise feature	8.6 degrees min	10 degrees min
Break over angle with/without over-raise feature	8.9 degrees min	9 degrees min
Departure angle with/without over-raise feature	9 degrees min	10 degrees min
Turning radius (outside body corners)	46' max	45' max
Axle zone clearance	5" min	5" min

**1.2.1 Turning Radius**

The Bus shall meet the outside body turning radius requirements specified in Table 1.2 regardless of load to the GVWR.

On 60' buses, the articulated angle shall be no greater than 46 degrees. The swing-out of the outer rear corner of the trailer shall not exceed 29-1/2 inches.

**1.2.2 Underbody Clearance**

The Bus shall maintain the minimum clearance dimensions as shown in Table 1.2 and defined in SAE Standard J689, regardless of load, up to the GVWR. All components under the Bus, including traction motor shall be protected from impacts.

Ramp Clearances: Any encroachment into the approach or departure angle area shall encounter a structural member before any component. Contractor shall verify the approach and departure angles.

Ground Clearance: Ground clearance shall be no less than eight inches except within the axle zone and wheel area.

Axle Zone Clearance: Axle zone clearance (the axle zone is the projected area between tires and wheel on the same axial centerline) shall be no less than five inches.

**1.3 PROPULSION SYSTEM PERFORMANCE**

The Bus shall be road-tested and shall meet the following criteria with respect to GVWR. Acceleration times begin when the accelerator pedal is depressed; lag time between depression of the accelerator pedal and movement of the Bus shall not be noticeable. Minimum actual Bus speed and acceleration requirements can be found in Table 1.3.1. The SFMTA, at its sole discretion, may require Contractor to verify the performance of the Bus on any or all the grades listed.

**TABLE 1.3.1 – Performance Requirements**

Speed on Grade			Acceleration on Grade			
Grade	Speed Requirement 40-Foot	Speed Requirement 60-Foot	Grade	mph	Time (seconds) 40-Foot	Time (seconds) 60-Foot
0% Grade	60 mph (max)	60 mph (max)	0% Grade	0-10	5	7
2% Grade	55 mph	40 mph	0% Grade	0-20	10	10
5% Grade	25 mph	20 mph	0% Grade	0-40	26	35
10% Grade	15 mph	11 mph	2% Grade	0-15	8	9
16% Grade	10 mph	8 mph	5% Grade	0-18	10	12
18% Grade	7 mph	>0 mph	10% Grade	0-14	10	12
21% Grade	>0 mph	Not Applicable	16% Grade	0-10	12	12
23% Grade	Not Applicable	Not Applicable				

**Locations of Grades for Speed and Acceleration Tests:**

Interstate 280 at 25 <sup>th</sup> St	0% grade heading southbound toward San Jose.
Hwy. 101 at Beatty Ave	2% grade heading southbound toward San Jose.
California St & 28th Ave	5% grade heading westbound for three blocks.
Jackson St & Steiner St	10% grade heading westbound.
Castro St & 24th Ave	16% grade heading northbound.
Pine St from Kearny St to Grand Ave	18% grade heading westbound.
Mississippi St from 22nd St to 20th St	20% grade heading northbound.
DeHaro Street from Mariposa St. to 23rd St	21% grade heading southbound.
Noe St & 26th Ave	23% grade heading southbound.

**1.4 DUTY CYCLE**

The Bus shall be designed to be compatible with the terrain and environment found in the SFMTA’s service area. Also, the Bus shall be capable of running continuously at GVWR in the environmental conditions found in SFMTA’s service area. These conditions include high humidity, rain, and occasional temperature extremes.

Bus shall meet all propulsion and braking system performance requirements specified below in this section. Braking application and performance shall remain consistent regardless of ESS State of Charge (SOC) or other variances related to regenerative braking.

The system shall be programmable to allow optimization of acceleration and deceleration rate. Performance may be affected when reprogramming. The manufacturer shall supply new performance data to the SFMTA as appropriate when programming changes affect vehicle performance.

Manufacturer to provide a complete list of programmable acceleration and deceleration settings and list the changes to vehicle performance for each setting. Performance data shall include acceleration data as shown in Table 1.3.1 and an estimate of effect on energy consumption per mile on a standard drive cycle.

Contractor shall supply documentation confirming the Bus meets all relevant requirements of 49 CFR Part 571, Section 121, as well as Division 12, Chapter 3 of the California Vehicle Code.

Jerk, the rate of change of acceleration, shall be minimized throughout acceleration and deceleration and shall average no greater than 0.3 g/s over any half-second interval. This requirement shall be achieved regardless of operator actions.

The Bus shall be capable of continuous operation at freeway speeds with GVWR and an ambient temperature of 115°F without overheating or degradation of any operating component. It shall operate in stop-and-go downtown traffic with no adverse effects. The Bus shall also be able to safely and efficiently negotiate the hilly conditions found in San Francisco. The SFMTA's service area includes grades of up to 23 percent.

The Bus shall achieve normal operation in the environmental conditions of San Francisco with temperature ranges of 0°F to 115°F, at relative humidity between 5 percent and 100 percent, and at essentially sea level altitudes. Any exception to the above requirement must be approved by the SFMTA.

The 60-ft Bus shall be capable of traveling along the paths of the three routes listed in Section 6.1.1, Operating Range, for 60-ft BEBs with adequate clearance such that its chassis does not contact the road or sidewalk.

The 40-ft Bus shall be capable of traveling along the paths specified below with adequate clearance such that its chassis does not contact the road or sidewalk. The SFMTA, at its sole discretion, may require Contractor to verify the clearance of the Bus on any or all the locations listed below.

#### **Examples of Paths for 40-ft Bus Clearance Testing:**

- Sacramento Street – from Drumm St. to Van Ness.
- Clay Street – from Van Ness to Drumm St. 24 Divisadero Line – from 30th & Mission, heading west on 30th, turning right/north on Noe, turning left/west on 26th Street, then right/north on Castro/Divisadero – following that north to Geary Blvd. This route is repeated in the opposite direction.
- Operate around turn from Clayton onto Market and from Market onto Clayton (note: 40-ft only).
- DeHaro Street – from Mariposa St. to 23rd St (note: this is a 21% grade).
- 23rd Street – between Indiana and Pennsylvania in both directions (note: this provides severe grade changes to check the straight-on approach, break-over, and departure clearances).
- Mansell Street at San Bruno intersection; confirm the departure angle.
- Rhode Island at 26th Street – negotiate southbound turn onto 26th without contact between road surface and chassis (note: this determines front-left side chassis clearance through left hand turn).
- Golden Gate bridge toll plaza
- Southbound Crossover to WB Lincoln Way (curb lane to curb side bus stop right turn) or 3rd St NB to 20th (EB).

- U-turn loops on Fillmore and Marina-22-line, 14th/Quinatar-6-line.
- F-line ROW on Embarcadero from Battery to Mission (note: test of vehicle body).
- VA Hospital at Fort Miley to verify height clearance of 10' 10".

**1.5 AUDIBLE NOISE LEVEL CONTROL**

Instrumentation and other requirements shall conform to SAE Standard J366, except that the two-dBA tolerance is not allowed. The contractor shall develop a test plan for validating the noise levels based on the following criteria. This plan shall be presented to the SFMTA for review and approval. The tests shall be configured to be conducted with the Bus unloaded.

**1.5.1 Interior Noise**

The Contractor shall use testing procedures in accordance with the Altoona interior noise test to: a) measure the noise level when the Bus is stationary with 80 dBA white noise on the left side exterior of the Bus; b) measure the noise level when the Bus is accelerating at full throttle from 0-35 mph; and c) observe vibrations/rattles with the Bus operating at various speeds from 0-55 mph.

**TABLE 1.5.1**

<b>OPERATING MODE</b>	Maximum Allowable at Any Seat Location in Passenger Area	Maximum Allowable at Operator Seat
Stationary w/80dBA	65 dBA	75 dBA
(0-35 mph)	80 dBA	75 dBA with AC OFF 78 dBA with AC ON
Vibration/Rattles	none	none

**1.5.2 Exterior Noise**

The Contractor shall use exterior noise testing procedures in accordance with the Altoona noise test to measure the exterior noise levels when a Bus is operating at all three conditions.

**TABLE 1.5.2**

<b>OPERATING MODE (Curb Side)</b>	<b>MAXIMUM ALLOWABLE</b>
Pull-away test at full throttle	83 dBA
Curb idle test w/AC ON	65 dBA
Full throttle from 35 mph	80 dBA

## 1.6 ELECTRONIC NOISE CONTROL

Electrical and electronic subsystems and components on the Bus shall not emit electromagnetic radiation that will interfere with on-board equipment, fare collection, telephone, radio, TV reception or be susceptible to R.F.I./E.M.I., and shall not be affected by external sources of R.F.I./E.M.I. (Reference Section 7.12, Electrical and Electronic Noise).

## 1.7 COMPONENT PROTECTION AND OVER-RIDE

All major components of the propulsion system shall be monitored for proper operation and shall be provided with automatic shut-down features that will protect the components from damage in the event of conditions such as over-speed, over-temperature, overload, or short circuit. Such shutdown features shall be tied to warning lights and alarms in the driver's area, and to fault codes logged in the diagnostic system.

The control system shall be designed so that components that are mechanically connected to the rear wheels shall be prevented from over-speeding. This shall be accomplished automatically, without operator intervention, through a speed limiting control system. As an example, accelerator application shall be progressively reduced and/or regenerative braking shall be progressively applied to prevent the drive motor system from over-speeding.

## 1.8 SHOCK HAZARDS

Casual contact with components that have a sufficient voltage potential (EMF) to cause bodily injury shall not be possible. No passenger, driver, or passerby shall be able to contact such equipment.

Electrical systems and equipment shall conform to the applicable SAE standards and/or recommended practices for electric vehicles. The electrical system shall also conform to SAE standards for wiring and connectors.

There should be no high voltage areas within the passenger compartment. For maintenance purposes, all devices that contain high-voltage circuits (maximum circuit operating voltages greater than 50V) shall be contained within protective enclosures or enclosed Coach body compartments that are either non-conductive or have been coated with SFMTA approved non-conductive insulation.

All access covers for such enclosures and compartments shall be labeled with a warning and the voltage, for example "**DANGER-> 600 VOLTS"DC**". All high voltage wiring and equipment shall be shielded by access covers, requiring the removal of at least one bolt, screw, or latch. It shall not be possible to contact high voltage devices with the access covers closed.

Appropriate warning signs and labels shall be used to alert maintenance personnel and/or emergency crews to the presence of high voltage batteries and cabling within the Coach. All

visible high voltage equipment or conductors shall be identified with a “HIGH VOLTAGE” marking. The Bus should be clearly marked “ELECTRIC VEHICLE” on the exterior.

Energy storage box enclosures shall be properly grounded and considered part of the chassis ground. Ground fault protection circuits shall be provided to ensure insulation integrity between the high voltage circuit components and the Coach chassis. Circuit breakers and/or fuses (or approved equal) shall be provided to effect electrical isolation of components and systems (including the energy storage unit) in the case of a short circuit and/or excessive current draw. In the case of battery isolation, the disconnecting contactors shall be located as close as possible to the positive and negative output of the energy storage unit. A means for informing the operator of the loss of high voltage ground isolation shall be provided by proper annunciation on the dashboard with visual and audible signals in a phased warning and shutdown.

High voltage cables and wires shall be installed in the dedicated harnesses, wire conduits, or raceways. High voltage wires and harnesses shall be permanently identified with the use of orange color per SAE specifications.

Low voltage systems should be independent of high voltage systems, so that emergency lighting, cameras, and all other accessories remain operable in the event of a high voltage system failure.

The Contractor shall provide specific safety precautions and procedures in the service manuals to enable maintenance personnel to safely access doors and covers on inverters, converters and other energy storing devices. Doors and covers shall utilize square “door key” latches allowing for commonality among other doors on the Bus.

The energy storage system enclosure, inverter(s), converter(s), main switch group, Propulsion Control System (PCS) and traction motor terminal covers shall all be labeled with “HIGH VOLTAGE WARNING” labels.

The energy storage system, inverter(s), converter(s), main switch group, PCS, traction motor and propulsion system generator shall be enclosed or covered to prevent casual contact. The energy storage unit shall be stored in a sealed container(s).

If the traction battery storage box cover is removable, the traction (energy storage) batteries will remain a live power source if the cover is removed. The distance between main terminals shall be beyond the mechanics reach to minimize potential problems. Energy storage modules shall be properly secured to withstand road vibrations and designed to ensure that their terminals do not contact any part of the Bus body or storage box and are not ejected, or leak, even under severe crash conditions.

The storage box must be sealed to the extent practical while being well ventilated and kept within acceptable operating temperatures by a thermal management system. If the low voltage battery is removed from the Bus, all high voltage should be isolated within the battery boxes, regardless of the position of the master switch.



## 1.9 MASTER DISCONNECT

The Bus shall be equipped with a master disconnect switch that interrupts all high voltage power. If the master disconnect switch is in the "Off" position, there will be no high voltages originating from the ESS. The master disconnect switch shall be capable of being locked in the "OFF" position. The purpose and function of the switch shall be clearly and permanently marked to be easily understood by an individual unfamiliar with electric Vehicles. The switch shall be readily accessible to maintenance and emergency service personnel but shall not be in areas that can be readily accessed by passengers. The design of this switch shall provide for hand operation and include physical lock-out/tag-out features for maintenance.

## 1.10 ELECTRO-MAGNETIC INTERFERENCE (EMI)

EMI requirements evaluation shall be performed to identify the following criteria:

1. Acceptable levels of radiated emissions from the Coach both in low frequency (30Hz-30kHz) and RF frequency (30kHz-100MHz) ranges shall be identified. A report shall be submitted to SFMTA utilizing the guidelines of CISPR12 and ICES-002, or equivalent (such as MIL-STD-461 and/or SAE-J551) that identifies known properties of existing SFMTA-approved devices, such as: portable/mobile radios, PA systems, fare collection, multiplex and door control systems have been tested and approved.
2. RF susceptibility levels. Latest guidelines of MILSTD-461 and/or SAE-J551, as well as known properties of existing SFMTA devices, such as: radios, PA systems, fare collection, door control shall be included
3. Electromagnetic compatibility between the various electrical and electronic devices mounted on the electric Coach shall be ensured by utilizing established EMC containment techniques, such as proper shielding, grounding, filtering, signal wiring separation, switching frequency management.
4. Adequate EMI/EMC testing shall be conducted by analysis only on the individual components and on the finished Coach to prove that design goals for EMI/EMC are met.
5. A summary report shall be delivered to SFMTA covering items 1-4 with problem areas identified.

## 1.11 PROTOTYPE

The Contractor shall produce and deliver to the SFMTA a prototype Bus that is entirely representative of a production unit. The prototype shall undergo qualification testing to verify that the requirements of these specifications have been met. The format for qualification testing shall be determined by the SFMTA.

The SFMTA will fully accept the Bus only if all major performance criteria, including those outlined in Sections 1.3, 1.4, and 1.5, are met. Any Buses that fail these performance criteria will be allowed no more than 90 working days to rectify the failures or obtain a waiver for that requirement.

The SFMTA shall notify the Contractor in writing of the specific areas in which the prototype does not comply with the specification no later than 90 working days after the prototype has successfully completed its evaluation period.

Any failure by the SFMTA to detect any Defects or omissions in this review shall in no way relieve the Contractor from fully complying with the Contract.

The prototype Bus shall be brought up to the final production Bus configuration as mutually agreed by the Contractor and the SFMTA.

### **1.12 ALTOONA TESTING**

Prior to Final Acceptance of the 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. A copy of the Altoona test shall be provided upon request. 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 all such failures will not occur shall be submitted to the SFMTA.

A manufacturer whose Bus is involved in a structural-related fleet failure in any transit property in the U.S. or Canada in the last ten years must have completed the detailed investigation of the failure and the detailed structural analysis of the complete Bus structure to rule out any effect on any part of the structure. All failures involving basic body, structure, axles, and suspension are included as structural related failures for purposes of this specification. If the apparent responsive manufacturer's Bus has been involved in a structurally related fleet failure, that manufacturer shall submit the report to the SFMTA project manager for review with the initial proposal.

The investigation of failure and structural analysis must be carried out by a reputable, independent Transit Industry Consultant and shall not only be limited to Finite Element Analysis (FEA) but be confirmed by actual track test with suitable time concentration, to prove ability of modified structure to perform for the specified 500,000 miles in the SFMTA's operating conditions. The report shall include all models and access to the software used to solve the model. Clear comparisons of the design, and improvements must be shown both in the report and the provided model. The SFMTA reserves the right to approve the consultant prior to work performance. The report submitted to the SFMTA must be detailed and must include proof of accuracy of the SFMTA's operating conditions.

### 1.13 MATERIALS

All materials used in construction of the Bus and all its parts shall conform in all respects to American Society of Testing Materials (ASTM), Society of Automotive Engineers (SAE), or industry recognized standards. Materials used shall be duplicated in manufacture, design, and construction on each Bus (reference Section 8.1 (Materials)).

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.

### 1.14 CORROSION RESISTANCE

The Bus shall resist corrosion from atmospheric conditions, road chemicals, salt and other commonly encountered corrosive substances, as well as from bus washing performed per SFMTA standards, for a period of either 12 years or 500,000 miles. An underbody coating shall be applied to the Bus unless the Bus underbody is not susceptible to corrosion; the SFMTA may grant a waiver to Contractor for this requirement. It shall maintain structural integrity and maintain nearly original appearance throughout its service life, provided it is maintained by the SFMTA in accordance with the procedures specified in the service manual (Reference Section 2.1.8, Resistance to Corrosion).

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.

#### 1.14.1 Electrolyte Spills

Battery boxes shall be designed to prevent all battery fluids from entering the passenger compartment during a crash involving the Bus.

### 1.15 WORKMANSHIP

The Bus shall be built in accordance with Contractor's vehicle production drawings. Workmanship shall conform in all respects to the best practice in the industry. Welding procedures, welding materials, and qualifications of welding operators shall be in accordance with the standards of the ASTM and the AWS.

All lines, cables, and hoses shall be properly routed, supported, and secured with adequate clearance to mitigate any potential rubbing, fouling, ruptures, shorts, or similar issues.

### **1.15.1 Cable/Lines/Hoses/Wire Securement**

All clamps shall always maintain a constant tension, expanding and contracting with the secured materials in response to temperature changes and aging of the material. Cables, lines, hoses, and wires shall not foul or rub. All cables, lines, hoses, and wires shall be secured at a minimum of 30-inch intervals unless otherwise approved by the SFMTA.

## **1.16 MAINTAINABILITY**

As a goal, relative accessibility of components, measured in time required to gain access, shall be inversely proportional to frequency of maintenance and repair of the components (Reference Section 11.5, MAINTAINABILITY).

### **1.16.1 Maintenance and Inspection**

Scheduled maintenance or inspection tasks as specified by the Contractor shall be within the prevailing industry practices and subject to SFMTA approval (Reference Section 11.5.4, Maintenance and Inspection).

### **1.16.2 Electronic Components**

Electrical subsystems shall consist of replaceable units so that each major component, apparatus panel, or wiring harness is easily repairable or replaceable with standard hand tools or by means of connectors (Reference Section 7.5 (Electrical Components)). Contractors shall provide general configuration layouts, arrangements, schematics (with or without dimensions), and, when applicable, specification sheets. Contractors shall provide electrical drawings, which shall include a master wiring schematic (complete bus electrical system), and individual sub-system schematics and wiring diagrams. The Contractor shall provide software information required by the SFMTA to perform maintenance.

The Bus shall have a self-diagnostic system for the purpose of self-testing and fault isolation such that a mechanic in the field should be able to isolate a failure to a single removable component.

Contractor shall supply a recommended list of and pricing for shop test equipment necessary for testing, troubleshooting, and calibrating individual electrical assemblies. Test equipment shall be able to isolate a failure to a component or component grouping. All test equipment will be accompanied by documentation to allow SFMTA personnel to operate and repair them. This should include but not be limited to schematics, operation manuals, and maintenance manuals.

### **1.16.3 Interchangeability**

Components with identical functions shall be fully interchangeable where possible. These components shall include, but are not limited to, passenger window hardware, interior trim, step

treads, lamps, lenses, and seat assemblies. Components with non-identical functions shall not be, or appear to be, interchangeable.

### **1.17 FIRE SAFETY**

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

Where practical, all materials used in the construction of the Passenger Compartment of the Bus shall be in accordance with Section 302 of the FMVSS. Materials entirely enclosed from the passenger compartment, such as insulation within the sidewalls, need not comply. In addition, smaller components, such as seat grab rails, switch knobs and small light lenses, shall be exempt from this requirement.

A fire-retardant barrier or coating between the energy storage unit and storage box and the Bus itself should be used to prevent, or at the very least delay, the spread of fire.

Battery container materials shall be non-reactive with the battery contents. The use of non-conductive storage boxes for the house batteries, or ones coated with non-conductive materials, is preferred.

Battery overheating or fire in the battery compartment shall actuate a visual and audible alarm at the operator's control panel. The specific type of alert shall be indicated to the operator. The alarm shall have a distinguishing audible level and configuration. The visual and audible alarm must be approved by the SFMTA.

A fire suppression system shall be provided inside the traction motor compartment to reduce the risk of the fire from spreading to other parts of the Vehicle (Reference Section 5.9, FIRE DETECTION / SUPPRESSION). The fire suppression system shall be a dry chemical suppression system or approved alternative. Fire detection systems shall be provided for the house battery compartment, all ESS battery packs, traction motor compartment, and for all other power conversion hardware and electronics on the vehicle.

### **1.18 NEW COMPONENTS**

All components not manufactured by the Contractor and required or selected by SFMTA that are not standard equipment on the Coach shall have the design, installation, and integration certified by the component/subcomponent manufacturer to ensure proper function of the component. Contractor shall assume primary responsibility for systems integration. The SFMTA requires that a representative from the component/subcomponent manufacturer certify the design and installation. Records of these certifications shall be provided to the SFMTA prior to delivery of the prototype Coach. Certifications shall clearly indicate that the installation and application of the component/subcomponent meets the installation and operational guidelines of

the manufacturer and has been approved by the manufacturer's representative. The component manufacturers shall, at minimum, certify the following Major Component installations:

- Steering and Hydraulic System
- Brakes and Air System
- Electric Drive System
- Propulsion Control System
- Energy Storage and Management System
- Destination Sign and Voice Annunciation System
- Heating and Ventilation System
- Fire Detection / Suppression System
- Video Surveillance System
- Vehicle Telematics System
- Cooling System
- Paint
- Axles
- Passenger Doors
- Suspensions
- Wheelchair Ramp
- Wheelchair Securement System
- Charging station(s) (if applicable)
- Bus Chassis

## 2 BODY

### 2.1 BODY STRUCTURE

The Bus shall have a clean, simple design, primarily derived from Bus performance requirements and passenger service criteria established in these specifications. The body and under-structure shall be built as an integral unit reinforced at points of stress and concentration.

The Bus shall navigate through all established SFMTA revenue bus infrastructure (including but not limited to charging areas, bus maintenance and storage areas, body shop areas, and tire shop areas) without coming into contact with any part of the facilities or its attachments or having any clearance issues.

Body materials shall be selected, and the body fabricated for easy replacement and repair, as well as to reduce maintenance, extend durability, and provide consistency of appearance throughout the service life of the Bus.

The passenger compartment shall be separated from the traction motor and energy storage systems by fireproof bulkheads. This bulkhead shall preclude or retard propagation of a traction motor or an energy storage system compartment fire into the passenger compartment and shall be in accordance with the Recommended Fire Safety Practices defined in the latest revision of FTA Docket 90A. Only necessary openings shall be allowed in the bulkhead, and these shall be fire-resistant. If the Supplier's overall design contains no bulkheads, the Suppliers may use the floor and roof as a barrier between the high voltage batteries and the cabin. Any passageways for the climate control system air shall be separated from the electric drive system by fire-resistant material. Piping through the bulkhead shall have fire-resistant fittings or caulking 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. Service 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.

Detailing shall be kept simple. Add-on devices and trim shall be minimized and, where necessary, integrated into the basic design.

#### 2.1.1 Strength and Fatigue Life

The basic structure shall be designed so that fatigue failure will not occur during the service life of the Bus. The structure shall also withstand impact and inertial loads due to street travel during normal SFMTA service throughout the Bus's service life without permanent deformation or damage.

#### 2.1.2 Distortion

The Bus, at GVWR and under static or dynamic conditions, shall not exhibit deformation or deflection that will damage panels or structural members or impair operation of doors, windows, or other mechanical elements. Static conditions include the Vehicle at rest with any one wheel or dual set of wheels on a six-inch curb or in a six-inch deep hole. Dynamic conditions include operation on a variety of road surfaces at prudent speeds up to the maximum for each type of Bus and road irregularities such as chuckholes and railroad level crossings.

### 2.1.3 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 six-inch reduction in any interior dimension. Windows shall remain in place and shall not open under such a load but shall be easily opened when used as emergency exits.

Exterior panels below three feet from the ground and their supporting structural members shall withstand a static load of 2,000 pounds applied perpendicular to the Bus anywhere below the three-foot height by a pad no larger than five inches square. This load shall not result in deformation that prevents installation of new exterior panels to restore the original appearance of the Bus. Components located behind these panels cannot be damaged by this test method.

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

The Contractor shall demonstrate compliance by relevant test results or by dynamic FEA, per the requirements in Section 2.1.1 Strength and Fatigue Life.

### 2.1.4 Resonance

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

### 2.1.5 Towing

Fixed towing devices shall be provided on each end of the Coach. The towing devices shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the Coach within 20 degrees of the longitudinal axis of the Coach. The rear towing device(s) are only for extracting the vehicles from a ditch or pulling them to position to be towed from the front and shall not provide a toehold for unauthorized riders. The front towing devices shall allow attachment of a rigid tow bar and shall permit lifting of the Coach, at curb weight, by the towing devices and the tow bar until the front wheels are clear of the ground. The method of attaching the tow bar must be approved by the SFMTA.

Contractor shall provide a description of the towing provisions for approval by the SFMTA. Any specialized towing adapters for emergency road service and quick Coach recovery by contracted towing companies must be approved by the SFMTA and the contracted towing company.

### 2.1.6 Jacking and Hoisting

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.

The bus axles or jacking plates shall accommodate the lifting pads of a two-post (or three-post if 60 ft. articulated bus) hoist system. Jacking plates, if used as hoisting pads, shall be designed to prevent the bus from falling off the hoist. Other pads or the bus structure shall support the bus on jack stands independent of the hoist. The vehicle shall be capable of lifting by the wheels and, as necessary to meet tire load requirements, the proper number for wheel lifts and/or adapters must be used.

### **2.1.7 Exclusion of Water**

The Coach shall be designed to assure that the underside, wheelhouses, floor, exterior body, windows, passenger doors, roof ventilators, lamps, access doors, and other openings do not admit water into the interior of the Coach or into any compartments covered by exterior doors during operation. Any equipment compartment located inside the Coach shall be sealed to prevent water entry.

The SFMTA requires that each Coach be water tested in the Contractor's manufacturing facility before shipment to San Francisco. The Contractor shall propose a water test method for SFMTA approval that includes a 15-minute water test.

The proposed water test method shall include duration of test, rate of water flow, amount and placement of nozzles, and nozzle pressure/pattern. Each Coach shall be water-tested. Coaches, which fail any part of the test shall be repaired and fully re-tested until they pass. All exterior hardware must be installed. No temporary sealing methods can be used.

Any leaks found during this test shall be repaired by the Contractor, who will also make appropriate corrections in the assembly line and factory water test.

### **2.1.8 Resistance to Corrosion**

The Coach shall resist corrosion from atmospheric conditions, road chemicals, salt, graffiti removal chemicals, commercial cleaning solutions, and other commonly encountered corrosive substance. It shall maintain structural integrity and maintain nearly original appearance throughout its service life, provided it is maintained by the SFMTA in accordance with the procedures specified in the service manual. Materials exposed to the elements and all joints and connections of dissimilar metals shall be either corrosion proof or protected from galvanic corrosion. The corrosion inhibitor shall be non-flammable and the application must be approved by the SFMTA.

All interior and exterior stainless-steel hardware shall be of approved grades. Representative samples of all materials and connections shall withstand a two-week salt spray test in accordance with ASTM Procedure B-117 with no visual or structural detrimental effects and no significant structural degradation or weight loss over one percent.

### **2.1.9 Skid Resistance**

The Coach shall be designed to resist damage from impact and skidding against asphalt roads when the road conditions exceed the vehicle's rated breakover, approach, and departure angles. Metal skid plates shall be provided on the underside of the front and rear overhangs of

the Coach to protect sensitive components or any parts of the chassis that would be significantly damaged by skidding on the surface of a road. Vulnerable composite chassis components on the underside of the front and rear overhangs shall be protected by metal skid plates.

## **2.2 EXTERIOR**

The exterior and body features, including grilles and louvers but not including the roof area, shall be shaped to allow complete and easy cleaning by SFMTA's automatic bus washers without snagging washer brushes or retaining water and dirt. 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. 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 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.

### **2.2.1 Strength and Installation**

Exterior panels that are three feet above the road may be structural components. Exterior panels below three feet shall be easily repairable and may be replaced. Composite structural components shall be repairable using common composite repair techniques or be easily replaceable.

### **2.2.2 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 ⅞ 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.

### **2.2.3 Rain Gutters**

Gutters shall be provided or designed as an integral part of the Bus body to prevent water flowing from the roof onto side windows and doors. Regardless of the motion of the Bus, the gutters shall not drain onto the windshield or operator's side window, or into the door boarding area.

### **2.2.4 License Plate Holders**

Provisions shall be made to mount standard U.S. license plates per SAE J686 on the front and rear of the Bus. License plates shall be mounted so that they can be cleaned by the SFMTA's automatic bus washing equipment without being caught by the brushes. License plates and

mountings shall not provide toeholds or handholds for unauthorized riders. The rear license plate shall be illuminated per SAE J587.

### **2.2.5 Bicycle Rack**

The Contractor shall install a Byk-Rak or Sportworks front-loading three-bicycle rack with non-glare finish, or approved equal, on the front bumper of the Bus. The mounting of the bicycle rack to the Coach shall be designed in a manner that the rack can be easily removed in the event the Vehicle needs to be towed. The bike rack shall not impair or obstruct the visibility of the headlights; Contractor may submit an alternative bike rack designs or bus configurations as necessary to meet this requirement. The Contractor shall submit details of installation to the SFMTA for approval during design review.

A bike rack deployment indicator light, clearly visible to the operator, shall be installed on the dash.

### **2.2.6 Finish and Color**

Bus exterior shall be painted or wrapped with decals (colors and paint specifications are given in Section 8: MATERIALS AND OVERALL WORK QUALITY). SFMTA and Proposer shall develop a paint scheme that aligns with the SFMTA's latest brand guide (see ATTACHMENT 2: DECAL LISTING). The Contractor shall furnish anti-graffiti/vandalism treatment subject to SFMTA approval; this treatment includes Axalta 8430S Clearcoat or approved equals.

All exterior surfaces shall be smooth and free of visible fasteners, wrinkles, dents, and blemishes. Exterior shall be finished with lead-free Axalta Imron Elite, PPG Delta DBHS 2.7 VOC, Gelcoat, or approved equal in accordance with the paint manufacturer's recommendations.

### **2.2.7 Fender Skirts**

Fender skirts of flexible rubber shall be included in all wheel housings. Fender skirts shall be easily replaceable. Wheels and tires shall be removable with the fender skirts in place.

### **2.2.8 Splash Aprons**

Splash aprons composed of composition or rubberized fabric at least 1/4 inch thick shall be installed behind each wheel and shall extend downward to within four inches of the road surface. Apron widths shall be no less than tire widths. Splash aprons shall be bolted to the Coach under structure. Splash aprons and their attachments shall be inherently weaker than the structure to which they are attached. Splash aprons and their attachments shall not be included in the road clearance measurements. 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.

### **2.2.9 Windshield Wipers and Washers**

The Coach shall be equipped with Sprague, Comotech, DOGA, or approved equal, electric powered, continuously variable speed windshield wipers for the windshield. At 60 mph, no more than ten percent of the wiped area shall be lost due to windshield wiper lift.

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

The windshield washer system shall have not less than a two-gallon reservoir located for easy refilling. A location inside the Coach near the front step is permissible. Access shall be provided through a spring-loaded paddle door. Reservoir pumps, lines, and fittings shall be corrosion resistant, and the reservoir itself shall be translucent for easy determination of fluid level. No equipment shall be located beneath the reservoir.

### **2.2.10 Service Compartments and Access Doors**

Contractor shall provide conventional doors with piano hinges for access to the rear service compartment and all auxiliary equipment compartments or shall provide alternative designs for SFMTA approval. Access openings shall be sized for easy performance of tasks within the compartment, including tool-operating space. All handles shall be flush with, or recessed into, the body contour and shall be sized to provide an adequate grip for opening. 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. Springs and hinges shall be corrosion resistant and shall last for the Buses service life.

#### **2.2.10.1 Exterior Access Doors**

Access doors shall be of rugged, corrosion-resistant metal or composite construction and shall maintain mechanical integrity and function under normal operations throughout the service life of the Coach. They shall close flush with the body surface and be prevented from coming loose or opening during transit service or bus washing operations. Access doors when open, shall not restrict access for servicing other components or systems. All maintenance access doors shall be locked with 5/16-inch square tool.

All access doors shall be retained in the open and closed positions with over-center gas-filled springs or mechanical props unless otherwise approved by the SFMTA. Doors smaller than 36 square inches shall be retained in the open and close positions by over-center springs. A thumbhole or handhold shall be provided on such doors to facilitate opening and closing.

#### **2.2.10.2 Rear Equipment Compartment**

The rear maintenance door, and both rear side maintenance doors shall be easily opened by one person. Traction motor oil shall be checked and added through the maintenance compartment doors.

#### **2.2.10.3 Low Voltage Battery Compartment**

The low voltage or auxiliary battery compartments shall be constructed of stainless steel, polyethylene, or approved equal material. Low-voltage batteries shall be located under the floor of the Bus, properly vented and self-drained, and accessible only from the outside of the Bus. The Bus shall prevent accumulation of debris on top of the batteries. 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. Batteries shall be properly secured to withstand road vibrations and designed to ensure that their terminals do not contact any part of the Bus body or storage box and are not ejected, or leak, even under severe crash conditions.

Batteries shall be mounted in trays that are constructed of stainless steel, polyethylene with a stainless steel sub-frame, or approved corrosion resistant materials. Batteries should be easily accessible; the SFMTA prefers that battery trays easily slide out of the body for service or replacement. Battery trays may be e-coated or powder coated to assist with corrosion or abrasion resistance. Low voltage systems should be independent of high voltage systems, so that emergency lighting, cameras, and all other accessories remain operable in the event of a high voltage system failure. If the low voltage battery is removed from the Bus, all high voltage should be isolated within the battery boxes, regardless of the position of the master switch.

#### **2.2.10.4 Electronic Equipment Compartment**

The Contractor shall provide a secured enclosure for electronic equipment. Location and design must be approved by SFMTA.

#### **2.2.11 Bumper System**

Bumpers shall be Romeo Rim High Energy Level Polymer (HELP) bumpers or approved equal, adapted to the Bus provided, and installed to meet the performance requirements of these Technical Specifications. The bumpers may wrap around the Bus but shall not exceed the allowable Bus width. Bumper material shall be corrosion resistant. Visible surfaces shall be black. These qualities shall be sustained throughout the service life of the Bus. Support and backing of the resilient portion of the bumper shall be made from appropriate materials and be mounted in a manner that shall protect the Bus in the event of an accident. A steel or reinforced aluminum sub-frame shall be used.

##### **2.2.11.1 Front Bumper**

No part of the Bus, including the bumper, shall be significantly damaged by a five-mph impact of the Coach at curb weight with a fixed, flat barrier perpendicular to the Buses 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 by 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 by 5.5-mph impacts into the corners at a 30° lateral angle to the longitudinal centerline of the bus. The energy absorption system of the bumper shall be independent of every power system of the Coach and shall not require service or maintenance in normal operation during the service life of the Coach. The flexible portion of the bumper may increase the overall Coach length specified in (Section 1.2, DIMENSIONS) by no more than seven inches.

##### **2.2.11.2 Rear Bumper**

No part of the Coach, including the bumper shall be damaged by a two-mph impact with a fixed, flat barrier perpendicular to the longitudinal centerline of the Bus. The bumper shall return to its pre-impact shape within ten minutes of the impact. When using a yard tug with a smooth, flat plate bumper two feet wide contacting the horizontal centerline of the rear bumper, the bumper shall provide protection at speeds up to five mph, over pavement discontinuities up to two inches high, and at accelerations up to two mph/sec. The rear bumper shall protect the bus when impacted anywhere along its width by the common carriage with contoured impact surface

(defined in Figure 2 of FMVSS 301) loaded to 4000 lb., at 4 mph parallel to or up to a 30 deg angle to the longitudinal centerline of the bus.

The rear bumper or bumper extensions shall not offer footholds to unauthorized riders. The bumper extensions shall not hinder service and shall be integrated into the Bus body with no protrusions or sharp edges. The bumper shall be independent of all power systems of the Bus and shall not require service or maintenance in normal operation during the service life of the Bus. Any flexible portion of the bumper may increase the overall Bus length specified in Section 1.2, DIMENSIONS, by no more than six inches.

### **2.3 INTERIOR TRIM, PANELING AND ACCESS**

Materials shall be selected based on ease of maintenance, durability, appearance, safety, flammability, and tactile qualities. Trim and attachment details shall be kept simple. Trim shall be secured to avoid resonant vibrations under normal operational conditions. Panels shall be reinforced to resist buckling, flexing, drumming, vandalism, and other rigors of SFMTA revenue service. They shall permit easy removal of paint, greasy fingerprints, and ink from felt-tip pens, be resistant to scratches and markings, and be easily replaceable and tamper resistant.

All interior surfaces below the lower edge of the 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. Interior mullion trim, moldings, and trim strips shall be textured stainless steel, PVC, or anodized aluminum. Individual trim panels and parts shall be interchangeable. Untrimmed areas shall be painted and finished to the quality described in Section 2.2.6 (Finish and Color).

#### **2.3.1 Divider and Side Trim Panel**

Sturdy divider panels constructed of durable, unpainted, corrosion-resistant material complementing the interior shall be provided as required at the rear of the entry stepwell and at the front and rear of the exit stepwell(s). Surfaces of the divider panels shall conform to Attachment 3: Materials, Colors and Finishes.

These dividers may be mounted on the sidewall or floor and shall project toward the aisle no farther than passenger knee projection in longitudinal seats, the aisle side of the transverse seats, or the edge of a stepwell. Divider panels shall not extend more than 10 inches higher than the daylight opening of the side windows. Panels forward of longitudinal seats shall extend to below the level of the seat surface. Dividers positioned at the doorways shall provide no less than 2-1/4 inches of clearance between the divider panel and the opened door. Modesty panels installed at doorways shall be equipped with grab rails if passenger assists are not provided by other means. 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.

Interior side wall panels shall be synthetic paneling, backed with a durable, moisture-resistant material of sufficient thickness. The material shall be presented to the SFMTA for approval and shall permit easy removal of paint, greasy fingerprints, and ink from felt-tip pens. Panels shall be easily replaceable without removing the window(s) and tamper resistant. They shall be reinforced, as necessary, to resist buckling, flexing, drumming, vandalism, and other rigors of transit bus service.

### **2.3.2 Rear Bulkhead**

The rear bulkhead shall be paneled with melamine-type material, composite, scratch-resistant plastic, or approved equal, of sufficient thickness and trimmed with aluminum or stainless steel. The panels above the seat shall be contoured to fit the ceiling, sidewalls, and seatbacks. Any air vents in this area shall be louvered to reduce airflow noise and designed to reduce trash or litter being thrown or drawn through the grille. Air vents shall be reinforced to prevent bending by passengers. The air vents shall meet the requirements of Section 2.3.6, Access Doors, if components requiring service are located behind the grille.

### **2.3.3 Headlining**

Ceiling panels and the trim between the passenger windows and in the front end down to the level of the lower daylight opening shall be made of durable, corrosion resistant, easily cleanable material approved by the SFMTA. For ease of graffiti removal, the surface shall be smooth and matte. The Contractor shall provide a proposal of graffiti-resistant materials and a suitable graffiti removal solution. The specific color and surface type must be approved by SFMTA prior to production.

Headlining shall be supported to prevent buckling, drumming, or flexing, and shall be mechanically 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 tamper-proof, shall be aluminum, stainless steel, or a durable polymer material.

### **2.3.4 Front End**

The entire front end of the Coach shall be sealed to prevent debris accumulation behind the dash and to prevent the operator's feet from kicking or fouling wiring and other equipment. The front end shall be free of hazardous protrusions. Paneling across the front of the Coach and any trim around the operator's area shall be sufficiently durable and made of formed metal, polymer, or composite material.

Formed metal dash panels shall be polymer coated or painted and finished to the quality described in Section 2.2.6 (Finish and Color). Plastic dash panels shall be reinforced as necessary, resistant to age discoloration and cracking, vandal resistant, and easily replaceable. All colored, painted, and plated parts forward of the operator's barrier and below the upper daylight opening shall be finished with a smooth, dull matte surface in a flat black or gray color that matches or coordinates with the Coach interior.

The dash will be constructed with a rigid sub-structure so that components designated for dash mounting can be securely affixed. Mounting areas shall be pre-drilled and tapped as appropriate. The components shall be mounted to appropriate structures using machine screws, threaded rivet nuts, or another approved fastening method. Contractor and the SFMTA will determine which components shall be fastened to the dash during design review.

### **2.3.5 Fastening**

Interior panels shall be attached so that there are no exposed edges or rough surfaces. Panels and fasteners shall not be easily removed by passengers but shall be replaceable when

necessary. Exposed interior fasteners should be minimized. Fasteners shall be corrosion resistant. Self-tapping screws are not permissible for attachment of interior panels.

### **2.3.6 Interior Access Doors**

Access for maintenance and replacement of equipment shall be provided by panels and doors that appear to be an integral part of the interior. Removal of fixtures or equipment that is unrelated to the repair task to gain access is not permitted. Access doors shall be hinged with gas springs or mechanical props, where practical, to hold the doors out of the mechanic's way. All door hinges shall be stainless steel piano-style type hinges or approved alternative. All interior access doors, panels, and actuator compartments shall be retained securely with latches with self-contained tamper-resistant fasteners approved by the SFMTA. Panels shall prevent entry of mechanism lubricant into the bus interior.

## **2.4 FLOOR**

The floor shall consist of the subfloor and the floor covering that will last the life of the bus. The floor deck may be integral with the basic structure or mounted securely on the structure to prevent chafing or horizontal movement. Sheet metal screws shall not be used to retain the floor, and all floor fasteners shall be serviceable from one side only. The joints should be filled with adhesive and rough surface areas faired with an appropriate bonding material and sanded smooth where required. 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 should 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 and treads, with coverings applied, shall withstand a static load of at least 150 pounds, applied through the flat end of 1/2-inch diameter rod with 1/32-inch radius, without permanent visible deformation.

The floor, as assembled, including the sealer, attachments, and coverings, shall be waterproof, non-hygroscopic, resistant to wet and dry rot, resistant to mold growth, and impervious to insects. All edges shall be sealed with an SFMTA-approved sealer.

All gaps in the floor shall be filled and made flush. Floor covering sheets shall run the full width of the Coach. Structural members shall support all joints in the floor. The use of parallel joints in the structural members shall be minimized to the extent practicable. Floor irregularities and joints shall not be visible after installation of floor covering.

Plywood is not acceptable flooring for this procurement. The flooring shall be composite material flooring, Coosa, Milwaukee, SpaceAge Synthetics, René Composite, or an approved equal. Any de-laminations or bubbles formed between the floor covering and the subfloor is not acceptable. Reference Section 10.1.1.3, FIGURE 10-1 for the flooring warranty requirement.



### 2.4.1 Height

Height of the floor above the street shall be no more than 15.3 inches measured at the centerline of the front and rear doorway when the doors are open. Steps leading to the upper deck are preferable; however, a ramp with a slope may be acceptable to the SFMTA.

### 2.4.2 Edges

Where the floor meets the walls of the Coach, the edges shall be blended with a fillet or be otherwise bonded to prevent water infiltration. The design of the Vehicle shall prevent debris accumulation between the floor and wheel housings or provide a transition between the floor and any walls that do not have cove moldings.

### 2.4.3 Floor Covering

Floor covering shall be Altro Transflor TFFG2704F "Rocket", Coosa Composites, or approved equal. Floor covering shall be nonskid, material that remains effective in all weather conditions and complies with all ADA requirements. The floor covering, as well as transition of flooring material to the center aisle and to the stepwell area, shall be smooth and present no tripping hazards.

The standee line shall be at least two inches wide and shall extend across the Coach aisle 18 inches behind the turn of the corner at the forward edge of the wheel well; and at the exit door area in line with the inward edge of the opened door. This line shall be the same yellow color as the edge of the door area. Color shall be consistent throughout the floor covering.

The floor covering shall closely fit the sidewall cove or extend to the top of the cove. The color of the floor covering in the passenger compartment shall be the same as that in the vestibule. The design shall be submitted for approval by the SFMTA.

## 2.5 STEPS AND STEPWELLS

Interior step risers shall be no more than 10-3/4 inches.

The plane of the step treads shall be essentially parallel to the plane of the floor, sloped only sufficiently to prevent water accumulation on the floor. All step treads shall be covered with the same nonskid floor covering material and shall remain effective in all weather conditions. The edge of the vestibule floor shall conform to ADA requirements and shall have a maximum of 5/16-inch overhang at the step riser. The outer edge of the step, just below the step nosing, at the rear door shall be covered with a strip of corrosion resistant material. The edge of the vestibule floor tread shall have a bright, contrasting yellow band no less than two inches wide on the full width of the opening. The color shall be permanently blended into the floor covering material. Yellow / black caution stripe decals are required at each vertical face of the step.

## 2.6 WHEEL HOUSINGS

Sufficient clearance and air circulation shall be provided around the tires, wheels, and brakes to prevent overheating when the Coach is operating. Wheels and tires shall be removable when the Coach is raised by the axle or suspension, even with the air bags depleted. Interference between the tires and any portion of the Coach shall not be possible in maneuvers up to the limit of tire adhesion with Coach weights from curb 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.

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.

## **2.7 INSULATION**

The Contractor shall ensure that the Coach is properly insulated thermally and acoustically to meet the SFMTA's performance requirements. Any insulation material used between the inner and outer panels shall be fire resistant and installed to minimize entry and retention of moisture. Insulation properties shall be unimpaired during the service life of the Coach. The insulation material shall be non-hygroscopic and resistant to fungus and the breeding of insects. The material shall be physically retained to prevent tearing.

### **2.7.1 Thermal Insulation**

The combination of inner and outer panels on the sides, roof, and ends of the Coach, and any material used between these panels shall provide a thermal insulation sufficient to meet the interior temperature requirements specified in Section 3.4 INTERIOR CLIMATE CONTROL. The Coach body shall be thoroughly sealed so that the operator or passengers during normal operations cannot feel drafts with the passenger doors closed.

### **2.7.2 Sound Insulation**

The combination of inner and outer panels and any material used between them shall provide sufficient sound insulation to meet all performance requirements specified in Section 1.5.1. These conditions shall prevail with all openings, including doors and windows, closed and with accessories switched off.

### 3 FURNISHINGS

#### 3.1 WINDSHIELD, DRIVER WINDOW, AND PASSENGER WINDOWS

The Bus body shall accommodate a windshield, driver's window, and passenger windows. All windows shall be supported by metal or composite sub-structures. All designs and dimensions of windshield and windows must be approved by the SFMTA.

##### 3.1.1 Passenger Windows

Windows shall be required on each side of the Coach. All passenger windows shall be of the smooth flush mount "BRT" style, also referred to as "seamless windows". Passenger windows shall not be bonded in place.

##### 3.1.1.1 Dimensions

At minimum, the height of all passenger windows shall span from the shoulder height of a 5<sup>th</sup>-percentile seated female passenger to the eye level of a 95<sup>th</sup>-percentile standing male passenger. Windows shall be divided horizontally. The bottom portions of the windows shall be fixed. The upper portion over the side destination sign shall be fixed. All windows shall be easily replaceable without disturbing adjacent windows and shall be mounted so that flexing or vibration from electric motor operation or normal road excitation is not apparent. All windows shall be the same size to the extent practicable.

##### 3.1.1.2 Materials

All passenger windows and door windows shall have a minimum of 3/16 in. nominal thickness tempered safety glass. The material shall conform to the requirements of ANSI Z26.1 Test Grouping 2 and the recommended practices defined in SAE J673. The SFMTA prefers that passenger windows and door windows have a luminous transmittance between 40% and 60% and a solar energy transmittance between 40% and 50%; Windows over the side destination signs shall not be tinted. Window sash shall be weather-protected and corrosion-resistant. The tracks and seals shall be designed to be vandal resistant and to last the service life of the Coach.

##### 3.1.1.3 Anti-Vandalism Provision

The contractor shall apply 1/8-inch thick, scratch resistant, clear panels to all the interior passenger windows. These panels shall protect the Coach windows from etching and other forms of vandalism. The protective panels shall be clear and shall have minimal effect on the transmittance of the underlying glazing. This material shall not be adversely affected by ultraviolet rays and shall withstand normal cleaning practices. No accumulation of moisture shall be allowed between the surfaces of the original windows and the protective panels. Each protective panel shall be capable of being removed and installed by a single mechanic within three minutes. This anti-vandalism provision must be approved by the SFMTA.

### 3.1.1.4 Emergency Exits

All Coaches shall be provided with adequate exits for quick passenger escape during emergency conditions. All emergency exits shall comply with applicable codes and requirements, including FMVSS 217, as well as with best industry practices.

Where practical, all passenger side windows shall open outward to provide an emergency exit on each side of the Bus. A simple red latch shall be provided on all passenger side windows that take no more than 20 pounds of force to manipulate. This latch shall not pinch a person's fingers or hands when operating and shall be designed so that it returns to its normally closed position. It shall not be possible for passengers to use the latch as an accessory hook. Latch design must be approved by the SFMTA. Each emergency exit window location shall be labeled with an instruction plate (preferably close to the latch). Contractor shall provide emergency exit provision for SFMTA approval.

## 3.2 DOORS

Doors shall be a Vapor slide-glide style at the front entrance area and Vapor plug sliding style, or approved equal, at the rear exit area(s) on the curb side of the Coach. The front entrance door shall be forward of the front wheels and located so that the operator is able to collect or monitor the collection of fares. The rear exit doors on 40-ft Buses shall be in front of the drive (rear) axle; 60-ft articulated Buses shall have exit doors fore of the center axle and fore of the rear axle. Passenger entrance and exit doors and doorways shall comply with all requirements of the ADA.

The rear exit doors shall be equipped with Vapor CLASS (Contact-Less Acoustic Sensing System) or an approved alternative. This system shall allow passengers to open the rear doors through the movement of their hand or body after the operator enables this feature. Operator enabling of this feature shall result in the illumination of a green light above the doors notifying passengers that the exit door can be opened. The door system will recognize the presence of passenger in the exit area or within 24 inches of the outside opening of the Coach, and not close until the area is cleared of people.

On the outside of the Bus on each set of exit doors, there shall be pushbutton-style door request buttons to allow for onboarding passengers to open the exit door when the Bus is stopped and the operator has enabled the doors to open. These buttons shall be lit with green LEDs when passengers are able to open the door. The system shall have a positive mechanical locking feature when the door control is in the "OFF" position. A door annunciator shall make digitally recorded messages (such as warnings, greetings, or service announcements) in the exit door area. The contractor shall present details of their methodology for entrance and exit door operation for SFMTA review. The task of the final commissioning shall be included in the Contract price.

### 3.2.1 Materials

The structure of the doors, their attachments, inside and outside trim panels, and any mechanism exposed to the elements shall be durable and corrosion resistant. Doors shall be constructed of aluminum or approved alternative materials. Top and bottom door seals shall be brush-type, flap-type, or an approved equal. The doors, when fully opened, shall provide a firm support and shall not be damaged if used as an assist by passengers. Door edges shall be sealed to prevent infiltration of exterior moisture, noise, dirt, and air from entering the passenger compartment, to the maximum extent possible based on door types.

### 3.2.2 Dimensions

Door openings shall be no less than 74 inches high. The front door free clear opening shall be able to accommodate a 30-inch wheelchair ramp at minimum. The rear door shall have a free clear opening of 37 inches wide for the entire vertical height.

### 3.2.3 Door Glazing

The doors may be split into two sections with a rubber divider between the sections as approved by the SFMTA. The edge of a six (6) inches high curb shall be visible to the seated operator through the closed front door when the Coach is more than 12 inches from the curb. The rear doors shall be split, with a glazed upper portion and an aluminum lower panel. Exit door glazing materials shall conform with Section 3.1.1.2 (Materials).

### 3.2.4 Door Projection

Exterior projection of the doors shall be minimized and shall not exceed 6-1/2 inches during the opening or closing cycles or when doors are fully opened. The inside edge of each door panel shall have no less than two inches of soft weather-stripping. The doors when closed shall be effectively sealed and the hard edges of the doors shall be at least four inches apart.

Inside the Coach, the door mechanisms shall be recessed into the ceiling or paneled over so that no ledges are created. Projection of any part of the doors inside the bus shall not cause an obstruction of the rear door mirror or cause a hazard for standees.

### 3.2.5 Door Height above Pavement

It shall be possible to open and close the passenger doors when the Bus, loaded to GVWR is not knelt and is parked with the tires touching an eight inches high curb on a street sloping toward the curb so that the street side wheels are five inches higher than the curb side wheels.

### 3.2.6 Actuator

Door opening and closing speeds shall be independently adjustable. The door actuators shall be rebuildable. Actuators and the complex door mechanism shall be concealed from passengers

but shall be easily accessible for servicing through an overhead panel that is secured by latches and can be opened and closed without tools.

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.

### **3.2.7 Emergency Door Operation**

In the event of an emergency, it shall be possible to manually open doors designated as emergency exits from inside the Coach using a force of no more than 25 pounds after actuating an emergency door-unlocking device directly adjacent to each door. The unlocking device shall be clearly marked as an emergency-only devices and shall require punching in a small plastic window before being able to activate. Concise instructions for emergency exits shall be posted near the device. The respective door emergency unlocking device shall be accessible from the doorway area. The unlocking device shall be easily reset by the operator without special tools or opening the door mechanism enclosure. Doors that are required to be classified as “emergency exits” shall meet the requirements of FMVSS 217.

When any of the door emergency unlocking devices are actuated, the door interlock system shall inhibit propulsion, and the service brakes shall be applied to stop movement regardless of the position of the override switch described in Section 4.1.4.3 (Interlock Override Switch). The interlock system shall be able to be overridden if the Coach is required to be moved.

Locked doors shall require a force of more than 300 pounds to open manually. When the locked doors are manually forced to open, damage shall be limited to the bending of minor door linkages with no resulting structural damage to the doors, motors, and complex mechanisms.

### **3.2.8 Sensitive Edges**

The rear exit door shall be equipped with an electric or air-wave-type sensitive edge in the rubber weather stripping on the center edges of the doors. Closing door edge speed shall not exceed 12 inches per second and opening door speed shall not exceed 19 inches per second. The doors shall stop and reverse direction when the doors close on an object as small as a 1-inch diameter smooth cylinder held perpendicular to the plane of the door opening at any point where the door halves meet. These specifications shall not apply to the top two inches or the bottom two inches of the sensitive edge.

The sensitive edge system shall alert the Coach operator by a visual and audible alarm if the doors encounter an obstruction. The system shall react to this obstruction within no more than a second. Regardless of the function of the sensitive edge, it shall be possible to withdraw a 1½ in. diameter cylinder from between the center edges of a closed and locked door with an outward force not greater than 35 lb.

### 3.2.9 Front Door Timing (Entrance Door)

Doors shall open or close completely within—2 - 4 seconds from the time of actuation.

### 3.2.10 Rear Door Timing (Exit Door)

Doors shall open or close completely within—2 - 4 seconds from the time of actuation.

## 3.3 LIGHTING

Wherever possible, Contractor shall utilize LED lights from a proven manufacturer. Wheelchair ramp and kneeling indicator lights shall be illuminated with LED light. The Contractor may utilize a single LED warning light to be used for wheelchair ramp deployment and the kneeling indicator. Stop, turn, tail, and marker lights shall be flush mounted or low profile. LEDs shall have a minimum expected life of 50,000 hours of operation at 25 degrees Celsius.

### 3.3.1 Exterior Lighting

All exterior lights shall be sealed to prevent entry and accumulation of moisture or dust, and each lamp shall be replaceable in less than five minutes. LED lamps with anti-scratch coatings shall be used wherever possible. Lights mounted on any compartment doors or adjacent panels shall be protected from the impact shock of door opening and closing. Lamps, lenses, and fixtures shall be interchangeable to the extent practicable.

Turn signal lights shall be provided on both sides of the Coach. All side turn signal lights shall be mounted above or forward of each wheel well, except for the front curbside turn signal which may be aft of the wheel well. In addition to the amber lights, a right turn cornering lamp shall be installed between the wheel well and the exit door(s). The right turn cornering lamp shall be activated by the right turn signal switch during night runs only.

#### 3.3.1.1 Courtesy Lights

An ADA compliant door header LED strip light shall be provided at both entrance and exit doors. The LED lights will illuminate the door opening to the ground.

#### 3.3.1.2 Back-up 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.

### 3.3.2 Interior Lighting

The LED passenger interior lighting system shall be DINEX, Hadley, TCB, Pretoria, or approved equal. The interior lighting system shall provide a minimum 15 foot-candle illumination on a one

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 foot-candles. Lighting in the turntable area of 60-ft articulated Buses may be reduced to 7 foot-candles.

Floor surface in the aisles shall be a minimum of ten foot-candles, and the vestibule area a minimum of 4 foot-candles with the front doors open and 2 foot-candles with the front door closed. The front entrance area shall provide enough illumination to meet ADA requirements. The rear exit area shall illuminate when the rear door is unlocked.

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 brightness of the interior light system shall be adjustable to minimize glare.

Lenses shall be designed to effectively "mask" the light source without visible bright or dim spots. Lens shall be sealed to inhibit incursion of dust and insects yet are easily removable for service. If threaded fasteners are used, they must be held captive in the lens. Access panels shall be provided to allow servicing of components located behind light panels.

When the master switch is in the Night Run mode, the first light module on each side of the Coach shall turn off when the front door is in the closed position and illuminate to maximum light level when the door is opened. The light system may be designed to form part of the entire air distribution duct.

### **3.3.3 Service Area Lighting**

LED lamps shall be provided in the motor compartments and all other compartments where service may be required to generally illuminate the area for night emergency repairs or adjustments. The motor compartment lights shall be controlled by a conveniently located toggle switch near the rear start controls in the compartment or in an approved location. Lights located in other service compartments shall be provided with toggle switches on the light fixture or conveniently near the light fixture. 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. Adequacy of lighting must be approved by the SFMTA during prototype review.

## **3.4 INTERIOR CLIMATE CONTROL**

The interior climate control system shall provide heating, ventilation, and air conditioning (HVAC). The HVAC system shall be a proven system from Thermo King, MCC, Eberspächer, or approved equal. 40-ft Buses shall be equipped with a single HVAC system; 60-ft articulated Buses shall utilize an HVAC system on each section of the vehicle fore and aft of the articulated joint.



The Contractor shall provide to the SFMTA all the essential information needed to test and troubleshoot the interior climate control electronic controllers. The system shall be compliant with the J1939 Communication Protocol for receiving and broadcasting of data. The task of the final commissioning shall be included in the Contract price. The HVAC system may use R134a or R407c as refrigerant; the Proposer shall clearly indicate which refrigerant is being used on the Coaches.

### **3.4.1 Controls**

The control of the Interior Climate Control shall utilize hard-wired switches or a display panel with AUTO, A/C, HEAT, and VENT modes located in a place that is convenient to the operator and is approved by the SFMTA.

### **3.4.2 Air Flow**

The ventilation mode of the interior climate control system shall introduce outside air into the Coach at or near the ceiling height at a minimum rate required to maintain 68-72 degrees F. Airflow shall be evenly distributed throughout the Coach.

### **3.4.3 Air Intakes**

Outside openings for air intake shall be at least seven feet above ground level, in a location that minimizes the intake of dust, particulates, and emissions from traffic. All intake openings shall be baffled to prevent entry of water.

Except for roof-mounted ventilators, outside air shall be filtered before discharge into the passenger compartment. The filter shall meet the ASHRAE requirement for five percent or better atmospheric dust spot efficiency, 50 percent weight arrestance, and a minimum dust holding capacity of 60 gram per 1000-cfm cell. More efficient air filtration may be provided to maintain efficient heater operation. Air filters shall be easily cleaned or removed for service. Moisture drains from air intake openings shall be located to prevent clogging from road dirt.

## **3.5 ROOF VENTILATORS**

At least one roof ventilator shall be provided in the roof of the Coach at location(s) approved by the SFMTA. Each ventilator shall be easily opened and closed manually by one person and shall also function as an emergency exit. When open, with the Coach in motion, these ventilators shall provide fresh air inside the Coach. Each ventilator shall cover an opening area no less than 425 square inches. Each ventilator shall be capable of being positioned as a scoop with either the leading or trailing edge open no less than 4 inches, or with all four edges raised simultaneously to a height no less than 3-1/2 inches.

### **3.6 WHEELCHAIR LOADING SYSTEM**

An automatically-controlled, power-operated wheelchair lift system compliant to requirements defined in 49 CFR 571.403 (FMVSS 403) shall provide ingress and egress quickly, safely and comfortably, both in forward and rearward directions, for a passenger in a wheelchair from a level street or curb. The wheelchair loading system shall conform to all applicable ADA requirements. The task of the final commissioning shall be included in the Contract price.

#### **3.6.1 Wheelchair Ramp**

The wheelchair ramp shall be a Lift-U LU-18 or approved equal with a flip-out type design and shall be self-contained, electrically powered, fully compliant with ADA and FTA requirements, and shall be provided at the front door of the Coach. The driver shall be able to deploy the ramp from a seated position. In case of a power failure, driver shall be able to deploy the ramp manually. When the system is not in use, the passageway shall appear normal. In the stored position of the ramp, no tripping hazards shall be present, and any resulting gaps shall be minimized. The ramp shall present a 1:6 maximum slope when deployed to the ground. All components of the ramp shall be accessible and serviceable through an interior access panel in the ramp. All drive chains shall be a minimum size #40 and constructed of corrosion resistant material. Ramp shall use only inductive proximity switches where required; the use of mechanical limit switches shall not be allowed. The loading platform shall be covered with replaceable or renewable nonskid material and shall be fitted with devices to prevent a wheelchair from rolling off the sides during ingress or egress. During deployment or stowage, the ramp floor plate shall not present any dangerous moving parts to passengers.

Deployment or stowage of the ramp shall require no more than 15 seconds. The device shall function without failure or adjustment for 500 cycles or 5,000 miles in all weather conditions on the design operating profile when activated once during the idle phase. A manual override system shall permit unloading a wheelchair and storing the device in the event of a primary power failure, requiring no more than 20 lbs. to manually stow or deploy. The ramp assembly shall be replaceable within 30 minutes by a mechanic without the need of any special tools or fixtures.

#### **3.6.2 Wheelchair Ramp Controls**

The controls shall be simple to operate and conveniently located so the driver can operate and monitor the loading operation without leaving the driver's station. Control switches shall be of the momentary type, so that release of the control switch will stop the ramp immediately. All wheelchair ramp controls and their locations must be approved by the SFMTA.

The Coach shall be prevented from moving during the loading or unloading cycle by an accelerator and brake interlock system. The loading system shall be inhibited from retracting or folding when a passenger is on the ramp/platform and shall be equipped with an electronic current limiting feature to minimize damage if the ramp hits an obstruction during the stow/deploy functions. Whenever the ramp system is being deployed or stowed, an audible

alarm shall sound, and an LED visual signal shall illuminate. One International Symbol of Accessibility, in blue and white, shall be provided near the ramp signal at the front door opening of the Coach, visible to patrons in the curbside front of the oncoming Coach. All wheelchair ramp maintenance instructions shall be supplied by the Contractor.

### **3.7 PASSENGER SEATS**

A minimum of 32 passenger seats shall be provided in each 40' Bus unless otherwise directed by the SFMTA. A minimum of 44 passenger seats shall be provided in each 60' Bus unless otherwise specified by the SFMTA. The seatbacks shall be contoured to increase passenger knee room and Coach capacity. The aisle between the transverse seats shall be no less than 23.3 inches wide at seated passenger hip height. Contractor shall be required to present to the SFMTA their proposed seating layout(s); these layouts shall maximize the space in the passenger area while meeting ADA requirements for clearances required for accessible ingress and egress. Seating layout shall be optimized to meet GVWR and GAWR capacities and must be approved by SFMTA.

All priority seating area seats, including accommodations for wheelchair securement, passengers using crutches, canes, or walkers, or passengers with difficulties walking, shall be installed with blue color seat inserts with the Priority Seating stencil, referred in the latest edition of the SFMTA Vehicle Decal Package.

Powered USB ports shall be provided on the passenger seats. SFMTA prefers USB hubs with USB 2A and C ports. Contractor shall propose a USB hub layout that makes USB ports accessible to all seated passengers.

#### **3.7.1 Dimensions**

Seats shall have hip-to-knee room measured from the front of one seatback horizontally across the highest part of the seat surface to the seat or panel immediately in front. Hip-to-knee room measured from the center of the seating position, from the front of one seat back horizontally across the highest part of the seat to a vertical surface immediately in front, shall be a minimum of 26 in. At all seating positions in paired transverse seats immediately behind other seating positions, hip-to-knee room shall be no less than 27 in.

Floor room, measured at the floor forward from a point vertically below the front of the seat surface, shall be no less than 14 inches. Seats immediately behind the wheel housings may have foot room reduced, provided the wheelhouse is shaped so that it may be used as a footrest. Transverse seats accommodating two passengers shall have a minimum width of 35 inches, and seats accommodating one passenger shall have a minimum width of 18 inches.

#### **3.7.2 Design**

Passenger seats shall be USSC 4One Gemini seats, or approved equal, integrally molded with drain holes. The seat frame structure shall be a cantilever design that is mounted to the Coach

wall structure with sufficient strength for the intended service. In locations at which cantilevered installation is precluded by design and/or structure, other seat mounting may be allowed. The rearmost bench seat may be a molded design without individual frames.

The passenger seat frame and its supporting structure shall be constructed and mounted so that space under the seat is maximized to increase wheelchair maneuvering room and is completely free of obstructions to facilitate cleaning. The lowest part of the seat assembly that is within 12 inches of the aisle shall be at least 10 inches above the floor. The underside of the seat and the sidewall shall be configured to prevent debris accumulation, and the transition from the seat underside to the Coach sidewall to the floor cove radius shall be smooth. The seatback shall be contoured to maximize knee room. All transverse objects in front of forward-facing seats, including seatbacks, modesty panels, and longitudinal seats, shall not introduce a laceration hazard as a result of structural failure. Flip-up seats shall be securely held in the open or closed position while the Bus is in motion. No seats shall rattle while the Bus is in motion.

### **3.7.2.1 Transverse Seat**

The back of each transverse seat shall incorporate a handhold. The handhold shall extend above the seatback near the aisle so that standees shall have a convenient vertical assist, no less than four 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 40<sup>th</sup>-percentile male passenger. The handhold shall also be usable by a 5<sup>th</sup>-percentile female, as well as by larger passengers, to assist with seat access and egress for either transverse seating position. The seatback handhold may be deleted from seats that do not have another seat directly behind them and where vertical assist is provided in accordance with Section 3.9 (Passenger Assists). Armrests shall not be included in the design of transverse seats.

### **3.7.2.2 Longitudinal Seat**

Longitudinal seats shall be the same general design as transverse seats but without seat back handholds. Longitudinal seats may be mounted on the wheelhouses. Folding 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 fixture that adequately performs the function of restraining passengers from sliding forward off the seat. Armrests are not required on longitudinal seats that fold up in the wheelchair parking area when the armrest on the adjacent fixed longitudinal seat is within 1-1/2 to 3-1/2 inches of the end of the seat surface. Armrests shall be located from seven to nine inches above the seat surface. The area between the armrest and the seat surface shall be open. The top and sides of the armrests shall have a minimum width of one inches and shall be free from sharp protrusions.

### **3.7.2.3 Handholds and Armrest Strength**

Seat back handholds and armrests shall withstand static horizontal and vertical forces of 250 pounds applied anywhere along their length with less than 1/4-inch permanent deformation. Seatback handholds and armrests shall withstand 25,000 impacts in each direction of a

horizontal force of 125 pounds with less than 1/4-inch permanent deformation and without visible deterioration.

### 3.7.3 Structure

The seat assembly shall withstand static vertical forces of 500 pounds applied to the seat surface in each seating position with less than 1/4-inch permanent deformation in the seat or its mountings. The seat assembly shall withstand static horizontal forces of 500 pounds evenly distributed along the top of the seatback with less than 1/4-inch permanent deformation in the seat or its mountings. Seatbacks shall withstand repeated impact of two 40-pound 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 seatback 10,000 times from distances of 6, 8, 10, and 12 inches respectively. Seat surfaces shall withstand 100,000 randomly positioned 3-1/2 inches drops of a squirming, 150 pounds, smooth-surfaced, buttocks-shaped striker with only minimal wear on the seat surface.

### 3.7.4 Construction and Materials

The seat shall utilize plastic construction with replaceable inserts to minimize weight while allowing for maximum vandal resistance and minimal maintenance. Seats must be modular, allowing each component to be easily replaced if necessary. Seat surfaces and back inserts shall be granite blue), or an alternative color as approved by the SFMTA. Priority seats and stroller seats require white stencil on the seat inserts according to SFMTA Vehicle Decal Standard. Complete seat assemblies shall be interchangeable to the extent practicable. All materials and workmanship shall conform to SPI standards and specifications in testing for plastic materials.

### 3.7.5 Wheelchair Accommodation

Two forward wheelchair securement positions, at least 60 inches in length and as close to the front door as practical, shall be provided for each Coach in a staggered configuration. Each wheelchair accommodation shall provide parking space and a securement system compliant with ADA requirements for one passenger in a wheelchair. No portion of the wheelchair or its occupant shall protrude into the normal aisle when parked in the designated wheelchair parking space. Contractor shall submit wheelchair accommodation options for SFMTA review and approval as part of the general seating arrangement.

The design and construction of the Bus shall be in accordance with all requirements defined in 49 CFR Part 38, Subpart B: ADA Accessibility Specifications for Transportation Vehicles - Buses, Vans and Systems, the latest approved ADAG Board guidelines, and California Title 13 standards. Space and body structural provisions shall be provided at the front door of the Bus to accommodate a wheelchair ramp that meets these requirements.

### **3.7.5.1 Maneuvering room**

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. SFMTA prefers the maneuvering room of each Coach to closely resemble the drawing shown in Attachment 5 (Wheelchair Maneuvering Room). No width dimensions shall be less than 34 inches; area requiring 90 degree turns of wheelchair shall have a clearance arc dimension of no less than 35 inches; and in the parking area, where 180-degree turns are expected, space shall be clear in a full 60-inch diameter circle. Wheelchair footrest clearance of 12 inches above the floor surface shall be provided on the outside turning radius.

### **3.7.5.2 Wheelchair Securing Devices**

A QPod three-point wheelchair securement device, or approved equal, shall be provided at each wheelchair position. A hand or foot operated release lever shall be conveniently located to release the latching mechanism. The wheelchair latching mechanism shall not interfere with battery-operated wheelchairs. A bumper shall be provided at each wheelchair location. Seatbelts shall be easily accessible for wheelchair users. A belt-type securement system and shoulder strap seat belt shall be included. The wheelchair securing devices configuration and installation must be approved by the SFMTA. The seat belt retraction circuit should not include an audible alarm.

## **3.8 PASSENGER STOP REQUEST SYSTEM**

A passenger chime and “Stop Requested” signal system that complies with applicable ADA requirements defined in defined in 49 CFR, Part 38.37, shall be provided. It shall be integrated with the Digital Voice Announcement System (see Section 3.13). “STOP REQUESTED” signs shall be illuminated with LEDs. The location of each sign must be approved by the SFMTA. The “Stop Requested” signal shall be clearly indicated on the operator’s dash.

The signs shall remain illuminated until any of the passenger doors are opened, at which point the chime and illumination systems shall reset. Whenever the sign is illuminated, the chime signal shall be muted, and it shall not disable the “STOP” pushbutton for a wheelchair passenger to request to disembark.

### **3.8.1 Exit Signal**

The exit signal system shall consist of a vandal resistant pull cable, chime, and interior sign message. The pull cable shall be located the full length of the Coach on the sidewall and no higher than the division bar between the upper and lower window sections. Vertical pull cable shall be provided at each window mullion and at each wheelchair user area. Eyelets shall be provided as necessary to prevent the cords from rubbing against the Coach interior. In addition, pushbuttons labeled “STOP” shall be provided on vertical stanchions. Contractor shall submit pushbutton locations for SFMTA review and approval.

A chime shall announce when the system is activated from any pull cord or any "STOP" button on the vertical stanchion. Simultaneously, all "STOP REQUESTED" signs shall illuminate. The chime shall announce no later than 0.5 second after the cord is pulled.

### **3.8.2 Mobility Aid Passenger Exit Signal**

A "STOP" push button shall be mounted underneath the folding seat or in a position easily accessible to the patron in each of the wheelchair parking areas and shall be no higher than 48 inches and no lower than 15 inches from the floor. A distinct double-chime shall sound anytime the exit signal system is activated from the wheelchair passenger areas.

When the exit signal system is activated from a wheelchair passenger area, a light on the dashboard shall be illuminated to alert the driver that a mobility aid passenger wishes to disembark. This shall also illuminate the "STOP REQUESTED" sign with a message that displays "RAMP REQUESTED". Configuring the system so that the Coach stop, Coach ID #, and time are announced upon activation is strongly encouraged.

The location and construction of the "STOP" push buttons at the wheelchair passenger areas shall be submitted to the SFMTA for review and approval.

### **3.9 PASSENGER ASSISTS**

Passenger assists in the form of full-grip vertical stanchions or handholds shall be provided for the safety of standees and for Coach ingress and egress. Passenger assists shall be convenient in location, shape, and size for both the 95<sup>th</sup>-percentile male and 5<sup>th</sup>-percentile female standees. Starting from the entrance doorway and moving anywhere in the Coach, full-length vertical assists shall be provided so that a 5<sup>th</sup>-percentile female passenger may easily move from one assist to another without losing support. Vertical assists shall be mounted on the aisle side of the seatback of every transverse seat. These assists shall be functionally continuous with the overhead assist. For 60-ft articulated Buses, passenger assists shall be provided to aid in the transition between the front and rear sections of the Bus.

Excluding those mounted on the seats and doors, the assists shall be between 1-1/4 and 1-1/2 inches in diameter with no corner radii less than 1/4 inch. All passenger assists, including those along edges of modesty panels, shall permit a full handgrip with no less than 1-1/2 inches of knuckle clearance around the assist. In addition, flexible grey PVC straps in yellow metal mounting bracket shall be secured to the overhead assists, allowing passengers a grab handle when not gaining the opportunity for a seat (see Section 3.9.3: Overhead). Each hand strap location shall be stationary by using clamp shell compression parts and SFMTA prefers not to drill through the assists. Contractor shall submit the proposed layout of passenger assists and grab handles to the SFMTA for approval.

Any joints in the assist structure shall be underneath supporting brackets and securely clamped to prevent passengers from moving or twisting the assist. All areas of the passenger assists that are handled by passengers, including functional components used as passenger assists, shall

be of stainless steel construction. Yellow powder-coating shall be applied to passenger assists directly adjacent to the rear exit door to signal to passengers that it is an exit area. Black powder coating shall be applied to any passenger assists in the front of the Bus that could pose a risk of reflecting light into the driver's view. Assists shall withstand a force of 300 pounds applied over a 12-inch lineal dimension in any direction normal to the assist without permanent visible deformation. All passenger assist components, including brackets, clamps, screw heads, and other fasteners used on the passenger assists, shall be designed to eliminate pinching, snagging, and cutting hazards and shall be free from burrs or rough edges.

### **3.9.1 Doorways**

Assists shall be mounted in the doorway and on the doors to aid passengers in boarding and alighting. A 5<sup>th</sup>-percentile female shall be provided functionally continuous assists from the curb to the assists within the Coach. For design purposes, use a six-inch curb height. These assists shall begin with a vertical element not less than 12 inches long and no more than 4 inches from the outside edge of the exit area tread and continue inward no less than the first inboard stanchion. Assists in the doorways shall be no less than 3/4 inch in width and shall provide at least 1-1/2 inches of knuckle clearance between the assists and their mountings. A full-size vertical assist that is functionally continuous with the overhead assist shall be provided on the aisle side of the modesty panels at the entrance and exit areas.

The SFMTA will review door opening passenger assists and provide final approval during the prototype Coach development to maximize aid to seniors, persons with disabilities, and wheelchair users boarding the Coach.

### **3.9.2 Vestibule**

A horizontal passenger assist shall be located across the front of the Coach to 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 continuous support for a boarding passenger from the front door through the fare collection procedure. Passengers shall be able to lean against the assist for security while paying fares. The assist shall be no less than 36 inches above the floor. The assists at the front of the Coach shall be arranged to permit a 5<sup>th</sup>-percentile female passenger to reach easily from the door assist to the front assist and then to vertical assists on the operator's barrier or front modesty panel.

### **3.9.3 Overhead**

Except forward of the standee line and at the exit doors, a continuous full-closed-grip, overhead assist shall be provided along both sides of the Coach. This assist shall be located at a height convenient to standees, directly over the aisle-side edge of the transverse seats. The assist shall be no less than 70 in. above the floor.



**3.9.4 Grab Straps**

Contractor shall supply Bentech grab straps (part # SH-21-TP) or approved alternative on the overhead assists. Contractor shall provide grab straps at 18-inch intervals along the overhead assists; the quantity and location of grab straps shall be approved by the SFMTA.

**3.9.5 Longitudinal Seats**

Longitudinal seats shall have vertical assists located between each pair of seating positions, except for seats that fold up to accommodate wheelchair securement. Assists shall extend from near the leading edge of the seat and shall be functionally continuous with the overhead assist. Assists shall be staggered across the aisle from each other where practicable and shall be no more than 52 inches apart longitudinally. Vertical assists shall be attached either by plastic receiver cups or stainless-steel receiver cups with isolators bolted to the seat grabrail on one end, and bracket attachments to the overhead horizontal assist at the other end.

**3.9.6 Divider Panel**

A horizontal passenger assist shall be mounted on the top of every divider panel forward of a transverse seat.

**3.10 DESTINATION SIGNS**

Contractor shall provide and install on each Bus an automatic electronic sign system by Luminator or approved equal. The system shall conform to all applicable ADA requirements and shall function seamlessly with the DVAS specified in Section 3.13. All locations and mounting of equipment must be approved by the SFMTA.

The proposed electronic signs and equipment to be installed and integrated by the Contractor are:

Item	Part Location	Part Description	Qty.
1	Front	24x200 Spectrum	1
2	Curbside	8x96 Amber	1
3	Streetside	8x96 Amber	1
4	Rear w/camera	16x48 Amber	1
5	Dash	12x40 Amber	1
6	Operator Area	MCU Controller	1

The Master Run Switch shall control power to the sign system. The signs shall operate in all positions of this switch except in "OFF" position.

The system shall be capable of integrating with additional information devices, such as interior information signs, Voice Annunciation devices, and fareboxes. The system shall provide for destination and/or Public Relations (P/R) message entry.

The system shall have the ability to sequentially display multi-line destination messages, with the route number portion remaining in a constant "on" mode at all times. It shall also be capable of accepting manual entry of Route Alpha/Numeric on any/all signs.

The system shall be capable of storing and displaying up to 10,000 message lines. Message memory shall be changeable and sized according to the message listing noted herein. Download via a PCMCIA card or Memory Transfer Unit will not be accepted.

The route profile shall be capable of being uploaded wirelessly.

All sign programming tools shall be supplied by the Contractor. The task of the final commissioning onsite at the SFMTA shall be included in the Contract price.

### **3.10.1 Display**

The displays shall consist of pixels utilizing high intensity LEDs. The LEDs shall be the only means of illumination of the displays. Each pixel shall have a dedicated LED for illumination of that pixel in any lighting conditions. The displays shall adjust intensity level automatically as a function of the ambient light conditions. No fan or special cooling shall be required for the displays. The LEDs will have a life expectancy of 100,000 hours and each LED shall consume no more than 0.02 watts. The LED's power circuit shall be protected against normal Bus power surges. The LEDs shall be mounted such as to be visible directly to the observer positioned in the viewing cone, allowing for full readability 65 degrees either side of the destination sign centerline. Destination readings shall be furnished by the SFMTA. The characters formed by the displays shall meet the requirements of the ADA (reference 49 CFR Section 38.39).

The sign enclosure shall prevent condensation and the entry of dirt, dust, moisture, water, and insects during normal operation or cleaning with a cyclone cleaner. Access shall be provided to clean the inside of destination sign windows and to remove or replace the sign mechanism. The Bus manufacturer shall comply with the destination sign manufacturers recommended mounting configuration and installation procedures to assure optimum visibility of the sign display.

### **3.10.2 Front Destination Sign**

The front destination sign shall be in full color. The front destination sign shall feature 24 rows by 200 columns of LEDs. All service performed on this sign must be done through the sign access door.

### **3.10.3 Curb Side Designation**

The curbside destination sign shall be amber display and shall feature 8 rows by 96 columns of LEDs. The display must be easily read from the sidewalk level.

### **3.10.4 Street Side Destination Sign**

The street side destination sign shall be amber display and shall feature 8 rows by 96 columns of LEDs.

### **3.10.5 Rear Destination Sign**

The rear destination sign shall be amber color display and shall feature 16 rows by 48 columns of LEDs. The rear destination sign shall include an integrated backup camera, which will display a view on the driver's integrated dash display with a latency of 100 milliseconds or less.

### **3.10.6 Dash Mounted Run Number Sign**

The integrated run number sign shall be amber display and have no less than 12 rows by 40 columns of LEDs. The display area shall be able to display a minimum of 4 characters and each of the 4 characters shall be capable of displaying all 26 upper case letters as well as numbers 0 through 9. Run numbers to be displayed shall be input directly into the destination sign system's MCU (see Section 3.10.7 below) and the display shall also receive the run number information through the radio/AVL system via an approved CAN communication protocol. The sign shall be mounted as low as possible on the dash on the curb-side of the Bus.

### **3.10.7 Operator Control Unit (OCU)**

The OCU shall be used to view and update display messages. It shall be recessed mounted in an area that is easily accessed by the Bus operator. The make, model, and location of the OCU must be approved by the SFMTA.

The OCU shall utilize a water-resistant multi-key conductive rubber pad keyboard and be designed for transit operating conditions. The OCU keypad shall have a sealed, elastomeric membrane.

The OCU shall contain a color LCD touchscreen display. Programmable multifunction keys shall be used for basic operation while the touchscreen shall be used for more advanced operations. The OCU shall provide audible feedback to alert the operator to view the display for a message, or beeps indicating that a key is depressed. The OCU shall continuously display visual feedback associated with the selected destination code.

The OCU shall be capable of accepting information by interfacing to the radio/AVL system via an approved CAN communication protocol for automated destination code and public relations code selection.

The sign system shall be reprogrammable through the system control console by a standard USB 2.0 thumb drive. An Ethernet connection shall be used to keep sign image transfer times to under 90 seconds for a 10,000-line listing from the on-board computer to the sign system.

### **3.11 ITS CABINET**

An Intelligent Transportation Systems (“ITS”) cabinet shall be provided to accommodate all onboard electronic equipment, including the mobile radio/AVL equipment and third-party auxiliary equipment. The design, contents, and layout of the ITS cabinet shall be presented to the SFMTA for approval during design review.

The compartment shall have a locked door. The ITS cabinet shall be supplied with a nominal 12-volt, direct current with positive and negative leads. This service shall be protected by circuit breaker(s) located at the circuit breaker panel sized by the Contractor.

### **3.12 CUSTOMER INFORMATION SYSTEM**

[RESERVED]

### **3.13 DIGITAL VOICE ANNOUNCEMENT SYSTEM**

The Bus manufacturer shall provide all equipment and a full installation for the Digital Voice Announcement System (DVAS) by Conduent for approval by the SFMTA. The Contractor shall work with Conduent to obtain a full bill of materials for the proposed DVAS and shall submit this bill of materials to the SFMTA for approval. The DVAS shall be incorporated into the current SFMTA radio system specified in Section 3.17. An Ethernet connection shall be used to keep sign image transfer times to under 90 seconds from the on-board computer to the sign system.

The system shall meet or exceed all ADA requirements found in 49 CFR Sections 37.167 and 38.35 and shall provide different, simultaneous audio announcements to riders onboard and waiting curbside. The system shall also provide a control capability for integrating present and future electronics on the Bus. To maximize the system's useful life and to ensure ease of integration with third party electronics on transit Vehicles, the system shall provide a robust, open software and hardware architecture. The system shall have the capability of hardware and software extension to include new or additional features. The system shall be simple to update and easy to program.

The DVAS shall include an IVU 4000 capable of providing a single log-on for other in-vehicle electronics systems (e.g., destination / head signs systems, fare collection systems, automatic passenger counters, etc.). The communications protocol to accomplish system integration shall be SAE J1708 and J1939 communication protocols. The vendor shall also broadcast driver identification information, APC data, and route information on the J1939 network to be used by the ViriCiti data monitoring system. Odometer information must be transmitted over J1939 to the

IVU 4000. The system shall include an easy-to-use means of specifying whether log-on and/or passwords are required, and what Bus operator ID's and passwords are acceptable for each subsystem. The DVAS shall be capable of playing audio diagnostics for all integrated electronics and provide audio messages describing any failures.

All discrete signals, unless otherwise approved by the SFMTA, shall be transmitted over J1939.

The DVAS shall allow the operator to select the route via the MCU or the MDT for the radio system and shall display the route and the next stop to be announced on the operator control unit. The operator shall have the ability to scroll forward or backward within the selected route's list of announcements. Internal announcements are intended for on-board riders and shall play either by manual activation by the operator or in response to signals received by an on-board Automatic Message Trigger (AMT). The AMT function shall incorporate a GPS receiver and dead reckoning. External announcements shall play automatically when the door is opened for a stop.

The DVAS shall have dual channel audio capable of playing simultaneous internal and external announcements. Vendor shall provide all database programming and route mapping services necessary for the system to be fully functional.

The system shall include a noise-sensing device, an Automatic Gain Control (AGC) Microphone, for each audio channel and shall automatically and independently adjust each channel's audio volume as appropriate in response to ambient noise.

Contractor shall also provide real-time driver information, real-time passenger information, and real-time route information through the vehicle J1939 connection or an API from Conduent to the ViriCiti/ChargePoint data monitoring systems.

### **3.13.1 Programming**

Each Bus shall be delivered with a fully programmed, fully functioning voice annunciation system. The programming for the voice annunciation system shall match the current annunciator image deployed on the SFMTA's bus fleet, including all stops on all routes. The trigger points for all voice announcements shall be user programmable. The DVAS system shall include the full feature set as provided by the SFMTA upon request.

Contractor shall offer for purchase all required software, hardware configuration, and training to maintain and operate the DVAS.

All hardware and software shall be uniquely identified as SFMTA property with serial numbers.

### **3.13.2 Sign Requirements**

The internal display sign shall display coordinating text for next stop and other audio announcements. The sign shall meet all ADA requirements for internal signage. The sign shall be

an LED-type sign with 16 characters per line with bright amber LEDs. The sign shall be no larger than 27" x 2 1/8" x 4 1/8" (single line)/6 1/8" (double line). Messages can be shown streaming or by any of 3 single frame modes with automatic centering. Speed, delays, and looping shall be programmable. Busy/ready status shall be poll-able. The sign shall have forced reset capability.

The internal LED display sign shall be used to display the words "Stop Requested" and shall be visible to passengers. When the passenger chime is activated and shall remain on until the front or rear door is opened. The internal LED display sign shall also be used to display "Ramp Requested" when the wheelchair passenger stop request is activated.

The sign enclosure shall be approved by the SFMTA and consist of metal construction with welded and sanded seams, black powder coat finish, and an acrylic fascia with matte finish for reduction of glare. Sign shall be constructed to withstand the harsh environmental conditions found in transit applications.

### **3.13.3 GPS Vehicle Location Message Trigger**

The GPS shall be capable of providing its positioning information to other onboard equipment. Such GPS information shall be made available for AVM and AVL applications. The system shall automatically determine adherence to the Bus route and trigger the announcement of the next Bus stop as it is approached. The system shall utilize GPS satellites signals, WAAS satellites, a heading sensor, and an odometer sensor to provide continuous location information and automatic correction.

Once initialized, the automatic announcement system shall not require Operator intervention or action in the event of off-route excursions. The system shall detect off-route excursions and remain silent when off route. The system shall detect reacquisition of the route, at any point along the route, and automatically determine and announce the next valid Bus stop.

### **3.13.4 Data Transfer and Wireless Data Transfer**

The DVAS shall be reprogrammable on the Bus. On-Vehicle reprogramming shall also be accomplished in a single-step process using a 802.11g or faster protocol.

The wireless Upload/Download Automated system shall transfer the new data from a local computer to the on-board memory or vice versa. After the transfer is initiated, the system shall trigger an automated data update followed by "Voice Update Completed" type message on the Signs and the MCU Display. The system shall provide a software application to manage the fleet data deployment update and the update completion status.

## **3.14 PUBLIC ADDRESS SYSTEM**

A public address system that complies with the ADA requirements of 49 CFR Section 38.35 and enables the operator to address passengers either inside or outside the Coach shall be provided in a location approved by SFMTA engineering.

The public address system shall be activated by a floor-mounted momentary switch to permit the operator to make internal and/or external announcements; volume levels shall remain consistent when switching between speakers. The speaker select switch shall be easily accessible to the operator. Six interior speakers shall be installed on a 40' Bus; ten interior speakers shall be installed on a 60' Bus. One exterior speaker shall be provided at each set of entrance or exit doors. These speakers shall be terminated at the ITS compartment with a service loop of at least four feet in length. One exterior AGC microphone shall be provided at the front door of each Bus, and one interior AGC microphone shall be provided at the midpoint of each Bus. Contractor shall work with Conduent to ensure the interior and exterior speakers are integrated and configured with the proper impedance.

All speakers shall broadcast in a clear tone so that all announcements are clearly heard in all passenger locations. The PA system shall be muted when not in use. A boom-style microphone or approved equal shall be provided and shall be mounted on the A-pillar adjacent to the operator. The SFMTA must approve all equipment locations and installation plans for the public address system.

### **3.14.1 Audio Announcement Subsystem**

Audio announcements shall be initiated automatically at points along SFMTA motor Coach routes. Each announcement shall be designated interior and/or exterior. The volume for each announcement shall be automatically set based upon analysis of the ambient noise level (this automatic volume adjustment needs to react within 0.100 seconds to changes in noise level). All volume settings shall be digitally set to ensure consistent volume throughout the fleet. At least 8 exterior and 8 interior preset default settings, each with different volume and ambient AGC choices, shall be provided, as well as enough memory for saving at least 10 additional user-defined volume settings. Exterior volume settings shall be configurable based on the time of day.

An Integrated Public Address (IPA) Subsystem shall use the Vehicle's interior and exterior public address speakers. This system shall provide the driver the capability to make their own interior and exterior announcements, determined by a driver-controlled switch. The IPA shall override passenger audio announcements and shall have its own gain control independent of the AGC.

### **3.15 DIGITAL VIDEO RECORDING AND SURVEILLANCE CAMERA SYSTEM**

The Contractor shall provide equipment and installation for a digital video recording and surveillance system (DVRS) by Genetec or approved equal and shall demonstrate successful operation of the system on each Vehicle. The DVRS system shall provide full coverage of the interior and exterior of the Vehicle and will also support two Transit-Only Lane Enforcement (TOLE) cameras. The DVRS shall interface with the CradlePoint router as described in Section 3.17 MOBILE RADIO/AVL SYSTEM, provided by Conduent. The system design be reviewed and approved by the SFMTA during detailed design and prototype review.

The DVRS shall be capable of being programmable to automatically tag events and pre-programmed activities.

The system shall be able to retain time, date, and any user programmable data (e.g., Coach number, route, run) without connection to the power source. The system shall have its own power supply connected to the 12 volt or 24-volt power of the Coach, and shall include an uninterruptible power source that provides for 30 minutes of system run-time without vehicle power. The system must be able to withstand all transients, surges, and dips in power from the Buses electrical system without any deterioration of system performance. The system shall not be affected by electro-magnetic interference (EMI) or radio frequency Interference (RFI). The system shall meet all applicable rules and regulations of the Federal Communications Commission (including FCC Part 15 Rules and Regulations) and the Department of Transportation.

The Contractor shall include in the Vehicle maintenance manuals wiring diagrams clearly showing the interfacing Coach wiring for the system as well as individual maintenance manuals for each piece of supplied equipment. These manuals shall include schematic diagrams and maintenance procedures for tasks including but not limited to operation, preventive maintenance, and troubleshooting. The task of the final commissioning onsite at the SFMTA shall be included in the Contract price.

At the discretion of the operator, a control event marker (pushbutton or equivalent) shall be available to mark an event in the same manner as specified for the silent alarm in Section 4.1.10.

A suggested Bill of Materials may be found in ATTACHMENT 8: SUGGESTED BILL OF MATERIALS. This Bill of Materials may not include all components required to be installed and integrated by the Contractor. The Contractor shall obtain a final Bill of Materials from RCM Security Inc.

### **3.15.1 Camera**

Contractor shall provide and install all camera system equipment required for full coverage of the vehicle, and two TOLE cameras located as specified by the SFMTA. The brand of cameras used shall be Hanwha, and the specific models shall be subject to approval by the SFMTA during design review. The camera system must be compliant with the Real Time Streaming protocol.

Exterior cameras shall not make any audio recordings outside of the Bus including in the front or sides of the Bus.

An analog surveillance backup camera integrated with the Luminator rear run sign shall be provided and shall be integrated with the driver's dash for the purpose of displaying live video of the rear of the Bus to the dash display when the Bus is in reverse. In addition, a rear exterior IP



camera shall be provided and shall be integrated with the Genetec DVR for the purpose of recording video.

Interior analog cameras overlooking each exit door shall be provided and shall integrate with the driver's dash for the purpose of displaying live video to the dash display when the doors are open. Camera views for middle and rear exit doors shall be displayed on the dash display in a split-view configuration; Contractor may propose an alternative solution to the SFMTA for approval. An interior IP camera shall also be provided at each exit door and shall be integrated with the Genetec DVR for the purpose of recording video.

The TOLE cameras shall be positioned to capture an identifiable image of the vehicles in front of the Bus, including the license plate, color, and other identifying characteristics of the vehicles. The TOLE cameras shall be positioned to capture the location of the vehicles illegally occupying the transit-only lanes in front of the Bus. The operator shall be able to manually trigger the creation of a timestamp file corresponding to an incident recorded by the TOLE cameras with a pushbutton located on the dash or driver's side console. The timestamp file format shall be approved by the SFMTA and shall be readily accessible by SFMTA video shop personnel.

The exterior camera outside the Bus shall be pointed towards the rear and at the doors. It shall prevent damage to the lens from the Bus washers or tree branches on the Vehicle's route.

All cameras supplied shall have a standard IP color signal output. The cameras shall be capable of producing undistorted 150dB or better wide dynamic image, i.e., capable of capturing face images with bright backgrounds within the transit vehicle. The cameras shall have M12 connectors, be power over Ethernet (PoE) and of 1920 x 1080 or greater resolution. The cameras shall work in all lighting conditions.

### **3.15.2 Digital Video Recorder**

The digital video recorder (DVR) shall be a Genetec SVR300A Mobile Data Recorder, or approved equal, capable of recording the outputs of the TOLE cameras and video surveillance cameras on internal separately removal hard drives. The video surveillance camera solid state drive shall provide a minimum of one month video retention with H.264 compression algorithm and shall be a minimum eight terabyte capacity SATA drive or an approved equal. The TOLE camera hard drive shall provide a minimum of three days storage capacity and shall be a minimum eight terabyte capacity solid state drive, or an approved equal. The DVR shall record all cameras simultaneously at a speed of not less than five frames per second each, along with synchronous audio tracks, and shall record time, date, Vehicle number, GPS location information, and time sync. The GPS information shall be able to relate to an address on a map.

The DVR shall be capable of recording IP audio signal from the interior IP surveillance cameras. The SFMTA shall have the ability to approve which IP cameras' audio feed will be recorded. (See *ATTACHMENT 6: CAMERA LAYOUT*)

The DVR shall have the ability to automatically download selected video events in user selectable increments via a wireless connection in a manner satisfactory to the SFMTA. The specific Bus and time range shall be selectable.

The DVR shall have the capability to be pre-programmed to download recorded incidents that have not been “tagged” by the operator up to one hour in length from all cameras recorded in the Bus when the Bus returns to the yard in a manner satisfactory to the SFMTA.

The download shall continue until complete even if the Bus is powered down.

The DVR shall have the capability to transmit live video, from inside the Bus, upon demand to a laptop or other mobile device while the Vehicle is still in revenue service in a manner satisfactory to the SFMTA.

The DVR shall have a shutdown feature where the DVR is powered down after a specified period following the ignition of the vehicle being turned off. The time interval before DVR shutdown shall be adjustable from zero to 30 minutes.

The live video feed shall be transmitted up to a distance from the Bus that shall be determined by the SFMTA.

### **3.15.3 Health Monitor Tool (HMT)**

The Contractor shall provide Health Monitor Tool (HMT) application software for continuous monitoring of the health of remote DVRs. The DVR shall be capable of sending real-time health checks and notification through e-mail or text of any defect noted during Bus operation.

A. The HMT software shall perform the following functions:

- Automatically monitor multiple remote connected DVRs at set intervals.
- Manually poll all DVRs for system health variables.
- Provide an online report of all results.
- Export reporting capability in 3 formats (Excel, HTML, and CSV).
- Email notification of events to multiple recipients.

B. Monitored Events:

- Connection: Network connectivity test.
- Failed Drive Access: Each drive shall be verified.
- Camera Failures during Defined Intervals: Cameras shall be continuously tested to ensure connectivity.
- Reboots anytime a DVR is restarted or shutdown.
- Time Since Recording: Verification that recording is continuing up to current time.

- Protected Capacity Used %: System shall monitor the space remaining for protected video and display the percentage used.

### **3.15.4 Downloading Software**

The downloading software shall have the capability to be programmed by a maintenance technician at the server to be able to download recently recorded video for QA checks of equipment functionality of each transit Vehicle on a daily, weekly, and monthly basis. The downloading software shall have the ability to download the error/status log from the DVR every time the transit Vehicle is back in the depot yard. It shall include a "GPS Search" feature that will allow SFMTA staff to search video via GPS map location and time/date pin pointing. Users shall interface with the program through a Graphical User Interface (GUI).

The downloading software shall have fleet-wide software for viewing DVR and camera "health status" that are continuously updated and recorded in a log file accessible to the SFMTA Video Technicians and shall include real time health checks and alerts that can send notifications to SFMTA staff via e-mail/text of any Defect noted during operation.

The system shall have the capability to be pre-programmed to download recorded incidents that have not been "tagged" by the operator, up to one hour in length from all cameras recorded on the transit Vehicle when the Vehicle returns to depot yard. The Contractor shall provide all support equipment needed to facilitate this (i.e., antenna, transmitter, receiver, and server).

### **3.15.5 Wireless System**

The wireless system on the Bus shall be a Cradlepoint R1900 wireless router. The Contractor shall supply or use an existing antenna mounted on the roof of the Bus of at least three dBm gain, and if needed per the Contractor's power configuration, an external power supply to power the bridge may be installed. The wireless bridge shall have the capability to turn on and off the DVR via a wireless switch or IP relay.

### **3.15.6 Security Enclosure**

The mobile DVR shall be designed to withstand extreme shocks, vibrations, and temperatures. A system status and event button indicator shall be provided on the outside of the enclosure. A pick-resistant tubular pin tumbler lock or better shall be used. The lock shall be quarter turn lock and unlock. The internal and external assembly of the security enclosure shall be designed for ease of removal and repair of an internal subassembly and of the entire assembly. Ease of use, convenience of maintenance, changing user parameters, and media removal and replacement are also important functional requirements for the system. Design of the security enclosure must be approved by the SFMTA during prototype review.

### 3.15.7 Viewing Recordings

The viewable and audible data shall meet all applicable requirements for admissibility set forth in the California Evidence Code and the Federal Rules of Evidence. The SFMTA shall be able to view the GPS location of the vehicle for each recorded event and search for recorded events at a specified location.

### 3.15.8 Documentation and Training

Documentation and training for the surveillance system are referenced in Section 9.1.8 (Surveillance Camera System Training).

## 3.16 DRIVECAM

The Contractor shall install provisions for a Lytx DriveCam system on all Vehicles. The DriveCam system shall include the SF300 Cellular Event Recorder and all hardware and equipment required to provide an operational event recorder system that meets the written software and hardware related specifications that DriveCam provided to the SFMTA. The Contractor shall be responsible for sourcing the required wiring harnesses and other mounting hardware; the SFMTA shall provide the SF300 event recorder. The final system design and installation must be approved by SFMTA.

### 3.16.1 Hardware

A suggested Bill of Materials may be found in ATTACHMENT 8: SUGGESTED BILL OF MATERIALS. The Bill of Materials may not include all components required to be installed and integrated by the Contractor. The Contractor shall obtain a final Bill of Materials from Lytx.

## 3.17 MOBILE RADIO/AVL SYSTEM

The Contractor shall provide all equipment for, and fully install, the mobile radio/AVL system by Conduent, subject to approval by the SFMTA. The Contractor shall work with Conduent to verify the full bill of materials provided in ATTACHMENT 8 for the proposed radio/AVL system and shall submit a proposed bill of materials to the SFMTA for approval.

The Contractor shall supply an uninterruptible power source as described in Section 3.26, UNINTERRUPTIBLE POWER SOURCE, capable of providing sufficient back-up power for the mobile radio/AVL system and cellular/WiFi access point.

The location of all radio and public address equipment shall be in the ITS cabinet at an accessible location and shall be subject to SFMTA review and approval. The SFMTA prefers that the operator's handset shall be located on the curbside of the operator's dash adjacent to the farebox; alternative locations may be submitted for SFMTA approval.

The task of the final commissioning of the mobile radio/AVL system shall be included in the Contract price.

The proposed Bill of Materials to be installed and integrated by the Contractor can be found in ATTACHMENT 8: SUGGESTED BILL OF MATERIALS. The Bill of Materials may not include all components required to be installed and integrated by the Contractor. The Contractor shall obtain a final Bill of Materials from Conduent.

**3.17.1 Radio Antenna**

Contractor shall provide and install all antennae for the SFMTA radio system specified in Section 3.17. Contractor shall provide and install coaxial cables from the ITS compartment to each antenna location.

**3.17.2 Discrete Signals**

Contractor to provide the following discrete signals:

Item	Signal Name	Method
1	Wheelchair Deploy	J1939
2	Wheelchair Stow	J1939
3	Stop Request	J1939
4	Stop Request ADA	J1939
5	Stop Request Clear  (Cleared by either front door open or rear door enabled)	J1939
6	Odometer In	J1939
7	Bike Rack Deploy	J1939
8	Rear Door Open	J1939
9	Front Door Open	J1939

**3.18 FARE COLLECTION**

Provisions for a Genfare Odyssey fare box, including a mounting plate and wiring for power and J1708 connectivity, shall be provided as far forward as practicable. The location of the fare box shall not restrict traffic, including wheelchairs, in the vestibule and shall allow the operator to easily reach the fare box operational buttons and to view the deposited fares. The location shall provide sufficient clearance for easy access to the cash box/receiver system, coin and bill modules, and the Master Controller Card. The location of the fare box shall comply with ADA requirements. Wiring and mounting shall meet all clearance and access requirements. The farebox system shall be capable of communicating with the IVU via the J1708 protocol.

### 3.18.1 Electrical

A 10-amp maximum, 24-volt, direct current protected circuit shall be used to power the fare box. This circuit shall be composed of three wires, +24VDC wire, 24VDC return, and a ground lead all enclosed in a protective flexible conduit. All wires are 14 AWG, stranded, and oil/grease/abrasion resistant. Where applicable, the Contractor shall install circuit breakers.

### 3.18.2 Fare Box Mounting

The Contractor shall provide a dedicated mounting location for a Genfare Odyssey farebox with drilled and tapped holes. The positioning of the mounting location shall allow for sufficient clearance of the farebox cashbox door for opening and removing the cashbox. The Contractor shall place emphasis on the proposed placement of the fare box in order to meet space and maneuverability requirements for wheelchairs and to minimize the possibility of injury to the operator. The location of the fare box and installation procedures must be approved by the SFMTA.

### 3.19 CLIPPER®

Each Coach shall be provided with wiring provisions and mounting locations for a Clipper® 2.0 system. The Clipper® system shall consist of one Onboard Validator (OBV) for each door, a CradlePoint router, a 4G cellular antenna, and associated cables and hardware. The Contractor shall be responsible for installing all associated cables and harnesses. Cables shall not be exposed and accessibility to wiring shall be a primary design consideration for ease of maintenance. The mounting locations of the routers, antennae, and CID(s) must be approved by the SFMTA. Cubic will be responsible for providing and installing all associated equipment for the Clipper system as well as commissioning onsite at the SFMTA.

The Clipper on-board equipment requires either 12VDC or 24VDC power from protected sources with voltage variations from 9VDC to 32VDC. The protection shall be a 5A manual resetting circuit breaker that visibly identifies an open circuit in the tripped state.

### 3.20 AUTOMATIC PASSENGER COUNTING (APC) SYSTEM

Contractor shall furnish, install, and demonstrate successful operation of the APC system with the IRMA sensor installed on each door. The APC system shall communicate with the radio system. The system shall be capable of generating reports on the passenger load with bus stops information at the discretion of the user. Cables shall be mounted so as not to interfere with the operation and maintenance of the wheelchair ramp, or other Vehicle systems. The installation will be heavy duty and able to withstand the stresses of urban transit operation in the SFMTA environment. Accessibility of wiring and ease of maintenance shall be primary design considerations. The APC shall be able to count wheelchair users, as well as ambulatory passengers. The APC system design and location must be approved by the SFMTA.

The APC system shall have the following features and capabilities:

- A. Acquisition of passenger counts by means of sensing devices at each Vehicle door opening.
- B. Fully adjustable detection zones that meet the requirements of the Vehicle design.
- C. Bicycle rack and wheelchair ramp switches that tabulate bicycle rack and wheelchair ramp users.
- D. 95% counting accuracy that is unaffected by normal variables, including but not limited to:
  - The reasonable speed at which someone passes by sensors.
  - Passengers carrying items such as backpacks, boxes, briefcases, etc.
  - Obstructions to the sensors, such as passengers remaining immobile within the sensor field.
  - The difference between passengers boarding and exiting the Vehicle.
  - Variations in light and temperature.

Contractor shall offer for purchase all required specialized tools for the APC. The task of the final commissioning onsite at the SFMTA shall be included in the Contract price.

### **3.20.1 Electrical**

The APC system shall operate in all positions of the master run switch. Power shall be provided to the APC system at all times, except when the battery has been shut off; this is to enable the wireless download to operate at all times, as explained in Section 3.15.2 (Digital Video Recorder). Power may be provided through the mobile radio/AVL system and uninterruptible power supply.

The APC system shall have a very small current draw; when powered, it shall not drain the Vehicle low voltage batteries below vehicle starting level (as applicable) for at least four full days.

The APC system shall have its own circuit breaker, and it shall be internally protected against voltage transients and RF interference to ensure proper operation in the SFMTA operating environment.

### **3.20.2 System Enclosure**

The APC system shall be housed in a sturdy vandal-resistant enclosure that includes a tamper- and pick-resistant lock. The unit shall be installed in an area approved by the SFMTA. This area must be easily and safely accessible to authorized personnel.

### **3.20.3 GPS (Global Positioning System)**

The APC system shall log an accurate location of the Vehicle while passengers board and exit. Location information will include but not be limited to route and Bus stop/car stop identification.

### 3.20.4 Computer Data Logging System

[RESERVED]

### 3.20.5 Computer Data Analysis Software

[RESERVED]

## 3.21 PASSENGER INFORMATION HOLDER

Two frames shall be provided to the rear of the operator's barrier to retain information sized 17 inches wide and 11 inches high posted by the SFMTA, such as routes and schedules.

Three "take-one" boxes shall be mounted inside the Coach. The SFMTA prefers that two boxes on the street side shall be mounted on the window pillars: one half-way between the operator's area and the space across from the rear door and one half-way between the rear door and the rear of the Coach. One box shall be mounted on the rear door pillar. The "take-one" boxes shall be aluminum or stainless steel and shall retain a 1-1/4 inches stack of 4-1/4 inches-wide media. The boxes shall be four inches deep.

Locations and placement of the passenger information holders are subject to SFMTA review and approval.

## 3.22 NUMBERING AND SIGNING

Coaches shall have four-digit fleet numbers counting upward in sequence with Coach serial numbers. The SFMTA will inform the Contractor of the fleet numbers. The SFMTA logo and serial numbers shall be decals. The SFMTA common carrier number "CA 49819" shall be on decals in three-inch high numbers on both the curbside and the streetside of the Coach. The Contractor shall provide the Vehicle number on a decal on the roof of the Vehicle. A Bus fleet number plate shall be installed on the panel behind the operator seat. All fleet number designs and locations shall be subject to approval by the SFMTA.

The interior of the Coaches shall have the four-digit fleet number in three-inch block style decal located on the panel or access door above the operator's head and centered vertically from the windshield to the ceiling and horizontally between the Coach interior walls. In addition, on the panel behind the operator's station, a Braille Vehicle number sign will be placed in accordance with ADA height and size requirements listed below.

Signing shall be applied to the inside and outside of the Coach in compliance with the ADA requirements defined in 49 CFR Section 38.27. Signs shall be durable and resistant to fading, chipping, and peeling; they may be painted signs, decals, or pressure-sensitive appliqués. All decals shall be sealed with clear, waterproof sealant around all exposed edges if required by the decal supplier. Signing listings are included in ATTACHMENT 2 Decal Listing. Contractor will be



supplied with a sample of all decals and decal drawings at design review. Sign materials, location and placement shall be subject to approval by the SFMTA.

### **3.23 CHASSIS MOUNTED PEDESTRIAN BARRIER (S1 GARD)**

Contractor shall provide a chassis mounted S1 Gard pedestrian barrier (part number 547320 or approved equal) on the curbside in front of the rear axle wheel. The pedestrian barrier shall be designed to push pedestrians away from the curbside rear wheel.

### **3.24 TELEMATICS**

The Contractor shall provide a data monitoring system by ViriCiti, making use of the ViriCiti Datahub onboard vehicle telematics device. The service shall collect information on energy management, route data, driver information, average passenger loads, and vehicle data (including fault codes). The monitoring system shall be fully compliant with version 2.0 or later of the Open Charge Point Protocol (OCPP) standard. In addition to complying with OCPP, the vendor shall also provide real-time driver information, real-time passenger information, and real-time route information through the vehicle J1939 connection or an API from Conduent to the ViriCiti data monitoring system.

The ViriCiti Datahub shall interface with the SFMTA's HxGN EAM asset management system through an API or other means to retrieve bus status and any associated status descriptions for display on ViriCiti's telematics dashboard. ViriCiti shall also provide odometer mileage data to the SFMTA HxGN EAM asset management system through an API or other means. Frequency of data uploads to and downloads from HxGN EAM shall be subject to approval by the SFMTA.

The Contractor shall provide a five-year subscription for ViriCiti, which includes the core vehicle and charging station packages as well as the optional driver behavior, maintenance, and smart charging packages.

### **3.25 UNINTERRUPTIBLE POWER SOURCE**

The contractor shall integrate a 12VDC Lithium-Ion uninterruptible power source after the ignition is shut off capable of providing sufficient back-up power for the mobile radio/AVL system, the Digital Video Recording and Surveillance system, and Cradlepoint router. The back-up power shall provide a minimum of 90 minutes for the mobile radio/AVL, 30 minutes for the Digital Video Recording and Surveillance system, and 240 minutes for the Cradlepoint router. The power source and controller design shall be approved by the SFMTA. This uninterruptible power source is included in the DVRS Bill of Materials.



## 4 OPERATOR'S AREA

The objective of designing the operator's area is to provide an environment for the driver to operate the Coach safely and efficiently for long periods of time without injury and with minimal fatigue. The operator's area shall also be designed to minimize glare to the extent possible; no mirrors or viewing areas shall be unusable due to glare under normal day or night operation. The use of polished metal and light-colored surfaces within and adjacent to the operator's area shall be avoided. To the extent practicable, areas that are visible from outside the Coach in the vicinity of the dash panel and cowl shall be configured to preclude use for storage of items. The Contractor shall present the complete detailed layout of the operator's area at the design review for approval by the SFMTA.

The Contractor shall construct a mock-up of the operator's area or provide a render or engineering drawing of the operator's area for approval by the SFMTA prior to the manufacture of each prototype Coach.

### 4.1 CONTROLS

All switches and controls shall be in convenient and accessible locations for the operator and shall either be marked with easily read backlit identifiers or shall be easily legible at night. All panel-mounted switches and controls shall be replaceable, and the wiring at these controls shall be serviceable from the vestibule or the operator's seat. Switches, controls, and instruments shall be dust and water resistant, consistent with the Coach washing practice described in Section 2.3, INTERIOR TRIM, PANELING AND ACCESS unless otherwise approved by the SFMTA. All operator controls shall be in positions where the operator can activate and deactivate them without reaching below the dash level and shall be in a position that the operator's body cannot contact them while entering and existing the control station, or while operating the Coach.

#### 4.1.1 Operator Control

SFMTA Operations personnel will be heavily involved with the final approval of the operator's area. All controls shall be identifiable by shape, touch, and permanent non-wear or fading identification markings. Specific requirements for operator controls are summarized in Figure 4-1 (Operator Control Requirements). All required switches and controls are included in Figure 4-2 (Operator Switches and Controls) and shall be rated for heavy duty automotive applications.

No wiring, equipment or housings shall interfere with the operation of foot-controlled switches or pedals. Controls and all dash features shall be designed so that the operator or passengers may not easily tamper with them. The layouts of all control areas must be approved by the SFMTA.

**4.1.2 Instruments**

Vehicle speed, indicator lights, and air pressure gauges for primary and secondary air tanks shall be located on the front cowl immediately ahead of the steering wheel and may be either analog or displayed on a digital screen. Illumination of the instruments shall be simultaneous with the marker lamps. Glare or reflection in the windshield, side window, or front door windows from the instruments, indicators, or other controls shall be minimized. All instruments and indicators (including those shown on the LCD screen) shall be easily readable in direct sunlight. Instrument and indicator light readability in all conditions will be approved by the SFMTA during prototype evaluation.

The instrument panel shall include a speedometer with a maximum possible indicating speed of no less than 75 mph that is arranged in increments of five mph.

The instrument panel shall display the ESS state of charge and the voltage of the 12 volt and 24 volt batteries. The Bus shall report ESS SoC as 100% when the bus is fully charged. A display in the instrumental panel or on the dash shall be able to show exit door activities via the surveillance camera system when the exit doors are open. The same display shall also show a view behind the coach via the rear exterior surveillance camera when the coach is in reverse. The latency of the backup camera and exit door camera displays shall be less than 50 milliseconds. For 60-ft buses, the display shall be capable of receiving triggers from three sources (backup camera, rear exit door camera, and middle exit door camera).

The instrument panel wiring shall be easily accessible for service from the operator's seat or from the top of the panel. Wiring shall have sufficient length and be routed to permit service without stretching or chafing the wires.

**FIGURE 4-1 OPERATOR CONTROL REQUIREMENTS**

SUBJECT	SPEC/DESIGN
Steering wheel adjustment	2.5" vertical minimum; 6" horizontal steering, or as otherwise approved by the SFMTA
Steering wheel	18" to 20" diameter unless otherwise approved by the SFMTA
5 <sup>th</sup> percentile acc. pedal angle at rest	Conform to SAE J287-J941-J1052 and J1522
5 <sup>th</sup> percentile brake pedal angle at rest	Conform to SAE J1516
95 <sup>th</sup> percentile acc. pedal angle at rest	Conform to SAE J1516
95 <sup>th</sup> percentile brake pedal angle at rest	Conform to SAE J1516
Turn signal controls left foot	35 - 45 degrees from horizontal
Control accessibility – side	Conform to SAE J287
Control accessibility – front	Conform to SAE J287
Seat height adjustment	13" – 19" from floor to top of uncompressed seat
Seat adjustment forward	Min. 9"

Object detection	42" height at 26" in front of Coach
Horizontal view	Min. 90 degrees
Obstruction – divider	Less than 3 degrees obstruction to field of view
Obstruction – pillar	Less than 10 degrees of binocular obscuration
Upward view	15 degrees minimum
Brake	Range of resistance: 10 – 80 lbs. Angle from horizontal: 45 degrees. Free play: 1.2 degrees. Pedal travel: 0.5" – 2.5". Height above accelerator: 1.2".
Accelerator	Range of resistance: 4 – 10 lbs. Angle from horizontal: 45 degrees. Free play: 5 degrees. Maximum travel: 20 degrees

**FIGURE 4-2 OPERATOR SWITCHES AND CONTROLS**

<b>SWITCHES</b>
Master run switch
Start button (if applicable)
Kneel switch
Over raise feature
Hill holder switch
Interior lighting switch
Wheelchair ramp switch
Power door switch
Operator area lighting switch
Hazard light switch
Pedal adjustment
Silent alarm switch
Speaker selection switch
Hazard warning switch, with extension arm
Rear door override switch
Foot-controlled turn signal switches
Horn button in steering wheel hub
Foot-controlled headlight switch
Fire suppression system manual activation switch
Temporary interior lighting switch ("sweeper switch")
Event marker button
High beam switch
Regen disable switch (not to be accessible in operator area)
Interlock override switch (see Section 4.1.4.3 for location)

<b>CONTROLS</b>
-----------------

Accelerator pedal
Brake pedal
Door controller
Windshield wiper control
Windshield washer control
Interior climate control
Defroster control
Operator's heater controls
Parking brake control
Wheelchair ramp controls
Harris radio MDT
Destination sign controls
Exterior side mirror adjustment control
Instrument panel lighting intensity control

**4.1.3 Indicators**

Critical systems or components shall be monitored by a built-in diagnostic system with visible and audible indicators. The diagnostic indicator lamps shall be in clear sight of the operator. The intensity of indicator lamps shall permit easy determination of "on"/"off" status in bright sunlight but shall not cause a distraction or visibility problem at night. All analog indicators shall be illuminated using backlighting. Whenever possible, sensors shall be of the closed-circuit type so that failure of the circuit or sensor shall activate the malfunction indicator. Sensors shall be accurate to +/- two percent of the manufacturer's specified value. 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. Diagnostic indicators are listed in Figure 4-3 (Onboard Diagnostic Indicators).

**FIGURE 4-3 ONBOARD DIAGNOSTIC INDICATORS**

VISIBLE INDICATOR	AUDIBLE ALARM	FUNCTION
Low coolant	Yes	Coolant pressure low
Battery overheating	Yes	Battery coolant temperature high
Low air	Yes	Air system low in primary or secondary reservoir
Kneel	Yes	Kneeling system activated
Wheelchair ramp	Yes	System activated
Fire	Yes- 75 dB (min)	Over critical temperature in service compartment
Low hydraulic fluid	Yes	Hydraulic fluid low fluid level
Check system and stop system indicator	Yes	Check System and Stop System indicator.
Mobility aid passenger exit signal	No	Mobility aid passengers want to get off
High headlamp	No	High headlamp is on
Right and left turn	Yes, with disable switch	Indication of left turn or right turn
Hazard warning	No	Warning signal to other drivers (may be common with turn indicators)
Rear doors open or enabled	No	Rear doors are opened
Parking brake not applied	Yes- 75 dB (min)	Parking brake is not applied and master run switch is at "OFF" position
Parking brake applied	No	Parking brake is applied
Seat belt	Yes	Warning signal to operator for not wearing seat belt
Interlock is off	Yes	Interlock is turned off
Service brake applied	No	Service brake is applied (may be common with parking brake indicator)
Energy storage unit temperature	Yes	Warning of high temperature and/or fire and/or smoke condition
Energy use	No	Dynamic energy usage efficiency indicator(s)
Low HV isolation	Yes	voltage system
Controller	Yes	Overheat
Low State of Charge (SOC)	Yes*	Progressive low power indicator(s). *Indicator at 20%; audible alarm at 5%. Final configuration to be approved by the SFMTA.
Estimated range remaining	No	Indication of estimated range remaining on state of charge.
Wait to start (if applicable)	No	Indicates Bus electric drive is not ready to be started
Door obstruction sensor	Yes	Indication of rear door sensitive edge activation
High voltage system fault	No	Detects high voltage faults and initiates drive system shutoff and battery disconnection.
ABS failure	No	Detects failure in ABS system
HVAC failure	No	Detects failure in HVAC system
Charging system low/high	No	Detects a fault in the charge rate, initiating a time-delay shutoff if necessary

**4.1.4 Door Controls**

Controls for the front entrance and rear exit doors shall be either a single 5-position master door switch or a push button control, conveniently located and operable in a horizontal plane by the operator's left hand. The setting of this control shall be easily determined by position and touch. The 5-position master door switch shall also activate the hazard light whenever the switch is not in the "centered" position. In the case of the push button control, the hazard light shall be activated whenever the front or rear doors are opened or enabled. The 5-position master door switch shall have the following settings:

**FIGURE 4-4**

Switch Position	Door Function
Second position forward	Front door open and rear doors enabled
First position forward	Front door open and rear doors disabled
Centered	Front door closed and rear doors disabled
First position rearward	Front door closed and rear doors enabled
Second position rearward	Front door open and rear doors enabled

Contractor shall provide push buttons on the outside of the Vehicle on each exit door. While the rear exit doors are enabled to open, passengers on the outside of the Vehicle shall be able to push the buttons to open the door. With the rear door override switch enabled from the operator's area, the rear exit door will open and remain open if the rear exit doors are enabled by the master door switch.

Contractor shall provide the complete door control design for SFMTA approval.

**4.1.4.1 Door Operations**

The door design, configuration, locations, operation, and mounting installations must be approved by the SFMTA.

A separate switch, convenient to the operator, shall convert the rear doors to power doors with simultaneous opening and closing of both door valves controlled by the operator.

Doors shall open or close completely within 2 – 4 seconds from the time of actuation and shall be subject to the adjustment requirements of Section 3.2.6 (Actuator).

The rear exit door panels shall include a sensitive edge for the purpose of alerting the operator and reversing door operation in the event an individual or object gets caught between the doors on closure. The sensitive edge will activate a toned alarm in the operator's area, and immediately open the exit door. Once the obstruction is cleared, the operator will be required to recycle the door controller to the open position before being able to again activate closure of the doors. Detailed specifications are listed in 3.2.8 (Sensitive Edges).



#### **4.1.4.2 Interlock**

When any door controls are activated, an accelerator interlock shall inhibit the acceleration of the Vehicle, and a braking interlock shall engage the rear axle service brake system once the vehicle reaches two mph or below. The interlocks shall not release until the front and rear doors have closed and the operator has positioned the door control to the "all doors closed" position. If the Vehicle is not stationary when the interlock is engaged, a loud, momentary alarm will sound. Reference Section 6.1.2 (Propulsion System Interlocks).

#### **4.1.4.3 Interlock Override Switch**

An interlock override switch, enclosed in the front destination sign compartment or located on the street side overhead panel above the driver, shall, when set in the disable position, release and deactivate the door interlocks, allowing the release of the inhibited throttle, and enabling the front doors. An audible alarm shall be activated when the override switch is in the disable position. The design, terminology, and location of the interlock override switch must be approved by the SFMTA during design review.

#### **4.1.5 Steering Wheel and Horn Button**

The steering wheel shall last the life of the Coach, and shall be constructed of a hard, smooth black material impervious to, cleaning fluids, and body acids. The steering wheel shall be no less than 18 inches in diameter and shall be shaped with a soft rim grip for comfort for long periods of time. Steering wheel spokes and wheel thickness shall ensure visibility of the dashboard so that vital instrumentation is clearly visible at center neutral position (within the range of a 95th-percentile male, as described in SAE J1050, Sections 4.2.2 and 4.2.3). The steering column shall be capable of a minimum six-inch horizontal adjustment and a 1.8-inch vertical adjustment from the operator seat. Clearance requirements shall be met in all positions; reference Section 5.2.2 (Turning Effort).

Dual electric horns shall be provided and be mounted to prevent entry of water and dirt into the horn trumpets. The horns shall sound high and low notes that match the SFMTA's existing bus fleet and are clearly audible over 80 dBA traffic noises from 300 feet away. The horn button shall be in the steering wheel hub and shall be protected from debris accumulation and shall not incorporate any manufacturers' logo.

The steering wheel and horn shall be approved models from Vehicle Improvement Products.

#### **4.1.6 Accelerator and Brake Pedal**

Contractor shall install an adjustable pedal system by Kongsberg or approved equal. The adjustable pedal system shall permit the brake and accelerator pedals to simultaneously slide three inches forward or rearward. The adjustment shall be made via a dash mounted toggle or rocker switch. The switch shall be clearly labeled to identify it as pedal adjustment and shall be within easy reach of the operator. The design and locations shall be determined during the design review process.

Accelerator and brake pedals shall be designed for ergonomic use and shall meet the recommendations in SAE J1516. Foot surfaces of the pedals shall be faced with wear-resistant, nonskid, replaceable material. Force to activate the brake pedal control shall be an essentially linear function of the Coach deceleration rate and shall not exceed 80 pounds at a point seven inches above the heel point of the pedal to achieve maximum braking. The heel point is the location of the driver's heel when foot is rested flat on the pedal and the heel is touching the floor or heel pad of the pedal. Brake and accelerator design shall refer to Figure 4-1 (Operator Control Requirements).

#### **4.1.7 Master Run Switch**

Controls for propulsion operation shall be closely grouped within the operator's area. These controls include a separate master run switch may include an additional start switch or button. The master run switch shall be a four-position (Stop Propulsion/Day Run/Night Run/Park) rotary switch located conveniently to the operator's left.

The "Accessory Park" mode shall enable the operator to keep critical systems active while keeping the bus parked. Contractor and the SFMTA shall determine which systems are powered while "Accessory Park" mode is enabled.

#### **4.1.8 Hill Holder**

The Contractor shall provide an automatic hill holding system, but if manual control is necessary, the hill holder control shall be conveniently located to the operator's left. Reference Section 5.3.8 (Hill Holder).

#### **4.1.9 Turn Signal**

Turn signal controls shall be foot-controlled, water-resistant, heavy-duty momentary contact switches, floor-mounted on a platform in a manner that precludes confusion between the left turn, right turn, and high-beam switches. Whenever a turn signal control is activated, an external audible warning shall sound to warn other drivers that the Coach is preparing to make a turn. The external audible curbside turn signal alarm shall be located on the exterior of the Bus in an optimal audible location and shall sound whenever the turn signal is activated.

The Contractor shall install two independent override toggle switches, one for the left turn beeper and one for the right turn beeper, in a secured locking compartment on the Vehicle, only accessible by mechanics (see Figure 4-2 Operator Switches and Controls). The location shall be reviewed and approved by the SFMTA.

#### **4.1.10 Silent Alarm**

Contractor shall install a silent alarm switch (OTTO Engineering part number P4-614122 or approved equal). Approved equal switches should meet IP68 water and dust resistance requirements. The switch shall be located in an approved location below the seat cushion level

on the street side console of the operator's area and shall be protected from accidental activation by a guard. When the silent alarm switch is activated, the following events shall occur:

- The DVR shall produce a time stamp corresponding to the emergency event marking a window of recorded data that extends beyond the beginning and ending of an event.
- SFMTA Central Control shall be alerted through the AVL system.

## 4.2 OPERATOR SEAT

The operator seat shall be a RECARO Ergo Metro AM384, modified to meet the specifications listed below in Section 4.2.1, Dimensions and Adjustability, or approved equal. It shall be easily removable from the Coach for service or repair. A non-removable headrest is required; however, it shall be easily removed and installed by a mechanic. Installation must be approved by the SFMTA.

The Contractor shall install a parking alert alarm on the Bus. The alarm shall sound if the Operator unbuckles the seatbelt and leaves the operator seat without engaging the parking brake. The Contractor may utilize the seat belt fastening as the sensing element; however, the SFMTA prefers that a switch or sensor in the seat itself be used to sense the operator's presence. The Contractor is required to submit their proposed parking alert alarm methodology to the SFMTA for review and approval.

### 4.2.1 Dimensions and Adjustability

The operator's seat shall be adjustable so that persons ranging in size from the 95th percentile male to the 5th percentile female may safely and comfortably operate the Coach. The operator's seat cushion shall have a minimum width of 18 inches, a depth of 16 inches and a rearward slope with a total range of adjustability of 10 degrees. The operator seatback height, measured from the point of intersection of the uncompressed seat cushion with the seatback to the top of the back, shall be a minimum of 23 inches. The angle formed between the seat back and the seat cushion shall be adjustable in the range of 95 to 120 degrees. The height of the seat shall be adjustable so that the distance between the top of the uncompressed seat cushion and the floor shall vary between 12 and 20 inches. The height of the lumbar support from the seat shall vary between 9 and 12 inches. The seat shall be adjustable forward and rearward for a minimum travel of 9 inches and shall provide a minimum of 33.5 inches of horizontal distance between the seat reference point and heel of the driver on accelerator pedal. While seated, the operator shall be able to make all adjustments by hand, easily and conveniently. Adjustment mechanisms shall hold the adjustments and shall not be subject to inadvertent changes.

### 4.2.2 Structure and Materials

The operator's seat shall be contoured to provide maximum comfort and safety for extended periods of time. Cushions shall be padded with at least three inches of closed cell molded self-skinning polyurethane on the seat cushion and seat back and shall comply with FMVSS fire and smoke requirements. Supplementary cushioning shall be provided by air suspension of the seat assembly. The spring rate of the supplementary suspension and the seat height shall be

independently adjustable by the operator. Seat suspension shall effectively dampen road shock, so the seat shall not oscillate excessively during normal driving conditions, including passing over potholes. Upholstery shall be H012 Hampton Black Vinyl, or approved equal, and must be approved by the SFMTA during prototype review.

The seat shall be adjustable without unfastening the seat belts. The seat shall be supplied with a belt assembly and a lap belt system and shall accommodate all drivers in all positions of the seat. Seat belts shall be stored in automatic retractors. The color of the operator seat shall be black, and the seat belt shall be orange.

### **4.3 OPERATOR'S VENT AND HEATER/DEFROSTER**

A dedicated operator-controlled heater and blower shall be provided to heat the operator area and defrost the windshield. The unit shall be sized and designed to operate in the San Francisco environment while providing a comfortable work area during normal transit operation. The blower shall have at least two speeds. Adjustments shall permit variable distribution or shutting off the airflow. The windshield defroster unit shall comply with the SAE recommended practices J381 and J382. If the proposed ventilation system does not meet these requirements, the Contractor shall submit their proposed system to the SFMTA for final approval. Placement and modes of operation for the ventilation system must be approved by the SFMTA.

Contractor shall demonstrate the operator's area heating and ventilation system's compliance with the specification.

### **4.4 OPERATOR WINDOWS**

#### **4.4.1 Windshield**

The windshield shall permit an operator's field of view as specified in SAE Recommended Practice J1050. The vertically upward view shall be at least 14 degrees, measured above the horizontal and excluding any shaded band. The vertically downward view shall permit detection of an object 42" high at no more than 24" in front of the Coach. The horizontal view shall be a minimum of 90 degrees above the line of sight. Windshield pillars shall not exceed 10 degrees of binocular obscuration. The windshield shall be designed and installed to minimize external glare as well as reflections from inside the Coach.

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

#### 4.4.2 Side Window

The operator's side-window shall consist of 3/16 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 entire side window area shall contain a two-section sash. The front and rear sections shall slide horizontally and be glazed with float-type, single-density, tinted safety glass with approximately 73 percent light transmittance. The assembly shall have a ratchet mechanism to prevent uncontrolled sliding. The window tracks, channels, and seals shall be designed to last the service life of the Coach. Contractor shall provide glass dimensions and specifications. The side window shall be equipped with a visor or approved equal. The design of the operator's side window and locking arrangement must be approved by the SFMTA.

#### 4.5 MIRRORS

##### 4.5.1 Exterior

The Coach shall be equipped with a pair of corrosion-resistant exterior rearview mirrors mounted to the exterior of the Coach. Both mirrors shall be Hadley or an approved equal. Both mirrors shall be remote adjustable. The mirrors shall be separately adjustable and replaceable. The mirrors shall permit the operator to view the highway along both sides of the Coach, including the rear wheels. The exterior rearview mirrors should have turn signals embedded to the mirror lens. Both mirrors shall be mounted on swivel arms with their lower edges no less than 76 inches above the street surface.

Mirrors shall be firmly attached to the Coach to prevent vibration and loss of adjustment, but not so firmly attached that the Coach or its structure is damaged if the mirror is struck, and the mirrors shall retract or fold sufficiently to allow Coach-washing operations. Wiring for exterior mirrors shall utilize Quick Disconnect Connectors located as close as possible to the mirror for ease of maintenance or replacement. The mirrors shall be mounted on spring-loaded brackets and be guarded from hitting the Coach sides in the retracted position. Mounting arms shall not protrude beyond the outside mirror edge. The mirrors, mirror bracket construction, mounting locations and installation must be approved by the SFMTA.

##### 4.5.2 Interior

Rear view and step well mirrors shall be provided and arranged so that the operator can observe passengers throughout the Coach without leaving the operator's seat and without shoulder movement. With a full standee load, including standees in the vestibule, the operator shall be able to observe passengers in the entrance and exit door areas, anywhere in the aisle, and in the rear seats. Interior mirrors shall not be in the line of sight to the exterior curbside mirror. Mountings shall be designed to resist flexing, vibration, and vandalism.

Interior observation shall be accomplished by a swivel-mounted flat rear-view mirror of 8 inches by 15 inches attached above and to the right of the operator's head. The locations of mirror mountings must be approved by the SFMTA, and Contractor shall demonstrate that the step well mirror does not encroach upon passenger doors during ingress/egress.

#### **4.6 PUBLIC ADDRESS SYSTEM**

The public address system shall be activated by an easily accessible floor-mounted momentary switch to permit the operator to make internal announcement and/or external announcement; switching from inside to outside speakers shall not require volume adjustment. Contractor shall provide a boom-style microphone or approved equal for the public address system. Reference Section 3.14 (Public Address System).

#### **4.7 OPERATOR'S AREA LIGHTING**

The operator's area shall have a light to provide general illumination, and it shall illuminate the half of the steering wheel nearest the operator to a level of 10 to 15 foot-candles. This light shall be controlled by a switch convenient to the operator.

A high-intensity bullet light mounted in the ceiling shall spotlight the money receptacle of the fare box when the front door is open and the master run switch is set to permit the Bus to drive.

#### **4.8 OPERATOR BARRIER**

An operator barrier in the operator's area shall be provided on all Buses. The barrier shall be designed to have no glare, reflection, and rattle during use. The barrier shall be from Arow Global or an approved equal. The final barrier design must be approved by the SFMTA during design review. Where visibility is required, clear Lexan type material or laminated safety glass can be used to comply with all FMVSS visibility and safety requirements. The design of the operator barrier must be approved during the design review and shall comply with all applicable regulations. The barrier color should be black or gray in color. The barrier shall meet the strength requirements described in Section 2.3.1 (Divider and Side Trim Panel). The latching mechanism shall be easily accessible to operators of all heights. The Contractor shall review the barrier on the existing SFMTA fleet prior to submitting a proposal for the SFMTA to review and approve.

#### **4.9 TRASH RECEPTACLE**

Contractor shall provide and install a trash receptacle; the design of the receptacle shall be approved by the SFMTA.

#### **4.10 SUN VISOR**

Contractor shall provide adjustable sun visors for use on the operator's front and side of the windshield. The front visor shall have 20 inches of travel. The side visor shall not obstruct the street side exterior mirror. Deployment of the visor shall not restrict vision of the rearview mirrors. Visor adjustments shall be made easily by hand with positive locking and releasing devices and shall not be subject to damage by over tightening.

Sun visor construction and materials shall be strong enough to resist breakage during adjustments. The visor, when deployed, shall be effective in the operator's field of view at

angles more than 5 degrees above the horizontal. Covering on the visor shall be black vinyl like that of the operator's seat.

#### **4.11 STORAGE LOCKER**

The contractor shall furnish and install one storage locker with latch in the curbside wheel well or in the operator area. The location and design of the storage locker must be approved by the SFMTA.

#### **4.12 OPERATOR'S PLATFORM**

The operator's platform shall be finished with no sharp edges and shall not interfere with or impede wheelchairs or other mobility aids. The SFMTA prefers that the Contractor provide operator's platforms similar in construction to those on the SFMTA's existing motor coaches.

The floor in the operator's area must be capable of being easily cleaned and shall be arranged to prevent debris accumulation. Floor covering shall be Altro Transflor TFFG2704F "Rocket" or approved equal.

## 5 CHASSIS

### 5.1 SUSPENSION AND AXLES

#### 5.1.1 General Requirement

All axle suspensions shall be pneumatic type and shall have a load rating compatible with that of the axles. The Coach should be equipped with an anti-sway bar or other equipment approved by the SFMTA to limit Bus sway. The basic elements of the suspension system shall last the life of the Coach without major overhaul or replacement. Suspension beams, weldments and structural members shall be considered as parts of the basic body structure. Suspension pivots shall be replaceable. Bushings shall be permanently lubricated and interchangeable at all positions. Adjustment points shall be minimized and shall not be subject to a loss of adjustment in service. Necessary adjustment shall be easily accomplished with minimum disassembly or removal of components. Caster and toe-in adjustments shall be possible without removal of any component.

#### 5.1.2 Axles

All axles shall have a minimum load rating sufficient for the Coach loaded to GVWR and shall operate for 200,000 miles on the design operating profile without repairs. The axle gearing shall be easily accessible for lubrication and the axle make and model must be approved by the SFMTA. Front and rear axles shall be M.A.N, ZF, Meritor, Rockwell, or other approved equal.

The front axle suspension system shall be a dropped beam type with hollow section. The Contractor may propose an alternate independent front suspension system.

The rear axle shall be a heavy-duty non-steerable type. End tubes shall be removable and shall be threaded to allow for adjustment of wheel bearing nuts. The lubrication drain plug shall be magnetic type.

Reusable axle hub bolts are preferred.

Minimum axle load ratings are encouraged to be rated so that GVWR is maximized.

#### 5.1.3 Wheel Bearings

Wheel bearings shall provide smooth, low friction rotation of the wheels under all operating conditions. The wheel bearings shall be easily accessible, maintainable, and replaceable. All bearings shall be sealed properly to prevent leakage of lubricant and shall not leak or weep lubricant when operating on the design operating profile for the duration of the initial manufacturer's warranty. The non-drive axle bearings shall be grease unitized bearings by SKF, Inc., FAG, or approved equal.



#### 5.1.4 Air Bellows

The air suspension system shall consist of at least two, and preferably four, air bellows per axle. The system shall use leveling valves and bellows to maintain constant spring characteristics and Coach body height, regardless of Coach loading. Leveling valve exhaust ports shall be guarded to avoid plugging with road dirt.

Air bellows shall be removable, replaceable, and serviceable without removal of any wheels while the Coach is on standard in-ground hoists, above ground hoists or in a pit area. The make and model of the air bellows shall be approved by the SFMTA.

#### 5.1.5 Travel

The suspension system shall permit a minimum wheel travel of 2.75 in. jounce (upward travel) of a wheel when the bus hits a bump (higher than street surface), and 2.75 in. rebound (downward travel) when the bus comes off a bump and the wheels fall relative to the body. Elastomeric bumpers shall be provided at the limit of jounce travel. Rebound travel may be limited by elastomeric bumpers or hydraulically within the shock absorbers. Suspensions shall incorporate appropriate devices for automatic height control so that regardless of load the Bus height relative to the centerline of the wheels does not change more than ½ in. at any point from the height required. The safe operation of the Bus cannot be impacted by ride height up to 1 in. from design normal ride height.

#### 5.1.6 Damping

Vertical damping of the suspension system shall be accomplished by hydraulic shock absorbers mounted to the suspension arms or axles and attached with replaceable bolts and nuts to appropriate locations on the chassis. Damping shall be sufficient to control Coach motion to three cycles or less after hitting road perturbations. The damper shall incorporate a secondary hydraulic rebound stop.

Shock absorbers shall maintain their effectiveness for at least 50,000 miles and each shock absorber unit shall be individually replaceable by a mechanic in less than 30 minutes. Variations in passenger loading shall not adversely affect the handling characteristics of the Coach sufficient to classify it as dangerous, unsatisfactory, or uncontrollable.

#### 5.1.7 Kneeling

The Coach must kneel at the front axle when commanded. The operator-actuated kneeling device shall lower the step at the front door to a height of no more than 12 inches, measured at the longitudinal centerline of the front door to the ground. Brake and throttle interlocks shall prevent movement when the Coach is kneeled. The kneeling control shall be disabled when the Bus is in motion. The kneeling controls shall not be operational while the wheelchair ramp is deployed. A three-position, spring-loaded, normally centered switch located in the operator's area shall control kneeling of the Coach. A downward force on the switch shall activate the

kneeling function. The Coach shall complete kneeling in a maximum of five seconds from the time the switch is activated. During the lowering and raising operations, the maximum acceleration shall not exceed 0.2g, and the jerk shall not exceed 0.3g per second, when measured on a front step tread.

An indicator, visible to the operator, shall be illuminated whenever the Coach is too low for safe street travel and the interlocks are engaged. An audible alarm and visual signal mounted near the door pillar shall operate when the Coach's kneeler is in motion. The audible alarm shall be a different frequency than other alarms and beeper. The sound and operation of this alarm must be approved by SFMTA at the design review. A warning light mounted near the curbside of the front door, a minimum 2-inch 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 Coach shall remain kneeled when the control switch is released. An upward force on the switch shall be required to raise the Coach. The Coach shall rise to the correct operating height within seven seconds regardless of load up to GVWR.

#### **5.1.8 Over-Raise Feature**

Due to the topography of the SFMTA Bus routes, the Contractor shall provide an over-raise switch on the side-panel console of the Operator platform. The over-raise feature shall be activated and shall sustain its raised height while the Bus is within a predetermined speed range. The over-raise feature shall be de-activated once the Bus speed exceeds the allowable speed limit. The SFMTA prefers that the over-raise feature have the capability to activate while the Vehicle is in motion during low-speed operations. The design and operation shall be determined and approved by the SFMTA at the design review.

The over-raise feature shall allow the Buses to traverse all routes in the SFMTA service areas without scraping the pavement.

#### **5.1.9 Lubrication**

All elements of steering, suspension, and drive systems requiring scheduled lubrication shall be provided with grease fittings conforming to SAE Standard J534. These fittings shall be located for ease of inspection and shall be accessible with a standard grease gun with flexible hose ends, from a pit or with the Coach on a hoist. Each element that requires lubrication shall have its own grease fitting with relief path. The lubricant specified shall be standard for all elements on the Coach to the greatest extent possible. The manufacturer shall supply the SFMTA with a maintenance schedule and protocol.

### **5.2 STEERING**

Buses shall be equipped with electrically-driven hydraulic power steering systems. The steering column shall have telescoping and tilt column adjustments. The steering gear shall be an

integral type with the number and length of flexible hydraulic fluid lines minimized. Fatigue life of all steering components must exceed 1,000,000 miles.

Alternative power steering systems submitted as approved equals must have similar performance, durability, housing size, height, and telescoping range. System shall be wired so that the controlling ECU correctly recognizes straight wheel position even after the Bus has been shut off.

### **5.2.1 Strength**

Fatigue life of all mechanical steering components shall exceed the service life of the Coach. No element of the mechanical steering system shall fail before suspension system components when one of the tires strikes a severe road hazard. The mechanical steering system shall be considered as part of the basic body structure.

### **5.2.2 Turning Effort**

Steering effort shall be measured with the bus at GVWR, stopped with the brakes released and the engine at normal idling speed on clean, dry, level, commercial asphalt pavement and the tires inflated to recommended pressure. Under these conditions, the torque required to turn the steering wheel 10 deg shall be no less than 5 ft-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 Coach in operation, the steering effort shall not exceed 55 pounds at the steering wheel rim, and perceived free play in the steering system shall not materially increase because of power assist failure. Gearing shall require no more than seven turns of the steering wheel lock-to-lock.

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

## **5.3 BRAKES**

### **5.3.1 Description**

The Bus shall have air actuated disc brakes. The disc brake system and replacement parts shall be commercially available in North America.

### **5.3.2 Actuation**

Service brakes shall be compressed air operated and controlled with a single actuator at each wheel. Force to activate the brake pedal shall be as specified in Section 4.1.6 (Accelerator and Brake Pedal).

Disc brakes shall have either axial or radial air actuation with a single floating caliper operation.

### 5.3.3 Friction Material

The entire service brake system, including friction materials, shall be designed to have an overhaul or replacement life of 30,000 miles with brake retardation through regenerative braking. Disc pad friction material shall be non-asbestos and be bonded directly to the pad. Brake pads shall meet all requirements for sale in California.

### 5.3.4 Rotors

Brake rotors shall be sized to the Vehicle weight and wheel diameter and meet all FMVSS requirements. The brake rotors shall be able to be resurfaced in the field and have the minimum thickness size stamped in the casting.

Wheel bearing seals shall run on replaceable wear surfaces. Wheel bearing and hub seals shall not leak or weep lubricant for 50,000 miles when running on operating profile.

### 5.3.5 Brake Adjustment

Disc brakes shall not require in-service adjustment and have mechanical or electronic brake wear indicators for lining thickness on each brake assembly.

### 5.3.6 Parking Brake

The parking brake shall be spring-applied and air-released, controlled by manual valve (Bendix or approved equal), and shall be mounted on the left side of the driver's seat. The design and location must be approved by SFMTA.

The parking brake system shall hold the Coach loaded to GVWR in both forward and rearward directions on a 21 percent grade for a 40-ft bus and an 18 percent grade for a 60-ft bus. This brake shall comply with FMVSS-121 requirements. A separate "Parking Brake Applied" (see Section 4.1.3: Indicators) indicator with audible alarm shall be provided on the panel and it shall:

- Activate an interior audible warning alarm and blinking warning lights if the parking brake is not applied and the Master Run Switch is set to the "Off" position (see Section 4.2: OPERATOR SEAT). A visual message on the dash may replace the alarm if approved by the SFMTA.
- Illuminate the "Parking Brake Applied" indicator upon activation of the control.

### 5.3.7 Anti-Lock Braking System with Traction Control

The Bus shall be equipped with an all-wheel anti-lock braking system with traction control by Rockwell, Wabco, Bendix or approved equal.

### 5.3.8 Hill Holder

A hill holder system shall be incorporated into the braking system. If configured for manual operation, control of the hill holder shall be via a momentary toggle switch located to the left of the operator. The hill holder may also function automatically via application of the brake pedal while the vehicle is stopped. Activation of the hill holder system shall engage the same rear service brake system as the interlock system described in Section 4.1.4.2 (Interlock). The hill holder shall hold the bus loaded to GVWR in both forward and rearward directions on the steepest grade that the bus is capable of climbing. Regardless of whether the hill holder is configured for automatic or manual operation, accelerator operation shall not be affected by activation of the hill holder. Activation of the hill holder shall light the brake lamps and prevent roll back.

### 5.3.9 Anti-Rollback System

Contractor shall provide a system for preventing the Bus from rolling backwards on hills if the operator does not manually apply the brakes. The function and design of this system shall be approved by SFMTA during the design review period.

### 5.3.10 Brake Jerk

Jerk, the rate of change of acceleration measured at the centerline at the floor level of the Coach, shall be minimized throughout acceleration and regenerative braking or other methodologies of auxiliary braking and shall be no greater than 0.3 g/sec for the duration of a quarter-second or more.

## 5.4 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 be smooth and shall not cause jerking or sudden changes in acceleration of the Bus. Actuation of ABS and/or automatic traction control (ATC) may override the operation of the regenerative brake. Energy regeneration shall not cause the driver to lose control of the Coach regardless of the surface coefficient ( $\mu$ ) that the Coach is being operated on.

Brake lights shall illuminate when regenerative braking is activated.

The SFMTA prefers that regenerative braking shall become engaged (with a resulting deceleration of no greater than 0.03 g) when the accelerator pedal is completely released. When the brake pedal is depressed to engage the service brakes, the resulting maximum deceleration from regenerative braking shall be 0.13 g. The resulting deceleration specified shall include the effects of regenerative braking, wind resistance and rolling resistance.

The Contractor shall ensure that the regenerative braking functionality is not impacted by the state of charge of the ESS. Contractor may opt to limit the ESS capacity so that regenerative braking is always available on the Bus or shall propose an alternate solution at the design review.

Braking effort derived from energy regeneration or dynamic braking shall be smoothly blended with the standard air braking system such that the braking response of the Vehicle is like that of a conventional diesel bus and requires no additional driver skill or training to operate beyond that of a conventional diesel bus.

Regenerative braking force shall remain consistent and predictable to the operator. The system shall be designed in a manner to effectively dissipate excess energy while providing consistent auxiliary braking.

## **5.5 AIR SYSTEM**

The Coach air system shall operate all accessories and the braking system with reserve capacity. New Buses shall not leak down more than five psi as indicated on the instrument panel mounted air gauges, within 15 minutes from the point of governor cut-off. The air system shall be equipped with check valves and a pressure protection relief valve to assure partial operation in case of line failures. Load and demand calculations shall be submitted to the SFMTA for approval.

Provision shall be made to apply shop air to the Coach Air systems through Amflo CP1 male fittings or approved equal. 1/4" Amflo CP1 or approved equal plugs shall be conveniently located in the motor compartment and behind the front bumper. The Contractor may submit alternative locations for air plugs for approval by the SFMTA. Metal identification plates shall be placed near the plugs to identify the connections. Final locations of the plugs must be approved by the SFMTA during prototype review.

### **5.5.1 Air Compressor**

The air compressor shall be a rotary scroll or rotary screw compressor. The air compressor shall have the capacity to charge the air system from 40 psi to the governor cutoff pressure in less than four minutes. The compressor output rating shall be sized accordingly for normal transit operation including but not limited to braking, door operation, air suspension and all other components requiring pneumatic power. The output rating shall be explained and presented to the SFMTA for approval during design review.

### **5.5.2 Air Lines and Fittings**

Air lines, except necessary flexible lines, shall conform to the installation and material requirements of SAE Standard J1149 for copper tubing with standard, brass, flared or ball-sleeve fittings, or SAE Standard J844 for nylon tubing if not subjected 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. Air lines shall be cleaned and blown out

before installation and shall be installed to minimize air leaks. All air lines shall be sloped toward a reservoir and routed to prevent water traps.

The SFMTA prefers that nylon tubing is installed in accordance with the standard color coding in Table 5.5.2. If the Contractor has different color-coding system other than what is listed in Table 5.5.2, then the Contractor shall submit their color-coding system to the SFMTA for review.

**TABLE 5.5.2**

GREEN	Indicates primary brakes and supply
RED	Indicates secondary brakes
BROWN	Indicates parking brake
BLACK	Indicates accessories
BLUE	Indicates suspension
YELLOW	Indicates compressor/governor

Nylon lines may be grouped and shall be supported at 30 in. intervals to prevent movement, flexing, tension strain, or vibration. Copper lines shall be supported by looms at intervals of no greater than five feet to prevent movement, flexing, tension strain, and vibration. Copper lines shall be prevented from touching one another or any component in the Coach. To the extent practicable and before installation, the copper lines shall be pre-formed 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, to avoid fatigue of the tubing.

Flexible hoses shall be as short as practicable and individually supported. They shall not touch one another or any part of the Coach except for the supporting grommets. Flexible lines shall be supported at 30” intervals or less. Grommets for bulkhead fittings shall protect the air lines at all points where they pass through under structure components.

The compressor discharge line between the air compressor and the bulkhead shall be flexible convoluted copper or flexible Teflon hose with a braided stainless steel jacket. End fittings shall be standard SAE or JIC brass or steel flanged, reusable, swivel-type fittings.

All hoses and lines shall contain adequate separation to ensure no contact between lines.

**5.5.3 Air Reservoirs**

Air reservoir tanks shall supply air for the Vehicle’s air suspension system, door operating mechanism and brake system.

All air reservoirs shall meet the requirements of FMVSS Standard 121 and SAE Standard J10. The air tanks shall include drain valves that are easily accessible. Major structural members shall be provided to 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.

### 5.5.4 Air Dryer

A QBA series air dryer from Wabtec, Bendix or approved equal, shall meet the following requirements:

- A. Dryer shall be sized for the air system volume and compressor capacity.
- B. Continuous flow capacity based on continuous inlet temperatures of 200°F.
- C. Dryer shall have an ambient operating temperature range from -40°F to 150°F
- D. Dryer shall have a filtration package that conditions the air before the towers. This includes a pre-filter for bulk carbon, oil and water removal and a coalescing filter with a 99.9% efficiency rating for the removal of water and oil aerosols down to .03 micron and dirt and carbon down to .3 micron.
- E. An automatic discharge for accumulated contaminants.

### 5.6 HYDRAULIC SYSTEM

All hydraulic systems shall demonstrate a mean distance between repairs greater than 50,000 miles. Hydraulic system service tasks shall be minimized and scheduled no more frequently than those of other major Coach systems. All elements of the hydraulic system shall be easily accessible for service or unit replacement. A priority system shall prevent the loss of power steering during operation of the Coach if other devices are powered by the same hydraulic system.

The hydraulic system shall operate within the allowable temperature range as specified by the lubricant manufacturer.

Sensors in the main hydraulic system, excluding those in the power steering system, shall indicate on the driver's on-board diagnostic panel conditions of low hydraulic fluid level.

The hydraulic system shall be pressurized by means of an electric motor located near the front of the Bus or at another approved location. If required, a cooling system may be employed to keep the hydraulic fluid at a safe working temperature. The SFMTA expects the hydraulic pump to be automatically switched on and off so that it is only operated when the hydraulic system requires charging. If the noise contains an audible discrete frequency that can easily be heard in the passenger compartment the design will be deemed unacceptable. The design is subject to SFMTA approval and must be submitted during the design review.

Filtering shall be provided as recommended by the manufacturers of the hydraulically powered units. Spin-on filters are preferred. Indicators on the reservoirs shall allow visual detection of low hydraulic fluid level. Permanent diagnostic quick-coupler ports, or approved equal, shall be installed at all locations necessary to provide complete troubleshooting of all hydraulic systems. The filtering system must be approved by the SFMTA.



## 5.7 FLUID LINES

Flexible fluid lines shall be kept at a minimum and shall be as short as practicable. Flexible lines shall be Teflon hoses with braided stainless-steel jackets, except in applications where premium hoses are required, and shall have standard SAE or JIC brass fittings. Hoses shall be individually supported and shall not touch one another or any part of the Coach. High-pressure hydraulic lines shall be Aeroquip, Manuli, Balflex, Parker-Hannifin, or approved equal.

All lines shall be rigidly supported to prevent chafing damage, fatigue failures, degradation, and tension strain. Lines should be sufficiently flexible to minimize mechanical loads on the components. Lines passing through a panel, frame or bulkhead shall be protected by grommets (or similar devices) that fit snugly to both the line and the perimeter of the hole that the line passes through to prevent chafing and wear. Pipes and fluid hoses shall not be bundled with or used to support electrical wire harnesses.

All hoses, pipes, lines, and fittings shall be specified and installed per the manufacturer's recommendations. Cooling system piping shall be stainless steel or brass. Where practicable, rubber hoses shall be eliminated.

Hoses shall be silicone or EPDM rubber type or approved equal that are impervious to all Bus fluids. All hoses shall be as short as practicable. All hoses shall be secured with stainless steel or coated for corrosion resistance clamps that provide a complete 360-degree 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.

## 5.8 WHEELS AND TIRES

### 5.8.1 Wheels

Wheels and rims shall be hub piloted and shall be aluminum one piece, Alcoa Dura-Brite or approved equal. All wheels shall be interchangeable where possible; a design utilizing different sized wheels may be proposed to the SFMTA for approval. Wheels shall be compatible with tires in size and load-carrying capacity front wheels and tires shall be provided in accordance with the SFMTA's requirements listed in Section 5.8.2.

### 5.8.2 Tires

The Contractor shall provide Michelin X InCity Energy Z LR L-315/80R22, 305/85R22.5, or 305/70R22.5 tires or an approved alternative. Contractor shall provide "plain" valve stem caps with each mounted tire. No valve stem tool will be permitted on the valve stem cap.

## 5.9 FIRE DETECTION / SUPPRESSION

Contractor shall furnish and install a fire suppression system by Amerex, or an approved equal.

The automatic detection and activation system shall provide 24-hour fire protection for the traction motor compartment. Detection system must be capable of operating without false detection from normally occurring drive temperatures, any source of light, or steam cleaning. It shall be impervious to oils, fuels, and chemicals normally found in a garage environment, and to UV light.

In addition to the other alarm sensors, a thermostat detector shall be provided to monitor the temperature of the rear propulsion compartment. This system shall include an uninterruptable power supply, consisting of an easily sourced and replaced battery, capable of sustaining operation for a period of at least 24 hours regardless of the primary energy source SoC and remain uninterrupted regardless of master run switch position.

The system shall also provide both a manual and automatic means to actuate the fire suppression system pneumatically or electrically. The fire detection layout and the location of the manual actuation switch must be approved by the SFMTA.

The system shall be able to data log and report to a depot via the CAN/J-1939 network. The system shall also have the following features:

- Compatible with all previous version Safety Net Systems
- Provides Safety Net diagnostic messages to vehicle CAN/J-1939 network
- May be used for system maintenance and safety system diagnostic review
- Two separate part numbers for 250k and 500k baud rate vehicle CAN networks
- Coordinates Safety Net internal clock with vehicle CAN controller

The system shall monitor the heat levels and activate an overheat warning light in the driver's compartment; when the temperature returns to normal, the overheated alarm shall be deactivated. The system will also provide appropriate status and warning lights on the driver's dashboard and provide an audible fire detection warning. This alarm shall sound in both fire and fault conditions. The system shall be immune to false alarms from light from the sun, flashlights, lightning (excluding a direct hit), and welding arc. The monitoring system shall have a method to determine that each individual component is correctly installed and functioning. The system control module shall be fully programmable via a personal computer. Programming features shall include, at minimum, the time delay cycles from fire detection to Bus shutdown and from Bus shutdown to fire suppression system actuation. If a fire is detected, the detection/suppression system shall automatically:

- Activate an audible warning alarm and warning lights.
- Shut off and close off the ventilation system.
- Reduce propulsion and disconnect propulsion battery power to slow the Coach.
- Flood the propulsion system with sufficient dry chemical agent to extinguish the fire when either the Vehicle speed falls below 15 mph or after certain time delay, adjustable between zero and 15 seconds.

- Commence Event Recording & Data Logging

## 5.10 ARTICULATED JOINT

60-ft 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 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 can make 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 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. Turntable seats shall be quickly and easily removable by one person. 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. The Bus shall sense vehicle speed, relative angle between the lead and trailing sections, throttle and braking actions, and any other necessary inputs to control the degree of stiffness in the joint to ensure that the Bus does not jackknife or operate in a dangerous or unsafe condition; a means shall be provided so that the operator can override the joint control in an emergency. The interconnecting structure shall be designed to prevent separation of the lead and trailing units from a road accident with a commercial or private vehicle. Contractor shall submit the design of the anti-jackknife joint for approval by the SFMTA.

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 by the SFMTA.

Easy access shall be provided to overhead electrical, air, hydraulic, and refrigerant lines passing through the turntable. Hydraulic fittings in the turntable shall be suitable for the given application and must be compatible with other fittings throughout the vehicle. Supports for overhead lines in the turntable shall be sufficient to last the life of the Bus without suffering fatigue failure and shall not cause undue wear or damage to the overhead lines as the joint is articulated.

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, brake interlocks, and positive mechanical stops. These devices shall operate when the maximum bend angle is being approached in either plane.

### **5.10.1 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, and system support lines, as well as all electrical and electronic cabling in 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. 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 submitted for approval by the SFMTA.

Bulkhead fitting shall be provided for all overhead lines at both ends of the raceway. The bulkhead area shall be easily accessible for servicing.

### **5.10.2 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. Bellows hardware shall be corrosion resistant, and the underfloor area of the bellows shall be easy to clean wherever regular maintenance is required. 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 SFMTA's discretion. The design of the bellows shall be submitted for approval by the SFMTA.

## 6 PROPULSION SYSTEM

### 6.1 PROPULSION SYSTEM DESCRIPTION

The Coach shall be powered by a battery electric propulsion system. To the greatest extent practical, the electric propulsion system shall conform to SAE J2910 and SAE J2344. 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. Function and operation of the Coach shall be transparent to the Coach operator and passengers. The prime contractor shall assure that the Coach structure is sufficiently robust to handle the loads from the propulsion system and be operated on a San Francisco duty-cycle for a period of 12 years without a structural failure. Durability of the battery electric propulsion system and its components shall not be compromised and the performance requirements shall be met. The propulsion and energy storage systems shall be presented to the SFMTA for approval during design review.

The drivetrain and all other related components shall communicate through the SAE J1939 protocol. Data communication components shall be compatible with the ViriCiti DataHub onboard vehicle telematics device and with version 2.0 or later of the Open Charge Point Protocol (OCPP) standard.

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

A detailed description of the propulsion system shall be provided with the proposal. The description shall include a written narrative, a block diagram showing major propulsion system components, an illustration showing the physical layout of propulsion components and high-voltage wire routing within the vehicle, and a detailed wiring diagram and/or electrical schematic for the high-voltage system. Proposer is required to provide a list of applicable industry standards that the proposed propulsion system meets.

#### 6.1.1 Operating Range

The average operating range of the Bus on all SFMTA routes shall be at least 160 miles on a full charge at the beginning of Bus life while operating in 60°F weather and carrying either a 52-passenger load on a 40-ft Bus or a 78-passenger load on a 60-ft bus. The SFMTA, at its sole discretion, may require performance testing to verify Bus range on any of their routes, including:

<b>40-ft BEB Routes</b>	<b>60-ft BEB Routes</b>
<ul style="list-style-type: none"> <li>• 9 San Bruno</li> <li>• 29 Sunset</li> <li>• 43 Masonic</li> <li>• 44 O’Shaughnessy</li> </ul>	<ul style="list-style-type: none"> <li>• 7 Haight/Noriega</li> <li>• 8 Bayshore</li> <li>• 38 Geary</li> </ul>

**6.1.2 Propulsion System Interlocks**

The propulsion system interlocks shall disable propulsion when:

- Any door of the Coach is activated by the operator door control (4.1.4.2 Interlock).
- The Coach kneeling system is activated.
- The wheelchair ramp is deployed or otherwise not stowed and locked completely.
- As otherwise required by Federal or California State Regulations.

The propulsion system interlock arrangement and control must be approved by the SFMTA.

**6.2 PROPULSION SYSTEM SERVICE**

For the Bus propulsion system, Contractor shall provide a voltmeter for the low-voltage batteries.

The propulsion system shall be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists, shall be required to remove the propulsion system or any subsystems. Any other component requiring service or replacement shall be easily removable.

**6.2.1 Energy Storage and Controller**

The energy storage system shall include a voltage equalization system designed to provide automatic real-time equalization of voltage between individual battery cells within each module. Design and performance must be approved by the SFMTA.

Energy storage shall be of a commercial design capable of operating in the San Francisco transit environment. Charging of the energy storage device shall be accomplished by external charging stations and regenerative braking.

**6.3 ENERGY STORAGE SYSTEM**

Contractor shall provide design and performance data for the energy storage system to the SFMTA. The energy storage system shall be of a commercial design capable of operating in the SFMTA transit environment. The primary charging of the energy storage system shall be

accomplished by an external DC charger, the on-board Electric Drive system controller and regenerative braking.

Thermal management will be provided to ensure optimal life and performance of the ESS over the environmental operating range.

The Bus shall have a heavy-duty energy storage unit, designed to last the life of the Bus, which, coordinated with the electric drive and the rear axle drive ratio, will enable the vehicle to meet all specified range, top speed, acceleration, and hill climbing requirements while still maintaining passenger comfort and providing a smooth ride. The ESS shall be rated to operate at the GVWR of the Bus. ESS will be designed to retain 75% of its as-new energy carrying capacity after 8 years.

The energy storage system shall include a management system to monitor and control the operating conditions within each energy storage system module, including voltage, current, and temperature. This system shall include an over-current and an over-temperature protection feature that disconnects flow of current to and from the energy storage modules in the event of an over-temperature or over-current condition.

The drive energy storage system shall include a voltage equalization system that will perform real-time equalization of voltage between individual energy storage cells within each module. This equalization function shall be accomplished automatically and shall not require manual intervention by the Bus operator or maintenance personnel.

Altoona testing results for vehicle efficiency in kWh/mile must be submitted for the proposed vehicle configuration. Preference will be given for systems that deliver the best performance when configured to the SFMTA's specifications.

The Bus body shall be designed and constructed to ensure passengers and the operator will not be exposed to electrical current either in normal operation or in the event of a vehicle accident. Analysis to validate the design and test data shall be provided to the Agency. The energy storage system shall be designed and constructed to prevent gas or fumes from the energy storage system from entering the interior of the Bus.

### **6.3.1 Battery Specification**

The Coach shall make use of an Energy Storage System (ESS) composed of battery cells using a suitable battery chemistry. The ESS shall comply with UN/DOT 38.3 requirements for lithium batteries or with similar standards for non-lithium batteries, as appropriate.

The Energy Storage System shall be designed so that the required maintenance tasks can be accomplished with minimal labor, and without requiring a mechanic to open the energy storage module enclosures or handle individual battery modules or cells.

The battery cells within the ESS shall be packaged into modules and mounted into enclosures which allows for ease of servicing. These enclosures shall be designed to minimize shock hazard to maintenance personnel. The enclosures shall be designed to last for at least 12 years in transit service operations. The enclosures 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 to maximize passenger capacity. The enclosure distribution shall not adversely affect handling of the Bus.

Written confirmation from the battery manufacturer attesting to the safety of the proposed battery system in the specified application and charging profile, including full disclosure and discussion of all issues or prior incidents relating to safety, shall be provided to the SFMTA after the completion of Altoona testing. Any thermal runaway events shall include a full explanation of the cause of the event and a list of all remedial action taken by the Contractor to prevent similar occurrences in the future.

### **6.3.2 Energy Storage System Charging**

The Bus shall support the SAE J1772 DC charging standard and shall accept charge using a J1772 CCS/Combo connector. The Manufacturer shall provide a detailed description of its charging system and specify its compliance with J1772 standard. The Bus shall be capable of 2-way communication between the charging dispenser and the Bus ESS/BMS. The Bus must provide the following driver alerts: (i) dynamic state of charge of the Energy Storage System, and (ii) charge rate. The SFMTA requires that both the Bus and charger systems be capable of independently commanding an emergency stop of the recharge cycle should a critical fault occur.

The SFMTA expects that all charging for the in-service use of the Buses will be done at an SFMTA maintenance facility using either a direct single port plug-in style charger or an inverted pantograph depot style charger.

The Buses shall be capable of being safely recharged via a DC charger utilizing the J1772 CCS/Combo connector. The ESS shall maintain this capability throughout the 12-year life of the Bus, or up to 500,000 miles, whichever occurs first.

Schunk charging rails for overhead chargers compliant with SAE J3105 must be provided. The ESS must be able to accept a charge rate of 300kW for a short period. The center of the overhead charging rails shall be installed above or in front of the center of the front axle of the Coach. Buses shall be equipped with RFID tags to assist with overhead charging activation.

The Buses must 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.



### 6.3.3 Conductive Manual Interface (On Board)

The SFMTA requires a contact style charging interface to be provided on the rear of the Bus on both streetside and curbside. The charging ports shall be protected from water and debris intrusion. The ports shall be easily accessible from the outside of the Bus through a separate body access hatch. The ports shall be located between 3 and 5 feet above the road surface with the Bus air suspension adjusted to ride height. Contractor shall provide drawings of the Bus charging ports layout will be provided by the Contractor to the SFMTA.

The SFMTA requires charging ports that comply with the SAE J1772 CCS Type 1 quick charging connector standard or approved equal.

At a minimum, the SFMTA expects the system to reach peak charge rates of 150 kW via single port plug-in style charging, or at 200 amps and the maximum voltage that can be supplied to the traction battery (whichever is lower).

### 6.3.4 Charging Station Data Collection and Transmission

The systems shall collect, store, and transmit additional data such as past Bus warning, error codes and charging details to remote locations, and automatically output this data and integrate it into the SFMTA's data collection system.

### 6.3.5 Electric Bus Fire Wall

A fireproof bulkhead (firewall) shall separate the passenger compartment from the battery enclosures; the bulkhead shall preclude or retard propagation of a battery fire into the passenger compartment. All piping, connectors, fittings, access panels, and fasteners shall be fabricated of fireproof material. These panels, their fasteners, and the firewall shall be constructed and reinforced to minimize warping that would compromise the integrity of the firewall during a fire.

## 6.4 DRIVE SYSTEM CONTROLLER (DSC)

The DSC (or similar onboard system) shall regulate energy flow throughout the electric drive and power system components to provide motive performance and accessory loads while maintaining critical system parameters (e.g., voltages, currents, temperatures) 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.

The system shall provide the following functionality:

- Storage of the Bus's data file generated on a day-to-day basis, to include:

- At a minimum, duty cycle information (e.g., time stamp, vehicle speed, elevation, location, ambient temperature), and energy profile information (e.g., voltage and current from the traction motor, auxiliary systems, ESS, power electronics, onboard charging system) at 1-second intervals
- History of charging sessions, energy in, time stamp, SOC
- Incidents and alarms
- Health monitoring and diagnostics information
- A means of indicating to the operator that the Bus has limited range or SOC remaining, and derating the bus performance and disabling non-critical features as necessary to extend remaining range. The parameters and details of this feature must be approved by the SFMTA during the Pre-Production Meeting.
- The system is assumed to include current / power sensors at strategic locations throughout the propulsion system components such that real time comparisons can be made between anticipated power flow and actual power. This feature shall facilitate health checking of components to indicate “open”, “shorted” and/or components that have considerable variance.
- The system is assumed to include the necessary sensor inputs at strategic locations, such as, temperature, voltage, pressure, etc. such that the entire array of devices is monitored in real time. This feature shall be able to execute commands for the self-preservation of component life, health, reliability, and safety. The on-board diagnostic system shall trigger a visual and audible alarm to the operator when the motor controller detects a malfunction, and the protection systems are activated.
- The system shall protect the traction motor(s) against progressive damage. The system shall monitor conditions critical for safe operation and automatically de-rate power and/or speed.
- The system shall include a subsystem capable of monitoring the level of connectivity between all propulsion components and associated cabling / connectors to the Bus’s chassis and low (12/24 vdc) systems to insure isolation. The energy storage module shall have at least two automatic means / devices of disconnect and one manual capable of interrupting the positive and negative connections within the module enclosure and rated for disconnect at maximum current.
- The system shall have an interlock that prevents engagement when the charger is connected to the traction battery.

If available, Contractor may offer an expert level software such that the Bus is optimized per duty cycle on the fly, e.g., “adaptive learning” to consider, route, time of day. The intent of this software would be to maintain the Bus’s level of expected performance while minimizing the charging required. Contractor may also make the drive system parameters configurable to allow optimization of acceleration and regenerative braking, overall performance, and electric power efficiency.

## 6.5 TRACTION MOTOR

The Coach shall be powered by a traction motor to meet or exceed the performance requirements of this specification for the strenuous service requirements of public transportation in San Francisco. The traction motor should be optimized for use in the electric propulsion system as well as in the areas of reliability, audible noise, and vibration.

- A. The traction motor shall have diagnostic capability via a laptop computer. Remote communication is encouraged. Reference Section 9.3 (Vehicle Subsystems Integration and Diagnostic Testing Requirements.)
- B. Contractor shall provide a list of all special tools required for maintaining and rebuilding the traction motor, if applicable.
- C. Propulsion fault lights and an audible alarm shall be provided at the operator's dashboard area.

### 6.5.1 Traction Motor Protection

All components specified within this section shall be weatherproof or housed within a weatherproof enclosure. The traction motor shall be protected by an electronic control system recommended by the motor manufacturer.

The motor controller shall be equipped with self-diagnostic system as well as system protection and performance diagnostic as a minimum. The controller shall retain records of motor failure which can be uploaded to a PC, laptop, or a diagnostic reader for evaluation/analysis. The locations of the diagnostic reader ports must be approved by SFMTA.

Both ports shall be permanently affixed to the Coach for ease of plug-in. The option to include remote diagnostic communication is encouraged.

## 6.6 BATTERY MANAGEMENT SYSTEM (BMS)

The battery management system shall control state of charge, voltage, current and temperatures on a module-to-module level and provide diagnostic output at the lowest field-serviceable element. The diagnostic output must be made available to the maintainer.

At a minimum, the battery management system (BMS) must perform the following functions:

1. The BMS must be capable of 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. The BMS must be capable of monitoring battery temperatures, mitigating damage to the battery and surroundings, and preventing thermal runaway.
3. The BMS must be capable of engaging prudent safety interlocks when an unsafe battery condition has been detected.

4. The BMS must be able to monitor the battery SoC and provide information to the rest of the vehicle.
5. The BMS must be able to communicate all data to the bus level information system (reference TS 84) for storage and communication.

Thermal management shall be provided to ensure optimal life and performance of the ESS over the environmental operating range.

During operation, battery temperatures must never exceed the manufacturer's recommended range in the design operating profile and specified ambient conditions. Battery cooling must be sufficient to prevent the temperature from exceeding the battery manufacturer's recommended maximum temperature.

Design and performance of the BMS must be approved by the SFMTA.

## **6.7 HIGH VOLTAGE DISCONNECT SYSTEM**

The high-voltage system shall be fitted with automatic disconnecting contactors located as closely as possible to the positive and negative battery output terminals to minimize the external circuitry that is not de-energized when the devices open. These contractors shall be in addition to any such devices incorporated in the motor controller and shall not require electrical power to operate (that is, they shall be normally open when unpowered).

The contactors shall be rated to interrupt the full load of the bus.

Contactors shall be controlled by the "High Voltage Disconnect" switch, and any safety-critical interlocks and interlock loops, motor-controller overcurrent-protection functions, and vehicle crash and/or fire sensors. Reset of the contactors shall require the deliberate action of the operator or maintenance personnel. Contactors should provide a visual or electrical indication of their status (open or closed) or of a failure to function.

This feature may be part of the emergency shutdown system, providing an organized/fail safe method for shutting the high voltage system down by manual activation of an emergency switch, sensed isolation fault between high voltage and chassis, opening an interlocked panel, or disconnecting high voltage cables of five amps or greater.

Service and emergency manual disconnects 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. All access to high voltage enclosures (except at high-voltage measurement junction boxes) must be interlocked, such that opening an enclosure automatically disconnects the high voltage system.

## 6.8 COOLING SYSTEM

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 agency. The Contractor shall provide evidence that the cooling system selected has the capability to handle peak heat rejection from the traction motor, energy storage system, propulsion control system, and the intermediate and low-voltage power supply with a partially clogged radiator at maximum ambient temperature plus heat reflected off the pavement. The entire cooling system shall be equipped with an electronic detection device to indicate overheating on the driver's control panel.

If a liquid cooling system is provided, a method of determining the cooling system's coolant level shall be provided and shall be accessible by opening one of the compartment's access doors at the ground level or at an approved location. A spring-loaded, pushbutton type, lever type, or approved alternative valve to safely release pressure or vacuum in the cooling system shall be provided.

Any radiator used shall be designed to withstand thermal fatigue and vibration associated with the installed configuration for a minimum of 300,000 miles without failure.

All liquid high voltage cooling systems shall be equipped with a properly sized water filter. Electrically driven, temperature-controlled cooling fans shall be provided.

An appropriately sized surge tank shall be easily accessible through the rear access door or shall be roof mounted. An alternative location for the surge tank may be submitted to the SFMTA for approval. EDPM or silicone hoses shall be used, and the cooling system piping shall be fabricated to include rolled ends to enhance clamp retention where hoses connect. The fan system shall include electronic feedback control and have diagnostics capability through a standard SAE J1939 diagnostics port. Diagnostics shall be accessible through standard laptop computers. Fan system diagnostics shall identify individual fans that have failed. The fan system may be integrated into other onboard diagnostics systems.

The fan control system may assure maximum efficiency of the system by activating only those fans necessary to maintain the drive system at proper operating temperatures, or by reducing the fan speed. It may also include a feature to automatically reduce fan speed, when temperature conditions allow, and whenever the vehicle stops to minimize ambient noise.

All electrically driven cooling pump are to be of a brushless motor design. Additionally, there shall be no seals that prevent liquid from the pump impeller from entering the electric drive motor. The pumps shall be fully sealed, maintenance free and rated at a minimum of 40,000 hours of operation at full load.

**6.9 DRIVE SHAFT**

Any drive shaft and universal joints shall be a heavy-duty type. 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. Universal joints and drive shaft slip joints shall have separate grease fitting accessible by a standard grease gun. The drive shaft assembly, mounting and components are required to be approved by the SFMTA.

**6.10 GEAR RATIO**

The gear ratio shall provide the Coach with the ability to maximize acceleration and climbing while still meeting the performance requirements specified in Section 1.3, (Propulsion System Performance). The final drive gear ratio requires SFMTA review and approval.

**6.11 LUBRICATION**

If necessary for maintenance purposes, traction motors shall have an oil sampling device compatible with the Probalyzer system or approved equal. The location of the sampling plug requires SFMTA review and approval.

**6.12 ACCESSORIES**

All accessories shall be electrically powered and shall not draw so much power from the ESS that the Coach performance during normal use fails to meet the stated performance metrics in Section 1.3 (Propulsion System Performance).

## 7 ELECTRICAL

The Coach shall be equipped with a Programmable Logic Control (PLC) system that is computer-based and completely modular. All electrical components or equipment shall comply with all the following subsections.

### 7.1 POWER REQUIREMENT

The electrical power system shall supply a nominal 12 and 24 volts of direct current (DC). Consumable items such as, but not limited to, light bulbs and headlamps shall be supplied at a nominal 12 volts DC. Precautions shall be taken to minimize hazards to service personnel. Startup and normal operation of the Bus shall not result in dangerous or damaging voltage fluctuations.

The 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.

The Contractor shall provide a 120VAC, 5A outlet in the ITS cabinet.

### 7.2 CIRCUIT PROTECTION

Manual reset circuit breakers or fuses shall protect all circuits, except for those involved in propulsion system start-up. Fuses shall be used only where it can be demonstrated that circuit breakers are not practicable, and they shall be easily accessible for replacement. This requirement applies to inline fuses supplied by either the Contractor or a supplier. All fuses and circuit breakers shall be easily accessible for replacement or reset by being in areas where special equipment (ladder or hoist) is not required for access. Precautions shall be taken to minimize hazards to service personnel. All manual reset circuit breakers shall provide visual trip indicators and manual on/off trip functions to aid in isolating circuits for troubleshooting.

All circuits and circuit branches (except headlamp and battery 12 & 24-volt feeds to the driver's apparatus panel) shall be protected by manual reset circuit breakers, soft fuses, fusible links, or other approved protective devices. Manual reset circuit breakers that are critical to the operation of the Coach shall be mounted in a convenient location with visible indication of open circuits. Circuit breakers or fuses shall be sized to a minimum of 15 percent larger than the total circuit load. The current rating for the wire used for each circuit must exceed the size of the circuit protection being used. All high voltage control (600 VDC) and power (1000 VDC) wiring shall have insulation protection rated for utilization in environments up to 125 degrees C.

All electrical equipment shall be internally protected against voltage transients and RFI interference to ensure proper operation in the SFMTA operating environment.

### 7.3 GROUNDING

Grounds shall not be carried through water piping, hinges, and bolted joints (except those specifically designed as electrical connectors). Batteries 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. Insulation of grounds shall in no way conflict with other vehicular operations.

### 7.4 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 Coach bar or chassis. A shield shall be connected at one location only, typically at one end of the cable, to avoid forming a ground loop. However certain standards or special requirements, such as SAE J1939 or RF applications, have separate shielding techniques that shall also be used as applicable.

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

### 7.5 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. These components shall be commercially available, designed to last the service life of the Coach, and be easily replaceable by a mechanic. Electrical equipment shall not be in an environment that will reduce the performance or shorten the life of the component or electrical system.

Electric motors shall be located for easy replacement and shall be replaceable in less than 15 minutes by a mechanic.

### 7.6 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. All electrical and electronic devices, subsystems, and components shall be repairable and maintainable by the SFMTA. Each module, except the main body wiring harness, shall be removable and replaceable in less than 30 minutes by a mechanic.



## 7.7 WIRING AND TERMINALS

All wire sizes and insulation shall be based on the current carrying capability, voltage drop, mechanical strength, temperature, flexibility, and fire resistance requirements for vehicle applications.

All lamp sockets shall be of two-wire design with Cannon-Shearson, Weather-Pak, Deutsch, or equal disconnects to eliminate corrosion or ground problems. To facilitate servicing, all lamp wires shall have leaders of at least six inches.

All wiring between major electrical components and terminations shall have double electrical insulation and be grouped, numbered, and/or color-coded with connections secured by bolted terminals. Wherever there is a possibility of interference, wiring and interconnecting cables shall be properly shielded.

Wires shall be uniformly color-coded and tagged. Wiring numbers shall be labeled via ink-jet or hot-stamped every six inches. Installation shall permit ease of replacement.

Wiring shall be prefabricated into standardized harnesses and wrapped and tied with "all weather UV type" nylon ties. Wiring harnesses shall not contain wires of different voltages unless all wires within the harness are sized to carry the current and insulated for the highest voltage wire in the harness.

Double insulation shall be maintained as close to the terminals, junction box, or electrical compartments as possible and is only applicable to wiring outside the electric panels. The requirement for double insulation shall be met by sheathing all wires and harnesses with nonconductive conduit.

Where possible, strain-relief fittings shall be provided at all points where wiring enters electrical components. Protective plastic or rubber grommets must be installed in every hole that provides passage for conduit or wiring to avoid chaffing or cutting of the conduit or wiring. Any clamps used throughout the electrical system shall be stainless steel and shall be cushioned. Wiring supports shall be nonconductive.

Major wiring harnesses shall not be located under the Coach floor, and under-floor wiring shall be eliminated to the extent practicable. Wiring necessarily located under the Coach shall be contained in sealed conduit or split loom tubing.

Precautions shall be taken to avoid damage from heat, water, solvents, or chafing. Wiring length shall allow replacement of end terminals twice without pulling, stretching, or replacing the wire. Except for large wires such as battery cables, terminals shall be crimped to the wiring and may be soldered only if the wire is not stiffened above the terminal and no flux residue remains on the terminal. Terminals shall be corrosion-resistant full ring Faston type or interlocking lugs with insulating ferrules where appropriate.

When a "T" splice is used, it must meet the following criteria:

- A mechanical clamp is used in addition to solder on the splice.
- The wire supports no mechanical load in the area of the splice.
- The wire is supported to prevent flexing.

Connectors shall be Weather Pack, Deutsch, Metri, or approved equal.

## 7.8 JUNCTION BOXES

All relays, controllers, flashers, circuit breakers, and other electrical components shall be grouped according to voltage and, if appropriate, mounted in easily accessible junction boxes. Exterior boxes shall be sealed to prevent moisture from normal sources, including motor compartment cleaning, from reaching the electrical components and shall prevent thermal or arc events inside the box from propagating outside the box. The components and circuits in each box shall be identified and their locations shall be permanently recorded on a schematic drawing glued to or printed on the inside of the box cover or door. The drawing shall be protected from oil, grease, fuel, and abrasion. The front junction box shall be completely serviceable from the street side exterior of the Coach, or from inside the header over the operator's seat. Other arrangements may be approved by the SFMTA.

## 7.9 MULTIPLEXING SYSTEM

The electrical system shall be controlled by multiplexing Programmable Logic Controllers (PLCs). Contractor shall provide complete details of the design of the multiplexing system during the design review. The multiplexing system shall provide and distribute power to ensure satisfactory performance of all electrical components. The SFMTA shall be granted no-cost licenses to utilize all software for interfacing with the multiplexing system for as long as the Buses remain in service.

The contractor shall provide the SFMTA all essential information and identify all equipment needed to test and troubleshoot the multiplexing system. Any software required for interfacing with the multiplexing system shall be listed in the list of tools furnished per the Contract.

## 7.10 LOW-VOLTAGE BATTERIES

At least two DEKA 8A8D Absorbed Glass Mat (AGM) MagnaPower batteries, or approved alternative, shall be provided. In the event of a temporary failure of the battery charging system, the low voltage batteries shall be able to operate the low voltage control system and the interior lighting system long enough to allow the operator to safely stop and park the vehicle. Regardless of the battery configuration, the Contractor shall be responsible for analysis and selection of a battery configuration of adequate capacity to supply the required load.

The Bus shall be equipped with a low voltage battery management system to prevent deep discharging and to protect the battery from operating outside of the manufacturer's safe

operating area. The system shall protect the battery from overcharging by limiting the current and/or voltage to prevent electrolyte degradation. The battery management system shall be capable of monitoring the voltage, temperature, State of Charge (SOC), and health of the battery when compared to its original capacity. The batteries shall be sufficiently protected from over temperature or meltdown.

The Bus shall keep the low voltage batteries charged whenever the Bus is powered on or the ESS is being charged. The SFMTA prefers that a resettable low voltage disconnect system be implemented to disconnect loads from the low voltage batteries when they drop below 23V.

Battery terminals shall be located for access in less than 30 seconds with jumper cables. Battery cables shall be flexible and sufficiently long to reach the batteries in the extended tray position without stretching or pulling on any connection. Cables shall not lie on top of the batteries and shall be sheathed and wrapped to prevent corrosion. The battery terminals and cable-ends shall be color-coded with red for the primary positive and black for the negative. Batteries shall be stamped with the date of manufacture.

Battery cables shall be sized accordingly to handle the load from the battery. The battery cable terminal connections shall be capable of withstanding the mechanical stress and vibrations commonly experienced during Coach revenue service.

#### **7.10.1 Battery Tray**

The battery tray shall be made of stainless steel, polyethylene, or approved corrosion resistant materials and shall properly support the batteries during service. Battery trays may be electrocoated or powder coated to assist with corrosion or abrasion resistance. The SFMTA strongly prefers a sliding battery tray design to facilitate removal or servicing of the low voltage batteries; a positive lock shall retain the battery tray in the normal position. Batteries shall be easily accessible for inspection and serviceable only from outside the Coach. The battery containment area shall be vented to the outside allowing for the mitigation of fumes from gassing batteries and provisions made for the drainage of cleaning liquid. The containment area access door shall be able to be opened without the use of a special key.

A polarized lug mating with Anderson power products #632062 or approved equal and manual release #919 shall be provided inside the battery compartment and adjacent to, but no further outboard than, the batteries.

#### **7.11 LOW VOLTAGE MASTER BATTERY SWITCH**

A master battery switch shall be provided for complete disconnection from all Coach electrical systems except systems that require 24/7 power supply. The master battery switch shall be in an outside compartment which requires no tool(s) to access. The location of the master battery switch shall be clearly identified on the access panel and be accessible in less than 10 seconds for activation. The master switch shall be capable of carrying and interrupting the total circuit load.

## 7.12 ELECTRICAL AND ELECTRONIC NOISE

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.

The Coaches shall meet all applicable FCC and FTA requirements in addition to the latest revisions of the agreed upon standards and guidelines listed below:

- CISPR 12 – Vehicles, Boats and Internal Combustion Engines – Radio Disturbance Characteristics – Limits and Methods of Measurements for the Protection of Off-Board Receivers
- MIL-STD-461 - Requirements for the Control of Electromagnetic Interference Emissions and Susceptibility
- American Conference of Governmental Industrial Hygienists (ACGIH) (See ATTACHMENT 4)
- UMTA-MA-06 0153-10 (DOT-TSC-UMTA-88-1) Radiated Interference in Rapid Transit Systems Volume I: Theory & Data
- UMTA-MA-06-0153-11 (DOT-TSC-UMTA-87-4) Radiated Interference in Rapid Transit Systems, Volume II: Suggested Test Procedures
- SAE J551 Performance Levels and Methods of Measurement of Electromagnetic Compatibility of Vehicles, Boats (up to 15m), and Machines (16.6 Hz to 18 GHz)
- SAE Recommended Practice ARP 1393: “Electromagnetic Compatibility and Interference Control for Rapid Transit Vehicles”

The Contractor shall develop and submit an EMI/EMC Control Plan for SFMTA review and approval prior to submittal of final drawings. The plan shall delineate the manner in which EMI and EMC will be mitigated and meet the requirements in this section.

## 8 MATERIALS AND OVERALL WORK QUALITY

### 8.1 MATERIALS

All materials used in the construction of the Coach and its parts shall be in accordance with the stated specification or description unless written approval for substitution is obtained. All materials shall comply with the standards established by ASTM, SAE, or similar association standards. Materials used shall be consistent in manufacture, design, and construction on each Coach and be marked to be readily identified.

Whenever under the Contract Documents it is provided that the Contractor shall furnish materials or manufactured components or shall do Work for which no detailed specifications are set forth, the Work performed shall be in full conformity and harmony with the intent to secure the best standards of manufacture in the Work as a whole or in part. The Contractor shall not take advantage of the omission of any part or detail which goes to make the Coach complete and ready for service, even though such part or detail is not mentioned in the Specifications or in the Contractor's approved design.

#### 8.1.1 Hazardous Materials

It shall be the design objective to eliminate from the Coaches all materials that are or may become hazardous to passengers, operators, or maintenance personnel. Of particular concern are materials that produce toxic smoke or gases when heated, possibly due to an accidental fire or when bodywork using welding equipment or cutting torches is necessary. No parts on the Coach shall contain lead, asbestos, or polychlorinated biphenyls. The Contractor shall provide for SFMTA approval of the material safety data sheets (MSDS) of any hazardous materials or fluids that must be used in the construction, operation, or maintenance of the Vehicle.

The SFMTA has the option to reject the use of any hazardous materials proposed for use on the Vehicles.

### 8.1.2 Consumables

All required consumable items shall be available in the United States from U.S. manufacturers or Contractor, including:

- Air filters
- Ventilating air filters
- Coolant and oil filters
- Belts
- Lamps
- Fuses
- Brake lining material
- Hoses and lines – air, coolant and hydraulic
- Wire terminations and connectors
- Air bags
- Brake Rotors

Any similar items shall also meet the above requirements. Any exceptions require the prior approval of the SFMTA.

## 8.2 OVERALL WORK QUALITY

Overall work quality shall be of the best grade and shall conform in all respects to the best practice in the industry.

Material and equipment shall be new and of a quality equal to that specified or accepted as the best industry practice. Mechanical, electrical, and electronic equipment and components shall be products of manufacturers of established good reputations regularly engaged in the fabrication of such equipment and components.

All work shall be executed in conformity with the best-accepted standard practice of the trade to contribute to maximum efficiency of operation, accessibility, pleasing appearance and minimum cost of maintenance.

### 8.2.1 Welding

Welding procedures, welding materials, and qualifications of welding personnel shall be in accordance with industry recognized standards. All welding work must conform to U.S. welding standards as approved by the SFMTA.

Where metal is welded, the contact surfaces shall be free of scale, grease, and paint.

## 8.2.2 Mechanical Fastening

No protruding screws, bolts, or similar items shall be permitted in the interior or the exterior of the Coach. Wherever exposed to passengers or otherwise possible, interior fasteners shall be stainless steel or zinc-plated steel. Where possible, all fasteners used in the Vehicle body exterior shall be of stainless steel except where mechanical requirements necessitate graded steel fasteners, or to minimize galvanic corrosion. The use of stretch to torque fasteners is discouraged.

### 8.2.2.1 Rivets

Rivets shall completely fill the holes. Surfaces exposed to passengers, operator, or maintenance personnel shall be smooth and free of burrs, fins, sharp edges, and dangerous protrusions.

### 8.2.2.2 Screws

At least 1-1/2 screw threads shall be visible beyond all nuts.

### 8.2.2.3 Bolts

All bolts or rods passing through composite flooring or exposed to the elements shall be an approved grade stainless steel or, with SFMTA pre-approval, be zinc plated. All nuts and bolts exposed to passengers shall be an approved grade stainless steel unless otherwise specified.

The design strengths for Grade 2 bolts and Class A nuts shall be used in sizing the mounting and attachment bolts for under floor mounted equipment, support structures, or brackets. However, all structural or load carrying bolts shall be of domestic manufacture and grade 5 or better. Bolts or screws used for structural connections shall have full-size bodies in areas subjected to bearing and/or shear loads. All structural or load carrying bolts shall be specified and installed appropriately for their intended loads.

For bolted joints subject to steady vibration, bolts with appropriate locking arrangement may be used. Nuts shall be of a self-locking type where appropriate. Wherever possible, bolts smaller than 1/4 inch shall not project more than 1-1/2 threads plus 1/4 inch, and bolts 1/4 inch or larger shall not project more than eight threads. All hardware is to be installed and torqued per ANSI guidelines or best industry practices.

## 8.2.3 Finishing

Special care shall be taken with the outside sheathing, roof, roof bonnets, and interior finish so that all kinks and wrinkles are removed before assembly to present a true and smooth finish. This shall be accomplished without excessive grinding, which may weaken the structure material. All painted surfaces shall have a true and smooth surface that will not show sanding or grinding marks after painting. All steel and aluminum body parts that are to be painted shall be thoroughly cleaned and treated before priming with a primer compatible with the paint system.

### **8.2.4 Electrical**

All electrical wiring harnesses should be tie-wrapped and supported at regular intervals. When wires, cables, hoses, or tubes go through walls or panels, the bulkhead holes shall have protective grommets/molding and the wires, cables, hoses, or tubes shall be clamped on both sides of the bulkhead hold. A 1/4-inch minimum clearance is required. All electrical wires shall be installed to as not to have any chaffing or rubbing with other components. Reference Section 7.7 (WIRING AND TERMINALS) for additional requirements.

### **8.3 PROOF OF COMPLIANCE WITH CONTRACT**

In order that SFMTA may attempt to determine whether the Contractor has complied with the requirements of the Contract Documents not readily determinable through inspection and testing of equipment, components or materials utilized in the Work, the Contractor shall, at any time when requested, submit to the SFMTA Project Manager properly authenticated test results, design documents or other satisfactory proof as to its compliance with such requirements.

### **8.4 DEFECTIVE WORKMANSHIP AND MATERIALS**

Wherever the SFMTA determines that the Work done or being done under the Contract, or the kind or quality of components, equipment or materials supplied in connection therewith, is not fully and completely in accordance with any requirement of the Contract Documents, it may give notice of such noncompliance to the Contractor in writing. The Contractor shall immediately upon receipt of such notice take appropriate action required to remedy such noncompliance at no additional cost to the SFMTA.



## **9 TRAINING, PUBLICATION, DIAGNOSTICS TESTING SOFTWARE**

### **9.1 TRAINING**

Training shall be designed and presented to ensure that each participant will be able to perform specific tasks or be able to demonstrate specific knowledge in his/her working area. Training shall provide specific course goals and objectives outlined in the lesson plans. Dates, hours, and locations of training shall be at the discretion of the SFMTA.

All manuals and lesson plans shall be provided electronically and with hard copies to all participating trainees. All computer software programs must be approved by the SFMTA.

The SFMTA reserves the right to copy all computer information for future use. Copies of all training aids shall be provided to the SFMTA Maintenance Training Department.

The Contractor shall submit its recommendations for training hours and categories for review and approval by the SFMTA.

#### **9.1.1 Training Plan**

Contractor shall submit a training plan at least 60 days before the delivery of the first bus. The training plan shall delineate the way the Contractor plans to meet the requirements of this specification. The plan shall include:

- Specific trainee performance objectives
- Draft lesson plans
- Specific topics to be covered, including subsystem groupings for mechanics and electronic technicians
- Probable training aids and materials
- Training schedule
- Training facilities required

#### **9.1.2 Training Materials and Personnel**

Contractor shall provide detailed instructional guides, outlining training philosophy, and weighted areas of instruction based on Contractor's understanding of the complexity of the equipment from a maintenance performance standpoint. In addition, Contractor shall identify recommended course lengths with basic electrical/electronic knowledge-driven instruction leading to a proficiency level suitable for new Vehicle maintenance.

Instructors shall be totally familiar with the technical information being taught, shall use instructional materials properly, and shall possess the skills required to make effective presentations. Safety must be an integral part of all instruction. Instructors must be transit literate and factory certified to teach the specific system being taught. The SFMTA prefers that

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all training instructors are employees or technical representatives from the maker of the equipment being trained on.

Upon commencement of classroom instruction, instructor shall be dedicated to the task of teaching without a break in the continuity of the instruction to perform other duties. Instructor shall be fluent in English.

The Contractor shall provide all handouts, training aids, audio-visual equipment, and visual aids for each class. Training materials, including audio-visual hardware, slides, view graphs, mock-ups, charts, and other aids, will become the property of the SFMTA upon the completion of the training course. The SFMTA or its designee may use such materials in subsequent training sessions for any other purposes. A training manual shall be prepared for each personnel classification and distributed to personnel in training prior to or at class start up.

### **9.1.3 Operations Instructors, Maintenance Instructors, Street Operations, and Managers**

The purpose of these training sessions, if offered by the Contractor, shall be to provide the necessary information to the SFMTA's operations instructors, maintenance instructors, and training management and operations managers so that they may train SFMTA operators, transit inspectors and maintenance personnel. This training shall cover all operational and maintenance aspects of the Coach, with emphasis on features of the Coach that are unique or may not have been encountered by SFMTA personnel. Separate training sessions shall be provided for street operation inspectors.

### **9.1.4 Maintenance Manager Training**

These training sessions, if offered by the Contractor, shall acquaint maintenance superintendents, general foremen, and foremen with the design, use, limitations, preventive maintenance, warranty periods, and special features of the Coach. This training can be included in the general orientation or be part of specific in-depth training time.

### **9.1.5 Service Personnel Training**

These training sessions, if offered by the Contractor, shall train service personnel in basic daily servicing requirements, including cleaning, inspection, towing, and routine servicing and the preventive maintenance inspections.

### **9.1.6 First Responder Training**

These training sessions, if offered by the Contractor, shall train first responder personnel, including firefighters, EMS, and law enforcement, in best practices for interfacing with the Bus during emergency situations.

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### **9.1.7 Mechanic Training**

These sessions shall provide the mechanics with the basic knowledge necessary to utilize the maintenance manuals and to safely perform preventive maintenance, troubleshooting, repairs, and overhauls. Sessions shall concentrate on individual subsystems and components, such as body, doors, propulsion, suspension, brakes, and operator controls. The Contractor shall include, as part of the training plan, a list of proposed subsystem groupings. Training shall include demonstrations of Time to Repair and Accessibility of Coach components and subsystems. Training for shop technicians will cover test equipment and subassembly bench repair and calibration.

Maintenance engineer training shall focus on overall system design, maintainability, computer diagnostic techniques, control systems, data collection and retrieval, life cycle predictions, optimization programming, electronic maintenance techniques, and special tools.

The Contractor shall provide to the SFMTA sufficient training and documentation needed to test, troubleshoot, maintain, and repair all electronic systems and subsystems.

Road Call sessions shall provide the mechanics with knowledge necessary to troubleshoot and fix, if possible, subsystems which may fail and cause service interruption. Mechanics shall be provided with both hands-on and classroom training.

### **9.1.8 Surveillance Camera System Training**

The Contractor shall provide training classes on how to operate and maintain the surveillance camera system (the number of classes and hours are subject to SFMTA approval, which may be based on Contractor's recommendations). The Contractor may provide this training as a pass-through service, invoicing the SFMTA directly and arranging for training personnel from the video surveillance system provider to perform the training.

A list of test equipment and special tools required to maintain the system shall be provided by the Contractor. Contractor shall provide pricing for a test fixture which duplicates an entire Vehicle system. The test fixture shall easily allow for the substitution of individual components of the system for test and repair purposes.

### **9.1.9 Videos**

The SFMTA may request digital recordings of any or all the Contractor's training sessions, at the SFMTA's discretion, or at least one session of each discrete training class at a price to be agreed upon by both parties. These recordings will be provided electronically by the Contractor for distribution within the SFMTA.

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In addition, the Contractor shall provide a complete set of training videos covering a range of topics including the following:

- Basic bus introduction including startup, charging, and shutdown procedures
- Propulsion and energy storage systems
- Axle and suspension systems
- Auxiliary electrical system
- Wheelchair ramp assembly
- Air and brake systems
- Door system
- Power steering system
- Heating and ventilating system
- Vehicle body components & repair techniques (e.g., special welding, interior panel replacement)
- Preventive maintenance practices for all preventive maintenance required on each Vehicle

Contractor shall submit a complete set of master recordings to the SFMTA in an approved electronic format, along with a complete set of training media. The Contractor shall maintain a complete set of reproducible recordings on file for a period of 12 years for use by the SFMTA.

The Contractor shall provide a digital copy of the draft training plan, including representations of classroom instruction and “hands-on” instruction. These sample training documents shall be submitted for SFMTA approval and shall be representative of the level of quality of the product that the SFMTA can expect for the balance of the training documents to be delivered.

#### **9.1.9.1 Video Quality**

For all videos requested by the SFMTA, the Contractor shall have in-house capability, or subcontract with a company approved by the SFMTA, for the following requirements:

- All work associated with video recording and production shall be performed by the Contractor or subcontractor approved by the SFMTA.
- The Contractor shall have script writing capabilities and be experienced with transit organizations and issues.
- Studio and/or field acquisition capabilities.
- Production of digital files for wide distribution in an industry accepted format.

The Contractor may elect to use its own actors, or SFMTA employees in actual classroom and Vehicle “hands-on” sessions. Video files shall be professionally edited to eliminate unnecessary and irrelevant sections that are common to live, on-location filming.

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### 9.1.10 Training Charts

The Contractor shall provide digital copies of the following schematic charts used for training and working reference: (a) the electrical system, (b) the air and brake system (c) the door system, and (d) battery cooling systems.

### 9.1.11 Interactive Multimedia Training

Upon request, the Contractor shall provide pricing for a series of interactive training modules on Coach maintenance procedures. This training must be specific to the Coach for this procurement, and to maintenance practices that are used by the SFMTA. The interactive training should be electronically formatted computer-based training (CBT) or approved equal, and compatible with all modern computer windows-type operating systems, office programs, and latest multimedia software. The files shall include video clips of component operation and critical adjustments.

Interactive Multimedia Training milestones shall consist of the following:

- Detailed design document, to be developed with SFMTA participation and completed 10 months prior to delivery of first production Coach.
- Video production
- Completion and review of video editing
- Prototype module delivery (test, review, and feedback of first module)
- Pre-production module delivery (test, review, and feedback of all modules)
- Delivery of completed program, including Trainer's Manual and Guide shall be completed per the schedule in Section 13.1 (Preferred Delivery Schedule). (The delivery must include system setup and troubleshooting, program administration guidelines, and answers to test questions.)

#### 9.1.11.1 Training Module

The training module shall have on screen text as well as voice over descriptions of the procedure being demonstrated. The module shall have a complete demonstration of the maintenance procedure followed by a self-paced post examination of the student. Only the student and the Training Manager shall have access to the scores for each training module. In addition, SFMTA shall have all licensing rights to unlimited reproduction of the electronic training module. The Contractor shall have the responsibility for providing all updates and revisions to the electronic training modules until all engineering modifications and final engineering changes have been approved and all Buses have been accepted.

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The training modules shall address the most critical systems pertaining to Coach Maintenance. One module shall be produced on each of the following systems:

- Programmable logic controller system
- Ramp installation and maintenance
- Door system control maintenance
- Electrical and electronics systems control maintenance, including multiplexing
- Disc brake installation and maintenance
- Energy Storage System (ESS)
- Propulsion system
- HVAC system

Each module shall include the following program elements as appropriate:

- Overview on system components, operations, and relationship with other relevant systems
- Step-by-step video demonstration of maintenance procedures (not more than 50 steps in the process), with random access to each step and multiple-choice quiz questions on critical steps
- Interactive job simulation exercises using three-dimensional solid modeling to graphically represent job setting and function on critical steps
- Built-in user performance tracking for confidential review by Maintenance Training Supervisor
- Visual-based parts identification and ordering information system (using three-dimensional solid model and/or stills)
- Contractor shall demonstrate the ability to produce interactive multimedia training that contains each of the program elements for the critical subsystems as described above.

## **9.2 PUBLICATIONS: MAINTENANCE MANUALS, ILLUSTRATED PARTS MANUALS, OPERATOR'S MANUALS, & VEHICLE RECORD BOOKS**

The Contractor shall provide maintenance, illustrated parts, and operational manuals for each Bus type according to Figure 9-1.

The Contractor shall provide all electronic copies of the Vehicle drawings as necessary for the pre-production process approvals. These drawings include Seating Layout Drawings, Dash layouts, Camera Layouts, AVA AVL drawings, Paint Scheme, APC layout, Fleet Management system drawings, Antenna layouts, Clipper location, and Radio provisions layouts. Contractor agrees to share additional drawings as they are needed by the SFMTA (ex. vehicle frame drawings) in PDF format.

The intent and purpose of all maintenance and operating documents provided to the SFMTA by the Contractor shall be to facilitate the safe and reliable operation of the Vehicle by the SFMTA during the entire expected operational life of the Vehicle. Using the information provided in the

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Contractor’s maintenance documentation, the SFMTA itself must be able to perform all procedures necessary to ensure the safe and reliable operation and maintenance of the Vehicle during its service lifetime. The Contractor shall submit a generic copy of each of the manuals for review and approval by the SFMTA before or upon receipt of the first Coach.

Release copies of the manuals shall reflect the most recent information available at the time of their release and shall be delivered to the SFMTA on or before delivery of the last production Coach. Manuals need to be updated in a timely manner whenever there is a FSRP issued.

**FIGURE 9-1**

<b>Manuals</b>	<b>Quantity / Vehicle type</b>	<b>Maintain up to date after the date of Conditional Acceptance of the Coaches</b>
Contractor Maintenance Manual	5	6 years
Contractor Parts Manual	5	12 years
Contractor Operator’s Manuals	10	6 years

The supplied manuals shall provide complete, concise, and clear documentation for all equipment ordered on the Vehicle and shall not include superfluous documentation for equipment that was not provided with the Vehicle. In addition to the printed copies of the manuals specified above, all maintenance operations and illustrated parts manuals shall be provided in digital format.

All such electronic documentation shall be viewable using common office and multimedia software such as Adobe Acrobat, Microsoft Office, and Windows Media Player. Contractor Published Bus Manuals can be supplied without security after the SFMTA signs a limited copyright agreement form. OEM component supplier manuals are not available in an "unsecured" file format. Within the relevant Vehicle warranty period provided for by the Contractor, the SFMTA will make no changes to the Contractor-provided documentation where such changes would compromise the intent of the Contractor’s original documentation with respect to the safe operation or reliability of the Vehicle, unless such change is agreed to in writing by both the SFMTA and the vendor. Where such changes are made, both the SFMTA and the Contractor shall maintain coordinated records of the changes, including the SFMTA contract number, manual part number, title, page number(s), date the change was made, who authorized the change, why the change was made, and before-and-after copies of the change. Contractor will provide such changes in the same digital format as used for the initial delivery of the manuals. At the expiration of the time periods specified above for Contractor maintenance of the documentation, or upon default of the Contractor in providing such document maintenance,

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the SFMTA shall have the right to reproduce copies of such documentation for internal use only, subject to the warranty concerns expressed herein.

Contractor and sub-supplier maintenance documents shall be supplied in an integrated electronic format and shall be generated for best readability on a current computer monitor. The default page setup for all printed maintenance and parts manuals shall be standard U.S. letter size (8.5" by 11") in portrait mode with a gutter suitable for use in a standard 3-ring binder. Wherever feasible, printed manuals should be organized so that updates or corrections to the manuals can be made with minimal impact to the overall document. Where drawings or other documents are too large to be easily legible in the default page size, such pages may be provided either as 11" tall by 14" (or longer) pages, or as 22" tall by 16" "four-up" pages. In both these cases of oversized pages, the printed page shall be capable of being neatly folded up into the default page size and shall have suitable reinforcement at the 3-hole edge of the page.

Major sections of the maintenance manuals shall be separated by 1/3- or 1/5-cut tabbed and labeled, reinforced index dividers. The printed Operator's Manual shall be a single softbound volume; with at least medium-weight, glossy-stock covers for durability, and may be smaller than the default 8.5" by 11" size, as dictated by the best compromise of readability and portability. Bus Electrical, Air, Hydraulic, PLC, HVAC, cooling system schematics and diagrams are all output in a convenient 11"x17" format and included in a separate sturdy 3-hole plastic binder and not within the Bus Service Manuals. An emphasis should be placed on durability and portability. In the interest of readability and clarity, the SFMTA may dictate that the Operator's Manual be printed in color.

### **9.2.1 Maintenance Manuals**

Contractor maintenance manuals shall be integrated so that all subsystems of the Coach are contained in a logically indexed, contiguous series of chapters and/or volumes. Sub-supplier maintenance manuals shall be supplied and referenced in the contractor's manuals for ease of access. Manual organization must be approved by the SFMTA before work begins on the manuals.

All standard and specialized maintenance or overhaul procedures that involve potential health and safety issues for the repair technician shall be clearly noted in the documentation with the international safety warning symbol appropriate to the level of potential danger involved. Procedures where the proper performance of the task is critical to the safe operation of the Vehicle shall also be clearly marked for emphasis. Maintenance manuals shall contain the complete data required for routine and periodic maintenance of all parts of the Coach.

At the beginning of each manual, it shall contain a table of contents, a list of abbreviations, instructions on how to use the manual, special safety precautions for maintenance and/or overhaul procedures, a general overview/introduction to the Bus and its systems and subsystems, and recommended required and/or specialized maintenance and overhaul tool

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lists, including electronic test equipment where appropriate. Main components of the manual shall include, but are not limited to, the following:

- A. Detailed theory/principles of operation of each primary system (e.g., the braking system) on the Bus and its relationship to and interactions with other primary systems on the Bus and, where applicable, to any off-board systems.
- B. Detailed theory/principles of operation of each subsystem (e.g., ABS) within its primary system, and the relationship and interactions of the subsystem to other subsystems within the primary system, and, where applicable, to other primary systems or the subsystems of those other primary systems.
- C. Field and shop troubleshooting procedures for all systems and subsystems using a combination of text, flowcharts and images as best suits the procedure.
- D. Shop overhaul procedures for all rebuildable or repairable systems on the Bus.
- E. Recommended preventive maintenance (e.g., lubrication and adjustment) requirements and schedule. Reference Section 9.2.1.1 (Preventive Maintenance).
- F. Schematic and wiring location diagrams (including wire and cable size and rating schedules, where appropriate) for all electrical systems and subsystems on the Bus.
- G. Air and hydraulic system diagrams showing locations in the Bus of air and hydraulic components.
- H. Detailed, illustrated procedures for component change-out, and run-in information as required.
- I. Body and structural information and materials specifications for major accident repairs.
- J. Electronic systems and subsystems documentation including schematics and diagnostic procedures, where applicable. Reference Section 9.2.5 (Electronic Systems Documentation.)

### **9.2.1.1 Preventive Maintenance**

Contractor shall provide a Preventive Maintenance (PM) section within the maintenance manuals specifying the recommended preventive maintenance procedures and the scheduling of those procedures. The manual shall provide an outline PM program with checklist, which can be used to perform PMs. The PM checklist pages shall be formatted so that copies can be made to stand as individual SFMTA documents, including lined space at the end of the document for additions and notes. The preventive maintenance manual shall also include recommendations for the scheduled overhaul of major systems above and beyond the normal maintenance procedures, where such overhaul is known to significantly improve the long-term reliability, maintainability and/or useful life span of the Vehicle.

In addition to the above requirements, the structure of the PM schedule must include the interval between each procedure (any combination of calendar based, mileage based, and/or hours based intervals); the SFMTA strongly prefers mileage-based intervals wherever appropriate. The Contractor shall also provide the following items, but may choose to do so in documents separate from the preventative maintenance manual:

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- 1) List of parts (Manufacturer Part #, Description, Quantity, UOM) required or recommended for each procedure
- 2) Estimated hours to perform each procedure

### 9.2.2 Illustrated Parts Manual

The Illustrated Parts Manuals shall be designed so that all systems and subsystems of the Vehicle are broken down to the component level in a logically indexed, contiguous series of chapters and/or volumes. Illustrations and their corresponding parts lists shall be arranged as to minimize the amount of cross-searching necessary to locate a part in the parts list from its drawing reference, or to locate the part on an illustration from its entry in the parts list. The parts list shall include the following data:

- Drawing reference (locator)
- Part description, including type, size or value, or reference to another drawing where such reference contains a more useful description of the part
- Quantity used in the currently illustrated system or subsystem

Illustrated parts manuals shall be arranged so that part numbers can be readily found and identified in the illustration for each system, subsystem, assembly, subassembly, or component part from an orderly breakdown of the complete Coach. The manual shall contain a convenient alphanumeric part number index listing the Contractor's part number against the page in the illustrated manual where it appears. In no case may any replaceable part remain unidentified.

Isometric exploded views or two-dimensional drawings that are detailed enough to show the relative location of each part shall be used to identify all Vehicle systems and subsystems. The technique to be used in the rendering of these two-dimensional drawings must be approved by the SFMTA before the draft manuals are created.

The Supplier shall supply a separate price list showing the Contractor's part number against the current net price (including freight) to the SFMTA of all non-generic parts used in the Vehicle at the time of delivery of the manuals.

Refer to Section **Error! Reference source not found.** (Database Information) for data formatting requirements.

#### 9.2.2.1 Parts Tables in Electronic Format

The Contractor shall supply parts data in a file format such as MS Excel with a complete listing of all parts as they appear in the Parts Manual (logically structured by Section, System, Assembly, and Sub-assembly) and as specified under 10.3.3.2 (Illustrated Parts Catalog Master File). The listing shall include.

- Vehicle system or subsystem containing the part

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- Contractor part number
- Part description
- Illustration number in parts manual
- Page number in parts manual
- Identification of special restrictions or hazards
- Identification of which buses contain the part

The purpose of these tables shall be to provide system and component parts data that is readily suitable for loading into SFMTA's EAM data processing system. The tables should include all information that is presented in the illustrated parts catalog.

At the highest level, the tables should make it possible to identify by serial number all the major assemblies installed on each individual Coach and thereafter all major sub-assemblies that are installed in each major assembly down to the lowest serialized sub assembly. The Contractor may use their own internal part numbers for this information.

### **9.2.3 Operator's Manuals**

The operator's manual shall completely, clearly, and concisely illustrate the recommended procedures for the safe and efficient operation of the Vehicle, including but not limited to pre-service and in-service check-outs, response to safety alarm systems, control of lighting and auxiliary Vehicle systems, Coach mechanical operation, maintenance checks, turning characteristics of the Coach, and emergency actions.

### **9.2.4 Electronic Systems Documentation**

Where an electronic system is an intrinsic part of the Bus, and where the contract for Bus specifies that an electronic system is field-repairable or shop-repairable, the Contractor shall at a minimum identify these components by part number, circuit or schematic diagrams, voltage, method of diagnosis and replacement procedure as part of the service and/or parts manuals in keeping with the requirements of Section 9.2.1 (Maintenance Manuals). The information within the multiplexing system user guides, Bus service and parts manuals, and Bus electrical schematics will provide the information necessary to maintain and service the equipment. Other data control modules such as battery unit ECUs would also be covered within the OEM manuals and Bus manuals and schematics.

### **9.2.5 Vehicle Records**

The Contractor shall provide a Vehicle record book to be included in each Coach upon its arrival at the transit property. Vehicle record books are to include as a minimum the following:

- Vehicle release/shipping approval certificates
- VIN sheet

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- Subcomponent serial numbers for all major systems
- Test records, including water test
- Inspection records and resident inspector defect sheets
- Calibration records, including steering alignment and ABS verification
- Vehicle weight record

Each book shall be indelibly marked with the serial number of the Vehicle it accompanies. Vehicle record books must be approved by the SFMTA or the designated SFMTA Resident Inspector before shipment. This information must also be provided electronically upon request by the SFMTA.

### **9.2.6 Computerized Maintenance, Preventive Maintenance, and Illustrated Parts Manual System**

The Contractor shall supply the parts lists as detailed in MS Excel as per 10.3.3.2 Illustrated Parts Catalog Master File. Contractor shall supply Parts Manual illustrations in either SVG vector or compressed JPG file format, whichever works better for the SFMTA.

The Contractor will supply its published Bus Maintenance Manual content in Adobe PDF format to allow the SFMTA to incorporate into its asset management system software. These files will be supplied with the draft Bus Manual delivery (with First Bus delivery) and again with the Final Bus Manual delivery (30 Days after receipt of SFMTA comments).

## **9.3 VEHICLE SUBSYSTEMS INTEGRATION AND DIAGNOSTIC TESTING REQUIREMENTS**

Contractor shall integrate all electronic systems on the Vehicle that can communicate using the latest data link protocol as well as the Coach multiplex system. The integration shall include software and hardware that collects and stores all available data in a logical manner. The software shall automatically generate an event log of all data and shall incorporate data from, but not limited to, the propulsion, energy storage unit, traction motor, ABS brakes, multiplexing, video surveillance system, destination sign, farebox, automatic passenger counter, and fire detection/suppression systems. The integration shall provide for a minimum storage time of two weeks. Contractor shall provide system integration details at design review. Function and suitability of design must be approved by the SFMTA.

The Contractor shall provide Self-Diagnostic Testing Software (SDTS) that analyzes the stored data for irregularities or failures to the maximum extent possible. The software shall be user-friendly, simple to operate, and able to function without affecting the integrity of the data from each of the other systems. The Contractor shall provide sufficient training and manuals for SFMTA personnel to operate the diagnostic testing software. All software shall be compatible with any PC laptop or desktop computer and must be approved by the SFMTA.

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The integration shall also include the ability to retrieve this data through rugged, environmentally protected ports located strategically in the Coach. One data port shall be installed in the motor compartment and one in an easily accessible location at the front of the Coach. The SFMTA will work with the Contractor to determine the optimum locations for the data ports. The Contractor shall provide details of all required equipment to retrieve diagnostic data and/or event logs from these ports during the design review and the data ports shall have the capability to access and download all information as specified in this section.

## 10 WARRANTY AND SPARE PARTS

### 10.1 BASIC PROVISIONS

#### 10.1.1 Warranty Requirements

Warranties in this document are in addition to any statutory remedies or warranties imposed on the Contractor. Consistent with this requirement, the Contractor shall warrant and guarantee to the SFMTA each complete Coach and specific subsystems and components according to the provisions listed in this section.

The Contractor shall ensure in its procurement arrangements that the warranty requirements of this Contract are enforceable through and against the Contractor's suppliers, vendors, and subcontractors. Any inconsistency or difference between the warranties extended to the SFMTA by the Contractor and those extended to the Contractor by its suppliers, vendors, and subcontractors, shall be at the risk and expense of the Contractor. Such inconsistency or difference will not excuse the Contractor's full compliance with its obligations under the Contract Documents.

If any vendor/supplier to the Contractor offers a warranty on a component that is longer or more comprehensive than the required warranties stated in Figure 10-1, the Contractor shall inform the SFMTA of this additional warranty and pass it through to the SFMTA at no additional cost to the SFMTA.

The Contractor shall ensure that such suppliers, sub suppliers, vendors, and subcontractors satisfactorily perform warranty-related work.

##### 10.1.1.1 Complete Coach

The Coach shall be warranted and guaranteed to be free from Defects and related Defects for two years or 100,000 miles, whichever comes first, beginning on the date of Conditional and/or Final Acceptance of each Coach (whichever comes first). During this warranty period, the Coach shall maintain its structural and functional integrity. The warranty shall be based on regular operation of the Coach under the operating conditions prevailing in the SFMTA service area.

##### 10.1.1.2 Subsystem and Components

Specific subsystems and components shall be warranted and guaranteed to be free from Defects and deficiencies. Contractor shall provide the respective warranties to meet the times or mileages given in Figure 10-1 (Component Warranty), beginning on the date of Conditional Acceptance of each Coach. If a component, system, or piece of equipment is added to or integrated into the Bus after the Bus is Conditionally Accepted, the 75%

for that item will commence on the date of installation of that item.

The basic body structure is composed of all components that are welded, riveted, or otherwise bonded together to form the main frame and body construction, including exterior panels, interior panels, roof, ceiling, and driver's barrier. Suspension beams, weldments, and structural members shall be considered as parts of the basic body structure. Bolted-on components and operating hardware are considered add-ons and therefore are not a part of the basic body structure.

Primary load carrying members of the Coach structure, including structural elements of the suspension, shall be warranted against corrosion failure and/or fatigue failure for a period of 6 years or 300,000 miles, whichever comes first.

The ESS shall be warranted and guaranteed to be free from Defects and related Defects for a period of 6 years or 300,000 miles, whichever comes first. The ESS warranty shall cover the replacement of any ESS modules and components required to ensure that the Coach retains at least 75% of the original usable energy capacity throughout the warranty period.

#### **10.1.1.3 Voiding Of Warranty**

The warranty shall not apply to any part or component of the Coach that has failed as a direct result of misuse, negligence, or accident, or that has been repaired or altered in any way to affect adversely its performance or reliability, except insofar as such repairs were in accordance with the Contractor's maintenance manuals and the workmanship was in accordance with recognized standards of the industry.

The warranty on any part or component of the Coach shall also be void if the SFMTA fails to conduct normal inspections and scheduled preventive maintenance procedures on the same part or component substantially as recommended in the Contractor's maintenance manuals, and such failure by the SFMTA is the sole cause of the part or component failure.

**FIGURE 10-1 ELECTRIC BUS SUBSYSTEM AND COMPONENT WARRANTY**

Items	Description	Years*	Mileage*
1	Body and Chassis Structure	3	150,000
2	Body and Chassis Corrosion Failure or Fatigue Failure	12	500,000
3	Propulsion System	6	300,000
4	Energy Storage System	6	300,000
5	Brake	2	100,000
6	Destination Signs	6	Unlimited
7	Heating, Ventilation	2	100,000
8	Air Conditioning Unit and Compressor	3	Unlimited
9	Door Systems	3	150,000
10	Air Compressor	2	100,000
11	Wheelchair lift and ramp system	2	100,000
12	Fire Suppression	3	150,000
13	Hydraulic Systems	2	100,000
14	Propulsion Cooling System	3	150,000
15	Power Electronics	2	100,000
16	Passenger Seating	5	Unlimited
17	Surveillance System	2	100,000

\*Whichever Occurs First

**10.1.2 Exceptions to Warranty**

The warranty shall not apply to scheduled maintenance items and items furnished by the SFMTA, except insofar as such equipment may be damaged by the failure of a part or component for which the Contractor is responsible.

**10.1.3 Detection of Defects**

If SFMTA detects a Defect within the warranty periods defined in Section 10.1.1, it shall notify the Contractor's representative within a reasonable time after discovery of the Defect. Within ten working days after receipt of notification, the Contractor's representative shall either agree that the Defect is in fact covered by warranty, or reserve judgment until the subsystem or component is inspected by the Contractor's representative or is removed and examined at SFMTA property or at the Contractor's plant. At that time the status of warranty coverage on the subsystem or component shall be mutually resolved between the SFMTA and the Contractor. Work necessary to commence the inspection or repairs, under the provisions of Section 10.2 (REPAIR PROCEDURES), shall commence within two working days after receipt of notification by the Contractor, unless such time is extended by the SFMTA, and shall be conducted in accordance with Section 10.2.1 (Repairs by Contractor). Specific detail about a manufacturer repair shall be reported to the SFMTA within 40 working hours of said repair.

If the SFMTA and Contractor are unable to agree whether a Defect is covered by the warranty provisions, the SFMTA may direct the Contractor to commence repairs in accordance with



Section 10.2.1 (Repairs by Contractor), pending agreement by the SFMTA and Contractor whether the repairs are covered by the warranty provisions. The Contractor shall promptly comply with such a request by the SFMTA.

#### **10.1.4 Fleet Defects**

A "Fleet Defect" is defined as cumulative failure of 50 percent of the same components in the same or similar application in a minimum fleet size of ten or more buses where such items are covered by warranty. A fleet defect shall apply only to the base warranty period outlined in Section 10.1.1.1 ("Complete Coach"). When a Fleet Defect is declared, the warranty on the affected item or component stops. The warranty period does not resume until the fleet defect is corrected. Where, in the SFMTA's opinion, such failure on multiple Vehicles creates a safety hazard or may result in damage to the Vehicle, such failure may, at the SFMTA's discretion, be considered a Fleet Defect, regardless of the proportion of such Defects identified.

For the purposes of identifying and addressing Fleet Defects, identical items include Major Components and subsystems purchased by the Contractor as complete units and/or serviced as complete units, such as the power train. If it can be demonstrated to the SFMTA's satisfaction that only a component of a complete unit or subsystem needs to be changed or replaced to correct the problem, then changing or replacing such component in all Vehicles may be acceptable. If it can be demonstrated to the SFMTA's satisfaction that Defects can be isolated to a specific production batch, then changing or replacing components or subsystems of the specific production batch may be acceptable.

The Fleet Defect warranty shall not apply to normal wear and tear items (including, but not limited to, consumables such as tires, brake pads or components supplied by the SFMTA).

##### **10.1.4.1 Repair Procedure and Corrective Action Plan**

Following written notification of a Fleet Defect, it shall be the Contractor's responsibility to investigate and provide a permanent resolution regardless of failed component origin. This includes the management, notification, and communications with all suppliers, sub-suppliers, and/or subcontractors. The resolution shall be inclusive of all parts and materials used in the manufacture and delivery of an Acceptable Vehicle.

Within 10 working days of receipt of notification of a Fleet Defect (unless the SFMTA grants an extension), the Contractor shall provide the SFMTA with a corrective action plan, subject to review and approval by the SFMTA, which shall be applied to all past, pending, and future Bus orders under this Contract. After a corrective action plan has been established and approved by the SFMTA, the Contractor shall specify how and when all Buses shall be corrected. After approval of the final work plan and schedule, the Contractor shall promptly undertake and complete the work program within the timeline established in the approved corrective action plan. The corrective work shall be reasonably designed to prevent the occurrence of the same Defect (including Related Defects) on all other Coaches and spare parts purchased under this

Contract. Any proposed changes to a corrective action plan or program must be submitted to the SFMTA for its approval.

The SFMTA reserves the right to suspend Bus delivery or acceptance whenever a Fleet Defect has been identified and the contractor is not meeting its obligations with respect to warranty service.

#### **10.1.4.2 Responsibility for Corrective Work**

The Contractor shall pay for all necessary labor and material to affect all fleet defect repairs to all Vehicles, including Buses for which the warranty had expired.

#### **10.1.4.3 Warranty after Replacement or Repair of Fleet Defects**

The warranty on parts or components used to remedy Fleet Defects shall begin when the retrofit parts are installed and shall be extended for the time and/or miles remaining on the original Coach warranty or the part manufacturer's warranty, whichever is first.

#### **10.1.4.4 Supply of Parts**

If a retrofit requires the Contractor to supply parts to the City, the Contractor shall ship the parts in individual kits, each kit consisting only of all the parts necessary to complete the repair/retrofit on one Bus. If retrofit parts are delivered to the City in any form other than individual kits, the Contractor shall undertake all work necessary to assemble parts into individual kits or shall reimburse the City (through the warranty claim process) for the cost of labor and materials required to do so.

Should the retrofit or redesign necessitated by a Fleet Defect render parts in the City's inventory obsolete, the City will return the obsolete parts to the Contractor for a full refund of their original cost, with no restocking fee or shipping cost, or, to the extent feasible, require the Contractor to supply new parts to replace the obsolete parts.

#### **10.1.4.5 Voiding of Warranty Provisions**

The fleet Defect provisions shall not apply to Coach Defects solely caused by noncompliance with the Contractor's recommended normal maintenance practices or by abuse of the equipment.

#### **10.1.4.6 Exceptions to Warranty Provisions**

Fleet Defect warranty provisions shall not apply to damage that is a result of normal wear and tear in service. The provisions shall not apply to SFMTA-supplied items.

### **10.1.5 Contractor's Representative**

The Contractor shall, at its own expense, provide qualified factory authorized service personnel at SFMTA facilities from the time the first Coach is delivered until the time that the last Coach is accepted. The Contractor's service personnel shall be available on request to assist the SFMTA in the solution of engineering or design problems that are within the scope of the Technical Specifications and that may arise during the warranty period. Maintenance or repair instructions or suggestions from these representatives affecting warranty shall be in writing and directed to the SFMTA Project Manager. The Contractor's service personnel shall have authority to accept and approve warranty claims and make timely decisions affecting the repair of Defects.

On a daily basis, Contractor shall supply a record of Contractor's personnel working within SFMTA property to the SFMTA supervisor or superintendent on site.

The record shall contain the following information: Date, Name, and SFMTA Vehicle ID number being worked on. Contractor shall inform the SFMTA in advance of any modifications proposed on the Vehicle during the warranty period.

The SFMTA will work with the Contractor's representatives as much as possible to minimize the costs and time involved in conducting warranty repairs; however, due to space constraints and labor agreements, the SFMTA cannot guarantee that any Contractor work will be performed on SFMTA property.

## **10.2 REPAIR PROCEDURES**

The SFMTA shall endeavor to perform warranty work wherever possible and seek reimbursement from Contractor for required labor hours and parts used. Contractor may be requested to perform or assist with sufficiently technical or abnormal warranty-covered repair work. The Contractor shall be responsible, and shall reimburse the SFMTA, for all costs for warranty work performed by SFMTA personnel or by any contractor(s) hired by the SFMTA to perform warranty work, as described in Section 10.2.2, Repairs by SFMTA.

### **10.2.1 Repairs by Contractor**

When the SFMTA requires the Contractor to perform warranty-covered repairs, the Contractor's representative must begin work necessary to effect repairs in a proper and timely manner within 10 working days after receiving notification of a Defect from the SFMTA. Whenever the Contractor makes warranty repairs, they shall use new parts, subcomponents, and subsystems, unless the repair of original parts is authorized in writing by the SFMTA. The SFMTA shall make the Coach available to complete repairs timely with the Contractor's repair schedule.

The Contractor shall provide, at its own expense, all spare parts, labor, tools, and space required to complete repairs. The Contractor may use SFMTA shop space for repairs if approved by the SFMTA. If SFMTA does not approve shop space the supplier shall use their own offsite location to repair the Bus. If the Coach is removed from SFMTA property, the

Contractor's representative shall diligently pursue the acquisition of parts and repair procedures. The schedule and scope of the repairs must be approved by SFMTA and performed within 10 working days unless otherwise approved in writing by the SFMTA.

## **10.2.2 Repairs by SFMTA**

The SFMTA strongly prefers that all major warranty-covered repairs be performed by the Contractor's equipment suppliers. If the event that the SFMTA has no option but to perform, or to procure a contractor to perform, the warranty-covered repairs, the requirements of this section shall apply.

### **10.2.2.1 Parts Used**

The SFMTA shall use new parts, subcomponents, and subsystems that Contractor shall provide specifically for this repair. Contractor shall stock most required parts, including those of its sub-suppliers. All parts shall be stamped or permanently marked with the OEM part number, and serial number if applicable.

Remanufactured parts may be provided by the Contractor for warranty-covered repairs if approved by the SFMTA.

### **10.2.2.2 Contractor-Supplied Parts**

Contractor shall furnish parts for all warranty work, whether the warranty labor is performed by the Contractor or by the SFMTA. Contractor shall deliver prepaid warranty parts for repairs within 72 hours of notification from the SFMTA. If longer than 72 hours, the Contractor must provide justification.

The SFMTA shall use parts or components available from its own stock only on an emergency basis. Monthly reports, or reports at intervals mutually agreed upon, of all repairs covered by warranty will be submitted by the SFMTA to the Contractor for reimbursement or replacement of parts or components. The Contractor shall provide forms for these reports.

### **10.2.2.3 Defective Parts Return**

The Contractor may request that Defective parts or components covered by warranty be returned to the manufacturing plant. The Contractor shall pay the total cost for this action. Materials will be returned in accordance with the Contractor's instructions. Contractor shall provide such instructions to the SFMTA Project Manager at the beginning of the project.

The Contractor's representative shall meet with an SFMTA representative on a biweekly basis to determine which parts need to be returned to the manufacturer for evaluation, or which parts may be discarded.

#### **10.2.2.4 Reimbursement for Labor**

The Contractor shall provide reimbursement for warranty labor hours to the SFMTA. Unless otherwise agreed by the SFMTA and the Contractor, the warranty labor rate charged to the Contractor will be the current fully burdened hourly wage rate of a 7381 Automotive Mechanic. The labor rate shall be agreed to, in writing, at the pre-production meeting, and is to be fixed for a period of one year. The warranty labor rate may be adjusted each year to match the current fully burdened hourly rate; the yearly rate adjustment must not exceed the Producer Price Index (WPU1413 - Truck and Bus Bodies) for that year. The labor hours spent on diagnostic time will not be included in the warranty claim.

Contractor has 60 days to approve warranty claims. Contractor shall reimburse the SFMTA for approved warranty claims within 60 Days after written claim approval is provided to the SFMTA by the Contractor. In the event the Contractor requires the failed component(s) be returned, the sixty 60 days reimbursement timeline requirement will begin from the date the Contractor receives the failed component(s). If the SFMTA does not receive payment within 60 Days, the SFMTA may deduct the amount of the approved claim from the progress payments due to Contractor.

#### **10.2.2.5 Reimbursement for Parts and Towing**

In the event the SFMTA deems it necessary to contract out for warranty repairs, the SFMTA shall notify Contractor, and the Contractor shall approve the warranty repair before the SFMTA proceeds with contracting out the repair. The Contractor shall reimburse the SFMTA for the actual cost of the repair, including charges for any warrantable parts, consequential parts or damages, labor, and towing or transportation. The SFMTA may impose a handling charge of up to 15% of the total cost of the warranty parts not to exceed \$250 per claim plus applicable taxes.

Contractor shall reimburse SFMTA for approved warranty claims within 60 Days after each warranty claim has been submitted by the SFMTA. If the SFMTA does not receive payment within 60 Days, the SFMTA may deduct the amount of the approved claim from the progress payments due to Contractor.

#### **10.2.2.6 Major Component Repairs**

To the extent that suppliers of Major Components require that warranty repairs be performed by an authorized dealer for those components, the SFMTA acknowledges that if it elects to repair these components without written permission from the original equipment manufacturer, the remaining warranty may be voided.

#### **10.2.3 Warranty after Replacement or Repairs**

The warranty on parts, components, or subsystems replaced as part of a standard warranty repair shall have the unexpired warranty period of the original subsystem, effective the

replacement date. Extended warranties shall begin on the date of the repair or replacement of the parts, components, or subsystems.

#### **10.2.4 Failure Analysis**

At the SFMTA's request, the Contractor, at its cost, shall conduct a failure analysis of a failed part involved in a Fleet Defect or that is safety-related or a Major Component that could affect fleet operation that has been removed from Coaches under the terms of the warranty. The analysis shall be documented and compiled into a report. The failure analysis reports shall be delivered to the SFMTA Project Manager within 60 Days of the receipt of failed parts.

### **10.3 DATA PROCESSING**

#### **10.3.1 Warranty and Computer Program**

The SFMTA and the Contractor will agree on the proposed process. The SFMTA prefers to use the Contractor's warranty module for all tracking and submission of Warranty repairs and/or claims. All systems modifications, parts retrofits, and factory recalls must be documented for integration into warranty software.

##### **10.3.1.1 Bus Master File**

The SFMTA and Contractor shall agree on the final configuration of the Bus Master File prior to the delivery of the first bus.

##### **10.3.1.2 Digital Parts Catalog**

The Contractor shall provide the SFMTA with a Microsoft Excel file with a list of all parts including part numbers, part descriptions, quantities, and other identifying information.

##### **10.3.1.3 Bus Maintenance Manuals and Diagrams**

The Contractor shall provide the following drawings via an approved electronic file sharing system:

- Maintenance Manuals
- Parts Manuals
- Training Manuals
- Wiring and Air Diagrams

### **10.4 SPARE PARTS**

The Contractor shall furnish the spare parts and tools per Section 4.1.2 of the Agreement. Delivery of the recommended list of spare parts and tools shall be completed prior to delivery of the first production Coach unless otherwise approved by the SFMTA.

Parts manuals shall be completed within 30 days after the delivery of the first production Coach.

Contractor shall provide a parts cross reference table identifying sub-suppliers and their part numbers.

The Contractor shall update the parts books files with any changes made for the 12 years after the initial production of the SFMTA Coaches described in this request. Any urgent updates shall be handled on a case-by-case basis, at the SFMTA's discretion. The parts books shall have the following indexes sorted in the following order:

- By Bus manufacturer's description
- By Bus manufacturer's part number

The Supplier shall provide 30-Day pricing information to help support the SFMTA in stocking of parts.

#### **10.4.1 Recommended Spare Parts from Build Sheet**

The Contractor shall submit a recommended spare parts list for the SFMTA's use when planning and ordering spare parts and to support the SFMTA's initial start-up for revenue operation.

The quantities shall be based on the quantity of Coaches on order at the time the parts list is generated and shall be sufficient to cover the SFMTA's reasonable needs for five years.

Spare parts shall be interchangeable with their corresponding part. All spare parts shall be reconfigured to the latest revision during the warranty period. The recommended spare parts list shall take into consideration the potential for certain unused parts and assemblies to "age" and otherwise experience degradation in performance or reliability when installed. All such parts and assemblies should be clearly marked with date of manufacture, ideal storage conditions information, and shelf-life date. This information tag should be clearly visible when the part, container, or assembly is stored.

**10.4.1.1 Contractor's Recommendations/Prices**

The Contractor's recommended spare parts list shall include the following:

- A. Contractor part number
- B. Part description
- C. Recommended quantity
- D. Price and/or extended price

**10.4.2 Availability**

The Contractor shall guarantee the availability of replacement parts for the Coaches for a period of 15 years after the date of conditional acceptance of the last production bus. Spare parts shall be interchangeable with the original equipment and shall be manufactured in accordance with the Quality Assurance Provisions in these Technical Specifications. Contractor shall guarantee availability of 14-Day delivery or less from receipt of normal purchase order. Contractor shall not make exclusive agreements with sub-suppliers that would preclude the SFMTA from purchasing components directly from sub-suppliers. Contractor shall be able to expedite delivery (e.g., overnight delivery) of emergency shipments for 85% of the Coach parts.

Spare parts must be available to repair all electronic assemblies and subassemblies. Special provisions shall be made to supply those components that are not readily available on the commercial market (custom parts, for example). Any custom-made transformers, inductors, programmable components, or other devices containing proprietary firmware, shall be made available to the SFMTA as spare parts. When the original manufacturer is no longer able to supply the spare IC's, the associated proprietary firmware, design specifications, and other relevant detail must be provided to the SFMTA at that time.



## 11 RELIABILITY, MAINTAINABILITY, AND SAFETY

The Contractor shall establish and maintain an efficient reliability program to maintain the Mean Distances Between Failures (MDBF) as specified in Section 11.2 (VEHICLE RELIABILITY REQUIREMENTS). Contractor's reliability engineering tasks shall focus on the prevention, detection, and correction of reliability design deficiencies, weak parts, and overall work quality defects. Reliability engineering shall be an integral part of the Vehicle design process, including design changes. The reliability program shall monitor and control sub-suppliers' design and manufacture of parts to ensure compliance with the Reliability requirements (see Section 11.2) and the Contract terms.

### 11.1 SERVICE LIFE

The Coach, including all subsystems, shall be designed to operate in transit service for at least 12 years or 500,000 miles. It shall be capable of operating at least 40,000 miles per year, up to and including its 12th year. Components and structural members shall be designed to withstand the loads and motor torque reactions expected in revenue service on any route in San Francisco.

### 11.2 VEHICLE RELIABILITY REQUIREMENTS

The Vehicles shall be designed to meet the service goal of at least 90% availability throughout a one-year period.

### 11.3 FAILURES

Failure definitions are for the purpose of reliability demonstration testing, specification compliance and warranty administration.

Classification of failures are described below:

- Bad Order: A failure that does not require removal of the Coach from service during its assignments but does degrade Coach operation. The failure shall be reported by operating personnel.
- Physical Safety: A failure that could lead directly to passenger, operator, or maintainer injury.

#### 11.3.1 Accountable Failures

Failures that are determined by the Failure Review Board (see Section 11.4) to have been caused by a design flaw or Defect in the Vehicle subsystems or components shall be tallied against the applicable warranty and Fleet Defect provisions of this Contract. Failures that are tallied for calculating the achieved reliability are those that meet the following criteria:

- A. They are detected on the equipment during any period the test is in process and test time is being accumulated and recorded - all safety-critical failures are accountable.

- B. They are verified by subsequent re-testing or investigation.
- C. They are independent (primary) failures.

In addition, an item failure will be accountable and included in the MDBF calculations when one or more of the following conditions exists:

- Inability of the equipment to attain or sustain minimum specified output requirements.
- Item failure symptoms that are detected during operation and recur in subsequent re-testing, but diagnosis and determination of the basic cause cannot be accomplished.
- Multiple independent (primary) item failures detected on the equipment during measurement test time (these will be individually accountable).

### **11.3.2 Non-Accountable Failures**

Item failures will be excluded from the MDBF computations when one of the following conditions exists:

- The item failure cannot be duplicated during subsequent re-test, and the cause cannot be determined by investigation and analysis. The SFMTA will judge the adequacy of the Contractor's analysis for this determination.
- The item failure is a dependent (secondary) failure resulting from an independent (primary) failure.
- The item failure is caused by mishandling, abuse, improper storage, or accidental damage.
- The item failure is the direct result of improper test procedure or improper test equipment.
- The failure is a recurrence of an earlier failure thought to have been corrected by adjustment or repair and occurs within 20 test hours of the original failure.
- The item failure occurred in a unit that had been subjected to verified operational or environmental stresses beyond design requirements.

## **11.4 FAILURE REVIEW BOARD**

A Failure Review Board with members from the SFMTA and the Contractor may be convened to periodically review and determine the relevance of each failure and to recommend appropriate corrective action both for Vehicles undergoing reliability demonstration testing and for those under warranty. The Failure Review Board shall be in effect during the complete warranty period of each Coach, and as necessary to resolve Fleet Defects.

## **11.5 MAINTAINABILITY**

The Contractor shall establish and maintain an efficient maintainability program to support the maintainability requirements as specified in Section 11.5.4 (Maintenance and Inspection) of the Contract. Maintainability engineering shall be an integral part of the Vehicle design process,

including design changes. Methods shall be taken to assure the sub-suppliers' efforts are consistent with the overall system requirements.

All systems or components serviced as part of periodic maintenance or whose failure may cause a physical safety hazard or road call shall be readily accessible for service and inspection. To the extent practicable, removal or physical movement of components unrelated to the specific maintenance or repair tasks involved shall be unnecessary. Relative accessibility of components, measured in time required to gain access, shall be inversely proportional to frequency of maintenance and repair of the components. Accessibility to components needing frequent maintenance shall be considered during the design reviews. The body and structure of all Coaches shall be designed for ease of maintenance and repair. Ease of repair shall correspond to the vulnerability of the item to damage in service.

Contractor shall provide all maintenance manuals to the SFMTA.

(Reference Section 9.2, Publications: MAINTENANCE MANUALS, ILLUSTRATED PARTS MANUALS, OPERATOR'S MANUALS, & VEHICLE RECORD BOOKS).

### **11.5.1 Special Tools and Diagnostics Equipment**

Each Coach shall be designed for disassembly, re-assembly, servicing, and maintenance by use of tools and items, which are normally available as commercial standard items. All grease fittings shall be capable of being serviced from a pitted area. Electronics assemblies and subassemblies shall also be maintainable using standard, commercially available test equipment and maintenance tools. The Contractor must provide a list of all special tools and any special information that is needed to repair and reassemble electronic assemblies. Jacks or dollies shall be specified to remove the energy storage system, traction motor, wheelchair ramp, and other large systems.

The following list of special tools and diagnostic equipment shall be available for purchase through the Contractor upon delivery of the first Bus. All tools and electronic test equipment described throughout this section must be of heavy-duty industrial grade quality approved by the SFMTA. Where software is provided to operate diagnostic equipment, a subscription for maintenance, support, and updates to that software should be included for the warranty period, including access to calibration codes.

#### **11.5.1.1 Special Purpose Electrical and Electronic Diagnostic Tools**

Contractor shall provide pricing information for a complete set of industrial quality electrical and electronic system test equipment and diagnostic tools, to include digital multi-meters (Fluke 87E or approved equal), scope meters (Fluke 124 or approved equal), carbon pile testers, inductive pick-up ammeters, PLC logic analysis software and computer interface connectors, and other software.

Contractor shall provide pricing information for a complete set of ESS maintenance, tune-up, and diagnostic tools, to include laptop computers, software, and connectors. Laptops are to be MIL-STD-810G compliant or equivalent, having the storage and performance capacity to effectively handle all the diagnostics utilized on the Bus, or approved equal having equivalent or superior durability, dependability, and ease of use. At a minimum they are to be equipped with 500 GB of SSD memory, 8 GB of RAM, one USB 2A port, and one serial (RS232) port or alternative port as required for interfacing with diagnostic tools.

#### **11.5.1.2 Special Purpose Electric Drive System Tools**

If applicable, Contractor shall provide pricing information for a complete set of electric drive maintenance and diagnostic tools, to include electronic diagnostic data software, computer connectors, printers, and hand-held diagnostic data readers shall be used for reading trouble codes stored in ECM memory and for providing operating information about the electric drive system; one electric drive stand with adapters for overhaul purposes; and one set of dynamometer controls and adapter plates to mate the electric drive supplied to the SFMTA transmission dynamometer.

#### **11.5.1.3 Special Differential and Propeller System Tools**

Contractor shall provide pricing information for a complete set of OEM installation and removal tools needed to maintain the differential and propeller shaft systems and for a set of differential overhaul tools.

#### **11.5.1.4 Tow Equipment**

Contractor shall provide pricing information for a set of specialized tow adapters, if required.

### **11.5.2 Electrical Maintainability**

Electrical subsystems shall consist of replaceable units so that each major component, panel, or wiring harness is easily separable with standard hand tools or by means of connectors. Each unit, except the main body wiring harness, shall be removable and replaceable by a mechanic.

### **11.5.3 Tire Replacements**

A mechanic shall be able to raise the bus and change any one tire in less than 30 minutes from the time the Coach is approached.

### **11.5.4 Maintenance and Inspection**

Scheduled maintenance or inspection tasks as specified by the Contractor shall be within the prevailing industry practices and subject to SFMTA approval. OEM shall provide a list of maintenance activities that can be performed while the vehicle is charging.

Scheduled maintenance tasks shall be related and shall be grouped in maximum mileage intervals. It shall be possible for a mechanic to accomplish the scheduled maintenance or inspection tasks as specified by the Contractor in a reasonable amount of time

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.

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

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

### **11.5.5 Hazards**

A Hazard is defined as any real or potential condition that can cause injury or death, or damage to or loss of equipment or property.

#### **11.5.5.1 System Safety Program Objectives**

The Contractor shall have the responsibility of developing a system safety program that shall as a minimum have as its objective minimizing Hazards.

#### **11.5.5.2 System Safety Criteria**

Criteria for system design and subsequent operation procedures shall assure that system safety objectives for Vehicles are implemented throughout design development, testing, delivery, operations, and maintenance. Safety of passengers, mechanics and operator shall be taken into full consideration.

Potential or actual Hazards that have been identified through analysis shall be limited in accordance with the following order of precedence:

- Design for minimum Hazard
- Use of safety devices
- Use of warning devices
- Use of special procedures.

### **11.5.5.3 System Safety Data**

Contractor shall provide appropriate system safety information and procedures for inclusion in training instructions, lesson plans and other publications.

## 12 QUALITY ASSURANCE

### 12.1 CONTRACTOR IN-PLANT QUALITY ASSURANCE REQUIREMENTS

#### 12.1.1 Quality Assurance Organization

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

##### 12.1.1.1 Control

The QA organization shall exercise quality control over all phases of production from initiation of design through manufacture to preparation for delivery. The organization shall also control the quality of supplied articles.

##### 12.1.1.2 Authority and Responsibility

The QA organization shall have the authority and responsibility for reliability, quality control, inspection planning, establishment of the quality control system, and approval/rejection of materials and manufactured articles in the production of the Coaches. These responsibilities include assuring that all components meet the engineering requirements for reliability, safety, and maintainability. The SFMTA or its representatives shall be allowed to participate in all Contractor and/or subcontractor tests and inspections of all components of the equipment, at the Contractor's and subcontractor's plants, for the purpose of QA.

#### 12.1.2 Quality Assurance Organization Functions

The functions of the QA organization shall include, but not be limited to, the following:

##### 12.1.2.1 Records Maintenance

The QA organization shall maintain and use records and data essential to the effective operation of its program. These records and data shall be available for review by the Resident Inspector(s).

##### 12.1.2.2 Corrective Actions

The QA organization shall detect and promptly assure correction of any conditions that may result in the production of Defective Coaches. These conditions may occur in designs, purchases, manufacture, tests, or operations that culminate in Defective supplies, services, facilities, technical data, or standards.

### **12.1.3 Standards and Facilities**

The following standards and facilities shall be basic in the QA process:

#### **12.1.3.1 Configuration Control**

The Contractor shall maintain drawings, assembly procedures, and other documentation that completely describe a qualified Coach that meets all the specification requirement options and special requirements of this procurement. The QA organization shall verify that each Coach is manufactured in accordance with these controlled drawings, procedures, and documentation.

#### **12.1.3.2 Production Tooling Calibration**

When calibrated tools or other devices are used for bus production, they shall be proved accurate at formally established intervals and adjusted, replaced, or repaired as required to maintain quality.

#### **12.1.3.3 Equipment Use by Resident Inspector(s)**

The Contractor's gauges and other measuring and testing devices shall be made available for use by the Resident Inspector(s) to verify that the Coaches conform to all specification requirements.

### **12.1.4 Control of Purchases**

[RESERVED]

#### **12.1.4.1 Supplier Control**

The Contractor shall require that each supplier of major systems or components maintain a quality control program for the services and supplies that it provides. The Contractor's QA organization shall assure all materials provided by suppliers for conformance conform to specification requirements. Materials that have been inspected, tested, and approved shall be identified as acceptable to the point of use in the manufacturing or assembly processes. Controls shall be established to prevent inadvertent use of nonconforming materials.

### **12.1.5 Manufacturing Control**

The Contractor shall ensure that all basic production operations, as well as all other processing and fabricating, are performed under controlled conditions. Establishment of these controlled conditions shall be based on the documented Work instructions, adequate production equipment and special working environments if necessary.



**12.1.5.1 Completed Items**

A system for final inspection and test of completed Vehicles shall be provided by the QA organization.

**12.1.5.2 Nonconforming Materials**

[RESERVED]

**12.1.5.3 Statistical Techniques**

[RESERVED]

**12.1.5.4 Inspection Status**

A system shall be maintained by the QA organization for identifying the inspection status of components and completed SFMTA Buses. Identification may include cards, tags, or other normal quality control devices. A vehicle history book shall be attached to each Bus to track QA functions and defects as the work progresses through the shop (see Section 12.2.2.3). A copy of the report must be attached to each Bus upon vehicle delivery.

**12.1.6 Inspection System**

The QA organization shall establish, maintain, and periodically audit a fully documented inspection system. The system shall prescribe inspection and test of materials, work in progress, and completed articles. As a minimum, it shall include the following controls:

**12.1.6.1 Inspection Personnel**

Sufficient trained inspectors shall be employed to ensure that all materials, components, and assemblies are inspected for conformance with the Vehicle design and specifications.

**12.1.6.2 Inspection Records**

Inspection rework or rejection records shall be attached to inspected articles. Articles that have been accepted after review by the Contractor and the City shall be identified. Articles that have been reworked to specified drawing configurations shall not require special identification. Articles rejected as obsolete, unsuitable, or as scrap shall be plainly marked and controlled to prevent installation on the Coach.

Discrepancies noted by the Contractor or Resident Inspector(s) during assembly shall be entered by the inspection personnel on a record that accompanies the major component, subassembly, assembly, or Coach from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, procedures, or other conditions that cause articles to be in nonconformity with the requirements of the Contract

specifications. The inspection personnel shall verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, then the SFMTA shall approve the modification, repair, or method of correction to the extent that the Contract specifications are affected. The inspection forms shall be posted at or near the point of inspection for each car and included in the Vehicle History Book when all discrepancies have been eliminated.

An Inspection and Test Log (Log) shall be maintained by the Contractor during equipment assembly. All Contractor and SFMTA in-process inspection sheets and test data records for that Bus shall be contained in this Log, which will be provided in the Vehicle History Book (see Section 12.2.3.3 – Vehicle History Book).

### **12.1.6.3 Quality Assurance Audits**

The Contractor's QA organization shall establish and maintain a quality control audit program. The Contractor shall submit a Quality Assurance Plan for SFMTA review and approval prior to the commencement of building the first Coach of this Contract.

### **12.1.6.4 First Article Inspection**

The first article Coach shall undergo a detailed inspection by SFMTA personnel or representatives. The purpose of this inspection will be to ensure that the Coach has been built to approved engineering standards and that all agreed-upon specifications have been incorporated. The configuration established at this inspection shall become a benchmark for all future production Coaches.

Coach inspection snag list will be transmitted to the SFMTA and the assembly line for immediate production corrections, so as not to have repeated delivery of Coaches with repeat snags. Corrections shall be made at the manufacturing facility prior to delivery and contractor shall provide a corrective action report to the SFMTA explaining what was done to prevent these from occurring on later Buses.

### **12.1.7 Resident Inspector**

Resident Inspector(s) shall represent the SFMTA at the Contractor's plant. They shall monitor, in the Contractor's plant, the manufacture of transit Coaches built under the procurement. The Resident Inspector(s) will be authorized to approve the pre-delivery tests, and to release the Coaches for delivery. Upon request to the QA manager/supervisor, the Resident Inspector(s) shall have access to the Contractor's QA files related to this procurement. These files shall include drawings, material standards, parts lists, inspection processing and reports, and records of Defects.

As necessary and prior to the beginning of Coach manufacture, the Resident Inspector(s) will meet with the Contractor's quality assurance manager/supervisor. They will review the inspection procedures and checklists.

The Contractor shall provide a workspace for the Resident Inspector(s) in proximity to the final assembly area. This space shall be equipped with desks, chairs, and other equipment sufficient to accommodate the Resident Inspector staff.

The presence of the Resident Inspector(s) in the plant shall not relieve the Contractor of its responsibility to meet all the requirements of this procurement.

## **12.2 TEST REQUIREMENTS AND COMMISSIONING**

This Section defines and establishes the requirements for comprehensive testing of the prototype and production buses. Criteria for evaluating Coaches in the pre-delivery and post-delivery tests will be uniform. No changes to the Bus specifications will be made after Conditional Acceptance aside from those arising from mutually agreed-upon change orders.

The prototype bus shall conform to the requirements of Section 12.2.1 (Prototype Bus Test Requirements), Section 12.2.2 (Pre-Delivery Tests), and Section 12.2.3 (Post-Delivery Tests).

Production buses shall conform to the requirements of Section 12.2.2 (Pre-Delivery Tests) and Section 12.2.3 (Post-Delivery Tests).

### 12.2.1 Prototype Bus Test Requirements

This Section defines and establishes the requirements for comprehensive testing of the prototype bus to be developed and managed by the Contractor. The SFMTA or its authorized representatives will have the option of overseeing all testing. The tests shall ensure proof-of-design and shall determine the compliance with the following requirements:

- Duty cycle and performance (as per Attachment 7)
- Dimensional requirements (as per Section 1.2)
- Electronic noise control (as per Sections 1.6 & 7.12)
- Audible noise control (as per Section 1.5)
- Contract compliance
- Braking & jerk rate (as per Section 5.3)
- Air compressor recovery rate (as per Section 5.5.1)

Where sufficient documentation of prior testing exists to verify that the Contractor's vehicle meets the SFMTA's test requirements above, the Contractor may submit that documentation in lieu of performing additional testing. The SFMTA shall review the documentation and determine if it constitutes acceptable verification of the test requirements.

SFMTA may provide sample test plans for duty cycle and performance, audible noise control, braking, jerk rate, and air compressor testing. Contractor shall finalize their proposed testing plans and submit the plans to the SFMTA for approval.

Duty cycle and performance testing must be performed within the City and County of San Francisco after prototype bus delivery; all other tests may be performed at a suitable location of Contractor's choosing. While instrumented and loaded with ballast, the Coach shall be tested on the routes specified in Attachment 7 to verify that the performance requirements in these Specifications are being met.

Contract compliance will be determined in the configuration audit during the First Article Inspection of the prototype bus.

The Contractor shall manage the testing and reporting process. The Contractor shall provide competent personnel in appropriate technical disciplines to ensure an uninterrupted test program. Where appropriate, tests shall be conducted under simulated operating conditions. Special tools, test equipment, instrumentation, data processing, and spare parts required during testing shall be furnished by the Contractor. Supplied equipment and parts shall be removed from SFMTA facilities at the conclusion of testing.

Within 30 Days after successful completion of each test, a report shall be provided that summarizes results, analyses, and corrective actions. Upon delivery of test reports, the SFMTA shall provide notice of acceptance or non-acceptance within two weeks.

Reports shall include photographs, charts, and additional data as necessary to support the test results. Reports must include a statement that certifies conformance to specified requirements. Should submitted data not be acceptable to the SFMTA, the Contractor shall complete the tests as specified with no increase in contract cost or extension of the delivery schedule.

### **12.2.2 Pre-Delivery Tests**

The Contractor shall conduct pre-delivery tests at its plant on each Coach following: (a) completion of manufacture and (b) before delivery to the SFMTA. These pre-delivery tests shall include visual and measured inspections, as well as testing of the total Coach operation and water tightness. The tests shall be conducted and documented in accordance with written test procedures to ensure that the completed Coaches have attained the desired quality and have met the requirements of these Technical Specifications.

The pre-delivery tests shall be scheduled and conducted with sufficient notice so that they may be witnessed by the Resident Inspector(s), who may accept or reject the results of the tests. The results of pre-delivery tests, and any other tests, shall be filed with the assembly inspection records for each Coach. The under-floor equipment shall be made available for inspection by the Resident Inspector(s), using a pit or Coach hoist provided by the Contractor. A hoist, scaffold, or elevated platform shall be provided by the Contractor to inspect the Bus roof easily and safely. Delivery of each Coach shall require written authorization of the Resident Inspector. Release of each Coach for delivery shall require written authorization of the Contractor. An executed copy of the authorizations shall accompany the delivery of each Coach. The SFMTA will not furnish an operator for these pre-delivery tests.

#### **12.2.2.1 Pre-Delivery Visual and Measured Inspection**

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

#### **12.2.2.2 Water Tightness**

Each Coach shall be tested as per Section 2.1.7 (Exclusion of Water).

#### **12.2.2.3 Vehicle History Book**

The Contractor shall produce a Vehicle History Book for each completed Bus. The Vehicle History Books shall be a specific record of production, testing, inspection, and relevant documentation for each individual Vehicle. The Vehicle History Book shall contain original

documents unless specified otherwise. All documents shall be marked with the Bus serial number, the production sequence number, or the SFMTA Bus number for the completed vehicle.

The Contractor shall provide electronic Vehicle History Books for each Bus. A draft Vehicle History Book will be submitted to the SFMTA for review and approval 60 Days before the first Bus is scheduled to ship.

The Contractor shall present their standard vehicle history book design to the SFMTA for approval. The SFMTA prefers that each Vehicle History Book contain the following:

- Table of contents
- Production control cross-reference sheet, listing:
  - Bus serial number
  - Shop order/production sequence number
  - Final SFMTA Bus number
- Production schedule for each Bus showing start and end dates for each major stage of manufacturing
- (Electronic copies only) All production drawings by number and revision status, including release date, current revision, and outstanding engineering change requests at time of production
- List of all serialized components
- Log of all non-conformances including status
- Test records and certificates
- Records of all required inspections
- Completed pre-shipment checklist
- Shipping authorization form

Each vehicle history book shall be presented to the SFMTA prior to the Bus being released from the Contractor's facility.

### **12.2.3 Post-Delivery Tests**

The SFMTA Project Manager/Representative may conduct post-delivery tests on each delivered Coach. The post-delivery tests will include visual inspection and functional tests.

Coaches that fail to pass the post-delivery tests are subject to non-acceptance. The SFMTA Project Manager/Representative will record details of all Defects on the appropriate test forms

and will notify the Contractor of non-acceptance. The Defects detected during these tests shall be repaired to bring the vehicle into compliance.

### **12.2.3.1 Post-Delivery Visual Inspection**

The post-delivery visual inspection is equivalent to the inspection at the Contractor's plant and will be conducted with the Coach in a static condition. Any deficiencies, Defects or visible delivery damage will be identified and recorded during the visual inspection of each Coach.

### **12.2.3.2 Functional Test and Vehicle Burn-In**

Prior to Conditional Acceptance, each Vehicle shall have a minimum of 500 driven miles. This mileage can be accumulated during the drive to SFMTA's acceptance facility, if approved by the SFMTA in advance.

If a Bus is to be driven to the SFMTA's acceptance facility, the speed and operation en route shall be controlled to conform to the recommendations of the system suppliers and tire supplier to prevent damage to any part of the Coach. At the time of delivery, a written report shall be submitted to the SFMTA by the Contractor listing all incidents and unusual Coach performance as well as the quantity of oil, coolant and other fluids added to the Coach during the trip.

In the event the drive-away trip of any Coach is interrupted, for any reason, the Contractor shall include in the report a description of the nature of the service or repair, and the cause and restoration, if any, required to continue the trip. Failure to submit this written report will result in the SFMTA not accepting delivery of the Coach.

## **12.2.4 Commissioning**

The Contractor shall provide a commissioning plan for all subsystems listed below. These systems shall be commissioned by the Contractor on each Bus prior to Conditional Acceptance.

- Propulsion system
- ViriCiti
- Radio system (Harris)
- CAD/AVL (Conduent)
- Video Surveillance (RCM)
- Destination signs
- Automatic passenger counter

The SFMTA shall be responsible for commissioning all systems listed below.

- Farebox
- Clipper 2.0
- DriveCam

### 12.2.5 Conditional and Final Acceptance

Upon completion of all required commissioning items and resolution of all major defects identified during the post-delivery inspection that impact performance, reliability, or safety in revenue service, the SFMTA shall Conditionally Accept each Bus. Upon Conditional Acceptance, the SFMTA shall place the Bus into revenue service. The SFMTA and Contractor shall mutually approve Conditional Acceptance documentation which details the remaining defects that need to be addressed on each Bus prior to Final Acceptance. If there are no defects found during Conditional Acceptance, the Bus shall receive Final Acceptance.

## 12.3 PROJECT PLANNING, SCHEDULING AND CONTROL

### 12.3.1 Introduction

This section specifies the requirements for project planning, scheduling, and progress reporting to be performed by the Contractor in conjunction with the Contract work. The Contractor shall employ Critical Path Method scheduling (CPM) for planning, scheduling, and reporting all work required by the Contract Documents.

### 12.3.2 Definitions and Clarifications

Baseline Schedule: The detailed CPM schedule, prepared by the Contractor, indicating the Contractor's plan for executing the Contract work. The Baseline Schedule shall conform to all requirements of the Contract Documents.

The Baseline Schedule shall be revised as necessary to incorporate approved Contract Modifications. The Contractor's performance or other avoidable delays shall not be considered justification for Baseline Schedule revision.

Current Schedule: The updated schedule indicating actual progress to date and forecasted logic and progress for the remaining work. The update will be, at a minimum, to the same level of detail as the Baseline Schedule. Monthly updates of the current schedule shall be a contract requirement.

As-Built Schedule: The resulting schedule incorporating all actual activity durations, milestone completions, and Contract extensions as accomplished or incurred during the Contract duration. The Contractor shall submit this As-Built Schedule to the City at the completion of the Contract work.

Work Day: Any day except Saturdays, Sundays, and US legal holidays. If multiple shifts per day or extended hours (more than eight hours per shift) are scheduled, this is to be noted with the activities to which this applies.

Use of Float: Float identified in the baseline, or Current Schedule is jointly owned by the City and the Contractor. Its use must be approved in the scheduling update process.



### **12.3.3 Description of Submittals**

A Baseline Schedule and Management Plan shall be submitted to SFMTA for review and approval.

Reference Section 13.1 (Preferred Delivery Schedule).

#### **12.3.3.1.1 Baseline Schedule**

Contractor shall submit a Baseline Schedule and shall include the following aspects:

- The program logic to be initially reviewed and approved by the SFMTA prior to initial design review.
- All activities related to major subsystems for the prototype and production Coaches.

The Baseline Schedule may take the form of a Gantt chart or other approved format.

### **12.3.4 Pre-Production Meeting**

The SFMTA and the Contractor shall hold a pre-production meeting after issuance of Notice to Proceed for the Contract. The purpose of the pre-production meeting shall be to review the project management plan (including key staff), communication flow and decision-making processes, production schedule and production processes, contractual requirements, quality assurance procedures, and technical configuration of the Buses.

The project management plan shall identify, at a minimum, the Contractor's project management team, technical engineering staff, quality assurance administrator, and warranty administrator.

### **12.3.5 Progress Review Meetings**

On a schedule mutually agreed upon by the City and the Contractor, meetings will be held to review the CPM schedule. The City, the Contractor, and, if necessary, the appropriate subcontractors shall attend the meetings.

During the meeting, the Contractor's schedule submission will be discussed and revised by the Contractor as necessary. The City may require the Contractor to modify any portions of the schedule because of "behind schedule" activities. The marked-up schedule documents from this meeting will serve as the Current Schedule until the Contractor incorporates the change in the computer program and produces the updated Current Schedule. City participation in the schedule review process shall not relieve the Contractor from the Contract required milestone completion dates of the Baseline Schedule in effect.

At monthly intervals, and at other times at the request of the City, the Contractor shall update the prior month's Current Schedule indicating progress during the reporting period, the latest

schedule status, any approved Contract modifications, and any proposed logic changes. The schedule update shall be prepared concurrently with, and be an integral part of, progress evaluation and reporting.

### 13 DELIVERY SCHEDULE

#### 13.1 PREFERRED DELIVERY SCHEDULE

The City's preferred delivery schedule is indicated below. Completion of items as indicated below shall occur before the time periods listed have elapsed.

Item	Days after Notice-to-Proceed
1) Submittal of Baseline Schedule and Management Work Plan	--30--
2) Submittal of Vehicle drawings, control, Reliability Program Plan, and test plans	--60--
3) Submittal of training program (including lesson plans)	--90--
4) Delivery of prototype Coach <sup>1</sup>	--270--
5) Submittal of draft operations, maintenance, parts manuals, recommended spare parts	--300--
6) Approval of prototype Coach (estimated)	--330--

Item	Days after Approval of Prototype
7a) Production starts	--90--
7b) Beginning of Coach delivery <sup>2</sup>	--120--
8) Submittal of final operations, maintenance, and parts manual	--135--
9) Delivery of special tools	-- TBD--
10) Completion of Coach delivery <sup>4</sup>	--TBD--

<sup>1</sup> Approval to deliver prototype will not be granted until after receipt and approval of all Vehicle drawings, controls, and test plans.

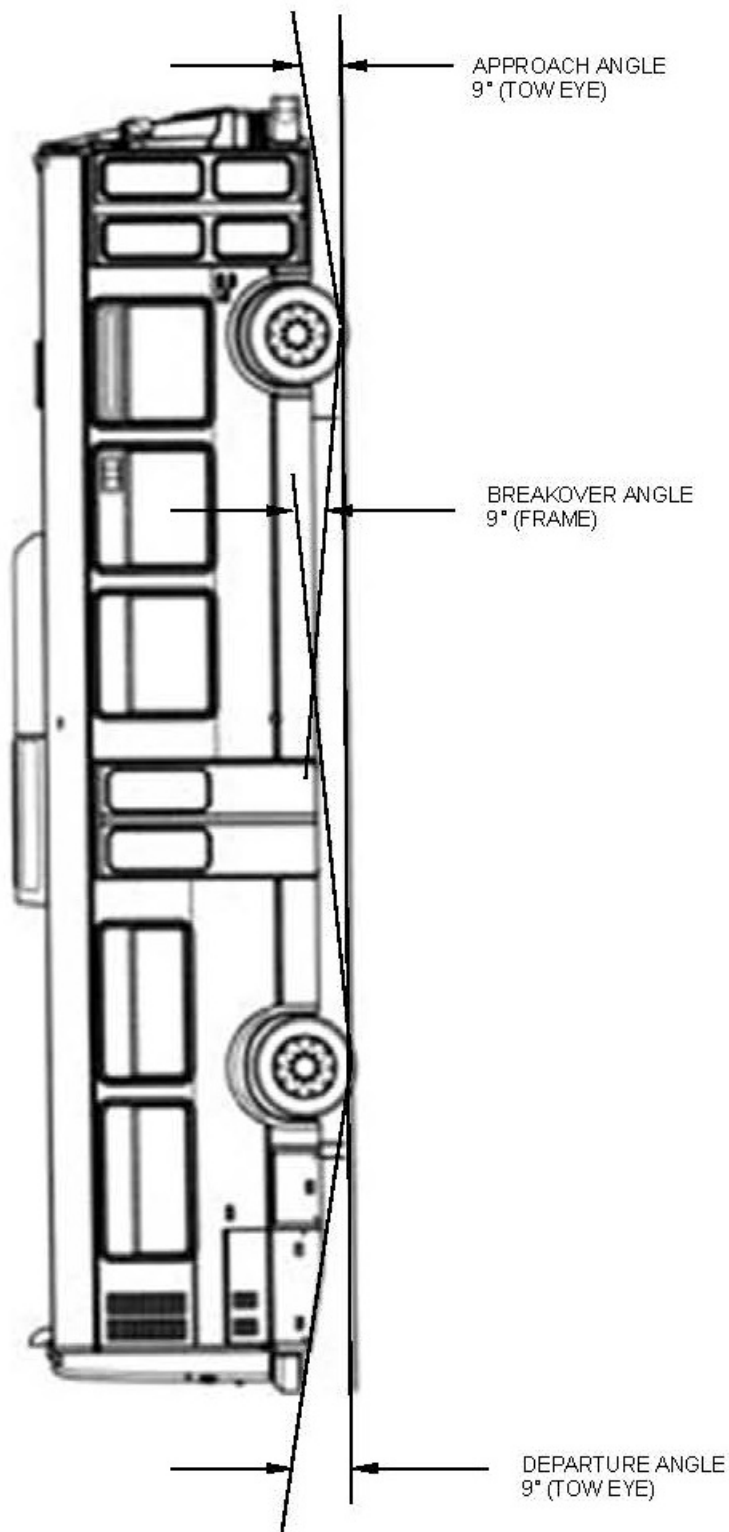
<sup>2</sup> Approval to deliver production Vehicles will not be granted until after submittal of a satisfactory training plan; draft operations, maintenance, and parts manuals; all computer software, manuals, current FSRP's, document and demonstrate their operation and after successful completion of all appropriate tests as described in Section 12.2 (Test Requirements and Commissioning) of the Technical Specifications.

<sup>3</sup> The delivery of the special tools is dependent on the shipping lead times agreed upon with the suppliers. This is after the SFMTA selects the final tool list.

#### 13.2 COACH DELIVERY

Coaches shall be delivered at a rate not to exceed three Coaches per week.

**ATTACHMENT 1: CLEARANCE**



**ATTACHMENT 2: DECAL LISTING**

A complete list of decals will be provided to the vendor at the pre-production meeting. OEMs are encouraged to provide a paint scheme to be approved by the SFMTA. The SFMTA reserves the right to utilize its own paint scheme.

The SFMTA's latest brand guide (PDF) will be provided to Contractor during the negotiation process.

**ATTACHMENT 3: MATERIALS, COLORS AND FINISHES**

NOTE: (1) All brand name callouts are understood to include the phrase, “or approved equal”;  
  
(2) Where stainless steel, aluminum, or fiberglass is called for, natural finish/color is acceptable.

<b>BUMPERS</b>	Romeo Rim High Energy Level Polymer (HELP)
<b>Front and Rear Bumpers</b>	
Color:	Black (colored throughout)
Reference:	Section 2.2.11 (Bumper System)

<b>FINISH</b>	Axalta Imron Elite, 2.7 VOC base coat/ clear cost system  PPG Delta DBHS 2.7VOC or approved equal
<b>Coach Exterior Color</b>	Match approved paint scheme
Reference:	Section 2.2.6 (Finish and Color)
<b>Coach Interior Color</b>	Black N3472 (with flattener) for Operator area in front of Standee Line
Reference:	Section 2.3.4 (Front End)

<b>FLOOR COVERING</b>	Altro Transflor
<b>Aisle floor*</b>	Altro Transflor
Color:	TFFG2704F "Rocket",
Reference:	Section 2.4.3 (Floor Covering)

For Arctic, front and rear sections shall be as specified.

<b>Floor under seats</b>	Altro Transflor
Color:	TFFG2704F "Rocket",
Reference:	Section 2.4.3 (Floor Covering)
<b>Operator's Platform</b>	Altro Transflor
Color:	TFFG2704F "Rocket",
Reference:	Section 4.12 (OPERATOR'S PLATFORM)
<b>Standee line</b>	Altro Transflor Two (2) inches wide
Color:	Yellow (colored throughout)
Reference:	Section 2.4.3 (Floor Covering)
<b>Step Nosing</b>	Altro Transflor Two (2) inches wide
Color:	Yellow (colored throughout)
Reference:	Section <b>Error! Reference source not found.</b> (Steps and Stepwells)
<b>Step Tread</b>	Altro Transflor
Color:	TFFG2704F "Rocket",

Reference: Section **Error! Reference source not found.**(Steps and Stepwells)

**Glazing**

**Passenger Windows** Between 40 and 60 percent luminous transmittance.

Reference: Section 3.1.1.2 (Materials)

**Operator’s Side –Window** 76 percent luminous transmittance

Reference: Section 4.4.2 (Side Window)

**Door Glass** Between 40 and 60 percent luminous transmittance

Reference: Section 3.1.3.2 (Materials)

**Windshield** Single-density tint

Reference: Section 4.4.1 (Windshield)

**INTERIOR TRIM** Textured stainless steel or anodized aluminum

**Trim moldings**

Reference: Section 2.3 (INTERIOR TRIM, PANELING AND ACCESS)



<b>PANELING</b>	Non-absorbing graffiti resistant material (final colors TBD with prototype)
<b>Divider panels</b>	1/4 inch thick
Color:	Grey
Reference:	Section 2.3.1 (Divider and Side Trim Panel)
<b>Headlining</b>	1/16 inch smooth and matte
Color:	Grey
Reference:	Section 2.3.3 (Headlining)
<b>Operator barrier</b>	1/10 inch thick
Color:	Grey
Reference:	Section 4.8 (OPERATOR BARRIER)
<b>Rear Bulkhead</b>	1/16 inch thick
Color:	Grey below the window / white above the window
Reference:	Section 2.3.2 (Rear Bulkhead)
<b>Side Wall</b>	1/10 inch thick
Color:	Grey
Reference:	Section 2.3.1 (Divider and Side Trim Panel)

<b>Passenger Seats</b>	Shell: Plastic / Insert: Padded PT2C
Color:	Blue
Reference:	Section 3.7.4 (Construction and Materials)
<b>Seat Shell Backs</b>	Plastic
Reference:	Section 3.7.4 (Construction and Materials)
<b>Seat Handhold</b>	Plastic
Reference:	Section 3.7.2.1 (Transverse Seat)
<b>Stanchions/Handholds</b>	Stainless Steel with Powder Coating
Reference:	Section 3.9 (PASSENGER ASSISTS)

<b>Steering Wheel</b>	Vehicle Improvement
<b>Horn Button</b>	Vehicle Improvement
Color:	Black
Reference:	Section 4.1.5 (Steering Wheel and Horn Button)
<b>Wheel Housings</b>	12-gauge or heavier stainless steel or equivalent fiberglass
Reference:	Section 2.6 (WHEEL HOUSING)
<b>Wheels</b>	Aluminum (Alcoa Dura-Brite)
Reference:	Section 5.8.1 (Wheels)

<b>Window Sash</b>	Aluminum
Reference:	Section 3.1.1.2 (Materials)

**ATTACHMENT 4: AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENIST (ACGIH)**

The ACGIH is an organization devoted to the administrative and technical aspects of occupational and environmental health. The guidelines and recommendations developed by the ACGIH are intended only for use in industrial hygiene by trained professionals. The threshold value limits (TVLs) for electric and magnetic fields present either time weighted average (TWAs) or ceiling values which most workers can be repeatedly exposed without adverse health effects.

The basis for the TVLs is specific to the field type and frequency range. No specific target organs have been identified for deleterious effects due to static magnetic fields. The ceiling value has been set a level below which no deleterious effects have been demonstrated in humans or animals. The whole body TWA has been set at the level used by Lawrence Livermore National Laboratory to limit the potential in the large aorta of an adult human to 1 mV. The ceiling for pacemaker wearers is based on the observation that the reed-relay switch in pacemaker can be closed by flux densities as low as 17,000 mG, placing the pacemaker in a synchronous pacing mode. Certain implanted medical devices such as aneurysm clips may experience significant magnetic forces and torques in strong flux densities if they contain ferromagnetic materials. No basis has been given for extremity limits.

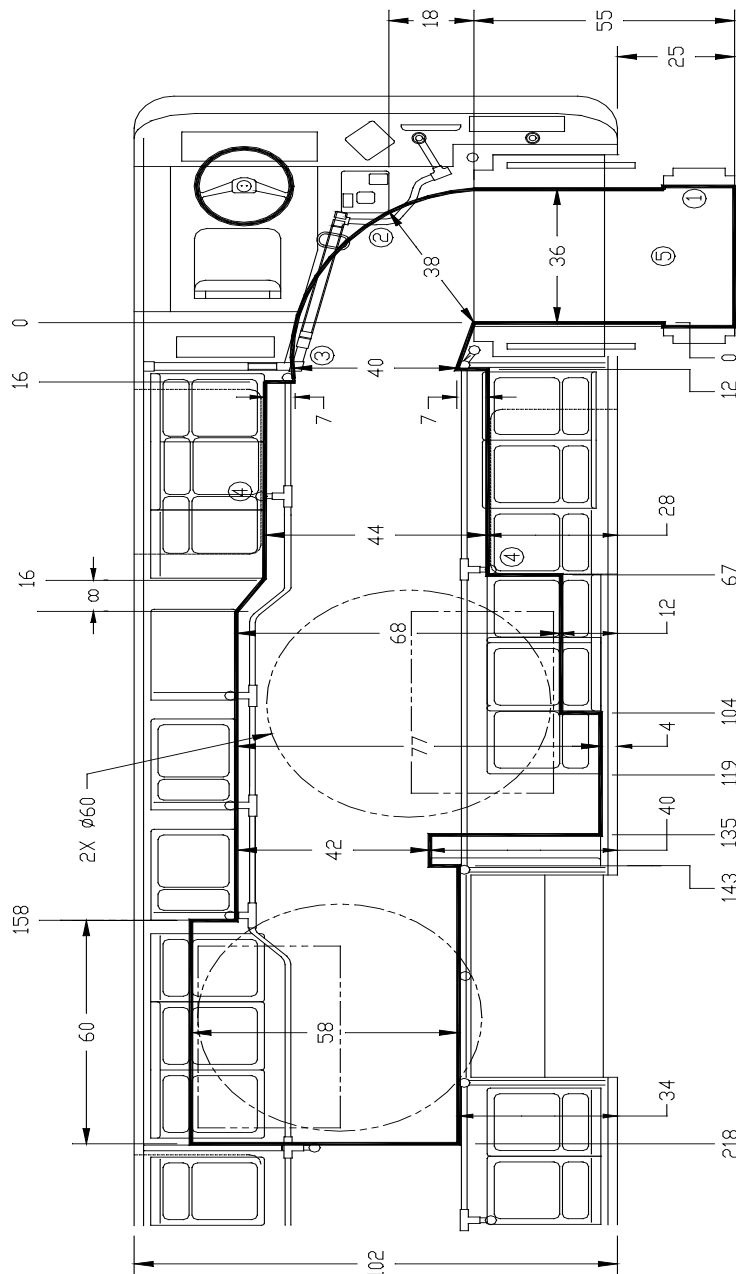
The limits for magnetic fields in the 1 Hz to 30 Hz (sub-RF) range have been set to limit the maximum induced current density within the human body to 10 mA/m<sup>2</sup> (rms). Other than the currently unresolved issue of risk of power frequency fields, there is no evidence of harmful effects from sub-RF magnetic fields that induce current densities in the body below 10 mA/m<sup>2</sup>. The limits for pacemaker wearers are designed to avoid electromagnetic interference (EMI) that has been demonstrated to cause certain models to revert to an asynchronous mode or exhibit abnormal pacing characteristics at 60 Hz flux densities as low as 1,000 mG. At very low frequencies approaching DC there is concern that pacemaker reed switches may be closed by the field.

The basis for the electric field limits below 30 kHz is identical to the case of magnetic fields: maintaining induced current densities within the body below 10 mA/m<sup>2</sup>. The limits for electromagnetic fields between 30 kHz and 3 MHz have been set to protect against shock and burn hazards. For the entire frequency range from 30 kHz to 300 GHz, the threshold limit values are intended to limit the average whole body specific absorption rate (SAR) to 0.4 W/kg. The primary concern is thermal damage.

**ATTACHMENT 5: WHEELCHAIR MANEUVERING ROOM**

The following is a drawing of the required wheelchair maneuvering room at the entrance of the Bus and the wheelchair securement area.

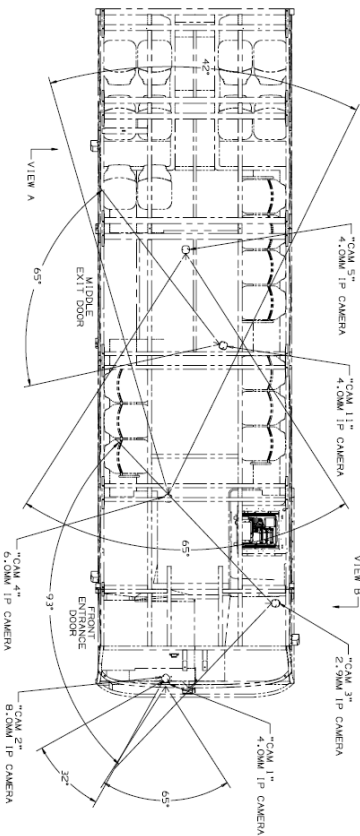
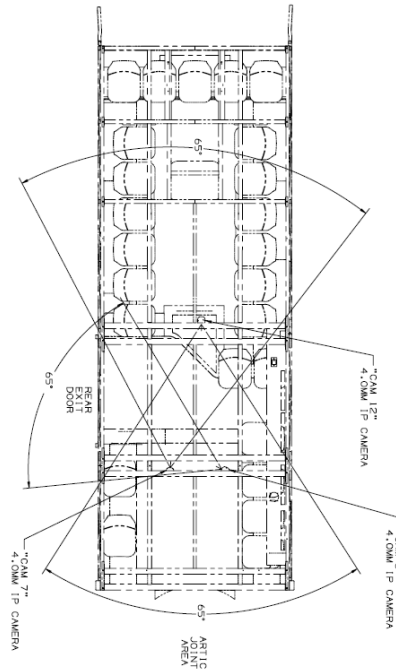
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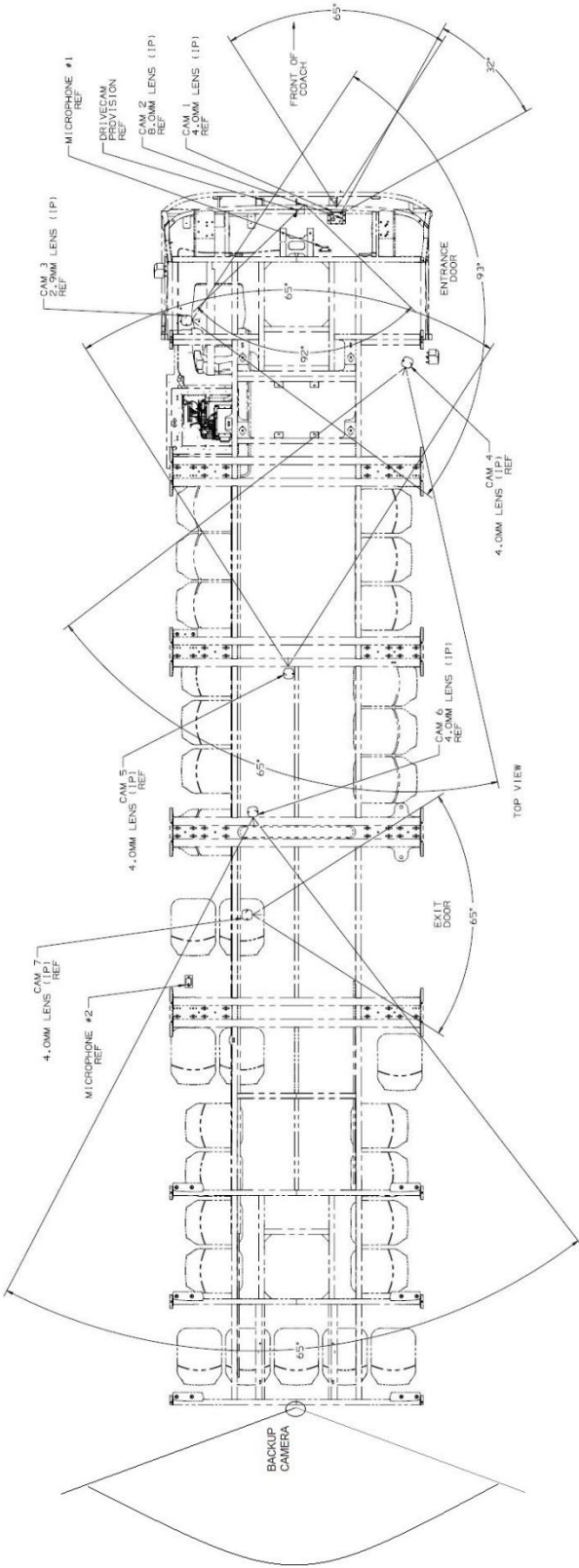


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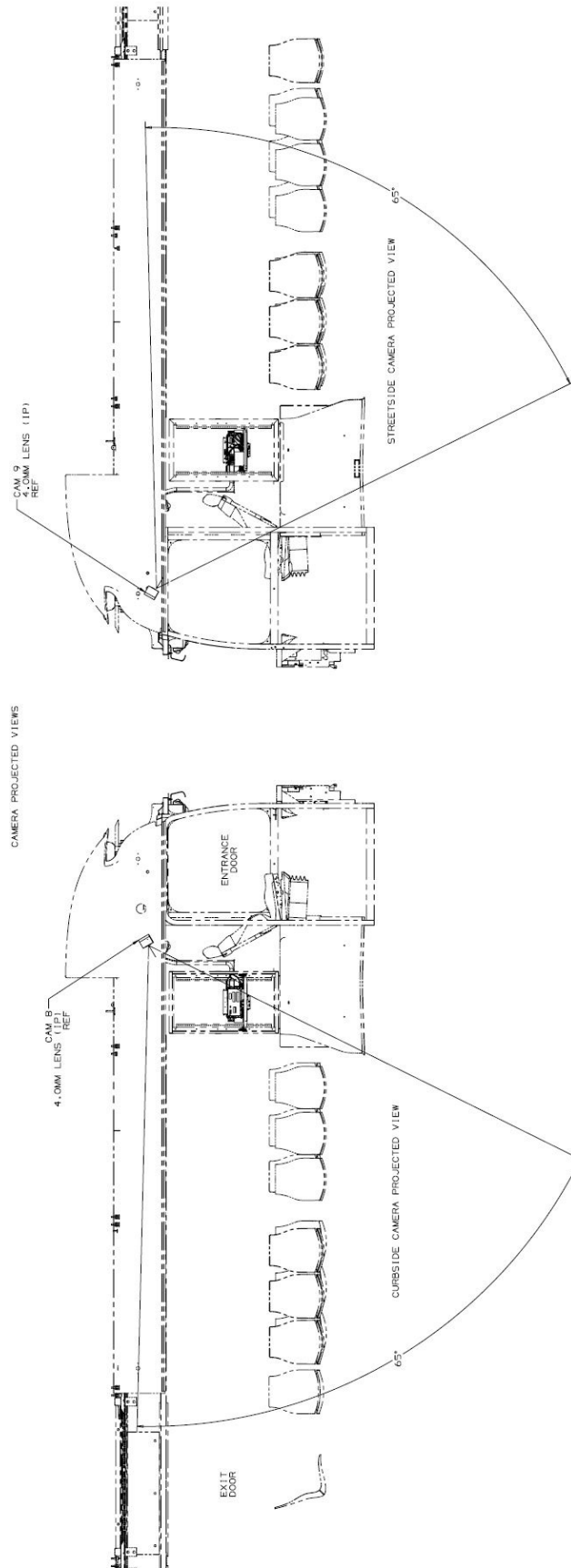
1. PLATFORM WIDTH INCREASED BY 1"
2. HAND RAIL CLEARANCE REDUCED BY 3" AT 35" ABOVE THE FLOOR.
3. DRIVER'S BARRIER BAR CLEARANCE REDUCED BY 4" AT 35" ABOVE THE FLOOR.
4. PASSENGER VERTICAL HAND RAIL CLEARANCE REDUCED BY 1"
5. FULLY DEPLOYED LIFT WITH 13" BARRIER EXTENDS 25" FROM SIDE OF BUS.
6. ALL DIMENSIONS ARE IN INCHES.

**ATTACHMENT 6: CAMERA LAYOUT**









**ATTACHMENT 7: PERFORMANCE REQUIREMENTS**

1. Speed, Acceleration, and Gradeability Requirements
2. Duty Cycle Requirements

**ATTACHMENT 7-1: SPEED, ACCELERATION, AND GRADEABILITY REQUIREMENTS**

The pilot Bus shall be road tested and shall meet the following criteria with GVWR. Acceleration times begin when the accelerator pedal is depressed; lag time between depression of the accelerator pedal and movement of the Coach should be minimized. SFMTA will fully accept the pilot Bus only if all performance criteria (range, gradeability, charging times, etc.) outlined below are met.

Sample Locations of Grades for Speed and Acceleration Tests:

Interstate 280 at 25 <sup>th</sup> St	0% grade heading southbound toward San Jose.
Hwy. 101 at Beatty Ave	2% grade heading southbound toward San Jose.
California St & 28th Ave	5% grade heading westbound for three blocks.
Jackson St & Steiner St	10% grade heading westbound.
Castro St & 24th Ave	16% grade heading northbound.
Pine St from Kearny St to Grand Ave	18% grade heading westbound.
Mississippi St from 22nd St to 20th St	20% grade heading northbound.
DeHaro Street from Mariposa St. to 23rd St	21% grade heading southbound.
Noe St & 26th Ave	23% grade heading southbound.

TABLE ATTACHMENT 7.1 – Speed Performance Criteria at GVWR

Grade	Speed Requirement 40-Foot	Speed Requirement 60-Foot	Speed Achieved	Pass/Fail
0% Grade	60 mph (max)	60 mph (max)		
2% Grade	55 mph	40 mph		
5% Grade	25 mph	20 mph		
10% Grade	15 mph	11 mph		
16% Grade	10 mph	8 mph		
18% Grade	7 mph	>0 mph		
20% Grade	>0 mph	>Not Applicable		
23% Grade	Not Applicable	Not Applicable		



TABLE 7.2 – Acceleration Performance Criteria at GVWR

<b>Grade</b>	<b>mph</b>	<b>Time (seconds) 40-Foot</b>	<b>Time (seconds) 60-Foot</b>	<b>Time Achieved</b>	<b>Pass/Fail</b>
0% Grade	0-10	5	7		
0% Grade	0-20	10	10		
0% Grade	0-40	26	35		
2% Grade	0-15	8	9		
5% Grade	0-18	10	12		
10% Grade	0-14	10	12		
16% Grade	0-10	12	12		

**ATTACHMENT 7-2: DUTY CYCLE REQUIREMENTS**

Coaches shall be designed to be compatible with the terrain and environment found in SFMTA’s service area. Also, Coaches shall be capable of running continuously with GVWR in the environmental conditions found in SFMTA’s service area. These conditions include high humidity, rain, and occasional temperature extremes.

The operating range of the coach operating on all the routes specified in Table F.4 below shall be at least 160 miles on a full charge at any point during the 8-year warranty period of the vehicle, with all accessories on, regardless of seasonal loads and driver efficiency.

Coaches shall be capable of continuous operation at freeway speeds with GVWR and an ambient temperature of 115°F without overheating or degradation of any operating component. They shall operate in stop and go downtown traffic with no adverse effects. Coaches shall also be able to safely and efficiently negotiate the hilly conditions found in the City and County of San Francisco. SFMTA’s service area includes grades of up to 23 percent.

The Coach shall achieve normal operation in the environmental conditions of San Francisco with temperature ranges of 25°F to 115°F, at relative humidity between 5 percent and 100 percent, and at essentially sea level altitudes. Any exception to the above requirement shall be approved by SFMTA.

The following composite routes are typical routes the Coach will take in normal revenue service. These include freeway and arterial travel.

TABLE 7.3 – Duty Cycle Requirements

<b>Service Route to be Tested for 160 Mile Range at GVWR</b>	<b>Range Achieved</b>	<b>Pass/Fail</b>
Route 9 San Bruno (40-ft)		
Route 29 Sunset (40-ft)		
Route 43 Masonic (40-ft)		
Route 44 O’Shaughnessy (40-ft)		
Route 7 Haight/Noriega (60-ft)		
Route 8 Bayshore (60-ft)		
Route 38 Geary (60-ft)		

TABLE 7.4 – Clearance Requirements

Location to be Tested (40-ft Bus)	Pass/Fail
Travel on 30th and Mission, 30th, right on Noe, left on 26th, right on Castro, Divisadero to Geary (both directions) without chassis scraping	
Operate around left turn from Clayton onto Market and right turn from Market onto Clayton	
Travel on De Haro from Mariposa to 23rd St without chassis scraping (Note: this is a 21% grade)	
Travel on 23rd St from Indiana to Pennsylvania in both directions without contacting road with chassis. This determines straight-on approach, break over, and departure clearances.	
Travel on Mansell St at San Bruno to determine if bus meets departure angle clearance.	
Travel on Rhode Island and turn southbound onto 26th without contacting road with chassis. This determines front-left side chassis clearance through left hand turn.	
Travel on 2nd St and turn westbound onto Folsom without contacting road with chassis. This determines rear-right side chassis clearance through right hand turn.	
Location to be Tested (60-ft Bus)	Pass/Fail
TBD	

**ATTACHMENT 8: SUGGESTED BILL OF MATERIALS**

DIGITAL VIDEO RECORDING AND SURVEILLANCE CAMERA SYSTEM (3.15) Vendor Part Number	Description	40'/60'
CBL-HAR-NFSFM-60-MDR6-1	ASSY-CABLES,CAMERA SYSTEM	40' & 60'
RCM-SVR300A	DVR, 8TB	40' & 60'
RCM-RS232-DVR-IVU	RS232 GPS cable	40' & 60'
NSW0812	POE SWITCH	40' & 60'
RCM-6351092ND	HMI LCD Display-EVENT SWITCH	40' & 60'
RCM-IP-SW1U	ETHERNET RELAY	40' & 60'
RCM-DC-UPS-1212-12A	UPS MODULE	40' & 60'
RCM-FB-PWR-CBL	FUSE BLOCK W/ PIGTAILS	40' & 60'
RCM-CBL-NF-SF-DVR-PWR	CABLE-DVR PWR/IGN INTERFACE	40' & 60'
RCM-CABLEDVR4B	CABLE-ETHERNET,CAT6E,18",BLUE 15 FT	40' & 60'
RCM-CABLEDVR4RG	CABLE-ETHERNET,CAT6E,18",90DEG,GREY 15 FT	40' & 60'
RCM-XNV6012-FF 2.4MM	CAMERA-IP,2.8MM (CAM #1), W/ AUDIO	40' & 60'
RCM-XNV6012-TOLE 8.0MM	CAMERA-IP,8.0MM (CAM #2), W/ AUDIO	40' & 60'
RCM-XNV6012-FD 2.4MM	CAMERA-IP,2.8MM (CAM #3), W/ AUDIO	40' & 60'
RCM-XNV6012-Aisle 2.4MM	CAMERA-IP,2.8MM (CAM #4), W/ AUDIO	40' & 60'
RCM-XNV6012-FS 2.4MM	CAMERA-IP,2.8MM (CAM #5), W/ AUDIO	40' & 60'
RCM-XNV6012-RS 2.4MM	CAMERA-IP,2.8MM (CAM #6), W/ AUDIO	40' & 60'
RCM-XNV6012-RD 2.4MM	CAMERA-IP,2.8MM (CAM #7), W/ AUDIO	40' & 60'
RCM-XNV6013-CS 2.8MM	CAMERA-IP,2.8MM (CAM #8), W/ AUDIO	40' & 60'
RCM-XNV6013-SS 2.8MM	CAMERA-IP,2.8MM (CAM #9), W/ AUDIO	40' & 60'
RCM-XNV6013-RV 2.8MM	CAMERA-IP,2.8MM (CAM #10), W/ AUDIO	40' & 60'
RCM-ANRDCAM	CAMERA-ANALOG,REAR DOOR	40' & 60'
RCM-ANSWCAM	CAMERA-ANALOG,STAIRWELL	60'
RCM-CMB-SF-FF-3S	BRACKET-FORWARD FACING CAMERA	40' & 60'
RCM-XNV6012-Aisle 2.4MM	CAMERA-IP,2.8MM (CAM #11), W/ AUDIO	60'
RCM-XNV6012-MS 2.4MM	CAMERA-IP,2.8MM (CAM #12), W/ AUDIO	60'
RCM-XNV6012-SW 2.4MM	CAMERA-IP,2.8MM (CAM #13), W/ AUDIO	60'
RCM-XNV6013-CSR 2.8MM	CAMERA-IP,2.8MM (CAM #14), W/ AUDIO	60'
R1900	Cradlepoint Router	40' & 60'
LG-IN2445	5G '7-1' antenna	40' & 60'

**DRIVECAM (3.16)**

Vendor Part Number	Description	Quantity
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ER-SF300-0027R	DriveCam SF300 Event Recorder, LTE, NA	1
PER-CAT-0020-NI	Cable – Extended Wiring Harness, 20-ft	1
PER-CAT-0500-NI	SF-Series – Device Power Cable	1
-/A	SF - ECM Vehicle Interface Kit	1
CBL-HD-S10-03P	RP1226 All-in-One (Data + Power) Cable 48”	1

## MOBILE RADIO/AVL SYSTEM (3.17)

Vendor Part Number	Description	Quantity
TMS-006298	Mounting Base with Ball Ram Vesa Base 3.625 sq.	1
TMS-006299	Mounting Base Square, 4.57 Sq.	1
TMS-006300	Socket Arm Assy, DBL Ball, RAM	1
120041-3	AGC Microphone, Internal	1
420000-24	AGC Microphone, External	1
131623-1	Gasket, External AGC Microphone	1
120004-5	Handset	1
130627-3	Bracket, Mount, Handset	1
110444-2	Sign, LED, Interior, 14 Characters, Amber, w/Conn	2
TBD	Switch, Ethernet, 16 Port	1
410006-1	TRAY-IVU-4000, EQUIPMENT w/TIB	1
410001-1	MDT-1000, Display	1
440080E-360	Cable Assy, MDT Display to IVU 4000	1
440057-12	Cable Assy, Vehicle Interface, CAN to IVU 4000	1
440100B-36	Cable Assy, IVU 4000 Ethernet to LNX 800 Switch	1
440071A-360	Cable Assy, Handset to IVU 4000 TIB	1
440068A-420	Cable Assy, IVU-4000 TIB to Farebox	1
440048A-264	Cable Assy, External AGC Pre-Amp to Audio Interface, IVU4000 TIB	1
440110A-120	Cable Assy, IVU to Harris M7300 Radio, Control and Serial	1
440093B-240	Cable Assy, AVA LED Sign to IVU4000 TIB, J1708_TR	1
440093B-390	Cable Assy, AVA LED Sign to IVU4000 TIB, J1708_TR	1
440055-420	Cable Assy, Internal AGC Microphone to IVU4000 TIB	1
141580A-12	Cable Assy, J1708 Splitter, TIB	2

440112B-24	Cable Assy, Discrete Alarm Connections, TIB to Bus	1
440086A-24	Cable Assy, Audio Interface, TIB to Bus	1
440099A-192	Cable Assy, Destination Sign, Luminator, MCU, w/Loom	1
141577-192	Cable Assy, Destination Sign, MCU to IVU 4000, Ethernet	1
141578A-36	Cable Assy, Power LNX 800 Switch	1
TMS-006134	ANTENNA, GPS	1
141352-180	CABLE ASSY, GPS ANTENNA, 15'	1
141593A-264	CABLE ASSY, 802.11P ANTENNA (TNC-RP female TO TNC Plug-90-RP)	1
AN-225001-004	ANTENNA-HARRIS RADIO (700/800 MHz, NMO)	1
141335-180	CABLE ASSY, HARRIS RADIO ANTE'NA, 15' (NMO TO MALE TNC)	1
410000	IVU-4000	1
410004-1_REVD	TIB, IVU4000, w/ must work board	1
440148A-72	Cable Assy, Vehicle Power to IVU4000 TIB	1
440149A-72	Cable Assy, Vehicle Power to IVU4000	1
440073A-24	Cable, IVU to TIB, Generic I/O	1
440074A-24	Cable, IVU to TIB, Vehicle I/O	1
440075A-24	Cable, IVU to TIB, Radio I/O	1
440076A-24	Cable, IVU to TIB, Audio I/O	1
N/A	RADIO-HARRIS, M7300, COMPLIANT WITH SFMTA'S OPENSKY PROTOCOL	1
N/A	RADIO MOUNTING BRACKET KIT TRAY, SHORT, REMOVE MOUNT	1
N/A	SAMLEX MODULE-POWER FILTER	1
N/A	CABLE-DC POWER, M7300 RADIO,	1
N/A	CAN TERMINATOR, STRAIGHT, RADIO	2
N/A	SENSORS, APC, MATRIX, FRONT & REAR	2
N/A	CABLES, MATRIX SENSOR, ETHERNET, M12 CONN to IVU	2
N/A	CABLES, MATRIX SENSOR, PWR	2
N/A	CELL ROUTER, CRADLEPOINT, IBR1700	1
N/A	ANTENNA, CRADLEPOINT	1

## **Appendix H**

### **Solaris Options and Technical Exceptions Accepted by the SFMTA**

**Exhibit H-1**  
Price Change Detail

Item	Description	NAe40	NAe60
1	SOL24-1 - KCM bus price	\$1,220,000	\$1,580,000
2	SOL24-1 – Optional included – Vapor doors instead of Ventura	\$1,960	\$2,940
3	SOL24-1 – Optional included – Additional battery HE 176 for NAe60ft	N/A	\$80,350
4	SFMTA Specifications - ITS Equipment including Viriciti 5-year license	\$103,518	\$104,862
5	SFMTA Specifications – Rosco e-mirrors	\$6,316	\$6,316
6	SFMTA Specifications – Apex 2 bike rack	\$1,457	\$1,457
7	SFMTA Specifications – Additional Warranties	\$48,082	\$57,918
8	SFMTA Specifications – Additional Service Support	\$24,863	\$24,863
<b>TOTAL BUS PRICE:</b>		<b>\$1,406,196</b>	<b>\$1,858,706</b>

## **Exhibit H-2**

### Technical Exceptions and Approved Equals

Note: **Red** text signifies edits or changes to language in the technical specifications.

SECTION	CONTENT	Deviation proposed	Agreement Between SFMTA and Solaris
1.2	DIMENSIONS	Overall passenger capacity: TBD (40ft), TBD (60ft) Approach angle: 8.6 degrees min (40ft), 8.6 degrees min (60ft) Break over angle: TBD degrees min (40ft), 9 degrees min (60ft) Departure angle: 9 degrees min (40ft), 9 degrees min (60ft)	Passenger capacity to be agreed upon during preproduction meeting.
1.3	PROPULSION SYSTEM PERFORMANCE	Solaris confirm acceleration on grade: 0% grade - 0-10mph - 7s (40ft) - 9s (60ft) 0% grade - 0-20mph - 12s (40ft) - 14s (60ft) 0% grade - 0-40mph - 30s (40ft) - 38s (60ft) 2% grade - 0-15mph - 10s (40ft) - 12s (60ft) 5% grade - 0-18mph - 12s (40ft) - 16s (60ft) 10% grade - 0-14mph - 12s (40ft) - 16s (60ft) 16% grade - 0-10mph - 14s (40ft) - 16s (60ft)	SFMTA accepts these performance figures.  Solaris confirms those accelerations for full passenger loading:  40-ft: 36 seating passengers + 20 standing passengers (to be confirmed during preproduction meeting) 60-ft: min 44 seating passengers + max 45 standing passengers (to be confirmed during preproduction meeting).
1.18	NEW COMPONENTS	The component manufacturers shall, at minimum, certify the following Major Component installations: <ul style="list-style-type: none"> <li>▲ Steering and Hydraulic System</li> <li>▲ Brakes and Air System</li> <li>▲ Electric Drive System</li> <li>▲ Propulsion Control System</li> <li>▲ Energy Storage and Management System</li> <li>▲ Destination Sign and Voice Annunciation System</li> <li>▲ Heating and Ventilation System</li> <li>▲ Fire Detection / Suppression System</li> <li>▲ Video Surveillance System</li> <li>▲ Vehicle Telematics System</li> <li>▲ Cooling System</li> <li>▲ Paint</li> <li>▲ Axles</li> <li>▲ Passenger Doors</li> <li>▲ Suspensions</li> <li>▲ Wheelchair Ramp</li> <li>▲ Wheelchair Securement System</li> <li>▲ Charging station(s) (if applicable)</li> <li>▲ Bus Chassis</li> </ul>	SFMTA accepts this deviation.
2.1.9	Skid Resistance	The Coach shall be designed to resist damage from impact and skidding against asphalt roads when the road conditions exceed the vehicle's rated breakover, approach, and departure angles. Metal skid plates shall be provided on the underside of the front and rear overhangs of the Coach to protect sensitive components or any parts of the chassis that would be significantly damaged by skidding on the surface of a road. Vulnerable composite chassis components on the underside of the front and rear overhangs shall be protected by metal skid plates.  Solaris comment: in the rear of the bus Solaris uses rubber skid	SFMTA accepts this deviation.
2.4.1	Height	Height of the floor above the street shall be no more than <del>15.3</del> 15.5 inches measured at the centerline of the front and rear doorway when the doors are open. Steps leading to the upper deck are preferable; however, a ramp with a slope may be acceptable to the SFMTA.	SFMTA accepts this deviation.
3.7.1	Dimensions	Depending on seat layouts Solaris confirms or not the 14 inches floor room. If there is a seat just before the articulated joint, it will be less than 14 inches.	SFMTA accepts this deviation.
3.21	PASSENGER INFORMATION HOLDER	To discuss during preproduction meetings.	SFMTA accepts this deviation.
4.1.2	Instruments	Table to discuss during preproduction. Solaris provides two types of dashboard. Depending on choice different values	SFMTA accepts this deviation.
4.5.1	Exterior	SFMTA allow to use digital cameras system instead of exterior rearview mirrors	SFMTA accepts this deviation. Solaris can install Rosco Vision system and physical mirrors. Rosco Vision system is approved California.
5.1.5	Travel	Solaris investigates possibility of driving 1-inch-raised bus at 15 mph	Solaris will provide current overraise function specification by e-mail. Final discussion on overraise function will occur during preproduction meeting.
5.9	FIRE DETECTION / SUPPRESSION	To discuss during preproduction meetings. Solaris will use basic Amerex system.	SFMTA accepts this deviation.
6.1.1	Operating Range	Solaris performs calculations after route data is provided	Solaris will provide batteries with estimated (nominal) capacity of (3x176kWh)528 kWh for 40-ft and (4x176kWh)704kWh for 60-ft. SFMTA accepts this deviation.
6.3	ENERGY STORAGE SYSTEM	No Altoona testing yet performed	SFMTA accepts this deviation.
6.6	BATTERY MANAGEMENT SYSTEM (BMS)	5. The BMS must be able to communicate all data listed in attachment to the bus level information system (reference TS 84) for storage and communication.	SFMTA agrees to accept Solaris' proposed battery management system.
6.11	LUBRICATION	If necessary for maintenance purposes, traction motors shall have an oil sampling device compatible with the Probalyzer system or approved equal. The location of the sampling plug requires SFMTA review and approval.	SFMTA accepts this deviation.

7.1	POWER REQUIREMENT	The electrical power system shall supply a nominal <del>12 and</del> 24 volts of direct current (DC). Consumable items such as, but not limited to, light bulbs and headlamps shall be supplied at a nominal <del>12 24</del> volts DC. Precautions shall be taken to minimize hazards to service personnel. Startup and normal operation of the Bus shall not result in dangerous or damaging voltage fluctuations.	SFMTA accepts this deviation.
7.7	WIRING AND TERMINALS	Major wiring harnesses shall not be located under the Coach floor, and under-floor wiring shall be eliminated to the extent practicable. <del>Wiring necessarily located under the Coach shall be contained in sealed conduit or split loom tubing.</del>	SFMTA accepts this deviation.
7.10	LOW-VOLTAGE BATTERIES	<del>At least two DEKA SA8D Absorbed Glass Mat (AGM) MagnaPower batteries, or approved alternative, 4 AGM batteries</del> shall be provided. In the event of a temporary failure of the battery charging system, the low voltage batteries shall be able to operate the low voltage control system and the interior lighting system long enough to allow the operator to safely stop and park the vehicle. Regardless of the battery configuration, the Contractor shall be responsible for analysis and selection of a battery configuration of adequate capacity to supply the required load.	SFMTA accepts this deviation.
10.2.2.4	Defective Parts Return	"The Contractor may request that Defective parts or components covered by warranty be returned to the manufacturing plant. The Contractor shall pay the total cost for this action. Materials will be returned in accordance with the Contractor's instructions. Contractor shall provide such instructions to the SFMTA Project Manager at the beginning of the project. <b>If the claim is considered unfounded SFMTA shall cover all the logistics expenses.</b> The Contractor's representative shall meet with an SFMTA representative on a biweekly basis to determine which parts need to be returned to the manufacturer for evaluation, or which parts may be discarded."	SFMTA accepts this deviation.
	CLEARANCE	Clearances as specified in Section 1.2	SFMTA accepts this deviation.
	AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENIST (ACGIH)	Solaris will be compliant with SAE 551/1	SFMTA accepts this deviation.
	WHEELCHAIR MANEUVERING ROOM	Solaris will provide drawing during the negotiation process.	SFMTA accepts this deviation.
	CAMERA LAYOUT	Solaris will adapt camera layout to the bus seat layout.	Camera layout to be agreed upon during preproduction meeting.
1.1.4	1.1.4 Legal Requirements A.The Bus shall meet all applicable FMVSS in effect at the date of manufacture. The Bus and equipment must comply with all applicable federal, state, and local regulations. Local regulations are defined as those below the state level. In the event of any conflict between the requirements of these specifications and any applicable legal requirement, the legal requirement shall prevail. B.Manufacturer shall certify to SFMTA that the Bus complies with 49 U.S.C. § 53231 and FTA implementing regulations at 49 CFR Part 665 concerning Coach testing. C.Manufacturer shall test the prototype Bus at the Altoona, PA Testing Facility and shall provide copies of all testing reports. If the Bus design proposed by the manufacturer has already been tested successfully at the Altoona, PA Testing Facility, then re-test of the prototype will not be necessary, subject to the SFMTA's approval of the test results. D.Manufacturer shall certify that the proposed Bus meets the specifications set forth in the ADA.	1.1.4 Legal Requirements A.The Bus shall meet all applicable FMVSS in effect at the date of manufacture. The Bus and equipment must comply with all applicable federal, state, and local regulations. Local regulations are defined as those below the state level. In the event of any conflict between the requirements of these specifications and any applicable legal requirement, the legal requirement shall prevail. <del>B.Manufacturer shall certify to SFMTA that the Bus complies with 49 U.S.C. § 53231 and FTA implementing regulations at 49 CFR Part 665 concerning Coach testing.</del> C.Manufacturer shall test <del>the prototype same</del> Bus type at the Altoona, PA Testing Facility and shall provide copies of all testing reports <del>once testing is finalized. Bus Acceptance and Payment shall not be subject to receiving the Altoona test report by SFMTA.If the Bus design proposed by the manufacturer has already been tested successfully at the Altoona, PA Testing Facility, then re-test of the prototype will not be necessary, subject to the SFMTA's approval of the test results.</del> D.Manufacturer shall certify that the proposed Bus meets the specifications set forth in the ADA.	SFMTA accepts this deviation.
8.1.1	Hazardous Materials. It shall be the design objective to eliminate from the Coaches all materials that are or may become hazardous to passengers, operators, or maintenance personnel. Of particular concern are materials that produce toxic smoke or gases when heated, possibly due to an accidental fire or when bodywork using welding equipment or cutting torches is necessary. No parts on the Coach shall contain lead, asbestos, or polychlorinated biphenyls. The Contractor shall provide for SFMTA approval of the material safety data sheets (MSDS) of any hazardous materials or fluids that must be used in the construction, operation, or maintenance of the Vehicle. The SFMTA has the option to reject the use of any hazardous materials proposed for use on the Vehicles.	Hazardous Materials. It shall be the design objective to eliminate from the Coaches all materials that are or may become hazardous to passengers, operators, or maintenance personnel. Of particular concern are materials that produce toxic smoke or gases when heated, possibly due to an accidental fire or when bodywork using welding equipment or cutting torches is necessary. No parts on the Coach shall contain <del>lead</del> , asbestos, or polychlorinated biphenyls. The Contractor shall provide for SFMTA approval of the material safety data sheets (MSDS) of any hazardous materials or fluids that must be used in the construction, operation, or maintenance of the Vehicle. The SFMTA has the option to reject the use of any hazardous materials proposed for use on the Vehicles.  <b>Solaris will provide its REACH declaration, required by EU laws, describing the various hazardous materials that are used in the manufacturing of Solaris buses.</b>	SFMTA accepts this deviation.
9.1.3	Operations Instructors, Maintenance Instructors, Street Operations, and Managers	Please refer to basic training package offered to SFMTA. Additional trainings can be offered and agreed upon request.	SFMTA accepts this deviation.
9.1.4	Maintenance Manager Training	Please refer to basic training package offered to SFMTA. Additional trainings can be offered and agreed upon request.	SFMTA accepts this deviation.
9.1.5	Service Personnel Training	Please refer to basic training package offered to SFMTA. Additional trainings can be offered and agreed upon request.	SFMTA accepts this deviation.
9.1.6	First Responder Training	Please refer to basic training package offered to SFMTA. Additional trainings can be offered and agreed upon request.	SFMTA accepts this deviation.
9.1.8	Surveillance Camera System Training	Please refer to basic training package offered to SFMTA. Additional trainings can be offered and agreed upon request.	SFMTA accepts this deviation.
9.1.9	Videos	Not available in Solaris. Solaris does not agree to recording training sessions and its employees due to intellectual property rights. Please remove this section.	SFMTA accepts this deviation.
9.1.9.1	Video quality	Subsection of 9.1.9. Not available in Solaris. Solaris does not agree to recording training sessions and its employees due to intellectual property rights. Please remove this section.	SFMTA accepts this deviation.
9.1.11	Interactive Multimedia Training	Not available in Solaris. Please remove this section.	SFMTA accepts this deviation.
9.2	PUBLICATIONS: MAINTENANCE MANUALS, ILLUSTRATED PARTS MANUALS, OPERATOR'S MANUALS, & VEHICLE RECORD BOOKS	Solaris will provide its standard manuals package	SFMTA accepts this deviation.
9.1.11.1	Training module	Subsection of 9.1.11. Not available in Solaris. Please remove this section.	SFMTA accepts this deviation.

9.2.1	Maintenance Manuals	Solaris will provide its standard manuals package	SFMTA accepts this deviation.
9.2.1.1	Preventive Maintenance	Solaris will provide its standard manuals package	SFMTA accepts this deviation.
9.2.2	Illustrated Parts Manual	Solaris will provide its standard manuals package	SFMTA accepts this deviation.
9.2.2.1	Parts Tables in Electronic Format	Solaris will provide its standard manuals package	SFMTA accepts this deviation.
9.2.3	Operator's Manuals	Solaris will provide its standard manuals package	SFMTA accepts this deviation.
9.2.4	Electronic Systems Documentation. Where an electronic system is an intrinsic part of the Bus, and where the contract for Bus specifies that an electronic system is field-repairable or shop-repairable, the Contractor shall at a minimum identify these components by part number, circuit or schematic diagrams, voltage, method of diagnosis and replacement procedure as part of the service and/or parts manuals in keeping with the requirements of Section 9.2.1 (Maintenance Manuals). The information within the multiplexing system user guides, Bus service and parts manuals, and Bus electrical schematics will provide the information necessary to maintain and service the equipment. Other data control modules such as battery unit ECUs would also be covered within the OEM manuals and Bus manuals and schematics.	Solaris will provide its standard manuals package	SFMTA accepts this deviation.
9.2.6	Computerized Maintenance, Preventive Maintenance, and Illustrated Parts Manual System	Solaris will provide its standard manuals package - update only if is need	SFMTA accepts this deviation.
10.1	BASIC PROVISIONS	Upon request of the SFMTA, the Contractor promptly shall provide to the Project Manager complete copies of written warranties or guarantees and of documentation of any other arrangement relating to such warranties or guarantees extended by the Contractor's suppliers, sub suppliers, vendors, and subcontractors covering parts, components, and systems utilized in the Coach. If any vendor/supplier to the Contractor offers a warranty on a component that is longer or more comprehensive than the required warranties stated in Figure 10-1, the Contractor shall inform the SFMTA of this additional warranty and pass it through to the SFMTA at no additional cost to the SFMTA. <b>Under the condition that the vendor/supplier agrees with it. In such a case the Contractor shall be deemed not liable for the part of the warranty which is longer or more comprehensive than the required warranties stated in Figure 10-1</b>	SFMTA accepts this deviation.
10.1.4	Fleet Defects	Not applicable for less than 10 buses	SFMTA accepts this deviation.
10.1.4.1	Repair Procedure and Corrective Action Plan	Not applicable for less than 10 buses	SFMTA accepts this deviation.
10.1.4.2	Responsibility for Corrective Work	Not applicable for less than 10 buses	SFMTA accepts this deviation.
10.1.4.3	Warranty after Replacement or Repair of Fleet Defects	Not applicable for less than 10 buses	SFMTA accepts this deviation.
10.1.4.4	Supply of Parts	Not applicable for less than 10 buses	SFMTA accepts this deviation.
10.1.4.5	Failure to Comply -- Corrective Action Plan	Not applicable for less than 10 buses	SFMTA accepts this deviation.
10.1.4.5	Voiding of Warranty Provisions	Not applicable for less than 10 buses	SFMTA accepts this deviation.
10.1.4.6	Exceptions to Warranty Provisions	Not applicable for less than 10 buses	SFMTA accepts this deviation.
10.2.2.3	Defective Parts Return	The Contractor may request that Defective parts or components covered by warranty be returned to the manufacturing plant. The Contractor shall pay the total cost for this action. Materials will be returned in accordance with the Contractor's instructions. Contractor shall provide such instructions to the SFMTA Project Manager at the beginning of the project. <b>If the claim is considered unfounded SFMTA shall cover all the logistics expenses in the return of the defective parts and costs of parts, labor and other costs related to this defect.</b> The Contractor's representative shall meet with an SFMTA representative on a biweekly basis to determine which parts need to be returned to the manufacturer for evaluation, or which parts may be discarded.	SFMTA accepts this deviation.
10.3.2	Warranty Data	The warranty data shall be provided in Microsoft Excel format with the following data elements for Contractor's warranty and manufacturer warranties on all individual components and part(s). The SFMTA will provide <del>Vendor</del> Contractor IDs to be used for this data. At the start of the project, Contractor shall provide a complete list of all manufacturers and/or vendors that Contractor will use in building the Vehicles. The SFMTA will provide <del>Vendor</del> Contractor IDs for use for the following warranty data.	SFMTA accepts this deviation.
10.3.3.2	Digital Parts Catalog	The Contractor shall provide the SFMTA with a Microsoft Excel file with a list of all <del>spare</del> parts including part numbers, part descriptions, quantities, and other identifying information, <b>after the Spare Parts Catalog is prepared and approved.</b>	SFMTA accepts this deviation.
10.2.2.1	Parts Used	We will provide original Solaris part number assembled in a bus	SFMTA accepts this deviation.
11.5	MAINTAINABILITY	Solaris' maintenance guidelines are included in its standard manuals package	SFMTA accepts this deviation.
12.1.5.4	Inspection Status	Remove section. Solaris will follow its QA process	SFMTA accepts this deviation.
12.1.6.2	Inspection Records	Remove section. Solaris will follow its QA process	SFMTA accepts this deviation.
12.2.1	Prototype Bus Test Requirements	Section to be revised by the parties. Dedicated meeting required. Definition of test plan to be agreed between the parties	Prototype bus test requirements to be finalized during the preproduction meeting.



		<p>Solaris will use its standard electronic vehicle history book. See proposed modifications to this article:</p> <p>The Vehicle History Book shall contain <del>original</del> <b>original electronic versions of documents (scan or electronic form)</b> unless specified otherwise.</p> <p>The SFMTA prefers that each Vehicle History Book contain the following:</p> <ul style="list-style-type: none"> <li>• Table of contents</li> <li>• Production control cross-reference sheet, listing: <ul style="list-style-type: none"> <li>• Bus serial number</li> <li>• Shop order/production sequence number</li> <li>• Final SFMTA Bus number</li> <li>• <del>Production schedule for each Bus showing start and end dates for each major stage of manufacturing</del></li> <li>• <del>(Electronic copies only) All production drawings by number and revision status, including release date, current revision, and outstanding engineering change requests at time of production</del></li> <li>• List of <del>all</del> <b>agreed</b> serialized components</li> <li>• <del>Log of all non-conformances including status</del></li> </ul> </li> <li>• Test records and certificates</li> <li>• Records of all required inspections</li> <li>• Completed pre-shipment checklist</li> <li>• Shipping authorization form</li> </ul>	<p>SFMTA accepts this deviation.</p>
12.2.2.3	Vehicle History Book		
13.1	PREFERRED DELIVERY SCHEDULE	Parties to review and agree on final Preferred Delivery Schedule	Delivery schedule to be finalized during preproduction meeting.
3.17	MOBILE RADIO/AVL SYSTEM	M7300 radio system to be provided by SFMTA and not included in bill of materials for buses.	Parties agree that Contractor shall only provide provisions for Harris M7300 mobile radio system, and that the SFMTA shall provide the radio for each bus.

**Appendix I**  
Project Delivery Schedule

Item	Expected Delivery	
	40-ft	60-ft
1) Submittal of Baseline Schedule	30 days after NTP <sup>4</sup>	120 days after NTP <sup>4</sup>
2) Preproduction Meeting / Design Freeze	90 days after NTP <sup>4</sup>	180 days after NTP <sup>4</sup>
3) Delivery of the prototype Buses <sup>1</sup> (one prototype for each bus build i.e. 40-ft & 60-ft)	12 months after Design Freeze	12 months after Design Freeze and no earlier than March 2027
4) Submittal of draft operations, maintenance, parts manuals, recommended spare parts	By delivery of prototype Bus	By delivery of prototype Bus
5) Submittal of Test Results	Within 30 to 60 days after delivery	Within 30 to 60 days after delivery
6) Approval of the Prototype Coaches (estimated)	Within 60 days after delivery	Within 60 days after delivery
7) Submittal of final operations, maintenance, and parts manual	By delivery of the last Bus	By delivery of the last Bus
8) Delivery of special tools (estimated) <sup>3</sup>	120 days from PO issued by SFMTA	120 days from PO issued by SFMTA
9) Completion of Bus delivery <sup>5</sup>	Within 6 months after Approval of the Prototype Coach	Within 6 months after Approval of the Prototype Coach

<sup>1</sup> Approval to deliver the prototype will not be granted until after receipt and approval of the certificates of insurance for Commercial Automobile Liability Insurance (see section 5.1.1(b)) and Workers Compensation Liability Insurance (see section 5.1.1(c)); and receipt and approval of all Vehicle drawings, controls and test plans.

<sup>2</sup> Approval to deliver production Vehicles will not be granted until after submittal of a satisfactory training plan; draft operations, maintenance, and parts manuals; all computer software, manuals, document and demonstrate their operation and after successful completion of all appropriate tests as described in Section 12.2, TEST REQUIREMENTS of the Technical Specification.

<sup>3</sup> The delivery of the special tools is dependent on the shipping lead times agreed upon with the Suppliers after the SFMTA selects the final tool list.

<sup>4</sup> NTP is subject to change

<sup>5</sup> Contractor may begin line entry of production buses before approval of the prototype Bus, but by doing so will assume all costs and risks associated with beginning line entry before the production bus design is finalized.

## Appendix J

### Payment Milestones

#### Item 1a and 1b - Coach Price

Milestone	Maximum Percent of Line Item 1 of Schedule 1 as applicable
(a) Delivery of vehicle at SFMTA property.	60% of Unit Price
(b) Conditional Acceptance of each Vehicle by SFMTA	25% of Unit Price
(c) Full Acceptance of each Vehicle by SFMTA	10% of Unit Price
(d) All Contract Deliverables have been received and Accepted as satisfactory (except for Items 2, 3 and 5 in the Schedule 1 – Schedule of Prices)	5% of Unit Price

#### Item 2 - Spare Parts

The City shall pay for spare parts once they have been delivered and accepted.

#### Item 3 – Training

The City shall pay for training when all training sessions have been satisfactorily completed and accepted.

#### Item 4 – Operating, Maintenance and Parts Manuals

The City shall pay for operating, maintenance, and parts manuals once they have been delivered and accepted.

#### Item 5 – Special Tools Separate from Coach

The City shall pay for special tools and other maintenance equipment upon their Acceptance by the SFMTA.