AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. Contract Number	Page of Pages	
DCKA-2011-R-0042	1	32

2. Amendment/Modification Number	3. Effective Date	4. Requisition/Purchase Request No.	5. Solicitation Caption
2	See 16C		Design, Manufacture, Test & Delivery of Streetcar Vehicles

6. Issued By: Code	7. Administered By (If other than line 6)
Department of Transportation **Office of Contracting and Procurement** **2000 14th Street, NW 6th Floor** **Washington, DC 20009**	**Department of Public Works** **Office of Contracting and Procurement** **Reeves Center, 3rd Floor** **2000 14th Street, NW** **Washington, DC 20009**

8. Name and Address of Contractor (No. Street, city, country, state and ZIP Code)	(X)	9A. Amendment of Solicitation No.
		DCKA-2011-R-0042
		9B. Dated (See Item 11)
		10A. Modification of Contract/Order No.
		10B. Dated (See Item 13)
Code Facility		

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

[X] The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers [ ] is extended. [X] is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment: (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or fax which includes a reference to the solicitation and amendment number. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or fax, provided each letter or telegram makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. Accounting and Appropriation Data (If Required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14

[ ]	A. This change order is issued pursuant to: (Specify Authority) The changes set forth in Item 14 are made in the contract/order no. in item 10A.
[ ]	B. The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation date, etc.) set forth in item 14, pursuant to the authority of 27 DCMR, Chapter 36, Section 3601.2.
[ ]	C. This supplemental agreement is entered into pursuant to authority of:
[ ]	D. Other (Specify type of modification and authority)

E. IMPORTANT: Contractor [X] is not, [ ] is required to sign this document and return _____ copies to the issuing office.

14. Description of amendment/modification (Organized by UCF Section headings, including solicitation/contract subject matter where feasible.)

A CONTRACT AMENDMENT IS NECESSARY TO MODIFY SPECIAL PROVISIONS (SP) AND OTHER ITEMS OF THE SOLICITATION AS FOLLOWS:

RESPONSES TO REQUESTS FOR CLARIFICATION

SEE ATTACHED REQUEST FOR FURTHER CLARIFICATION AND THE APPROPRIATE RESPONSES.

SOLICITATION.OFFER AND AWARD (SOA) SHEET

DELETE THE SOA INCLUDED WITH THE RFP AND REPLACE WITH THE ATTACHED.

Except as provided herein, all terms and conditions of the document referenced in Item (9A or 10A) remain unchanged and in full force and effect

15A. Name and Title of Signer (Type or print)		16A. Name of Contracting Officer Jerry M. Carter	
15B. Name of Contractor (Signature of person authorized to sign)	15C. Date Signed	16B. District of Columbia Jerry M. Carter (Signature of Contracting Officer)	16C. Date Signed 1/14/11

SOLICITATION, OFFER, AND AWARD

1. Caption	Page of Pages	
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2. Contract Number	3. Solicitation Number	4. Type of Solicitation	5. Date Issued	6. Type of Market
	DCKA-2011-R-0042	[ ] Sealed Bid (IFB) [X] Sealed Proposals (RFP) [ ] Sole Source [ ] Human Care Agreements [ ] Emergency		[X] Open [ ] Set Aside [ ] Open with Sub-Contracting Set Aside

7. Issued By:	8. Address Offer to:
DISTRICT DEPARTMENT OF TRANSPORTATION OFFICE OF CONTRACTING AND PROCUREMENT 2000 14TH STREET, NW - 6TH FLOOR WASHINGTON, DC 20009	Office of Contracting and Procurement 2000 14TH STREET, NW, 3RD FLOOR, WASHINGTON, DC 20009

NOTE: In sealed bid solicitations "offer" and offeror" means "bid" and "bidder"

SOLICITATION

9. Sealed offers in original and 7 copies for furnishing the supplies or services in the Schedule will be received at the place specified in Item 8, or if hand carried to the bid counter located at 2000 14th Street, NW, 3rd Floor, Wash DC 20009 until 2:00pm (Hour) local time 24-Jan-11 (Date)

CAUTION: Late Submissions, Modifications and Withdrawals: See 27 DCMR chapters 15 & 16 as applicable. All offers are subject to all terms & conditions contained in this solicitation.

10. For Information Contact	A. Name	B. Telephone (Area Code)	B. Telephone (Number)	B. Telephone (Ext)	C. E-mail Address
	LISA MINOR-SMITH, Prog. Compl. Spec.	202	671-2282		lisa.smith@dc.gov

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OFFER

12. In compliance with the above, the undersigned agrees, if this offer is accepted within _____ calendar days from the date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s), within the time specified herein.

13. Discount for Prompt Payment	10 Calendar days %	20 Calendar days %	30 Calendar days %	____ Calendar days %

14. Acknowledgement of Amendments (The offeror acknowledges receipt of amendments to the SOLICITATION):	Amendment Number	Date	Amendment Number	Date

15A. Name and Address of Offeror		16. Name and Title of Person Authorized to Sign Offer/Contract
	15B. Telephone (Area Code) / (Number) / (Ext)	15 C. Check if remittance address is different from above - Refer to Section G
		17. Signature
		18. Offer Date

AWARD (TO BE COMPLETED BY GOVERNMENT)

19. Accepted as to Items Numbered	20. Amount	21. Accounting and Appropriation

22. Name of Contracting Officer (Type or Print)	23. Signature of Contracting Officer (District of Columbia)	24. Award Date

Ref	Question	Answer
1	We noted that on the Cover Page, Number 6. states "Proposals must be delivered no later than 2:00 pm on Tuesday, February 1, 2011". However, Page 88, L.3 PROPOSAL SUBMISSION DATE AND TIME AND LATE SUBMISSIONS states "Proposals must be submitted no later than 5 PM EST on January 24, 2011. We believe that February 1st, 2011 is the correct submittal date, but want to be absolutely certain.	Correction made in Admendment #1 - See OCP Website - http://app.ocp.dc.gov/RUI/information/scf/solicitation_detail.asp?solicitation=DCKA-2011-R-0042 Associated Documents for Solicitation: DCKA-2011-R-0042
2	Would it be possible to obtain a word document of this RFP? It would be of great help, and make the response process much more streamlined.	No
3	What are the next steps after the submittal process? Do you have a rough time schedule for when you will make your supplier decision and after that decision has been made, when an NTP will be released?	Proposals will be evaluated and decision on whether to proceed with procurement or to solicit Best and Final Offers will be made by DDOT. Refer to Section L of the RFP. Schedule to be determined by DDOT.
4	Under item L.2.1.2 Vehicle Description, section "System Requirements" point (2) we are requested to provide Round Trip Simulation using line profile according to Figure 2-5. This Figure is missing in RFP mentioned this would be provided additionally. When do you suppose we could get this Figure?	Figure 2.5 with alignment profile attached.
5	TS 2.4.4 states that "Allowable wear of wheel" is to be 50 mm on diameter. We have on our TRIO T12 vehicles allowable wear 80 mm. We think that bigger wear would be better for the operator. Will be 80 mm wear acceptable?	Technical Specification Section 2.4.4 clarified to be minimum allowable wheel wear.
6	TS 2.3.3 states that: "The 3 phase ac system source voltage may be 208, 60 Hz." Will be 3 phase system 460 V, 60 Hz acceptable?	Technical Specification Section 2.3.3 allows for the usage of other 3-phase voltages with justification. We have no objection to the usage of 460 Vac, 60 Hz as the rms value of each phase is below the NFPA limit of 300 V in the passenger compartment. Convenience outlets will need transformation.
7	2.5.6 - Emergency Braking Requirements - Reference: Application of emergency braking shall be from the console emergency push button switch or from the propulsion system after detection of a spin/slide condition persisting longer than three seconds. - Question: When the propulsion control system detects a spin/slide condition, the propulsion system will output a signal for spin/slide detection. In this case, the propulsion system will not directly control emergency braking. Is it OK?	Independent supervision of the wheel slide circuitry is acceptable. Wheel slide control is not a fail-safe circuit. The purpose is to apply EB only if the release command persists for three seconds without any attempt to reapply the brakes. Attempts at reapplication must reset the timer function to avoid nuisance failures.
8	2.7 - Electromagnietc Interference and Compatibility - Reference: The vehicle, in the configuration proposed to DDOT, shall comply with EN 50121 for railway applications, except as indicated below. - Question: Only EN 50121 shall not be applied because this is a regional standard of Europe. We consider that EN 50121 shall be replaced by IEC 62236.	Refer to Technical Specification Section 16.1.2, for submittal of alternate standards. We use standards for which we know the content. We would have no objection to IEC 62236 if the content meets our requirements. Specifc issues or differences can be addresses if submitted.

Ref	Question	Answer
9	2.7.1 - Radiated Emission Limits - Reference: Radiated emissions shall be in accordance with the recommendations of EN 5021-3-1. - Question: We consider that "EN 5021-3-1" is wrong. Is this standard EN 50121-3-1? If yes, only EN 50121-3-1 shall not be applied because this is a regional standard of Europe. We consider that EN 50121-3-1 shall be replaced by IEC 62236-3-1.	Refer to Technical Specification Section 16.1.2, for submittal of alternate standards. We use standards for which we know the content. We would have no objection to IEC 62236 if the content meets our requirements. Specifc issues or differences can be addresses if submitted.
10	2.8.2 - General Safety Design Requirements - Reference: Software shall be considered unsafe unless it is verified as safe by an approved methodology. Approved methodologies shall comply with the requirments of IEEE 1483 and EN 50128. - Question: EN 50128 shall not be applied because this is a regional standard of Europe. We consider that EN 50128 shall be replaced by IEC 62279.	Refer to Technical Specification Section 16.1.2, for submittal of alternate standards. We use standards for which we know the content. We would have no objection to IEC 62279 if the content meets our requirements. Specifc issues or differences can be addresses if submitted.
11	Figure 2-5 - Alignment Drawing - Reference: To be Provided - Question: Would you like to provide this figure?	Figure 2.5 with alignment profile attached.
12	10.6.9 - Overspeed Protection - Reference: The overspeed protection logic shall remove propulsion, and command a brake application when the vehicle speed exceeds the overspeed protection set point. - Question: When the propulsion control system detects overspeed, the propulsion system will output a signal for overspeed detection and stop powering. The propulsion system will not directly command a brake application to the brake system. Is it OK?	We would anticipate a setpoint for removal of power prior to the overspeed trip and application of braking.
13	RFP - Item 6 - - Proposal Due Date - Please extend the proposal Due Date to March 31, 2011. As the RFP was released on December 24, 2010, a Federal Holiday, and the beginning of the traditional holiday season through the additional Federal Holiday of New Year's Day, the actual working time available for development and delivery of a proposal has been drastically reduced. Additionally, without benefit of any advance notice of general requirements or industry review of the specifications, it will take some time to fully evaluate, with our suppliers, the detailed requirements in order to provide the best possible proposal to DDOT to the ultimate benefit of DDOT.	No extension of Proposal due date.
14	TS2 - 2.1.1 - TS2-1 - Side Doors - Please revise this section to permit two door openings on each side both in the low floor section. One doorway is double (1220mm) at the center of the vehicle, and one doorway is single (815mm) at the cab end. Both are of sufficient width to permit wheel chair boarding.	Changed to allow single leaf door to be used. See attached revision to page TS2-1
15	TS2 - 2.2.2 - TS2-5 - Vertical Curves, crest and sag - Please increase the minimum vertical curve radius crest and sag to 350m to accommodate our service proven standard articulation design.	With no steep grades with sharp vertical curves anticipated on the DC alignment Technical Specification Section 2.2.2 has been change to 350 m on vertical curves. See attached page TS2-2.

Ref	Question	Answer
16	TS2 - 2.9 - TS2-17 - Service Proven - Please reduce fleet size requirement from 12 to 10 to include our service proven street car. This fleet of 10 streetcars has been in daily operation since 2005 and has accumulated nearly 1.5 million kilometers.	Minimum operating fleet requirements reduced to 10 vehicles. See attached page TS2-17.
17	TS4 - 4.1 - TS4-1 - Coupler - Please provide Secheron Model number for coupler compatibility.	The coupler complies with Czech norms. The model number is included on the attached page TS4-1.
18	TS4 - 4.6 - TS4-2 - Electrical Connection - Please provide specific part number, manufacturer, drawing of electrical connector. Please provide control circuits for trainline compatibility design.	Compatibility with existing vehicles is not required.
19	TS12 - 12.12 - TS1-3 - Disc and Hub - Revise to permit use of solid disc. Disc braking is only used at the end of the stop, for holding and parking brake and in limited duty as emergency brake and supplemental to a failed dynamic brake. The vane type configuration is not needed to achieve the intent of the specification. This service proven solid disc configuration is operational on many vehicles.	Thermal capacity must be demonstrated with CDRL 12-2. No objections to alternative proposal pending satisfactory performance.
20	TS13 - 13.7 - TS13-8 - CCTV - Recommend the incorporation of a CCTV system that is used to record interior, rear view, forward facing, and to replace exterior mirrors. The use of this data for accident investigation, slip fall, etc. is invaluable. Interior cameras also provide the operator a real time image of disturbances (triggered by PEI). Replacing the exterior mirrors with cameras removes the potential of a passenger standing on the raised platform being struck by an extended mirror.	CCTV cameras can be proposed as an option and will be evaluated according to the technical scoring in RFP Section M.3. Prior experience and benefits to DDOT should be included.
21	TS14 - 14.3.3 - TS14-6 - Exterior Mirrors - See item 20.	CCTV cameras can be proposed as an option and will be evaluated according to the technical scoring in RFP Section M.3. Prior experience and benefits to DDOT should be included.
22	TS2, TS10 - 2.5.13, 10.3.1 - TS-2, Figure 2-5 TS10-2 - Duty Cycle Ratings, Equipment Thermal Capacities - The fundamental basis for propulsion and braking system design is designing equipment with sufficient thermal capacity to meet the "Duty Cycle Ratings". The duty cycle ratings are based on the Plan and Profile Alignment drawings. Although we believe that our present configuration has sufficient capacity to meet most street car alignments, a thorough analysis is required to confirm this. The plan and profile alignment drawings are required to start this process. This information will be provided to our propulsion and braking suppliers for equipment sizing / confirmation.	Figure 2.5 with alignment profile attached.

Ref	Question	Answer
23	Request for Change: For vehicle manufacturers to be able to compile accurate pricing and complete a comprehensive technical proposal, (**Manufacture name removed**) kindly requests for a 90 day extension of the proposal due date. - Explanation: This request is recommended to allow vehicle manufacturers appropriate time to submit complete and comprehensive pricing and technical proposals which ensures a competitive bid process for D.C. Dot. It only seems appropriate to allow sufficient time for review of the extensive RFP, have sufficient time to ask questions, complete accurate pricing on an extensive list of spare parts, and compile a comprehensive and complete proposal.	No extension of Proposal due date.
26	What is the timescale and the procedure to reaching a decision on the preferred bid ?	DDOT wishes to evaluate and issue a Notice of Intent to Award at the earliest possible date. A decision on whether to award or pursue a Best and Final Offer is anticipated by February 15.
27	Are you looking only for a low bid, or is there scope for negotiation over the cost v specification ?	See RFP Section L for a description of the procurement process. Award will be based on best vehicle at best price.
28	Will a mock up to get passenger/operator feedback on details be important in your final decision over the specification ?	No
29	If a better specification can be offered at the bid price, would this be a material consideration	Proposals will be evaluated according to the District's best interest and the specifications published. Alternatives to the published specifications may be submitted for evaluation.
30	Given the winter snow in Washington, will you need a separate snowplow/broom streetcar ?	No
31	L.2.1.2 Vehicle Description - System Requirements - (2) Performance simulations over a complete round trip on the east/west line using the District's line profiles provided in Figure 2-5 of the Technical Specifications (TS) based on duty cycle requirements in TS 2.5.13. – 1. (**Manufacture name removed**) requirement for clarification - Missing Figure 2-5 - On TS 2-24 is presented that Figure 2-5 „To be provided". This Figure is necessary to be able to perform simulation of „duty cycle" as required in RFP. There is no reference to Figure 2-5 in TS 2.5.13. This reference is presented only in CDRL 2-5-8.	Figure 2.5 with alignment profile attached.
32	2.3.3 AC Supply Voltage - A source of 3 phase ac and single phase ac power shall be provided for loads specified elsewhere. - The 3 phase ac system source voltage may be 208, 60 Hz. Other 3 phase voltages may be approved with technical justification. All ac loads shall be designed for the voltage at the load point... - 2. (Manufacture name removed) requirement for clarification - (Manufacture name removed) proposes AC supply as 3 phase system 3x265/460V, 60Hz. Is such system acceptable for DDOT? Note. The car is to be equipped with a sensor of electrical insulation failure.	Technical Specification Section 2.3.3 allows for the usage of other 3-phase voltages with justification. We have no objection to the usage of 460 Vac, 60 Hz as the rms value of each phase is below the NFPA limit of 300 V in the passenger compartment. Convenience outlets will need transformation.

Ref	Question	Answer
33	2.4.4 Wheel Dimensions - Allowable wear on diameter 50 mm 3. (Manufacture name removed) requirement for clarification - (Manufacture name removed) proposes 80 mm „allowable wear on diameter", chat is according to our opinion more beneficial for the operator. From the provision is not clear if defined wear of 50 mm is minimal or fix value. - (Manufacture name removed) proposes to define this wear as: Minimum allowable wear on diameter.	Technical Specification Section 2.4.4 clarified to be minimum allowable wheel wear.
34	7.3.2 Floor Heat - Floor heating shall be provided with sufficient capacity to compensate for all carbody heat loss through conduction and radiation without consideration of any internal car heat sources. The controls shall modulate the floor heat to avoid temperature fluctuations in the passenger area. Floor heat shall be provided by baseboard convection units. Floor heat shall be provided by three phase 208 Vac and balanced between the three phases. High voltage, 750 Vdc primary voltage, shall not be permitted in the passenger compartment. - 4 (Manufacture name removed) requirement for clarification - Can we consider heating system located in the vehicle sidewalls – as installed on existing TRIO streetcars (see drw 1222101) – as heating located in "passenger compartment" as per provision 7.3.2 or could be considered as heating located outside of „passenger compartment"? - 5 (Manufacture name removed) requirement for clarification - TS provision 7.3.2 requires only 3 phase supply system 208 Vac. TS 2.3.3 states that 3 phase supply may be 208V, 60 Hz, and other 3 phase voltages may be approved. May be 3 phase system of 3x265/460V, 60Hz applied to supply floor heating?	Heating in the sidewalls must be considered as part of the passenger compartment unless separated by a fire-proof barrier. Three phase systems with 460 V line voltage are acceptable for heating the passenger compartment as long as the phase voltage to neutral is utilized to keep the voltage below 300 V per NFPA 130.
35	14.2.5 Windows - All windows shall be of the single-glazed, fixed-type, laminated, tempered safety glass tested in accordance with ANSI Z26.1 or approved equivalent standard. Glazing shall be mounted directly to the car structure by bonding or with neoprene glazing strips. Glazing strips, if used, shall be laced from the outside of the vehicle. The ends of the glazing strip shall be joined together by the hot vulcanization process or a gluing process approved by the City to form an endless glazing strip. The side and door windows in the passenger section shall be 6.5 mm laminated safety glass. - 6 (Manufacture name removed) requirement for clarification - Laminated tempered safety glass is required for side wall windows. Will be the same type of side windows from hardened glass as installed on TRIO vehicles acceptable for DDOT? (Manufacture name removed) thinks that hardened glass is better from "safety reasons" when there is a easier possibility to break the glass after car accidents to provide passengers evacuation	Tempered or "hardened" safety glass meeting the requirements of ANSI Z26.1 is permitted. A clarification to Technical Specification 14.2.5 is attached.
36	2.4.2 - Carbody Dimensions - P 156 - Allowed vehicle lengths: 19 m to 22 m of the platform. Vehicle cabs would extrude from the 22m platform - Would the Transit Authority consider vehicles that are longer than 22m but offer optimized boarding area (door coverage)? - There would be no safety concern since there will be no doors outside thus providing even more safety to the drivers.	A longer vehicle may be proposed. Clearly indicate how the doors and passenger boardings would work with the platforms described in Technical Specification Section 2.2.4 and Figure 2-4.

Ref	Question	Answer
37	2.4.2 - Carbody Dimensions - P 157 - Allowed vehicle width 2400 mm to 2500 mm - Is there any restrictions on the infrastructure that limits the vehicle width of the vehicle? Streecars are offered with vehicle widths of up to 2650m. Would the Transit Authority consider these types of vehicles, 2650m. Would the Transit Authority consider these types of vehicles,	Trackwork is already in the street and platforms have been constructed. The vehicle must fit a platform with the edge 1282 mm from the track center line. Refer to Technical Specification Section 2.2.4.
38	2.5.5 - Breaking Requirements - P158 - At all vehicle weights, service braking shall be 100% dynamic braking down to the dynamic 100% dynamic braking down to the dynamic In the event of dynamic brake failure on a truck, friction brakes shall automatically provide the necessary braking efforts to achieve the requested rate. The full service average braking rate requirements, as measured by the entry speed divided by stopping time, are: • 1.34 m/s2 +5%, with all dynamic brakes functional, from any entry speed to zero. • 1.34 m/s2 +10%, with one or more dynamic • 1.34 m/s2 +10%, with one or more dynamic speed to zero. After the initial stop with a dynamic brake failure, the system may automatically reduce vehicle maximum speed to conform to friction brake thermal limitations. - Can the Transit Authority confirm that the Full Service Braking average rate speficied herein shall ba achieved 100% dynamic down to the dynamic brake fade point up for all vehicle loads between AW0 and up to AW4 included?	Full service braking rates utilizing 100% dynamic braking down to the dynamic fade point is required. Alternatives utilizing blended friction/dynamic braking may be proposed for evaluation. Full braking rates are required from AW0 to AW3. See attached change to Technical Specification Section 2.5.5.
39	Section B: On Page 1, the Base Contract chart indicates a request of 25 HO scale models. However, on Pages 38 and TS2-17 it indicates a request of 14 HO scale models. - Please clarify if you want pricing for 25 or 14.	25
40	Section G: We would like to discuss further the milestone payments (Section G.4) which as written are potentially very burdensome to the vehicle manufacturer, and unlike any that we have seen from other cities where the manufacturer receives only 40 percent of the payments until delivery of all vehicles. May USC submit an alternate price based on an alternate milestone payment schedule?	The payment schedule is unchanged.
48	2.5.14 – System Redundancy and Recovery - The following systems shall be physically and functionally redundant and share no components except where specifically permitted: • AC and DC Power Sources - This contradictsSection 9.3 which permits "Auxiliary electrical power conversion shall be accomplished by one or two independent dc-to-ac inverters". USC requests clarification if AC power source needs to be redundant.	The redundancy and recovery provisions apply to several acceptable configurations of the propulsion, braking, and power supply system. One single inverter madule would be acceptable if the hydraulic pump motors and propulsion ventilation fans are powered from the battery-backed LVPS. One inverter housing two separate modules may be acceptable. Powering propulsion fans from the primary dc supply is acceptable. Technical Specification Section 2.5.14 requires the car not be totally disabled by a single point failure such as an inverter.

Ref	Question	Answer
49	2.5.14 – System Redundancy and Recovery - The following systems shall be physically and functionally redundant and share no components except where specifically permitted: • HVAC - USC requests clarification on the ducting between the cars. Is the intent for the ducting to be redundant within the HVAC requirement?	HVAC ducting does not need to be redundant.
50	2 – Figure 2.1 (Page TS2-20) - Vehicle Dynamic Envelope - There are conflicting pantograph lockdown heights. In Figure 2.1, 3500mm is listed. In Section 2.4.3 3800mm is listed. USC plans on following the 3800mm specification.	Technical Specification Section 2.4.3 dimension of 3800 mm for maximum lockdown height is correct.
51	4.1.3 – Strength - The coupler draft gear and anchor shall be capable of withstanding buff or draft loads of 400 kN with no permanent deformation. - The specification cannot be met if we use the standard folding Secheron coupler. We assume the intention for the folding coupler is mainly to be used for towing in emergency situations. This type of application does not require such a high load (400kN). If such a high load will be a requirement for the coupler it can be met by redesigning the coupler, mounting and the various structural portions of the front end of the car. Also, if this is the required coupler there may be compatibility issues with the existing fleet if they are using a standard Secheron folding coupler. The streetcar meets 400 kN compression load, but not applied at the coupler level. - USC requests further clarification for the statement, and requests confirmation that 400kN is required for coupler strength.	The coupler strength shall be sufficient to meet the towing requirements. The anchor, or attachment to the frame, shall meet the 400 kN requirement without permanent deformation.
52	5.3.11 – Park Brake and Control - The parking brake shall automatically be applied when both reversers in each cab of the vehicle are in the Neutral or Off position. - USC requests clarification. Current industry safety protocols allow for only one cab be active regardless of activity in non-active cab.	Parking brake control to be as stated in Technical Specification Section 5.3.11. This is independent of the cab interlock described in Technical Specification Section 5.3.1.
53	6.4.3 – Performance - The operating time of any door, from time of first motion to the point of completion, including cushioning, shall be 3.0 seconds to open and 4.0 seconds to close, +0.5 seconds. - The operating time of any door, from time of first motion to the point of completion, including cushioning, shall be 2.0 seconds to extend and 2.0 seconds to retract, +0.5 seconds. - Specification has two separate requirements for the same function. Is one for the bridgeplate requirement? Please clarify.	Technical Specification Section 6.4.3 has been changed to specificy bridgeplate.
54	7.3.2 – Floor Heat - Floor heat shall be provided by three phase 208 Vac - USC requests the option to use United States standard of 460 Vac.	Technical Specification Section 2.3.3 allows for the usage of other 3-phase voltages with justification. We have no objection to the usage of 460 Vac, 60 Hz as the rms value of each phase is below the NFPA limit of 300 V in the passenger compartment. Convenience outlets will need transformation.

Ref	Question	Answer
55	7.4.1 – Design Criteria - During vehicle cooling, the interior temperature shall be maintained within the range of 22°C to 24°C and the relative humidity shall be below 60% with the design and less than design load conditions. For ambient temperatures above 35°C, the interior temperature may rise above the specified range, but shall maintain at least 9°C below the ambient temperature. Car temperatures during cooling shall be maintained with an AW2 passenger load and maximum solar load based on worst case sun position and vehicle orientation. - USC requests that this paragraph be checked for accuracy. The most stringent standard for HVAC systems is designed to maintain 22°C to 26°C, a 6°C below the ambient temperature at AW1 passenger load.	The allowable range of temperature variation is typical of US LRV contracts. Specific HVAC requirements vary by location based on ASHRAE standards.
56	7.7 – CDRL - For the following, USC's supplier considers this information proprietary and prefers that the information not be published in written form, but can be provided in other ways. USC requests that the information be supplied in an alternate way. - Fan curves - Evaporator coil design criteria - Compressor (Electrical interface data will be provided) - Condenser coil design	Submittal requirements are typical of US LRV contracts and necessary to evaluate the compliance with the design criteria.
57	9.2.3 – Knife Switch - The box cover shall close only with the blade in the normal position. - Current industry standards now require the knife switch be fully enclosed with an external rotary switch. USC requests the specification be modified to meet industry standards.	Shop power supply to match the supply on the exsiting vehcile and carhouse design. Rotary switch may be considered during design review or may be proposed with description of how to interface with the DDOT shop.
58	10.7.1 – Traction Motors - Each traction motor shall be resiliently mounted - USC's traction motor currently exceeds the vibration requirements in this specification and requests the option not to resiliently mount the traction motor to the truck frame. The motor is designed to withstand the mechanical stresses according to IEC 61373 (dated 05/2010), Class 2 (bogie mounted), with the following requirements: - R.M.S. functional: - vertical 5.4 transverse 4.7 - longitudinal 2.5 m/s^2 - R.M.S. long-life: - vertical 30.6 transversal 26.6 - longitudinal 14.2 m/s^2 - R.M.S. long-life: - vertical 30.6 transversal 26.6 - longitudinal 14.2 m/s^2	Non-resiliently mounted motors may be proposed. Proposal should include test data and service history to support proposed change.
59	12.3 – Brake System Configuration - The calipers for each truck shall be controlled independently by their respective ECU and HPCU. - USC requests the option to control the braking on a per truck basis, both from the ECU and HPCU. Controlling both calipers on a truck by its respective ECU and HPCU provides a more reliable, lower maintenance and service-proven system. Furthermore, this type of control ensures the best performing interaction between the per truck controlled propulsion system, and the friction brake blending and wheel slide control.	Include description of system with proposal. No conflict with Technical Specification is identified.
60	12.3 – Brake System Configuration - Disc braking shall use hydraulic pressure to apply the service brakes and spring pressure to apply the parking brake. - USC requests the option to use the service-proven, fail-safe system of service braking controlled by using spring apply and hydraulic release.	The system described seems to comply with the specification. According to the comment the Proposer is controlling the service brake with hydraulic pressure and using a spring applied parking brake.

Ref	Question	Answer
61	13.5.6 – Destination and Information Signs - Interior signs shall have a minimum character height of 3 inches - USC standard interior sign is available up to 40mm. USC requests that the 3" requirement be lowered to 40mm which betters the ADA requirement for interior signs to be 5/8" minimum character size.	We are unaware of any ADA requirement for interior destination signs. ADA does require 5/8" minimum height for priority seating signs in the accessible seating areas (1192.75). Forty mm high characters may be approved during design review after the size and veiwing locations of the signs have been determined.
62	14.2 – Interior Finishing and Accessories - Walls shall have a graffiti resistance rating of "one", per APTA Transit Security Guidelines Manual, Section 21. The ceiling shall have a rating of "two". - To ensure compliance, USC requests a copy of APTA Transit Security Guidelines Manual, Section 21.	Contractors are required to purchanse their own copies of standards.
63	14.2.2 – Thermal Insulation - The floor shall be insulated with two layers of equal thickness of fiberglass separated by a vapor barrier. - USC requests the option to use composite material that will meet or exceed this requirement in lieu of fiberglass.	The floor design is intended to meet NFPA 130 requirements. Alternative designs also meeting NFPA 130 are welcome. Please submit test reports showing compliance with the alternative floor design in the proposal.
64	16.4.1 – General - High-strength, low-alloy high-tensile (HSLA) steel structural shapes, plates, and bars shall, as a minimum, conform to the requirements of ASTM A 588, where available. - USC requests the option of using ASTM A656, which has superior mechanical properties compared to ASTM A588.	Specific grades of steel are not specified. The third paragraph of Technical Specification Section 16.4.1 explicitly states the requirements for other high-strength, low alloy steels which may be used.

SECTION 1

GENERAL TOPICS AND DEFINITIONS

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MHz	Mega Hertz
MPa	Mega Pascal
min	Minute
mm	Millimeter
mV	Millivolt
µV	Microvolt
N	Newton
Pa	Pascal
s	Second
V	Volt
Vac	Volt alternating current
Vdc	Volt direct current
°C	Degree Celsius

1.6 Referenced Standards

36 CFR Part 1192	Americans with Disabilities Act (ADA) Accessibility Guidelines for Transportation Vehicles
49 CFR Part 27	Nondiscrimination of the Basis of Disability in Programs or Activities Receiving Federal Financial Assistance
49 CFR Part 37	Transportation Services for Individuals with Disabilities (ADA)
49 CFR Part 38	Accessibility Specifications for Transportation Vehicles
49 CFR Part 213	Track Safety Standards
49 CFR 571.108	Federal Motor Vehicle Safety Standards
AAR	Specifications for the Construction of New Passenger Equipment Cars
AAR	Wheel and Axle Manual
AAR C II	AAR, Operations and Maintenance Department Mechanical Division, Manual of Standards and Recommended Practices Section C – Part II
AAR M-201	Steel Castings
AAR M-618	Wire Reinforced Air Brake Hose
AAR M-927	Wire Reinforced Hose Assemblies
AAR RP-585	Wire and Cable Specification
AAR RP-586	Wire & Cable Insulating Material No. 589
AAR RP-587	Wire and Insulating Material No. 590
AAR S-540	Tape – Electrical, PVC

AAR 2518	Brake Installation Details, as incorporated in Standard S-400 (AAR Manual E)
ANSI/ASHRAE 37	Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment
ANSI/ASQC Z 1.9	Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming
ANSI B1.1	Standard, Unified Inch Screw Threads, (UN and UNR Thread Form
ANSI B1.13M	Metric Screw Threads – M Profile
ANSI B1.20.1	Pipe Threads, General Purpose (Inch)
ANSI B 18.1.2	Square and Hex Bolts and Screws Inch Series
ANSI/ASME B31.1	Power Piping
ANSI C 80.1	Rigid Steel Conduit – Zinc Coated (GCR)
ANSI C 80.5	Rigid Steel Conduit – Zinc Coated (ARC)
ANSI/ISO/ASQ Q9001	Quality Management Systems Requirements
ANSI Y1.1	Abbreviations for Use on Drawings
ANSI V32.2	Graphics Symbols for Electrical and Electronic Diagrams
ANSI V32.14	Graphic Symbols for Logic Diagrams
ANSI Z26.1	Safety Code for Safety Glazing Materials for Glazing Motor Vehicles Operating on Land Highways
APA PS 1-83	Structural Plywood
APTA	Transit Security Guidelines Manual, Section 21
APTA RP-E-002-98	Recommended Practice for Wiring of Passenger Equipment
APTA RP-E-009-98	Recommended Practice for Wire Used on Passenger Equipment
APTA RP-E-012-99	Recommended Practice for Normal Lighting System Design for Passenger Cars
ARI 700	Specifications for Fluorocarbon Refrigerants
ASME	Boiler and Pressure Vessel Code for Unfired Pressure Vessels
ASME B16.18	Cast Copper Alloy Solder Joint Pressure Fittings
ASME B16.22	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME FAP-1	Quality Assurance Program for Fastener Manufacturers and Distributors and Testing Laboratories
ASTM A 6	Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Pilings for Structural Use
ASTM A 36	Standard Specification for Carbon Structural Steel

ASTM A 53	Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 176	Standard Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet and Strip
ASTM A 262	Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
ASTM A 480	Standard Specification for General Requirements for Flat-Rolled Stainless and Heat Resisting Steel Plate, Sheet and Strip
ASTM A 502	Specification for Steel Structural Rivets
ASTM A 568	Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A 588	Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point to 4 in. Thick
ASTM A 606	Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance Section
ASTM A 666	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
ASTM A 710	Standard Specification for Age-Hardening Low-Carbon Nickel-Copper-Chromium-Molybdenum-Columbium Alloy Structural Steel Plates
ASTM A 736	Standard Specification for Pressure Vessel Plates, Low-Carbon Age-Hardening Nickel-Copper-Molybdenum-Columbium and Nickel-Copper-Manganese-Molybdenum-Columbium Steel Alloy
ASTM A 763	Standard Practices for Detecting Susceptibility to Intergranular Attack in Ferritic Stainless Steels
ASTM B 26	Specification for Aluminum-Alloy Sand Castings
ASTM B 33	Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes
ASTM B 85	Specification for Aluminum-Alloy Die Castings
ASTM B 88	Standard Specification for Seamless Copper Water Tube
ASTM B 88M	Standard Specification for Seamless Copper Water Tube (Metric)
ASTM B 108	Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B 247	Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings
ASTM B 280	Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service

ASTM B 633	Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C 542	Specifications for Lock-Strip Gaskets
ASTM C 1166	Standard Test Method for Flame Propagation of Dense and Cellular Elastomeric Gaskets and Accessories
ASTM D 638	Standard Test Method for Tensile Properties of Plastics
ASTM D 648	Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
ASTM D 785	Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials
ASTM D 790	Standard Test Methods for Flexural Properties of Unreinforced Plastics and Electrical Insulating Materials
ASTM D 792	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM D 952	Standard Test Method for Bond or Cohesive Strength of Sheet Plastics and Electrical Insulating Materials
ASTM D 1055	Specification for Flexible Cellular Materials - Latex Foam
ASTM D 1630	Standard Test Method for Rubber Property-Abrasion Resistance (Footwear Abrader)
ASTM D 1683	Test Method for Failure in Sewn Seams of Woven Fabrics
ASTM D 2047	Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine
ASTM D 2261	Standard Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine)
ASTM D 3159	Standard Specification for Modified ETFE – Fluoropolymer Molding and Extrusion Materials
ASTM D 3574	Standard Test Methods for Flexible Cellular Materials – Slab, Bonded and Molded Urethane Foams
ASTM D 3675	Standard Test Method for Surface Flammability of Flexible Cellular Materials Using a Radiant Heat Energy Source
ASTM D 3775	Standard Test Method for Fabric Count of Woven Fabric
ASTM D 3776	Standard Test Methods for Mass Per Unit Area (Weight) of Fabric
ASTM D 4034	Standard Test Method for Resistance to Yarn Slippage at the Sewn Seam in Woven Upholstery Fabrics
ASTM D 4966	Standard Test Method for Abrasion Resistance of Textile Fabrics (Martindale Abrasion Tester Method)
ASTM D 5034	Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

ASTM D 5420	Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)
ASTM E 94	Standard Guides for Radiographic Examination
ASTM E 119	Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E 162	Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
ASTM E 165	Standard Practice for Liquid Penetrant Examination for General Industry
ASTM E 446	Standard Reference Radiographs for Steel Castings up to 2 in. (51 mm) in Thickness
ASTM E 648	Standard Test Methods for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM E 662	Standard Test Method for Specific Optical Density of Smoke Generated by Sold Materials
ASTM E 709	Standard Guide for Magnetic Particle Examination
AWS	Welding Handbook
AWS B2.2	Standard for Brazing Procedure and Performance Qualification
AWS D 1.1	Structural Welding Code—Steel
AWS D 1.2	Structural Welding Code—Aluminum
AWS D 1.3	Structural Welding Code—Sheet Steel
AWS D 1.6	Structural Welding Code—Stainless Steel
BSS-7239	Boeing Support Standard BSS-7239 – Test Method for Toxic Gas Generation by Materials or Combustion
DIN VDE 0627	German Electrical Connector Standard
DIN 43652	German Electrical Connector Standard
EN 287-1	Qualification test of welders - Fusion welding - Part 1: Steels
EN 287-2	Qualification test of welders - Fusion welding Part 2: Aluminium and aluminium alloys
EN 288	Specification and approval of welding procedures for metallic materials. General rules for fusion welding
EN 50121	Railway Applications - Electromagnetic Compatibility
EN 50128	Railway Applications - Software for railway control and protection systems
EN 60529	Degrees of Protection Provided by Enclosures (IP Code)
FAA No. AC 43.13-1A	Stripping Insulation

FAR 25.853	Federal Aviation regulation Part 25: Air Worthiness Standards: Transport Category Airplanes, 853, Compartment Interiors
FS KK-L-165C	Leather, Cattlehide, Vegetable Tanned and Chrome Retanned, Impregnated, and Soles
FS QQ-B-654A	Brazing Alloys, Silver
FS QQ-P-416	Plating, Cadmium (Electrodeposited)
FS SS-T-312	Tile, Floor: Asphalt, Rubber, Vinyl-Composition
FS TT-P-664	Primer Coating, Alkyd, Corrosion-inhibiting, Lead and Chromate free, VOC-Compliant
FS TT-P-38	Paint, Aluminum
FTA-IT-90-5001-02	Quality Assurance and, Quality Control Guidelines
ICEA S-19-81	Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
ICEA S-66-524	Cross-Linked Thermosetting Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
IEC 60085	Electrical Insulation - Thermal Evaluation and Designation
IEC 60623	Secondary Cells and Batteries Containing Alkaline or Other Non-acid Electrolytes - Vented Nickel-Cadmium Prismatic Rechargeable Single Cells
IEC 60349	Electric Traction - Rotating Electrical Machines, Rail and Road Vehicles
IEC 60571	Electronic Equipment Used on Rail Vehicles
IEC 60850	Railway Applications - Supply Voltage of Traction Systems
IEC 61287-1	Railway Applications - Power Converters installed on board rolling stock
IEC 61349	Low-voltage switchgear and controlgear assemblies
IEEE 11	Rotating Electric Machinery for Rail and Road Vehicles
IEEE 16	Electrical and Electronic Control Apparatus on Rail Vehicles
IEEE 112	Standard Test Procedure for Polyphase Induction Motors and Generators
IEEE 1473	Communications Protocol Aboard Trains
IEEE 1475	Functioning of and Interfaces Among Propulsion, Friction Brake and Train-borne Master Control on Rail Rapid Transit Vehicles
IEEE 1483	Verification of Vital functions in Processor-Based Systems Used in Rail Transit Control
IFI	Industrial Fasteners Institute Fastener Standards
IFI	Industrial Fasteners Institute Metric Fastener Standards

ISO 3095	Railway applications -- Acoustics -- Measurement of noise emitted by railbound vehicles
ISO 3381	Railway applications -- Acoustics -- Measurement of noise inside railbound vehicles
MIL-STD-1916	DOD Preferred Methods for Acceptance of Product
MIL-A-9067	Adhesive Bonding, Process and Inspection Requirements
MIL-C-25427	Coupling Assembly, Hydraulic, Self-Sealing, Quick Disconnect
MIL-C-27072	Cable, Power, Electrical and Cable, Special Purpose Electrical, Multiconductor Single-Shielded, General Specification for
MIL-C-7438	Core Material, Aluminum, for Sandwich Construction
MIL-M-81531	Marking of Electrical Insulating Materials
MIL-P-8053	Plywood, Metal Faced
MIL-P-23469	Pins and Collars, Swage-Locking (Lockpins), General Specification for
MIL-T-8504	Tubing, Steel, Corrosion-Resistant (304), Aerospace Vehicle Hydraulic System, Annealed, Seamless and Welded
MIL-W-6858	Welding, Resistance: Spot and Seam
MIL-W-22759/6B	Wire, Electrical, Fluoropolymer-Insulated, Abrasion Resistant, Extruded PTFE, Nickel-Coated, Copper Conductor, 600-Volt
MS-25036	Terminal, Lug, Crimp Style, Copper, Insulated, Ring Tongue, Bell Mouthed, Type 11, Class 1 (for 105° C Total Conductor Temperature
MS-27212	Terminal Board, Assembly, Molded-in Stud, Electric
NEC	National Electrical Code - see NFPA 70
NEMA HP3	Electrical and Electronic PTFE (Polytetrafluoroethylene) Insulated High Temperature Hook-up Wire; Types (600 Volt), EE (1000 Volt) and ET (250 Volt)
NEMA LD 3	High Pressure Decorative Laminates
NEMA MG 1	Motors and Generators
NEMA 250	Enclosure for Electrical Equipment (1000 Volts Maximum)
NFPA 70	National Electrical Code
NFPA 130	Standard for Fixed Guideway Transit and Passenger Rail Systems
SAE J343	Test and Test Procedures for SAE 100R Series Hydraulic Hose and Hose Assemblies
SAE J429	Mechanical and Material Requirements for Externally Threaded Fasteners
SAE J516	Hydraulic Hose Fittings

SAE J517	Hydraulic Hose
SAE J533	Flares for Tubing
SAE J995	Mechanical and Material Requirements for Steel Nuts
SAE J997	Spark Arrester Test Carbon
SAE J1273	Recommended Practices for Hydraulic Hose Assemblies
SAE J1405	Optional Test Procedures for Hydraulic Hose Assemblies
SAE J2560	Forward Lighting Halogen Bulb Performance Requirements for Motor Vehicles
SAE J2039	Side Turn Signal Lamps for Large Vehicles
SAE J2040	Tail Lamps (Rear Position Lamps) for Use on Vehicles 2032 mm or More in Overall Width
SAE J2042	Clearance, Sidemarker, and Identification Lamps for Use on Motor Vehicles 2032 mm or More in Overall Width
SAE J2261	Stop Lamps and Front- and Rear-Turn Signal Lamps for Use on Motor Vehicles 2032 mm or More in Overall Width
SAE-AMS-STD-401	Sandwich Constructions and Core Materials -- General Test Methods
SAE-AMS-T-6845	Resistance Welding; Spot and Seam
SAE-AS-22758/10	Wire, Electrical, Fluoropolymer-Insulated, Extruded TFE, Nickel-Coated Copper Conductor, 1000 Volt
SAE-AS-22759/16	Wire, Electric, Fluoropolymer-Insulated, Extruded ETFE, Medium Weight, Tin-Coated Copper Conductor, 600-Volt, 150 Degrees C)
UIC 515-4	Passenger Rolling Stock - Trailer Bogies - Running Gear - Bogie Frame Strength Tests
UIC 615-4	Bogie Frame Structural Strength Test
UL-6	Electrical Rigid Metal Conduit - Steel
UL 465	Fire Resistance Ratings
UL 207	Refrigerant-Containing Components and Accessories, Nonelectrical
UMTA-MA-06-0153-85-8	Inductive Interference in Rapid Transit Signaling Systems, Volume II: Suggested Test Procedures
UMTA-MA-06-0153-85-11	Radiated Interference in Rapid Transit Signaling Systems, Volume II: Suggested Test Procedures
VDI 2060	Balance Quality Requirements of Rigid Motors

1.7 CDRL

No submittals are required for this Section.

END OF SECTION

SECTION 2

DESIGN AND PERFORMANCE CRITERIA

2.1 General Vehicle Configuration

2.1.1 Vehicle Type

The vehicle shall be an articulated, modern urban streetcar with contemporary styling, with the following characteristics:

- There shall be not less than three body sections including at least one low floor (350 mm) section.
- Not less than 50% of the vehicle shall be low floor.
- There shall be at least two doorways per side in the low floor section.
- Entry to the low floor section shall be level from 356 mm platforms for all vehicle loadings.
- One door per side near the center of the vehicle shall be equipped with a platform gap-bridging device for entry from 255 mm platforms.
- The vehicle shall be capable of bi-directional operation, with a fully functional cab at each end. Operating control and performance shall be equal from both cabs.
- The vehicle shall be designed for single unit operation with provisions for towing a non-operable vehicle.
- Seating shall generally be arranged laterally in a two by one configuration.
- The vehicle shall be heated and air conditioned consistent with the District of Columbia environment and these Technical Specifications.

Deleted: double wide

Within 180 days of NTP, the Contractor shall submit for DDOT approval general arrangement drawings of the vehicle as described in CDRL 2-1.

2.1.2 Compatibility with Existing City Systems

The streetcar system will be an integral part of the District's existing transportation system. As such, the vehicle must include systems that are functionally and physically compatible with interfaces external to the vehicle. Physical compatibility requirements are listed in Section 2.2. The vehicle systems identified are the Train-to-Wayside Communications (TWC) System and the Radio System (District-furnished equipment).

2.1.3 Elderly and Handicapped Accessibility

At least one double-leaf door per vehicle side will be equipped with an ADA-compliant platform bridging device for wheelchair access. All other double-leaf doors in the low floor section(s) shall be height-controlled to permit level boarding in compliance with ADA regulations.

Space for at least two wheelchairs shall be provided in each vehicle, adjacent to the doorways with the bridging devices. Stanchions, grab bars, and handrails shall be provided to permit safe use of this area by standees when no wheelchairs are present.

Other ADA requirements (as they apply to transit applications), such as signage and information displays, shall be incorporated.

2.2 Operating Environment

2.2.1 Right of Way Description

The vehicles will be operated on city streets in mixed traffic with typical maximum speeds of 40 km/h, and with occasional top speeds of up to 50 km/h.

Station stops will occur on curb extensions which will be sized to accommodate either level boarding from a 356 mm high platform or step and bridgeplate boarding from 254 mm high platforms for all doorways on the vehicle, but may not extend the entire length of the vehicle.

2.2.2 Right of Way Design Constraints

The physical constraints of the track, yard and wayside are included below. No warranty is made by the District that track will be maintained in its new condition.

Rail Types:	Ri52N/Ri59
Minimum horizontal curve radius:	20 m
Minimum vertical curve radius, crest:	350 m
Minimum vertical curve radius, sag:	350 m
Track gage:	1435 mm
Average track cross-slope:	25 mm
Maximum track cross-slope:	75 mm
Maximum sustained gradient:	7.0%
Reverse vertical curves:	Either a crest and a sag of 250 m separated by a tangent section of 7.5 m or a crest and sag of 350 m separated by no tangent track.
Compound curves:	An 20 m horizontal curve superimposed on a 450 m vertical crest or sag.
Platform heights:	356 mm and 254 mm

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2.2.3 Clearance and Fordability Requirements

Vertical under-car clearance is defined from TOR with the maximum suspension deflection and carbody roll, minimum vertical curve radius, maximum track superelevation, and fully worn wheels. Minimum vertical clearance shall be 50 mm.

Clearances between truck components and the carbody shall be as specified in Section 11.2.4.

The Contractor shall submit for review the dynamic vertical and horizontal excursions of the vehicle under normal and worst case conditions of truck and suspension motions, and carbody roll. The clearance envelope shall be limited to that shown on Figures 2-1 and 2-2. The Contractor shall submit the actual clearance requirements (CDRL 2-2 and 2-3) within 120 days of NTP.

The vehicle shall operate without impairment or damage in standing water of depths up to 75 mm.

Minimum carbon shoe length	1050 mm
Maximum longitudinal distance from vehicle pivot point centerline to center of pantograph shoe, locked down	1275 mm

2.4.4 Wheel Dimensions

Nominal Diameter, new	500 mm to 610 mm
Minimum allowable wear on diameter	50 mm
Wheel Profile	See Figure 2-3
Back-to-Back Dimension	1367 mm

Deleted: A

2.5 Performance Requirements

Specified performance shall be independent of wheel wear, climatic conditions, and vehicle weights, unless otherwise indicated.

Performance in dynamic braking shall be available at all line voltages down to, and including, zero volts, assuming line voltage is present at initiation of braking.

Performance in all friction braking modes shall be available at all line voltages down to, and including, zero volts.

All passenger weight designations (AW0 thru AW4) shall be based on 70 kg per passenger. See Section 1 for definitions.

2.5.1 Load Weighing

The tractive efforts produced by the propulsion and braking systems shall be apportioned on a per truck basis according to the vertical load on each truck, such that tractive efforts are optimized for available adhesion.

The load compensation signal shall be generated by the friction brake control system. The propulsion system shall use this load compensation signal.

2.5.2 Propulsion and Braking Assumptions

All propulsion and braking equipment shall be designed to interface properly and produce the required performance values. The basis for performance calculations, designs and evaluation shall be as follows:

- All acceleration, braking and jerk rates shall be based on level tangent dry track in still air except when otherwise noted.
- Propulsion equipment shall provide required performance at nominal 750 Vdc catenary voltage except as described below.
- Initial acceleration rates shall be as required by this section over a 525 Vdc to 925 Vdc range at the OCS.
- Braking rates shall be independent of the OCS voltage and once initiated, full dynamic braking capabilities shall be available without OCS voltage present.
- All specified performance capabilities shall be provided over the specified full range of the following:

- Wheel wear
- Ambient temperatures
- Low voltage power supply voltage

2.5.3 Acceleration Requirements

Specified acceleration performance shall be available at the nominal line voltage and higher, and at AW2 or lower.

Acceleration requirements are:

Acceleration rate at MC Max Power:	1.34 m/s^2, ± 5% from 0 to 32 km/h
Time to reach 40 km/h from 0 km/h:	less than 10 seconds

At weights greater than AW2, acceleration may be reduced in direct proportion to the ratio of AW2 weight/actual vehicle weight.

For line voltages less than nominal, the specified acceleration shall be provided except that the speed to which the acceleration is maintained may be reduced in direct proportion to line voltage/nominal voltage.

2.5.4 Speed Requirements

The vehicle shall have a minimum balancing speed of 48 km/h on level tangent track, over the specified range of wheel wear, at nominal line voltage, AW2 weight, still air. Minimum safe operating speed for all equipment with fully worn wheels shall be at least 65 km/h.

2.5.5 Braking Requirements

Full service braking effort shall be provided by dynamic braking. Dynamic braking shall be blended regenerative and rheostatic. Friction braking shall be capable of covering the loss of dynamic braking in the event of dynamic failure, and provide continued service braking at a reduced speed.

At all vehicle weights up to AW3, service braking shall be 100% dynamic braking down to the dynamic brake fade point.

In the event of dynamic brake failure on a truck, friction brakes shall automatically provide the necessary braking efforts to achieve the requested rate.

The full service average braking rate requirements from AW0 to AW3, as measured by the entry speed divided by stopping time, are:

- 1.34 m/s^2 ±5%, with all dynamic brakes functional, from any entry speed to zero.
- 1.34 m/s^2 ±10%, with one or more dynamic brake units inoperative, from any entry speed to zero. After the initial stop with a dynamic brake failure, the system may automatically reduce vehicle maximum speed to conform to friction brake thermal limitations.

The instantaneous variation in braking rate shall not exceed ±10% of the command value in blended braking and ±20% in friction brake only braking, at any speed.

Dynamic brake fade shall occur at 5 km/h or lower.

2.5.6 Emergency Braking Requirements

- Used in revenue rail operation for at least 1 million vehicle kilometers with at least 50,000 kilometers per vehicle; and
- Has a minimum fleet size of 10 vehicles.

Deleted: 2

For a complete car, a service proven design shall meet the following criteria:

- Used in revenue rail operation or operational testing for at least 1 year; and
- Has a minimum operating fleet size of 10 vehicles.

Deleted: 2

To establish a design's service proven history, the Contractor shall submit specific details of the application history, certified by current users of the equipment. Equipment, which does not meet the above criteria, may be proposed for DDOT approval if the Contractor has successfully supplied fleets of similar light rail vehicles which otherwise complies with the above requirements. (CDRL 2-15)

The Contractor may offer, for approval, a design that is basically unchanged from a service proven design, but which must be varied slightly in design or manufacture to meet DDOT requirements. The Contractor shall show, in detail, what has been changed in the equipment and why such changes will not adversely affect operation in the District of Columbia environment.

2.10 Models

Within 30 days after acceptance of exterior renderings, the Contractor shall commence building twenty-five HO scale models (approximately 1/87 scale) of a complete vehicle (exterior definition only). Each shall be provided complete with a mounting base and clear plastic cover. Models shall be delivered to DDOT no later than 6 months after NTP for DDOT review and approval. (CDRL 2-16)

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2.11 CDRL

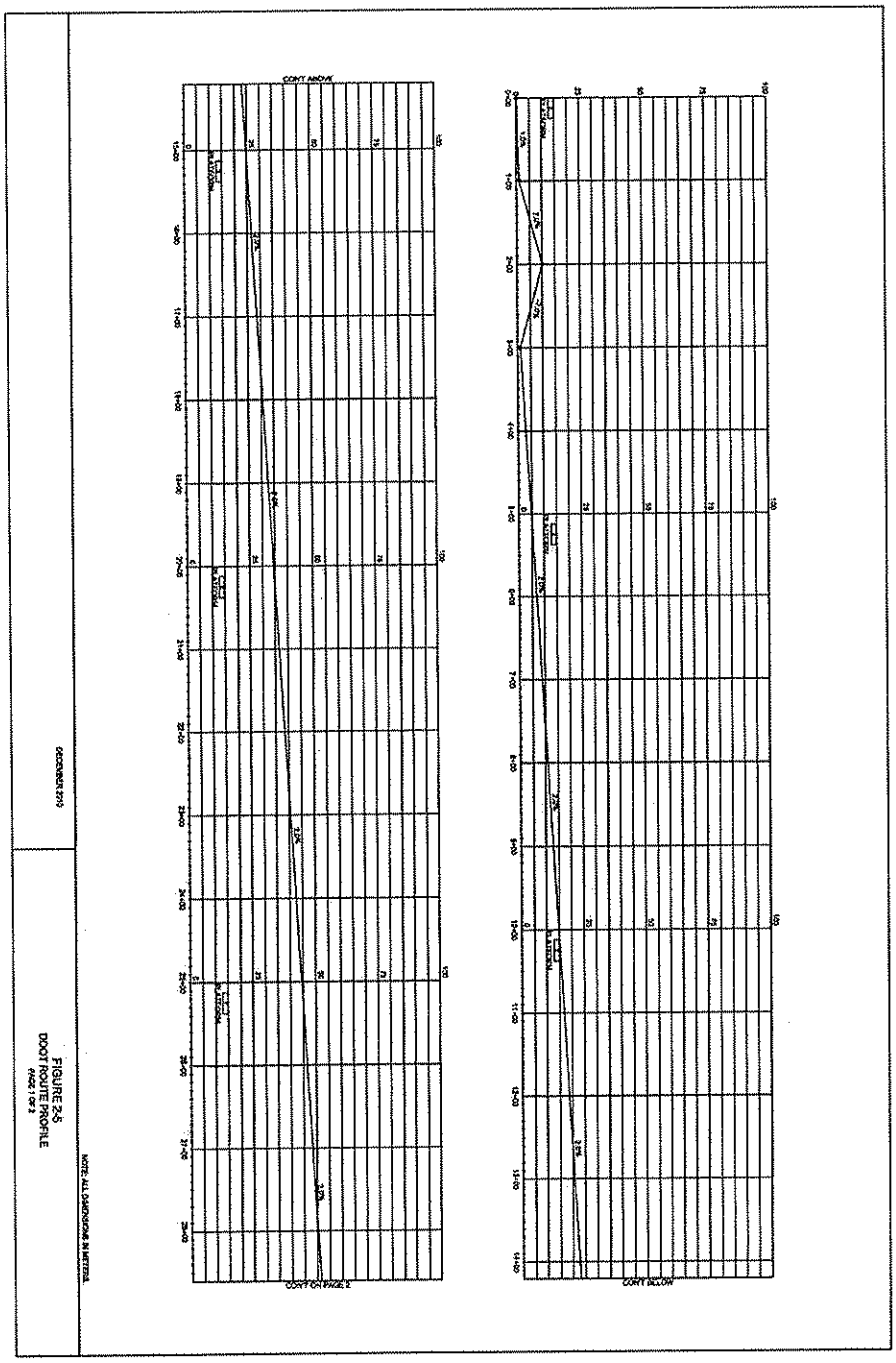
The following submittals are required.

2-1 Scaled general arrangement drawings, including:

- 2-1-1 Plan, profile, and front elevation drawings of the vehicle exterior, showing all visible features, with dimensions
- 2-1-2 Plan view of seating arrangement, including seat dimensions and spacings, aisle widths, wheelchair and bicycle areas, doorway dimensions, etc.
- 2-1-3 Longitudinal section drawings of the vehicle, showing seating arrangements, stanchions, interior steps, cab, etc.
- 2-1-4 Plan view drawing of all roof equipment, with dimensions
- 2-1-5 Plan view drawing of under-floor equipment, including trucks, with dimensions

2-2 Vehicle clearance dimensions on level tangent track showing effects of maximum suspension deflection and maximum body roll. Identify the location of the roll center(s).

2-3 Vehicle clearance dimensions on curves with cross-slope from 0% to 2% in 0.5% increments showing clearance requirements for both the inside and outside of curves, ranging from 20 m to tangent in a minimum of 20 DDOT approved


DECEMBER 2010
FIGURE 2-5
DDOT ROUTE PROFILE
PAGE 1 OF 2
NOTE: ALL DIMENSIONS IN METERS
CONT ABOVE
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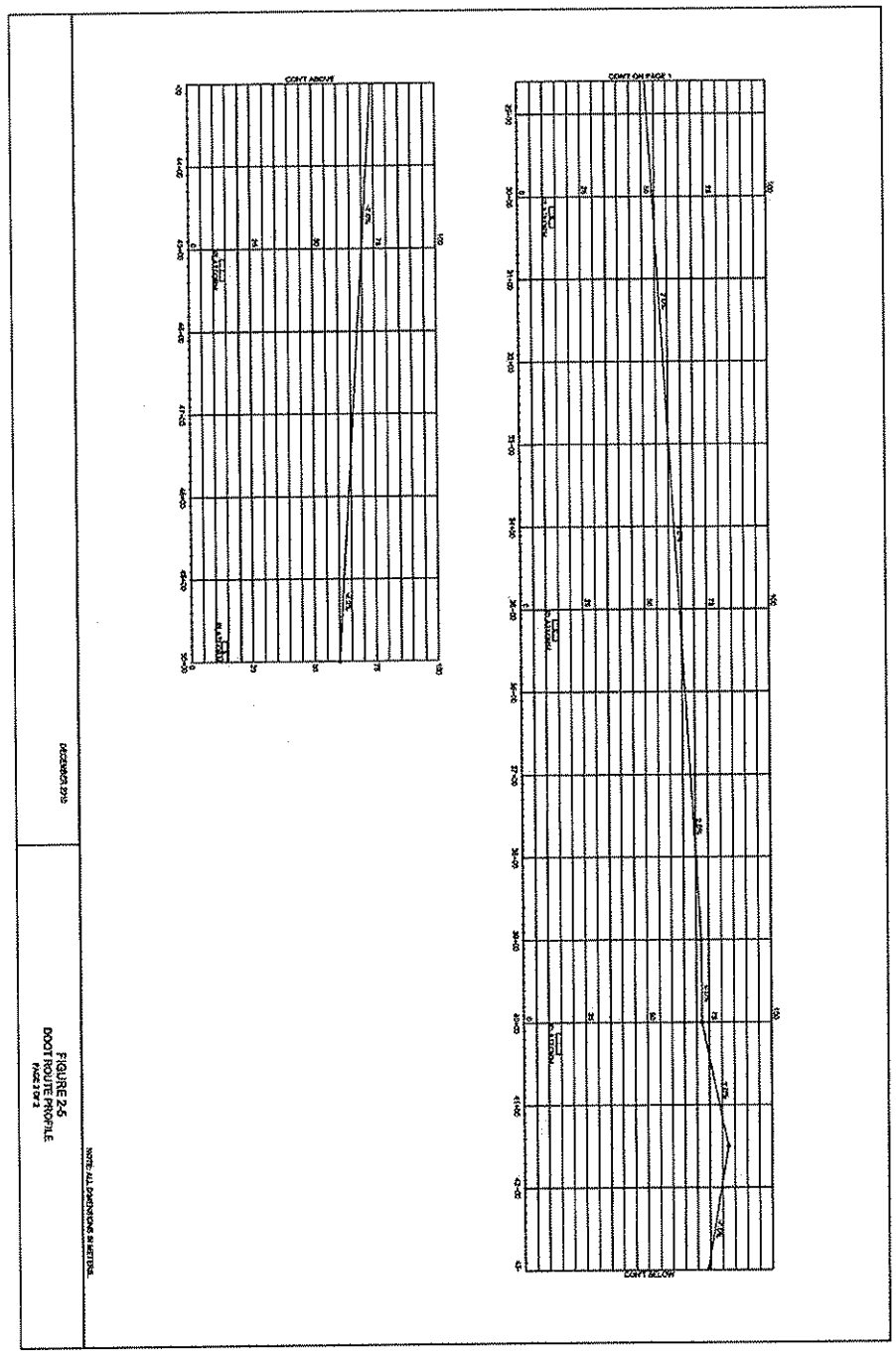
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NOTE: ALL DIMENSIONS IN METERS.
FIGURE 2-5
DDOT ROUTE PROFILE
PAGE 1 OF 2

SECTION 4

COUPLER

4.1 General

Coupling devices shall be provided to allow one vehicle to tow or push another vehicle under emergency conditions.

The couplers shall be compatible with the existing DDOT vehicles to permit coupling and towing in any configuration among the two vehicle types. The existing couplers, Secheron 0-SP-150046 R2, comply with Czech standards for streetcars.

Deleted: were manufactured by Sécheron in the Czech Republic

4.1.1 Configuration

The coupler shall be a manually-operated, storable, unit with resilient self-centering draft gear.

The coupler assembly shall be mounted to the car structure under the cab floor via bolted connection.

4.1.2 Geometry

The coupler system shall be capable of operating over track profiles specified in Section 2, including a combination of worst-case horizontal and vertical curves, superelevation, track wear, and track misalignment without damage or stress outside the system design limits. Additionally, the coupler system shall accommodate variations between adjacent cars resulting from uneven loading, wheel wear, maximum suspension travel, and suspension failure without damage or stress outside the system design limits.

4.1.3 Strength

The coupler assembly strength shall be sufficient to meet the towing requirements and operational requirements specified in Section 2.

Coupling at speeds up to 1 km/h shall be possible without damage to any coupler assembly components.

The coupler draft gear and anchor shall be capable of withstanding buff or draft loads of 400 kN with no permanent deformation.

4.2 Draft Gear and Anchorage

The draft gear shall provide rubber cushioning for the coupler in both buff and draft, and provide resilient mounting in the vertical direction to maintain nominal coupler height above top of rail. A means of vertical height adjustment of the coupler head to compensate for vehicle and coupler variations and wear shall be provided.

The draft gear shall provide for automatic centering of the coupler. The centering device shall also allow the coupler to be manually swung to either side to facilitate maintenance and coupling on non-tangent track.

4.3 Lateral Stop

Mechanical stops shall be provided to positively limit lateral coupler swing and prevent damage to the carbody structure and other equipment in the event the vehicle is operated with the

The bridgeplate shall be automatically deployed before the door opens if the operator selects the Release with Bridgeplate pushbutton. The bridgeplate request shall be canceled after with bridgeplate deployment.

The bridgeplate shall remain deployed until the operator issues a door Close command, at which time the bridgeplate shall retract after the associated door has closed and locked.

6.4.3 Performance

The delay time from receipt of a door command signal by the door controls to the first motion of a door panel shall not exceed 0.15 seconds if an associated bridgeplate is not deployed. If an associated bridgeplate is deployed, the first motion of a door panel shall not exceed 0.15 seconds after the bridgeplate is fully deployed.

The operating time of any door, from time of first motion to the point of completion, including cushioning, shall be 3.0 seconds to open and 4.0 seconds to close, ±0.5 seconds. The maximum door closing speed shall be 400 mm/s. Operating times shall be adjustable by DDOT via PTU or laptop computer between 2 and 5 seconds on both open and close in 0.5 second increments.

The operating time of any bridgeplate, from time of first motion to the point of completion, including cushioning, shall be 2.0 seconds to extend and 2.0 seconds to retract, ±0.5 seconds. Operating times shall be adjustable by DDOT via PTU or laptop computer between 1.5 and 4 seconds in 0.5 second increments.

Deleted: door

6.5 Door Obstruction Detection

The door system shall automatically detect obstructions, prevent a door from becoming entrapped, and limit the forces imparted to a person in the doorway.

The design and methods for door obstruction shall be submitted to DDOT for review and approval (CDRL 6-5).

6.5.1 Operational Requirements

A sensitive edge shall be incorporated within the leading edge of each door panel seal which shall operate a pressure wave switch. Additionally, the door control equipment shall detect restrictions in door motion via current sensing, speed vs. time tracking, or other approved methods.

Upon detection of an obstruction, the door panels in the affected doorway shall immediately decelerate, open and remain open for a preset period controlled by an adjustable time delay circuit. This timing circuit shall be adjustable from zero to 10 seconds. The door panels shall then again attempt to close. If the obstruction is no longer detected, the doors shall close and lock.

If the obstruction is still detected, the door panels shall continue to recycle for a pre-set number of times. If the recycle count is exceeded, the doors shall remain in the open position until reset by the operator. The recycle count shall adjustable from 3 to 10 times by DDOT.

If an open command is issued at any time, it shall override and reset the obstruction detection circuitry.

- A tight closing solenoid valve must be placed in the main liquid line to each evaporator.
- Compressor must be allowed to continue to operate thru a low pressure switch, even when cooling is not required.
- An electrical interlock between the evaporator fan and the liquid solenoid valve must provided. The interlock may be accomplished by hardwired relay or software.
- A low pressure setting must be made such that the compressor cut-in point corresponds to a saturated refrigerant temperature lower than the ambient temperature to which the compressor is subjected to.

A compressor crankcase heater shall be employed if it is required to meet the compressor manufacturer's warranty.

Equipment shall have a means of capacity control, including multi-circuited (two circuits minimum) evaporators, an expansion device for each evaporator circuit, and compressor capacity control. Adequate performance of the system over the full range of expected ambient temperatures and loads shall be demonstrated during the scan test.

Deleted: thermo-expansion valve

Deleted: Equipment using capillary tubes instead of expansion valves shall not be accepted.

Cooling coils shall be of corrosion resistant material and shall have a fin spacing facilitating cleaning for transit vehicle service conditions. Copper tubes and fins with a minimum thickness of 0.2 mm and a minimum spacing of 3 mm are required for maintenance reasons. Fins shall be capable of withstanding 175 kPa water or air pressure from a cleaning wand.

7.5 Controls

Car interior temperatures shall be uniform. During steady-state operation the interior temperatures shall not vary more than 2°C between points in the same horizontal plane of the vehicle, and shall not vary more than 3°C between any point 100 mm above the floor to 1700 mm above the floor in a vertical plane. Air comfort controls shall be provided to automatically activate appropriate operation modes to achieve the specified temperature and humidity inside the vehicle depending on ambient and vehicle interior conditions. The controls and systems shall be designed for energy-efficient operation, reliable operation, and easy maintenance.

Air comfort controls shall be activated automatically when an operators' console is activated. De-activation shall include a time delay to accommodate changing ends or an in-service layover in addition to the delay required for the HVAC pump down cycle.

The controls shall provide status and fault indication displays, located for convenient observation by maintenance personnel. Operator warning indications shall also be made to the operator if immediate service is needed.

7.6 Air Conditioning System Test and Charging

Each self contained air conditioning unit shall be charged and tested at the factory, prior to shipping to the car builder. In-factory testing shall include functional testing of control systems and unit output.

System charging shall be performed to the manufacturer's own procedure; but as a minimum, must incorporate these steps:

- Connect a drum of refrigerant to charging connection and introduce enough refrigerant into system to raise the pressure to 70 kPa. Close valves and disconnect

B2 = Light reflectance value of darker area

Floor covering at exposed removable floor access panels and at the edge of the articulation section shall be peripherally trimmed with stainless steel or aluminum molding.

Contractor shall propose the material manufacturer and model. Actual flooring color and pattern will be determined by DDOT during the design review process.

14.2.5 Windows

All windows shall be of the single-glazed, fixed-type, laminated or tempered safety glass tested in accordance with ANSI Z26.1 or approved equivalent standard. Glazing shall be mounted directly to the car structure by bonding or with neoprene glazing strips.

Deleted: ,

Glazing strips, if used, shall be laced from the outside of the vehicle. The ends of the glazing strip shall be joined together by the hot vulcanization process or a gluing process approved by the City to form an endless glazing strip.

The side and door windows in the passenger section shall be 6.5 mm safety glass.

Deleted: laminated

The cab windshield shall be laminated or tempered safety glass. The windshield shall be designed and installed to minimize external glare as well as reflections from inside the vehicle when the vehicle is operated at night with the passenger interior lighting in use.

The upper portion of the windshield may cover the end destination sign.

All glass products shall be readily available in the U.S. from U.S. suppliers, in the sizes and thicknesses provided on the delivered vehicle.

14.2.6 Passenger Seats

Passenger seats shall be heavy duty transit-grade seats with removable cushion inserts. All visible structural materials shall be brushed stainless steel. Non-visible internal structures may be steel or stainless steel. Seat designs with formed synthetic frames, such as FRP or thermoplastics may be considered but flammability and smoke properties must comply with Section 16 requirements.

Seating arrangement may be predominantly transverse (knee-to-back; three abreast, 2+1 seating), longitudinal, or a combination thereof. Seating on opposite sides of the vehicle shall be separated by an aisle of 635 mm minimum width.

The minimum total seat depth measured from the seat's forward edge to the forward surface of the seat back shall be 400 mm. Minimum seat spacing shall be 735 mm. Minimum seat back-to-back of seat ahead shall be 650 mm. The seat individual width shall be 430 mm to 480 mm.

Passenger seats shall be designed using recognized ergonomic and human factors principles to provide a safe and comfortable ride for the short distance local patronage anticipated for the streetcar. Materials shall be consistent with the intended use and performance requirements, with special consideration for passenger safety, comfort, durability, and maintainability.

Replacement of seats shall be easily accomplished through removal and reinstallation of no more than six mounting bolts per seat. Mounting bolts shall be hidden by inconspicuous snap-in covers where exposed to passenger view.