STATE OF MARYLAND

DEPARTMENT OF TRANSPORTATION

MARYLAND TRANSIT ADMINISTRATION

CONTRACT DOCUMENTS
FOR
CONTRACT NO. T-8000-0399

MARC III KAWASAKI COACHES (63) OVERHAUL

Prospective Offerors who have received this document from a source other than the Procurement Officer's authorized agency and who wish to assure receipt of any changes or additional materials related to this RFP, should immediately visit MTA's website (www.mta.maryland.gov) to download this RFP. Follow links "Business", "Procurement", and "Bids/Solicitation", to view the specifications and/or addenda.

ISSUE DATE: April 4, 2013

MARYLAND TRANSIT ADMINISTRATION

CONTRACT NO. T-8000-0399

MARC III KAWASAKI COACHES (63) OVERHAUL

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I. SOLICITATION INFORMATION AND INSTRUCTIONS

SECTION I
SOLICITATION INFORMATION AND INSTRUCTIONS
MARC III KAWASAKI COACHES (63) OVERHAUL
RFP T-8000-0399

A. GENERAL

This section specifies the general requirements for the preparation and submittal of Proposals in response to this Request for Proposals (RFP).

A.1 Schedule of Activities

The MTA has established the following schedule for progressing this RFP. The anticipated dates are only an estimate, and the MTA shall adjust the dates at its sole discretion.

ITEM	DATE
RFP Issue Date	April 4, 2013
Pre-Proposal Conference	April 17, 2013
Proposal Inquiry Deadline	May 13, 2013
Closing Date for Receipt of Proposals (2:00 p.m.)	June 24, 2013
Anticipated Best and Final Offer (BAFO)	August 30, 2013
Anticipated Selection Date	September 17, 2013
Anticipated Notice to Proceed	December 3, 2013

B. PREPARATION OF PROPOSAL

B.1 General

The MTA is soliciting an RFP that explains how the Proposer will meet the requirements of this procurement. Statements merely indicating that the Proposer will meet specific requirements are not acceptable. Technical descriptions should be such that the Administration is able to relate what is being offered to equipment that has been used in revenue service on other rail transit systems.

The MTA recognizes that there may be elements of the Proposal considered proprietary and confidential by the Proposer. The Proposal shall identify any specific information or design details that the Proposer considers proprietary. The Proposer shall clearly and prominently mark each and every page or sheet of such materials with "CONFIDENTIAL" and "PROPRIETARY," as it determines to be appropriate.

The MTA will disclose the information only in accordance with the Maryland Public Information Act. Under no circumstances, however, will the MTA be responsible or liable to the Proposer or any other party for the disclosure of such labeled material, for any reason whatsoever.

B.2 Issue Date

April 4, 2013

B.3 Issuing Office

This RFP is issued by the Office of Procurement of the Maryland Transit Administration and the sole point of contact for contractual questions. This office is the sole point of contact in the MTA for this RFP.

B.4 Inquiries

Inquiries and/or questions concerning this proposal shall be submitted in writing on Form 22, Section IV, Exhibit A1, and e-mailed to the Procurement Officer designated below:

Heidi J. Tarleton
Office of Procurement
Maryland Transit Administration
E-Mail: htarletonprocurementofficer@mta.maryland.gov

All inquiries and the corresponding MTA responses will be posted on the MTA website at http://www.mta.maryland.gov/solicitations. All questions and requests must be received at the e-mail address specified above no later than 4:00 p.m., local time on **May 13, 2013**.

No requests or inquiries will be considered unless delivered as specified above. The e-mail submitting questions must include the requestor's name, e-mail address, telephone and fax numbers, and the Proposer he/she represents.

B.5 Submittal of Proposals

Proposals shall be submitted under the following guidelines.

B.6 Closing Date

One (1) original bound Technical Proposal, ten (10) bound copies, and one (1) unbound copy (suitable for photocopy reproduction) of the complete Technical Proposal shall be submitted. In addition, one (1) electronic copy in CDROM or DVD media (searchable *.pdf format) containing the Technical Proposal responses to Special Provisions Sections C.3 and C.4., shall also be submitted. The hard copies and electronic copy must be submitted not later than **2:00 p.m**. local

time, **June 24, 2013**, addressed to:

Attn: Heidi J. Tarleton
Maryland Transit Administration
Office of Procurement
1331 S. Monroe Street, 2nd Floor
Baltimore, Maryland 21230

In addition, a separate sealed package containing one (1) original and ten (10) copies of the Price Proposal must be submitted to the same office by the same time. Each package shall be clearly and separately labeled on the outside as "Technical Proposal for Contract T-8000-0399" or "Price Proposal for Contract T-8000-0399" as appropriate. There will not be a public opening of the Proposals. Proposals that are not delivered by the time and date stated, or marked as specified, shall be rejected in accordance with applicable regulations. Electronic and fax proposals will not be accepted.

B.7 Addenda and Supplements

In the event that it becomes necessary to revise any part of this RFP, or if additional information is necessary to enable the Proposer to make an adequate interpretation of the provisions of the RFP, a supplement will be provided to firms who are identified as holders of the RFP.

B.8 Acknowledgment of Addenda

The Proposer shall acknowledge receipt of all addenda in the cover letter of the Technical Proposal. Failure to acknowledge all addenda shall cause the rejection of the Proposal.

B.9 Language Requirement

All language in the Proposal shall be prepared in English. All Contract documents, conferences, letters, technical information, and drawings shall be conducted or offered solely in the English language. All dimensions shall be in the U.S. inch/pound units and metric equivalent, if applicable.

B.10 Proposal Clarity and Completeness

To be considered, the Proposer is to submit a complete response to the RFP addressing the items requested. Proposal brevity and clarity are desired. The Proposer is advised that the MTA is not obligated to expend extraordinary effort if the Proposal is unclear, difficult to assess, and/or incomplete. At the sole discretion of the MTA such Proposals may be classified as unacceptable.

B.11 Oral Presentation

The Proposer will be required to make individual presentations or demonstrations in order to clarify their Proposals and to verify technical submissions. The MTA will not be

responsible for any costs incurred by the Proposer in the preparation of oral presentations.

B.12 Incurring Costs

The MTA is not liable for any cost incurred by the Offeror in preparation of its Proposal for this Contract.

C. SUBMITTAL OF PRICE PROPOSALS

The Price Proposal and the Technical Proposal, and any other documents as may be specified when executed and submitted by the Offeror, will constitute his Proposal. Price Proposals not presented on the Unit Price Schedule will not be considered. The Price Proposal shall be filled out in ink or typewritten. If erasures or changes appear in the Price Proposal, each erasure or change shall be initialed and dated by the individual signing the Price Proposal.

All documents bound with or attached to the Proposal are considered a part thereof and shall not be detached or altered when the Proposal is submitted. Proposals shall be submitted in the manner specified.

The Offeror shall specify a price in U.S. dollars for each item given and shall show the products of the respective unit prices and quantities written in figures in the column provided for that purpose, together with the total amount of the Proposal obtained by adding the amounts of the several items.

D. PRE-PROPOSAL CONFERENCE

A conference for all Offerors will be held on **April 17, 2013** at the **MARC Martins Maintenance Facility, 2700 Eastern Blvd, Middle River, Maryland 21220**, beginning at 9**:00 a.m**. All Offerors are encouraged to attend this meeting, but attendance is not mandatory. Attendance should be limited to no more than four (4) representatives per proposing team.

E. DISCUSSIONS

The Administration may enter into discussions with all Qualified Offerors. The term "Qualified Offerors" includes only those responsible Offerors who submitted proposals initially judged by the Procurement Officer to be reasonably susceptible of being selected for award. Discussions shall be led by the Offeror's Project Manager and will consist of an oral presentation by the Offeror to the Administration's Evaluation Committee, questions from and negotiations with the Committee and Procurement Officer. Offerors shall be notified of the time, date, and location of the discussions. **Submission of a proposal does not guarantee an Offeror the opportunity to be invited in for discussions.**

The Administration retains the right, at its discretion, not to hold discussions with Offerors and may award a contract on the basis of technical and price proposals as submitted if, in the judgment of the Procurement Officer, the response to this RFP demonstrates sufficient competition so that acceptance of an initial offer without negotiation would result in a fair and reasonable price.

F. BEST AND FINAL OFFERS (BAFO)

When it is in the best interest of the State, the Procurement Officer may permit qualified Offeror(s) to revise their initial proposals by submitting BAFO. This action is in accordance with COMAR 21.05.03.03.D.

G. THE PROPOSALS

To be considered, Offerors shall submit a complete response to the RFP using the format provided. This proposal format is mandatory. Proposals should provide a straightforward, concise delineation of the Offeror's capability to satisfy the requirements of this RFP.

H. SIGNATURES

Each proposal shall be signed by an officer authorized to make a binding commitment for the firm(s) making the proposals.

I. DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

1. **DISADVANTAGED BUSINESS ENTERPRISES ARE ENCOURAGED TO RESPOND TO THIS SOLICITATION NOTICE.**

2. The Maryland Transit Administration hereby notifies all Offerors that, in regard to any Contracts entered into pursuant to this advertisement, Disadvantaged Business Enterprises will be afforded full opportunity to submit Proposals in response to this Notice, and will not be subjected to discrimination on the basis of political or religious opinion or affiliation, race, color, creed, sex, age or national origin in consideration for an award.

3. It is the goal of the Administration that Disadvantaged Business Enterprises participate in all Contracts. Each Contract will contain goals for Disadvantaged Business Enterprise participation on a contracts-to-contracts basis. A subcontracting goal of thirteen percent (9%) has been established for this procurement**.** All bidders/Offeror must submit with their proposal a fully executed copy of the Certified DBE Utilization and Fair Solicitation Affidavit (MDOT DBE FORM A) and DBE Participation Schedule (MDOT DBE FORM B). **Failure to submit the required documents with offer shall result in the Offeror's Technical Proposal as not being deemed reasonably susceptible of being selected for award.**

4. **A Offeror may count toward its DBE goal 60 percent of its expenditures for materials and supplies required under the contract and obtained from a DBE regular dealer, and 100 percent of such expenditures to a DBE manufacturer. The DBE credited supplies may not exceed 60 percent of the entire contract goal.**

5. ALL DBE FIRMS MUST BE CERTIFIED BY THE MARYLAND DEPARTMENT OF TRANSPORTATION AT THE TIME OF TECHNICAL PROPOSAL SUBMITTAL. NO OTHER CERTIFICATIONS WILL BE ACCEPTED. **This process takes an**

average of SIX months. By submitting a response to this RFP, the Offeror agrees that, as a minimum, this percentage of the contracts price will be allocated to DBE's.

6. DBE Participation in work performed under this contract will be monitored by the State and must be in accordance with Exhibit E (Contract Exhibits).

7. **Questions or concerns regarding the DBE requirements of this solicitation must be raised before the receipt of technical proposals.**

8. A current directory of DBE/MBE's is available through the Maryland State Department of Transportation, Office of Minority Business Enterprise, P. O. Box 548, 7201 Corporate Center Drive, Hanover, Maryland 21076. The phone number is 410-865-1269 or 1-800-544-6056.

9. **The directory is also available at** http://www.mdot.state.md.us**. Select the Minority/Disadvantaged Business Enterprise link at the left side of the web site, half way down. The most current and up-to-date information on DBE/MBE's is available via this website.**

J. COMPLIANCE WITH LAW

By submitting an offer in response to this RFP, the Proposer, if selected for award, agrees that it will comply with all Federal, State, and local laws applicable to its activities and obligations under the contract. By submitting an Offer in response to this RFP, the Proposer shall be deemed to represent that it is not in arrears in the payment of any obligation due and owing the State of Maryland or any department or unit thereof, including but not limited to the payment of taxes and employee benefits, and if selected for award, that it shall not become so in arrears during the term of the contract.

K. ACCEPTANCE OF TERMS AND CONDITIONS

By submitting an offer in response to this RFP, an Offeror shall be deemed to have accepted all the terms, conditions, and requirements set forth in this RFP.

L. CONFLICT OF INTEREST - CONFIDENTIALITY

The Proposer covenants that it presently has no interest, and shall not have any interest, direct or indirect, which would conflict in any manner with the performance of services under this RFP. Without limitation, the Proposer represents to and agrees with the State that the Proposer has no conflict of interest between providing the State services hereunder and any interest the Proposer may have with respect to any other person or entity (including but not limited to any Federal or State regulatory agency) which has any interest adverse or potentially adverse to the State.

The selected Proposer agrees that any information, whether proprietary or not, made known to or discovered by it during the performance of, or in connection with, this RFP will be kept confidential and not be disclosed to any person other than the State, its designated officials, employees, and authorized agents. The Proposer agrees to immediately notify the State in

writing if it is requested to disclose any information made known to or discovered by it during the performance of or in connection with this RFP.

M. PROTESTS

Any protest relating to this solicitation or the award of a contract must be filed in accordance with Title 15, Subtitle 2, Part III of the State Finance and Procurement Article, Annotate Code of Maryland, and COMAR Title 21 (State Procurement Regulations), Subtitle 10, Administrative and Civil Remedies.

N. INCORPORATION BY REFERENCE

All terms and conditions of the RFP and amendments thereto; all provisions of the Offeror's proposal in response to the RFP, and amendments thereto; all applicable State and Federal laws, statutory and regulatory provisions and orders, are incorporated by reference and made a part of the contract to be entered into as a result of this RFP.

O. MEDIA ANNOUNCEMENTS

No media announcements written or oral, pertaining to this RFP or the services, study or project to which it relates shall be made without Administration approval and then only in coordination with the issuing office.

P. USE OF "e-MARYLAND MARKETPLACE"

"E-Maryland Marketplace" is an electronic commerce system administered by the Maryland Department of General Services. This means that all such information is immediately available to subscribers to e-Maryland Marketplace. Because of the instant access afforded by e-Maryland Marketplace, it is recommended that all Bidders interested in doing business with Maryland State agencies subscribe to e-Maryland Marketplace.

In order to receive a contracts award, a vendor must be registered on e-Maryland Marketplace.

SECTION II

PROPOSAL FORM WITH UNIT PRICE SCHEDULE

SECTION II
MARYLAND TRANSIT ADMINISTRATION
PROPOSAL FORM/UNIT PRICE SCHEDULE

CONTRACT NO. T-8000-0399
MARC III KAWASAKI COACHES (63) OVERHAUL

TO: MARYLAND TRANSIT ADMINISTRATION
ATTN: CONTRACT ADMINISTRATION DEPARTMENT
6 ST. PAUL STREET, 7TH FLOOR
BALTIMORE, MD 21202-1614

PROPOSAL OPENING DATE:
June 24, 2013
PROPOSAL OPENING TIME:
2:00PM Local Time

*Envelope Marked "Price Proposal" Contract No. T-8000-0399

PROPOSAL OF:_____
(Proposer's Name)

Prospective Proposer:

1. This proposal is hereby submitted to the Maryland Transit Administration (hereinafter sometimes called the "Administration") in response to SOLICITATION INFORMATION AND INSTRUCTIONS dated .

2. The UNDERSIGNED has thoroughly examined, acknowledges receipt of, and is familiar with the Contract Documents as well as the various instructions, information, and requirements covering the same, all as mentioned herein and in said SOLICITATION INFORMATION AND INSTRUCTIONS.

3. In compliance with said SOLICITATION INFORMATION AND INSTRUCTIONS the undersigned hereby propose to furnish all labor, equipment, and materials and perform all work described in and in strict accordance with the provisions of the Contract Documents for the consideration of the Unit Prices, total price and list less percentage, listed in the attached Proposal Form, and agrees that upon Notice of Award, within ninety (90) calendar days after the date of opening of proposals, unless mutually extended, he will within 120 calendar days after receipt of the prescribed forms, execute the Contract.

4. The UNDERSIGNED agrees and understands that the time of completion is as specified in the Special Provisions, unless the completion dates are extended as provided for in the Contract Documents.

5. The UNDERSIGNED hereby certifies that the _____ (Proposer's Name)/ /is, / /is not (CHECK ONE) included on the U.S. Comptroller General's List of ineligible contractors.

6. PARENT COMPANY

   a. The UNDERSIGNED represents that it / /is, / /is not, (CHECK ONE) OWNED OR CONTROLLED BY A parent company. For this purpose a parent company is defined as one, which either owns or controls the activities and basic business policies of the

UNDERSIGNED. To own another company means the parent company must own at least a majority (more than 50 percent) of the voting rights in that company. To control another company such ownership is not required; if another company is able to formulate, determine or veto basic business policy decisions of the proposalder, such other company is considered the parent of the proposalder. This control may be exercised through the use of dominant minority voting rights, use of proxy voting, contractual arrangements, or otherwise.

b. If UNDERSIGNED is owned or controlled by a parent company, insert in the space below the name and main office address of the parent company.

_____
Name

_____
Address

7. CERTIFICATION OF NON-MARYLAND CORPORATION (FOREIGN CORPORATION)

   a. A corporation not incorporated in the State of Maryland is considered to be a foreign corporation and, therefore, required to be registered with the Maryland State Department of Assessments and Taxation, if awarded this contract.

   b. Where a foreign corporation is currently registered with the Department of Assessments and Taxation, such a proposalder shall submit with his proposal a copy of the department's certification of his registration or qualification acknowledgement.

   c. If a foreign corporation is not currently registered, such a proposalder shall submit with his proposal his certification that, if notified of his apparent award of the contract, he will register with the Maryland State Department of Assessments and Taxation and provide a copy of the departments certification of his registration or qualification acknowledgement along with the executed contract.

8. The UNDERSIGNED acknowledges receipt of the following addenda to the Proposal Documents (Give the number and date of each).

   Addendum No._____ Dated_____

   Addendum No._____ Dated_____

   Addendum No._____ Dated_____

   Addendum No._____ Dated_____

   Failure to acknowledge receipt of all addenda may cause the proposal to be considered not responsive to the invitation, which would require rejection of the proposal.

A. CORPORATION PROPOSAL:

Name of Corporation

State in which Incorporated

FEIN:

Business Address

Telephone

Attest:

By:

Secretary

President or Vice President

Print Name

Print Name

B. PARTNERSHIP PROPOSAL:

FEIN:

Name of Partnership

Business Address

Telephone

Names of Each Partner:

Witness:

By:

Signature

Print Name

C. INDIVIDUAL PROPOSAL

Name

Business Address

Telephone

Witness:

By:

Print Name

Signature

Print Name

Contract T-8000-0399
UNIT PRICE SCHEDULE (BID FORM)

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
	Base Scope of Work:				
1.	**Management, Engineering, Tooling and Testing**	**Lump Sum**			**$ _____**
1a.	**Management, Engineering, Tooling and Testing - Mobilization**	**Lump Sum**			**$ _____**
2.	**MARC III Railcars Overhaul**				
	2-1a Carbody: Cab Car	Carset	14	$_____	$_____
	2-1b Carbody: Trailer Car (Incl. Snack)	Carset	42	$_____	$_____
	2-1c Carbody: Trailer w/Toilet	Carset	7	$_____	$_____
	2-2 Trucks and Suspension	Carset	63	$_____	$_____
	2-3 Couplers and Draft Gear	Carset	63	$_____	$_____
	2-4 Air Brake	Carset	63	$_____	$_____
	2-5 Electrical	Carset	63	$_____	$_____
	2-6 Interior	Carset	63	$_____	$_____
	2-7 Toilet Room	Carset	21	$_____	$_____
	2-8 Water and Waste Retention	Carset	21	$_____	$_____
	2-9 Doors	Carset	63	$_____	$_____
	2-10 HVAC	Carset	63	$_____	$_____
	2-11 Lighting	Carset	63	$_____	$_____
	2-12 Communications; Cab Car	Carset	14	$_____	$_____
	2-12b Communications: Trailer, Snack, TwT	Carset	49	$_____	$_____
	2-13 Cab Equipment	Carset	14	$_____	$_____
				(Avg. cost based on Item 2 Total Price)	**Sum of Items 2-1 through 2-13**
				$_____	**$_____**
3.	Spares (new spares and overhaul of existing spares)	Lump Sum			$_____
4.	Special Tools and DTE (new special tools and DTE and overhaul of existing special tools and DTE)	Lump Sum			$_____
5.	Training	Lump Sum			$_____
6.	Manuals	Lump Sum			$_____
7.	**Base Scope of Work Total Price [Sum of Items 1, 1a, 2, 3, 4, 5, and 6]**				**$ _____**
	Option Scope of Work:				
8.	Stepwell Surface Replacement (TS 1.3.7)	Carset	63	$_____	$_____
9.	Parking Brake Cable Replacement (TS 4.4.5)	Carset	63	$_____	$_____
10.	Not Used			$_____	$_____
11.	Passenger Convenience Outlets (5.2.3)	Carset	63	$_____	$_____
12.	New Toilet Room Module (7.3)	Carset	21	$_____	$_____
13.	Incandescent Lighting Replacement (11.2.1)	Carset	63	$_____	$_____
14.	Operators Seat Replacement (13.2.11)	Carset	14	$_____	$_____
(A)	**Option Scope of Work Total Price [Sum of Items 8, 9, 10, 11, 12, 13, and 14]**				**$ _____**
16.	**Miscellaneous Work Allowance**	Lump Sum			**$ 1,250,000**
17.	**Hidden Damage Allowance**	Lump Sum			**$ 500,000**

TOTAL PRICE [Sum of 7, (A), 16, and 17] **$ _____**

SECTION III

SAMPLE CONTRACT

SECTION III

SAMPLE CONTRACT AGREEMENT

MARC III KAWASAKI COACHES (63) OVERHAUL

CONTRACTOR: CONTRACT NO.: **T-8000-0399**

DATE: _____

THIS CONTRACT, made and entered into as of the above date by and between the **MARYLAND TRANSIT ADMINISTRATION**, an instrumentality of the Department of Transportation of the State of Maryland (hereinafter called the "Administration"), and,_____a _____(hereinafter called "Contractor").

Contractor covenants and agrees to perform all obligations of Contractor set forth in this Contract and in the documents listed below, which documents are incorporated herein by reference and which documents together with this Contract are hereinafter called "Contract Documents".

- CONTRACT AGREEMENT
- CONTRACT AFFIDAVIT
- SPECIFICATIONS/SCOPE OF WORK
- BID FORM
- CONFLICT OF INTEREST AFFIDAVIT

PERIOD OF PERFORMANCE: 3 YEARS FROM NOTICE TO PROCEED

LIQUIDATED DAMAGES: None

COMPENSATION:

In consideration of the faithful performance of all of Contractor obligations hereunder, the Administration shall pay to Contractor the compensation specified in the Proposal Form/Unit Price Schedule.

Aggregate Contract Amount: $_____

ADDRESSES:

Contractor:

_____

_____

_____

Administration:

Department of Transportation
Maryland Transit Administration
6 St. Paul Street
Baltimore, Maryland 21202-1614

IN WITNESS WHEREOF, the parties hereto have executed this Contract as of the date first above written.

WITNESS:

_____

_____
(Federal Tax I.D. Number)

CONTRACTOR

BY:_____
(Signature)

_____
(Printed Name)

_____
(Title)

WITNESS:

_____

MARYLAND TRANSIT ADMINISTRATION

BY:_____
(Signature)

Nancy Noonan
(Printed Name)

Deputy CAO of Support Services
(Title)

Approved as to Form and Legal Sufficiency:

_____
Assistant Attorney General

APPROVED BY BOARD OF PUBLIC WORKS

Date: _____Item No: _____

IV. PROPOSAL EXHIBITS

MARYLAND TRANSIT ADMINISTRATION
T-8000-0399
MARC III KAWASAKI COACHES (63) OVERHAUL

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PROPOSAL EXHIBITS

EXHIBIT A
NO BID NOTICE

EXHIBIT A

State of Maryland
Notice to Vendor/Contractors

To help us improve the quality of State solicitations and make our procurement process more responsive and business-friendly, we ask that you take a few minutes to complete this form. Thank you for your assistance.

Bid/Proposal Number: **T-8000-0399** Entitled: **MARC III KAWASAKI COACHES (63) OVERHAUL**

I. If you are not bidding, please indicate why:

- o Other commitments preclude our participation at this time.
- o The subject of the contract is not in our business line.
- o We lack experience in the work/commodities required.
- o The scope of work is beyond our current capacity.
- o We cannot be competitive. (Please explain below.)
- o The specifications are either unclear or too restrictive. (Please explain below.)
- o Bid /proposal requirements, other than specifications, are unreasonable or too risky. (Please explain below.)
- o Time for completion in insufficient.
- o Bonding/insurance requirements are prohibitive. (Please explain below.)
- o Doing business with government is simply too complicated.
- o Prior experience with the State of Maryland contracts was unprofitable or otherwise unsatisfactory. (Please explain below.)
- o Other:_____

II. Please explain your response further, offer suggestions or express concerns. (Use the back for additional information).

Remarks:_____

_____

_____

_____

OPTIONAL:

Vendor Name:_____ Date:_____

Contact:_____ Phone: ( ) _____

Address or email:_____

_____

PLEASE FAX THIS FORM TO (410) 454-7892 Attn: Heidi J. Tarleton or email to htarleton@mta.maryland.gov or mail to Procurement Division, 1331 S. Monroe Street, 2nd Floor, Baltimore, MD 21230.

THANK YOU

EXHIBIT B
BID/PROPOSAL AFFIDAVIT

EXHIBIT B

Bid/Proposal Affidavit.

A. Each solicitation shall provide notice that the affidavit in §B of this regulation shall be completed and submitted to the procurement agency with the vendor's bid or offer.

B. Mandatory Solicitation Addendum. The solicitation addendum shall be in substantially the same form as follows:

BID/PROPOSAL AFFIDAVIT

A. AUTHORITY

I HEREBY AFFIRM THAT:

I, _____ (print name), possess the legal authority to make this Affidavit.

B. CERTIFICATION REGARDING COMMERCIAL NONDISCRIMINATION

The undersigned bidder hereby certifies and agrees that the following information is correct: In preparing its bid on this project, the bidder has considered all proposals submitted from qualified, potential subcontractors and suppliers, and has not engaged in "discrimination" as defined in §19-103 of the State Finance and Procurement Article of the Annotated Code of Maryland. "Discrimination" means any disadvantage, difference, distinction, or preference in the solicitation, selection, hiring, or commercial treatment of a vendor, subcontractor, or commercial customer on the basis of race, color, religion, ancestry, or national origin, sex, age, marital status, sexual orientation, or on the basis of disability or any otherwise unlawful use of characteristics regarding the vendor's, supplier's, or commercial customer's employees or owners. "Discrimination" also includes retaliating against any person or other entity for reporting any incident of "discrimination". Without limiting any other provision of the solicitation on this project, it is understood that, if the certification is false, such false certification constitutes grounds for the State to reject the bid submitted by the bidder on this project, and terminate any contract awarded based on the bid. As part of its bid or proposal, the bidder herewith submits a list of all instances within the past 4 years where there has been a final adjudicated determination in a legal or administrative proceeding in the State of Maryland that the bidder discriminated against subcontractors, vendors, suppliers, or commercial customers, and a description of the status or resolution of that determination, including any remedial action taken. Bidder agrees to comply in all respects with the State's Commercial Nondiscrimination Policy as described under Title 19 of the State Finance and Procurement Article of the Annotated Code of Maryland.

B-1. CERTIFICATION REGARDING MINORITY BUSINESS ENTERPRISES.

The undersigned bidder hereby certifies and agrees that it has fully complied with the State Minority Business Enterprise Law, State Finance and Procurement Article, §14-308(a)(2), Annotated Code of Maryland, which provides that, except as otherwise provided by law, a contractor may not identify a certified minority business enterprise in a bid or proposal and:

(1) Fail to request, receive, or otherwise obtain authorization from the certified minority business enterprise to identify the certified minority proposal;

(2) Fail to notify the certified minority business enterprise before execution of the contract of its inclusion in the bid or proposal;

(3) Fail to use the certified minority business enterprise in the performance of the contract; or

(4) Pay the certified minority business enterprise solely for the use of its name in the bid or proposal.

Without limiting any other provision of the solicitation on this project, it is understood that if the certification is false, such false certification constitutes grounds for the State to reject the bid submitted by the bidder on this project, and terminate any contract awarded based on the bid.

C. AFFIRMATION REGARDING BRIBERY CONVICTIONS

I FURTHER AFFIRM THAT:

Neither I, nor to the best of my knowledge, information, and belief, the above business (as is defined in Section 16-101(b) of the State Finance and Procurement Article of the Annotated Code of Maryland), or any of its officers, directors, partners, controlling stockholders, or any of its employees directly involved in the business's contracting activities including obtaining or performing contracts with public bodies has been convicted of, or has had probation before judgment imposed pursuant to Criminal Procedure Article, §6-220, Annotated Code of Maryland, or has pleaded nolo contendere to a charge of, bribery, attempted bribery, or conspiracy to bribe in violation of Maryland law, or of the law of any other state or federal law, except as follows (indicate the reasons why the affirmation cannot be given and list any conviction, plea, or imposition of probation before judgment with the date, court, official or administrative body, the sentence or disposition, the name(s) of person(s) involved, and their current positions and responsibilities with the business):

_____

_____

_____.

D. AFFIRMATION REGARDING OTHER CONVICTIONS

I FURTHER AFFIRM THAT:

Neither I, nor to the best of my knowledge, information, and belief, the above business, or any of its officers, directors, partners, controlling stockholders, or any of its employees directly involved in the business's contracting activities including obtaining or performing contracts with public bodies, has:

(1) Been convicted under state or federal statute of:

(a) A criminal offense incident to obtaining, attempting to obtain, or performing a public or private contract; or

(b) Fraud, embezzlement, theft, forgery, falsification or destruction of records or receiving stolen property;

(2) Been convicted of any criminal violation of a state or federal antitrust statute;

(3) Been convicted under the provisions of Title 18 of the United States Code for violation of the Racketeer Influenced and Corrupt Organization Act, 18 U.S.C. §1961 et seq., or the Mail Fraud Act, 18 U.S.C. §1341 et seq., for acts in connection with the submission of bids or proposals for a public or private contract;

(4) Been convicted of a violation of the State Minority Business Enterprise Law, §14-308 of the State Finance and Procurement Article of the Annotated Code of Maryland;

(5) Been convicted of a violation of §11-205.1 of the State Finance and Procurement Article of the Annotated Code of Maryland;

(6) Been convicted of conspiracy to commit any act or omission that would constitute grounds for conviction or liability under any law or statute described in subsections (1)—(5) above;

(7) Been found civilly liable under a state or federal antitrust statute for acts or omissions in connection with the submission of bids or proposals for a public or private contract;

(8) Been found in a final adjudicated decision to have violated the Commercial Nondiscrimination Policy under Title 19 of the State Finance and Procurement Article of the Annotated Code of Maryland with regard to a public or private contract; or

(9) Admitted in writing or under oath, during the course of an official investigation or other proceedings, acts or omissions that would constitute grounds for conviction or liability under any law or statute described in §§B and C and subsections D(1)—(8) above, except as follows (indicate reasons why the affirmations cannot be given, and list any conviction, plea, or imposition of probation before judgment with the date, court, official or administrative body, the sentence or disposition, the name(s) of the person(s) involved and their current positions and responsibilities with the business, and the status of any debarment):

_____

_____

_____.

E. AFFIRMATION REGARDING DEBARMENT

I FURTHER AFFIRM THAT:

Neither I, nor to the best of my knowledge, information, and belief, the above business, or any of its officers, directors, partners, controlling stockholders, or any of its employees directly involved in the business's contracting activities, including obtaining or performing contracts with public bodies, has ever been suspended or debarred (including being issued a limited denial of participation) by any public entity, except as follows (list each debarment or suspension providing the dates of the suspension or debarment,

the name of the public entity and the status of the proceedings, the name(s) of the person(s) involved and their current positions and responsibilities with the business, the grounds of the debarment or suspension, and the details of each person's involvement in any activity that formed the grounds of the debarment or suspension).

_____

_____

_____.

F. AFFIRMATION REGARDING DEBARMENT OF RELATED ENTITIES

I FURTHER AFFIRM THAT:

(1) The business was not established and it does not operate in a manner designed to evade the application of or defeat the purpose of debarment pursuant to Sections 16-101, et seq., of the State Finance and Procurement Article of the Annotated Code of Maryland; and

(2) The business is not a successor, assignee, subsidiary, or affiliate of a suspended or debarred business, except as follows (you must indicate the reasons why the affirmations cannot be given without qualification):

_____

_____

_____.

G. SUB-CONTRACT AFFIRMATION

I FURTHER AFFIRM THAT:

Neither I, nor to the best of my knowledge, information, and belief, the above business, has knowingly entered into a contract with a public body under which a person debarred or suspended under Title 16 of the State Finance and Procurement Article of the Annotated Code of Maryland will provide, directly or indirectly, supplies, services, architectural services, construction related services, leases of real property, or construction.

H. AFFIRMATION REGARDING COLLUSION

I FURTHER AFFIRM THAT:

Neither I, nor to the best of my knowledge, information, and belief, the above business has:

(1) Agreed, conspired, connived, or colluded to produce a deceptive show of competition in the compilation of the accompanying bid or offer that is being submitted;

(2) In any manner, directly or indirectly, entered into any agreement of any kind to fix the bid price or price proposal of the bidder or offeror or of any competitor, or otherwise taken any action in restraint of free competitive bidding in connection with the contract for which the accompanying bid or offer is submitted.

I. CERTIFICATION OF TAX PAYMENT

I FURTHER AFFIRM THAT:

Except as validly contested, the business has paid, or has arranged for payment of, all taxes due the State of Maryland and has filed all required returns and reports with the Comptroller of the Treasury, the State Department of Assessments and Taxation, and the Department of Labor, Licensing, and Regulation, as applicable, and will have paid all withholding taxes due the State of Maryland prior to final settlement.

J. CONTINGENT FEES

I FURTHER AFFIRM THAT:

The business has not employed or retained any person, partnership, corporation, or other entity, other than a bona fide employee, bona fide agent, bona fide salesperson, or commercial selling agency working for the business, to solicit or secure the Contract, and that the business has not paid or agreed to pay any person, partnership, corporation, or other entity, other than a bona fide employee, bona fide agent, bona fide salesperson, or commercial selling agency, any fee or any other consideration contingent on the making of the Contract.

K. ACKNOWLEDGEMENT

I ACKNOWLEDGE THAT this Affidavit is to be furnished to the Procurement Officer and may be distributed to units of: (1) the State of Maryland; (2) counties or other subdivisions of the State of Maryland; (3) other states; and (4) the federal government. I further acknowledge that this Affidavit is subject to applicable laws of the United States and the State of Maryland, both criminal and civil, and that nothing in this Affidavit or any contract resulting from the submission of this bid or proposal shall be construed to supersede, amend, modify or waive, on behalf of the State of Maryland, or any unit of the State of Maryland having jurisdiction, the exercise of any statutory right or remedy conferred by the Constitution and the laws of Maryland with respect to any misrepresentation made or any violation of the obligations, terms and covenants undertaken by the above business with respect to (1) this Affidavit, (2) the contract, and (3) other Affidavits comprising part of the contract.

I DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THIS AFFIDAVIT ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF.

Date: _____

By: _____ (print name of Authorized Representative and Affiant)

_____ (signature of Authorized Representative and Affiant)

EXHIBIT C
CONTRACTORS'S QUESTIONNAIRE

MARYLAND TRANSIT ADMINISTRATION

CONTRACTOR'S QUESTIONNAIRE
PRE-AWARD EVALUATION DATA

IMPORTANT

This questionnaire is intended as a basis for establishing the qualifications of Contractor's for undertaking contract work under the jurisdiction of the Maryland Transit Administration.

This questionnaire forms a part of the Contractor's overall bid submission. Failure to submit it or lack of evidence of pertinent qualifications may be a basis for rejection of a bid, whole or part.

I. General

(a) Legal Title and Address of Organization

(b) Organizations Local Representative's Name, Title and Address

(c) _____Corporation _____Partnership _____Individual
(Check One)

(d) If a Corporation--State: _____
Capital Paid in Cash $_____
Date of Incorporation _____
State in which Incorporated

Name and Title of Principal Officers	Date of Assuming Position

(e) If Partnership-- State:
Date of Organization_____ Nature of Partnership
(General, Limited or Association)

Names and Addresses of Partners

(f) If Individual--State:
Full Name and Address of Owner

(g) Is any member of your organization employed by the State of Maryland, a member of any State Institution's Board of Managers or Trustees, or in any way officially connected with the State Government?___ If yes-- explain

(h) Give name and data about any contracts you have failed to complete, including any terminations of default (use separate sheet if necessary).

(i) Has your organization or any of its Directors, Officers, Partners or Supervisory Personnel ever been party to any criminal action relating directly or indirectly to the general conduct of your business?
If yes-- Explain

(j) Has your organization even been denied an award on which you were low bidder? _____ If yes-Explain

(k) Have you ever been assessed actual or liquidated damages for late completion? _____ If so, give full particulars _____

II. Financial

(a) Give value of total assets of organization

(b) Give value of total liabilities of organization

(c) Give total value of work accomplished by your organization in each of the last three years.

_____ 20____ _____ 20____ _____ 20

(d) Give value of work presently being accomplished b, or pending award to your organization

(Date)

(e) Give value of any judgments or liens outstanding against your organization

(f) Has any Bonding Company refused to write you a bond on any contract work? If yes -- Explain

(g) Give maximum value of contract work for which you could obtain Bond

III. Experience and Reference

Please complete the pages under **Exhibit L** detailing work experience and references.

The above statements are certified to be true and accurate.

Date at _____ this _____ day of _____ 20_____.

By:_____
(Title of Person Signing)

_____
(Name of Organization)

State of _____County (City) of _____

On this _____ day of _____, 20_____, before me,

_____, the undersigned officer, personally appeared

_____, known to me to be the person described in the foregoing Contractor's Questionnaire and acknowledge that he (she) executed the same in the capacity therein stated and for the purposes therein contained.

In witness whereof, I hereunto set my hand and official seal.

_____
Notary Public (SEAL)

My Commission Expires: _____

EXHIBIT D
CONFLICT OF INTEREST

CONFLICT OF INTERESTAFFIDAVIT/DISCLOSURE

A. "Conflict of Interest" means that because of other activities or relationships with other persons, a person is unable or potentially unable to render impartial assistance or advice to the State, or the person's objectivity in performing the contract work is or might be otherwise impaired, or a person has an unfair advantage.

B. "Person" has the meaning stated in COMAR 21.01.02.01B(64) and includes a bidder, Offeror, Contractor, consultant or subcontractor or sub consultant at any tier, and also includes an employee or agent of any of them if the employee or agent has or will have the authority to control or supervise all or a portion of the work for which a bid or offer is made.

C. The bidder of Offeror warrants that, except as disclosed in § D, below, there are no revenant facts or circumstances now giving rise or which could, in the future, give rise to a conflict of interest.

D. The following facts or circumstances give rise or could in the future give rise to a conflict of interest (explain in detail-attached additional sheets if necessary):

E. The bidder or Offeror agrees that if an actual or potential conflict of interest arises after the date if this affidavit, the bidder or Offeror shall immediately make a full disclosure in writing to the Procurement Officer of all relevant facts and circumstances. This disclosure shall include a description of actions which the bidder or Offeror has taken and proposes to take to avoid, mitigate, or neutralize the actual potential conflict of interest. If the contract has been awarded and performance of the contract has begun, the Contractor shall continue performance until notified by the Procurement Officer of any contrary action to be taken.

I DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THIS AFFIDAVIT ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLDEGE, INFORMATION, AND BELIEF.

Date:_____ By:_____

(Authorized Representative or Affiant)

EXHIBIT E
DISADVANTAGED BUSINESS ENTERPRISE FORMS

MDOT DBE FORM A
FEDERALLY-FUNDED CONTRACTS
CERTIFIED DBE UTILIZATION AND FAIR SOLICITATION AFFIDAVIT
PAGE 1 OF 2

THIS AFFIDAVIT MUST BE INCLUDED WITH THE BID/ PROPOSAL. IF THE BIDDER/OFFEROR FAILS TO ACCURATELY COMPLETE AND SUBMIT THIS AFFIDAVIT AS REQUIRED, THE BID SHALL BE DEEMED NOT RESPONSIVE OR THE PROPOSAL SHALL BE DEEMED NOT SUSCEPTIBLE OF BEING SELECTED FOR AWARD.

In connection with the bid/proposal submitted in response to Solicitation No. , I affirm the following:

1. DBE Participation (PLEASE CHECK ONLY ONE)

☐ I have met the overall certified Disadvantaged Business Enterprise (DBE) participation goal of percent (%). I agree that this percentage of the total dollar amount of the Contract for the DBE goal will be performed by certified DBE firms as set forth in the DBE Participation Schedule - Part 2 of the MDOT DBE Form B (Federally-Funded Contracts).

OR

☐ I conclude that I am unable to achieve the DBE participation goal. I hereby request a waiver, in whole or in part, of the goal. Within 10 business days of receiving notice that our firm is the apparent awardee or as requested by the Procurement Officer, I will submit a written waiver request and all required documentation in accordance with COMAR 21.11.03.11. For a partial waiver request, I agree that certified DBE firms will be used to accomplish the percentages of the total dollar amount of the Contract as set forth in the DBE Participation Schedule - Part 2 of the MDOT DBE Form B (Federally-Funded Contracts).

2. Additional DBE Documentation

I understand that if I am notified that I am the apparent awardee or as requested by the Procurement Officer, I must submit the following documentation within 10 business days of receiving such notice:
(a) Outreach Efforts Compliance Statement (MDOT DBE Form C - Federally-Funded Contracts);
(b) Subcontractor Project Participation Statement (MDOT DBE Form D - Federally-Funded Contracts);
(c) DBE Waiver Request documentation per COMAR 21.11.03.11 (if waiver was requested); and
(d) Any other documentation required by the Procurement Officer to ascertain bidder's responsibility/ offeror's susceptibility of being selected for award in connection with the certified DBE participation goal.

I acknowledge that if I fail to return each completed document (in 2 (a) through (d)) within the required time, the Procurement Officer may determine that I am not responsible and therefore not eligible for contract award or not susceptible of being selected for award.

MDOT DBE FORM A
FEDERALLY-FUNDED CONTRACTS
CERTIFIED DBE UTILIZATION AND FAIR SOLICITATION AFFIDAVIT
PAGE 2 OF 2

3. Information Provided to DBE firms

In the solicitation of subcontract quotations or offers, DBE firms were provided not less than the same information and amount of time to respond as were non-DBE firms.

4. Products and Services Provided by DBE firms

I hereby affirm that the DBEs are only providing those products and services for which they are MDOT certified.

I solemnly affirm under the penalties of perjury that the information in this affidavit is true to the best of my knowledge, information and belief.

_____	_____
Company Name	Signature of Representative
_____	_____
Address	Printed Name and Title
_____	_____
City, State and Zip Code	Date

MDOT DBE FORM B
FEDERALLY-FUNDED CONTRACTS
DBE PARTICIPATION SCHEDULE

PART 1 – INSTRUCTIONS FOR DBE PARTICIPATION SCHEDULE

PARTS 2 AND 3 MUST BE INCLUDED WITH THE BID/PROPOSAL. IF THE BIDDER/OFFEROR FAILS TO ACCURATELY COMPLETE AND SUBMIT PART 2 WITH THE BID/PROPOSAL AS REQUIRED, THE BID SHALL BE DEEMED NOT RESPONSIVE OR THE PROPOSAL SHALL BE DEEMED NOT SUSCEPTIBLE OF BEING SELECTED FOR AWARD.

*** STOP ***
FORM INSTRUCTIONS
PLEASE READ BEFORE COMPLETING THIS FORM

1. Please refer to the Maryland Department of Transportation (MDOT) DBE Directory at www.mdot.state.md.us to determine if a firm is certified for the appropriate North American Industry Classification System ("NAICS") Code **and** the product/services description (specific product that a firm is certified to provide or specific areas of work that a firm is certified to perform). For more general information about NAICS, please visit www.naics.com. Only those specific products and/or services for which a firm is certified in the MDOT Directory can be used for purposes of achieving the DBE participation goal.

2. In order to be counted for purposes of achieving the DBE participation goal, the firm `must be certified for that specific NAICS ("DBE" for Federally-funded projects designation after NAICS Code). **WARNING:** If the firm's NAICS Code is in **graduated status**, such services/products **will not be counted** for purposes of achieving the DBE participation goals. Graduated status is clearly identified in the MDOT Directory (such graduated codes are designated with the word graduated after the appropriate NAICS Code).

3. Examining the NAICS Code is the **first step** in determining whether a DBE firm is certified and eligible to receive DBE participation credit for the specific products/services to be supplied or performed under the contract. The **second step** is to determine whether a firm's Products/Services Description in the DBE Directory includes the products to be supplied and/or services to be performed that are being used to achieve the DBE participation goal.

4. If you have any questions as to whether a firm is MDOT DBE certified, or if it is certified to perform specific services or provide specific products, please call MDOT's Office of Minority Business Enterprise at 1-800-544-6056 or send an email to mbe@mdot.state.md.us.

5. The Contractor's subcontractors are considered second-tier subcontractors. Third-tier contracting used to meet a DBE goal is to be considered the exception and not the rule. The following two conditions must be met before MDOT, its Modal Administrations and the Maryland Transportation Authority may approve a third-tier contracting agreement: (a) the bidder/offeror must request in writing approval of each third-tier contract arrangement, and (b) the request must contain specifics as to why a third-tier contracting arrangement should be approved. These documents must be submitted with the bid/proposal in Part 2 of this DBE Participation Schedule.

6. For each DBE firm that is being used as supplier/wholesaler/regular dealer/broker/manufacturer, please follow these instructions for calculating the **amount of the subcontract for purposes of achieving the DBE participation goal**:

   A. Is the firm certified as a broker of the products/supplies? If the answer is YES, please continue to Item C. If the answer is NO, please continue to Item B.

   B. Is the firm certified as a supplier, wholesaler, regular dealer, or manufacturer of such products/supplies? If the answer is YES, continue to Item D. If the answer is NO, continue to Item C only if the DBE firm is certified to perform trucking/hauling services under NAICS Codes 484110, 484121, 484122, 484210, 484220 and 484230. If the answer is NO and the firm is not certified under these NAICS Codes, then no DBE participation credit will be given for the supply of these products.

   C. For purposes of achieving the DBE participation goal, you may count only the amount of any reasonable fee that the DBE firm will receive for the provision of such products/supplies - not the total subcontract amount or the value (or a percentage thereof) of such products and/or supplies. For Column 3 of the DBE Participation Schedule, please divide the amount of any reasonable fee that the DBE firm will receive for the provision of such products/services by the total Contract value and insert the percentage in Line 3.1.

MDOT DBE FORM B
FEDERALLY-FUNDED CONTRACTS
DBE PARTICIPATION SCHEDULE
PART 1 – INSTRUCTIONS FOR DBE PARTICIPATION SCHEDULE

D. Is the firm certified as a manufacturer (refer to the firm's NAICS Code and specific description of products/services) of the products/supplies to be provided? If the answer is NO, please continue to Item E. If the answer is YES, for purposes of achieving the DBE participation goal, you may count the total amount of the subcontract. For Column 3 of the DBE Participation Schedule, please divide the total amount of the subcontract by the total Contract value and insert the percentage in Line 3.1.

E. Is the firm certified as a supplier, wholesaler and/or regular dealer? If the answer is YES and the DBE firm is furnishing and installing the materials and is certified to perform these services, please divide the total subcontract amount (including full value of supplies) by the total Contract value and insert the percentage in Line 3.1. If the answer is YES and the DBE firm is only being used as a supplier, wholesaler and/or regular dealer or is not certified to install the supplies/materials, for purposes of achieving the DBE participation goal, you may only count sixty percent (60%) of the value of the subcontract for these supplies/products (60% Rule). To apply the 60% Rule, first divide the amount of the subcontract for these supplies/products only (not installation) by the total Contract value. Then, multiply the result by sixty percent (60%) and insert the percentage in Line 3.2.

7. For each DBE firm that **is not** being used as a supplier/wholesaler/regular dealer/broker/manufacturer, to calculate the **amount of the subcontract for purposes of achieving the DBE participation goal**, divide the total amount of the subcontract by the total Contract value and insert the percentage in Line 3.1.

   Example: $ 2,500 (Total Subcontract Amount) ÷ $10,000 (Total Contract Value) x 100 = 25%

8. Please note that for USDOT-funded projects, a DBE prime may count towards its DBE participation goal work performed by its own forces. Include information about the DBE prime in Part 2.

9. **WARNING:** The percentage of DBE participation, computed using the dollar amounts in Column 3 for all of the DBE firms listed in Part 2, MUST at least equal the DBE participation goal as set forth in MDOT DBE Form A – Federally-Funded Contracts for this solicitation. If the bidder/offeror is unable to achieve the DBE participation goals, then the bidder/offeror must request a waiver in Form A or the bid will be deemed not responsive, or the proposal not susceptible of being selected for award. You may wish to use the Goal Worksheet shown below to assist you in calculating the percentage and confirming that you have met the applicable DBE participation goal.

GOAL WORKSHEET	
Total DBE Firm Participation (Add percentages in Column 3 for all DBE firms listed in DBE Participation Schedule)	(A) _____%
The percentage amount in Box A above should be equal to the percentage amount in Box E below.	
Add *Countable* Subcontract Amounts (see 6 through 8 of Instructions) for all DBE firms listed in DBE Participation Schedule, and insert in Box B	(B) $_____
Insert the Total Contract Amount in Box C	(C) $_____
Divide Box B by Box C and Insert in Box D	(D) =_____
Multiply Box D by 100 and insert in Box E	(E) =_____%

MDOT DBE FORM B
FEDERALLY-FUNDED CONTRACTS
DBE PARTICIPATION SCHEDULE

PART 2 – DBE PARTICIPATION SCHEDULE

PARTS 2 AND 3 MUST BE INCLUDED WITH THE BID/PROPOSAL. IF THE BIDDER/OFFEROR FAILS TO ACCURATELY COMPLETE AND SUBMIT PART 2 WITH THE BID/PROPOSAL AS REQUIRED, THE BID SHALL BE DEEMED NOT RESPONSIVE OR THE PROPOSAL SHALL BE DEEMED NOT SUSCEPTIBLE OF BEING SELECTED FOR AWARD.

Prime Contractor	Project Description	Solicitation Number

LIST INFORMATION FOR EACH CERTIFIED DBE SUBCONTRACTOR YOU AGREE TO USE TO ACHIEVE THE DBE PARTICIPATION GOAL.

COLUMN 1	COLUMN 2	COLUMN 3 **Unless the bidder/offeror requested a waiver in MDOT DBE Form A – Federally Funded Contracts for this solicitation, the cumulative DBE participation for all DBE firms listed herein must equal at least the DBE participation goal set forth in Form A.**
NAME OF DBE SUBCONTRACTOR AND TIER	**CERTIFICATION NO. AND DBE CLASSIFICATION**	**FOR PURPOSES OF ACHIEVING THE DBE PARTICIPATION GOAL, refer to sections 6, 7 and 8 in Part 1 - Instructions. State the percentage amount of the products/services in Line 3.1, except for those products or services where the DBE firm is being used as a wholesaler, supplier, or regular dealer. For items of work where the DBE firm is being used as a supplier, wholesaler and/or regular dealer, complete Line 3.2 using the 60% Rule.**
☐ Please check if DBE firm is a third-tier contractor (if applicable). Please submit written documents in accordance with Section 5 of Part 1 - Instructions	**Certification Number:** _____ **(If dually certified, check only one box.)** ☐ African American-Owned ☐ Hispanic American- Owned ☐ Asian American-Owned ☐ Women-Owned ☐ Other DBE Classification _____	3.1. **TOTAL PERCENTAGE TO BE PAID TO THE SUBCONTRACTOR** (STATE THIS PERCENTAGE AS A PERCENTAGE OF THE TOTAL CONTRACT VALUE- EXCLUDING PRODUCTS/SERVICES FROM SUPPLIERS, WHOLESALERS OR REGULAR DEALERS). _____% (Percentage for purposes of calculating achievement of DBE Participation goal) 3.2 **TOTAL PERCENTAGE TO BE PAID TO THE SUBCONTRACTOR FOR ITEMS OF WORK WHERE THE DBE FIRM IS BEING USED AS A SUPPLIER, WHOLESALER AND/OR REGULAR DEALER)** (STATE THE PERCENTAGE AS A PERCENTAGE OF THE TOTAL CONTRACT VALUE AND THEN APPLY THE 60% RULE PER SECTION 6(E) IN PART 1 - INSTRUCTIONS). _____% Total percentage of Supplies/Products x _____60% (60% Rule) _____% (Percentage for purposes of calculating achievement of DBE Participation goal)

☐Please check if Continuation Sheets are attached.

MDOT DBE FORM B
FEDERALLY-FUNDED CONTRACTS
DBE PARTICIPATION SCHEDULE
CONTINUATION SHEET

PAGE __ OF ____

Prime Contractor	Project Description	Solicitation Number

LIST INFORMATION FOR EACH CERTIFIED DBE SUBCONTRACTOR YOU AGREE TO USE TO ACHIEVE THE DBE PARTICIPATION GOAL.

COLUMN 1	COLUMN 2	COLUMN 3 **Unless the bidder/offeror requested a waiver in MDOT DBE Form A – Federally Funded Contracts for this solicitation, the cumulative DBE participation for all DBE firms listed herein must equal at least the DBE participation goal set forth in Form A.**
NAME OF DBE SUBCONTRACTOR AND TIER	**CERTIFICATION NO. AND DBE CLASSIFICATION**	**FOR PURPOSES OF ACHIEVING THE DBE PARTICIPATION GOAL, refer to sections 6, 7 and 8 in Part 1 - Instructions. State the percentage amount of the products/services in Line 3.1, except for those products or services where the DBE firm is being used as a wholesaler, supplier, or regular dealer. For items of work where the DBE firm is being used as a supplier, wholesaler and/or regular dealer, complete Line 3.2 using the 60% Rule.**
☐ Please check if DBE firm is a third-tier contractor (if applicable). Please submit written documents in accordance with Section 5 of Part 1 - Instructions	**Certification Number:** _____ **(If dually certified, check only one box.)** ☐ African American-Owned ☐ Hispanic American- Owned ☐ Asian American-Owned ☐ Women-Owned ☐ Other DBE Classification _____	3.1. **TOTAL PERCENTAGE TO BE PAID TO THE SUBCONTRACTOR** (STATE THIS PERCENTAGE AS A PERCENTAGE OF THE TOTAL CONTRACT VALUE- EXCLUDING PRODUCTS/SERVICES FROM SUPPLIERS, WHOLESALERS OR REGULAR DEALERS). _____% (Percentage for purposes of calculating achievement of DBE Participation goal) 3.2 **TOTAL PERCENTAGE TO BE PAID TO THE SUBCONTRACTOR FOR ITEMS OF WORK WHERE THE DBE FIRM IS BEING USED AS A SUPPLIER, WHOLESALER AND/OR REGULAR DEALER)** (STATE THE PERCENTAGE AS A PERCENTAGE OF THE TOTAL CONTRACT VALUE AND THEN APPLY THE 60% RULE PER SECTION 6(E) IN PART 1 - INSTRUCTIONS). _____% Total percentage of Supplies/Products x _____60% (60% Rule) _____% (Percentage for purposes of calculating achievement of DBE Participation goal)

☐Please check if Continuation Sheets are attached.

MDOT DBE FORM B
FEDERALLY-FUNDED CONTRACTS
DBE PARTICIPATION SCHEDULE

PART 3 – CERTIFICATION FOR DBE PARTICIPATION SCHEDULE

PARTS 2 AND 3 MUST BE INCLUDED WITH THE BID/PROPOSAL AS DIRECTED IN THE SOLICITATION.

I hereby affirm that I have reviewed the Products and Services Description (specific product that a firm is certified to provide or areas of work that a firm is certified to perform) set forth in the MDOT DBE Directory for each of the DBE firms listed in Part 2 of this DBE Form B for purposes of achieving the DBE participation goal that was identified in the DBE Form A that I submitted with this solicitation, and that the DBE firms listed are only performing those products/services/areas of work for which they are certified. I also hereby affirm that I have read and understand the form instructions set forth in Part 1 of this DBE Form B.

The undersigned Prime Contractor hereby certifies and agrees that it has fully complied with the State Minority Business Enterprise law, State Finance and Procurement Article §14-308(a)(2), Annotated Code of Maryland which provides that, except as otherwise provided by law, a contractor may not identify a certified minority business enterprise in a bid or proposal and:

(1) fail to request, receive, or otherwise obtain authorization from the certified minority business enterprise to identify the certified minority business enterprise in its bid or proposal;

(2) fail to notify the certified minority business enterprise before execution of the contract of its inclusion of the bid or proposal;

(3) fail to use the certified minority business enterprise in the performance of the contract; or

(4) pay the certified minority business enterprise solely for the use of its name in the bid or proposal.

I solemnly affirm under the penalties of perjury that the contents of Parts 2 and 3 of MDOT DBE Form B are true to the best of my knowledge, information and belief.

_____	_____
Company Name	Signature of Representative
_____	_____
Address	Printed Name and Title
_____	_____
City, State and Zip Code	Date

MDOT DBE FORM C
FEDERALLY-FUNDED CONTRACTS
OUTREACH EFFORTS COMPLIANCE STATEMENT

In conjunction with the offer/proposal submitted in response to Solicitation No._____, I state the following:

1. Bidder/Offeror took the following efforts to identify subcontracting opportunities in these specific work categories:

2. Attached to this form are copies of written solicitations (with bidding/proposal instructions) used to solicit certified DBE firms for these subcontract opportunities.

3. Bidder/Offeror made the following attempts to personally contact the solicited DBE firms:

4. **Please Check One:**

☐ This project does not involve bonding requirements.

☐ Bidder/Offeror assisted DBE firms to fulfill or seek waiver of bonding requirements. (DESCRIBE EFFORTS)

5. **Please Check One:**

☐ Bidder/Offeror did attend the pre-bid/pre-proposal meeting/conference.

☐ No pre-bid/pre-proposal meeting/conference was held.

☐ Bidder/Offeror did not attend the pre-bid/pre-proposal meeting/conference.

_____	_____
Company Name	Signature of Representative
_____	_____
Address	Printed Name and Title
_____	_____
City, State and Zip Code	Date

MDOT DBE FORM D

FEDERALLY-FUNDED CONTRACTS

DBE SUBCONTRACTOR PROJECT PARTICIPATION AFFIDAVIT

IF THE BIDDER/OFFEROR FAILS TO RETURN THIS AFFIDAVIT WITHIN THE REQUIRED TIME, THE PROCUREMENT OFFICER MAY DETERMINE THAT THE BIDDER IS NOT RESPONSIBLE AND THEREFORE NOT ELIGIBLE FOR CONTRACT AWARD OR THAT THE PROPOSAL IS NOT SUSCEPTIBLE OF BEING SELECTED FOR AWARD. SUBMIT ONE FORM FOR EACH CERTIFIED DBE FIRM LISTED IN THE DBE PARTICIPATION SCHEDULE. BIDDERS/ OFFERORS ARE HIGHLY ENCOURGED TO SUBMIT FORM D PRIOR TO THE TEN (10) DAY DEADLINE.

Provided that _____ (Prime Contractor's Name) is awarded the Contract in conjunction with Solicitation No. _____, such Prime Contractor will enter into a subcontract with _____(Subcontractor's Name) committing to participation by the DBE firm _____ (DBE Name) with MDOT Certification Number _____ (if subcontractor previously listed is also the DBE firm, please restate name and provide DBE Certification Number) which will receive at least $_____ or _____% (Total Subcontract Amount/ Percentage) for performing the following products/services for the Contract:

NAICS CODE	WORK ITEM, SPECIFICATION NUMBER, LINE ITEMS OR WORK CATEGORIES (IF APPLICABLE)	DESCRIPTION OF SPECIFIC PRODUCTS AND/OR SERVICES

I solemnly affirm under the penalties of perjury that the information provided in this DBE Subcontractor Project Participation Affidavit is true to the best of my knowledge, information and belief. I acknowledge that, for purposes of determining the accuracy of the information provided herein, the Procurement Officer may request additional information, including, without limitation, copies of the subcontract agreements and quotes.

PRIME CONTRACTOR	SUBCONTRACTOR (SECOND-TIER)	SUBCONTRACTOR (THIRD-TIER)
Signature of Representative:	Signature of Representative:	Signature of Representative:
_____	_____	_____
Printed Name and Title:_____	Printed Name and Title:_____	Printed Name and Title:_____
_____	_____	_____
Firm's Name: _____	Firm's Name: _____	Firm's Name: _____
Federal Identification Number: _____	Federal Identification Number: _____	Federal Identification Number: _____
Address: _____	Address: _____	Address: _____
_____	_____	_____
Telephone: _____	Telephone: _____	Telephone: _____
Date: _____	Date: _____	Date: _____

IF DBE FIRM IS A THIRD-TIER SUBCONTRACTOR, THIS FORM MUST ALSO BE EXECUTED BY THE SECOND-TIER SUBCONTRACTOR THAT HAS THE SUBCONTRACT AGREEMENT WITH THE DBE FIRM.

EXHIBIT F
CONTRACT AFFIDAVIT

EXHIBIT F

Contract Affidavit

A. AUTHORITY

I HEREBY AFFIRM THAT:

I, _____ (print name), possess the legal authority to make this Affidavit.

B. CERTIFICATION OF REGISTRATION OR QUALIFICATION WITH THE STATE DEPARTMENT OF ASSESSMENTS AND TAXATION

I FURTHER AFFIRM THAT:

The business named above is a (check applicable box):

(1) Corporation — ☐ domestic or ☐ foreign;
(2) Limited Liability Company — ☐ domestic or ☐ foreign;
(3) Partnership — ☐ domestic or ☐ foreign;
(4) Statutory Trust — ☐ domestic or ☐ foreign;
(5) ☐ Sole Proprietorship.

and is registered or qualified as required under Maryland Law. I further affirm that the above business is in good standing both in Maryland and (IF APPLICABLE) in the jurisdiction where it is presently organized, and has filed all of its annual reports, together with filing fees, with the Maryland State Department of Assessments and Taxation. The name and address of its resident agent (IF APPLICABLE) filed with the State Department of Assessments and Taxation is:

Name and Department ID Number:_____Address:_____

and that if it does business under a trade name, it has filed a certificate with the State Department of Assessments and Taxation that correctly identifies that true name and address of the principal or owner as:

Name and Department ID Number: _____
Address:_____.

C. FINANCIAL DISCLOSURE AFFIRMATION

I FURTHER AFFIRM THAT:

I am aware of, and the above business will comply with, the provisions of State Finance and Procurement Article, §13-221, Annotated Code of Maryland, which require that every business that enters into contracts, leases, or other agreements with the State of Maryland or its agencies during a calendar year under which the business is to receive in the aggregate $100,000 or more shall, within 30 days of the time when the aggregate value of the contracts, leases, or other agreements reaches $100,000, file with the Secretary of State of Maryland certain specified information to include disclosure of beneficial ownership of the business.

D. POLITICAL CONTRIBUTION DISCLOSURE AFFIRMATION

I FURTHER AFFIRM THAT:

I am aware of, and the above business will comply with, Election Law Article, §§14-101 — 14-108, Annotated Code of Maryland, which requires that every person that enters into contracts, leases, or other agreements with the State of Maryland, including its agencies or a political subdivision of the State, during a calendar year in which the person receives in the aggregate $100,000 or more shall file with the State Board of Elections a statement disclosing contributions in excess of $500 made during the reporting period to a candidate for elective office in any primary or general election.

E. DRUG AND ALCOHOL FREE WORKPLACE

(Applicable to all contracts unless the contract is for a law enforcement agency and the agency head or the agency head's designee has determined that application of COMAR 21.11.08 and this certification would be inappropriate in connection with the law enforcement agency's undercover operations.)

I CERTIFY THAT:

(1) Terms defined in COMAR 21.11.08 shall have the same meanings when used in this certification.

(2) By submission of its bid or offer, the business, if other than an individual, certifies and agrees that, with respect to its employees to be employed under a contract resulting from this solicitation, the business shall:

(a) Maintain a workplace free of drug and alcohol abuse during the term of the contract;

(b) Publish a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of drugs, and the abuse of drugs or alcohol is prohibited in the business' workplace and specifying the actions that will be taken against employees for violation of these prohibitions;

(c) Prohibit its employees from working under the influence of drugs or alcohol;

(d) Not hire or assign to work on the contract anyone who the business knows, or in the exercise of due diligence should know, currently abuses drugs or alcohol and is not actively engaged in a bona fide drug or alcohol abuse assistance or rehabilitation program;

(e) Promptly inform the appropriate law enforcement agency of every drug-related crime that occurs in its workplace if the business has observed the violation or otherwise has reliable information that a violation has occurred;

(f) Establish drug and alcohol abuse awareness programs to inform its employees about:

(i) The dangers of drug and alcohol abuse in the workplace;
(ii) The business's policy of maintaining a drug and alcohol free workplace;
(iii) Any available drug and alcohol counseling, rehabilitation, and employee assistance programs; and
(iv) The penalties that may be imposed upon employees who abuse drugs and alcohol in the workplace;

(g) Provide all employees engaged in the performance of the contract with a copy of the statement required by §E(2)(b), above;

(h) Notify its employees in the statement required by §E(2)(b), above, that as a condition of continued employment on the contract, the employee shall:

(i) Abide by the terms of the statement; and
(ii) Notify the employer of any criminal drug or alcohol abuse conviction for an offense occurring in the workplace not later than 5 days after a conviction;

(i) Notify the procurement officer within 10 days after receiving notice under §E(2)(h)(ii), above, or otherwise receiving actual notice of a conviction;

(j) Within 30 days after receiving notice under §E(2)(h)(ii), above, or otherwise receiving actual notice of a conviction, impose either of the following sanctions or remedial measures on any employee who is convicted of a drug or alcohol abuse offense occurring in the workplace:

(i) Take appropriate personnel action against an employee, up to and including termination; or
(ii) Require an employee to satisfactorily participate in a bona fide drug or alcohol abuse assistance or rehabilitation program; and

(k) Make a good faith effort to maintain a drug and alcohol free workplace through implementation of §E(2)(a)—(j), above.

(3) If the business is an individual, the individual shall certify and agree as set forth in §E(4), below, that the individual shall not engage in the unlawful manufacture, distribution, dispensing, possession, or use of drugs or the abuse of drugs or alcohol in the performance of the contract.

(4) I acknowledge and agree that:

(a) The award of the contract is conditional upon compliance with COMAR 21.11.08 and this certification;

(b) The violation of the provisions of COMAR 21.11.08 or this certification shall be cause to suspend payments under, or terminate the contract for default under COMAR 21.07.01.11 or 21.07.03.15, as applicable; and

(c) The violation of the provisions of COMAR 21.11.08 or this certification in connection with the contract may, in the exercise of the discretion of the Board of Public Works, result in suspension and debarment of the business under COMAR 21.08.03.

F. CERTAIN AFFIRMATIONS VALID

I FURTHER AFFIRM THAT:

To the best of my knowledge, information, and belief, each of the affirmations, certifications, or acknowledgements contained in that certain Bid/Proposal Affidavit dated _____ , 20___ , and executed by me for the purpose of obtaining the contract to which this Exhibit is attached remains true and correct in all respects as if made as of the date of this Contract Affidavit and as if fully set forth herein.

I DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THIS AFFIDAVIT ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF.

Date: _____

By: _____ (printed name of Authorized Representative and Affiant)

_____ (signature of Authorized Representative and Affiant)

EXHIBIT G
PERFORMANCE BOND

STATE OF MARYLAND
MARYLAND DEPARTMENT OF TRANSPORTATION
PERFORMANCE BOND

PENAL SUM OF THIS PAYMENT BOND 25% of the total Contract Amount	DESCRIPTION OF CONTRACT T-8000-0399 MARC III Kawasaki Coaches (63) Overhaul
DATE OF BOND (Shall be no later than date on Contract)	DATE OF CONTRACT (To be filled in by the Administration)
State of Maryland by and through the following Administration acting for the Maryland Department of Transportation: MARYLAND TRANSIT ADMINISTRATION	

KNOW ALL MEN BY THESE PRESENTS, That we, the principal named below and Surety named below, being authorized to do business in Maryland, and having business addresses as shown below are held and firmly bound unto the obligee named above in the Penal Sum of this Performance Bond stated above, for the payment of which Penal Sum we bind ourselves, our heirs, executors, administrators, personal representatives, successors, and assigns, jointly and severally, firmly by these presents. However, where Surety is composed of corporations acting as co-sureties, we, the co-sureties, bind ourselves, our successors and assigns, in such Penal Sum jointly and severally as well as severally only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each co-surety binds itself, jointly and severally with the Principal, for the payment of such sum as appears above its name below, but if no limit of liability is indicated, the limit of such liability shall be the full amount of the Penal Sum.

WHEREAS, Principal has entered into or will enter into a contract with the State of Maryland, by and through the Administration named above acting for the State of Maryland, which contract is described and dated as shown above, and incorporated herein by reference. The contract and all items incorporated into the contract, together with any and all changes, extensions of time, alterations, modifications, or additions to the contract or to the work to be performed thereunder or to the Plans, Specifications, and Special Provisions, or any of them, or to any other items incorporated into the contract shall hereinafter be referred to as "the Contract".

WHEREAS, it is one of the conditions precedent to the final award of the Contract that these presents be executed.

NOW, THEREFORE, during the original term of said Contract, during any extensions thereto that may be granted by the Administration, and during the guarantee and warranty period, if any, required under the Contract, unless otherwise stated therein, this Performance Bond shall remain in full force and effect unless and until the following terms and conditions are met:

1. Principal shall well and truly perform the Contract; and
2. Principal and Surety shall comply with the terms and conditions contained in this Performance Bond.

Whenever Principal shall be declared by the Administration to be in default under the Contract, the Surety may, within fifteen (15) days after notice of default from the Administration, notify the Administration of its election to either promptly proceed to remedy the default or promptly proceed to complete the Contract in accordance with and subject to it terms and conditions. In the event the Surety does not elect to exercise either of the above stated options, then the Administration thereupon shall have the remaining contract work completed, Surety to remain liable hereunder for all expenses of completion up to but not exceeding the penal sum stated above.

The Surety hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this Performance Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

This Performance Bond shall be governed by and construed in accordance with the laws of the State of Maryland and any reference herein to Principal or Surety in the singular shall include all entities in the plural who or which are signatories under the Principal or Surety heading below.

IN WITNESS WHEREOF, Principal and Surety have set their hands and seals to this Performance Bond. If any individual is a signatory under the Principal heading below, then each such individual has signed below on his or her own behalf, has set forth below the name of the firm, if any, in whose name he or she is doing business, and has set forth below his or her title as a sole proprietor. If any partnership or joint venture is a signatory under the Principal heading below, then all members of each such partnership or joint venture have signed below, each member has set forth below the name of the partnership or joint venture, and each member has set forth below his or her title as a general partner, limited partner, or member of joint venture, whichever is applicable. If any corporation is a signatory under the Principal or Surety heading below, then each such corporation has caused the following: the corporation's name to be set forth below, a duly authorized representative of the corporation to sign below on behalf of the corporation, a duly authorized representative of the corporation to affix below the corporation's seal and each such duly authorized representative to sign below and to set forth below his or her title as a representative of the corporation. If any individual acts as a witness to any signature below, then each such individual has signed below and has set forth below his or her title as a witness. All of the above has been done as of the Date of Bond shown above.

FILL IN BELOW WHERE APPLICABLE. PLEASE TYPE OR PRINT ALL INFORMATION TO BE FILLED IN BELOW, EXCEPT WHERE A SIGNATURE IS INDICATED.

PRINCIPAL
1. Firm Name: Address: CORPORATE SEAL Signature: _____ Name & Title:_____ State of Incorporation: _____ Attest or Witness: _____ (Signature) Name & Title: _____
2. Firm Name: Address: CORPORATE SEAL Signature: _____ Name & Title:_____ State of Incorporation: _____ Attest or Witness: _____ (Signature) Name & Title: _____
3. Firm Name: Address: CORPORATE SEAL Signature: _____ Name & Title:_____ State of Incorporation: _____ Attest or Witness: _____ (Signature) Name & Title: _____

SURETY - CORPORATE ONLY

SURETY A	Surety Name: Address: Signature: _____ Name & Title: _____ Attest: _____ (Signature) Name & Title: _____	LIABILITY LIMIT $ (SEAL) State of Incorporation: _____
SURETY B	Surety Name: Address: Signature: _____ Name & Title: _____ Attest: _____ (Signature) Name & Title: _____	LIABILITY LIMIT $ (SEAL) State of Incorporation: _____
SURETY C	Surety Name: Address: Signature: _____ Name & Title: _____ Attest: _____ (Signature) Name & Title: _____	LIABILITY LIMIT $ (SEAL) State of Incorporation: _____

APPROVED AS TO FORM AND LEGAL SUFFICIENCY:

_____ OF _____, 20____.

_____

Chief Counsel

EXHIBIT H
SUBSTANCE ABUSE

Substance Abuse Prevention

MTA'S CONTRACTORS COMPLIANCE REQUIREMENTS

A. The Federal Transit Administration requires that any contractors employed to "STAND IN THE SHOES" of MTA Safety Sensitive employees must be in compliance with 49 CFR Part 40, (Procedures for Transportation Workplace Drug and Alcohol Testing Programs) and 49 CFR Part 655 (Prevention of Alcohol Misuse and Prohibited Drug Use in Transit Operations) at the risk of cancellation of the contract. The contractor must also comply with any amendments or revisions to 49 CFR Parts 40 and/or 655 which could become effective during the contract period. MTA is responsible to assure such compliance and will do so via on-site audits of personnel, facilities, record keeping and reporting requirements as well as monitoring various monthly and quarterly reports. The definition of FTA Safety Sensitive function and covered employee is set forth in 49 CFR part 655.4, definitions.

B. Any MTA Senior Manager responsible for administering a contract which meets the quoted criteria of "A", above, or who is responsible for the procurement of such a contract after 01/01/95 is responsible for:

1. Notifying in writing all contract service and maintenance providers of applicable regulatory requirements and the need for compliance.

2. Providing each contractor with a copy of the regulatory requirements.

3. Requiring each contractor to sign a "Confirmation of Receipt" form acknowledging receipt of the regulations.

4. Informing contractors of their record keeping and reporting requirements to the MTA, including retention of records, quarterly Management Information System (MIS) reporting on drug and alcohol results, quarterly certification of compliance, and monthly completion of the MTA date and time analysis report. Other reporting requirements may be directed by the MTA at any time.

4a. Retention of record requirements as listed in subpart H-Administrative Requirements of 49 CFR Part 655.71.

4b. Management Information System (MIS) requirements as listed in subpart H-Administrative Requirements of 49 CFR 655.72. Contractors shall complete and submit this calendar year report in quarterly increments.

4c. Certification of Compliance requirements as listed in subpart I-Certifying Compliance of 49 CFR Parts 655.81 and 655.83. Contractors shall certify their compliance each quarter with submission of their quarterly MIS reports to the MTA. The certification must be authorized by the organizations governing board or other authorizing official.

4d. The Monthly Date and Time Analysis report requires that each contractor update and maintain a Microsoft Office Excel spreadsheet on FTA drug and alcohol testing based upon random, post accident and reasonable suspicion directed testing. This report shall be submitted to the MTA by the 15th of the month following the month of record. This spreadsheet shall capture the name, date of hire, type of testing, date & time the testing appointment form was issued by a supervisor, time of arrival & departure at the collection center, specimen collection time, and work schedule of the employee tested.

C. The contractor shall establish and maintain a "Stand in the Shoes" policy in accordance with 49 CFR Parts 40 and 655 which shall contain:

1. A policy statement regarding drug use and alcohol misuse. The policy must contain the required elements of an anti-drug use and alcohol misuse program as outlined in 49 CFR Parts 655.12, 655.15, and 655.16

2. An employee training and education program which meets the requirements of 49 CFR 655.14.

3. A testing program for covered employees as described in 49 CFR 655 Subparts C and D which meets the requirements of this part and 49 CFR Part 40.

4. Procedures for referring a covered employee who has a verified positive drug test result or an alcohol concentration of 0.04 or greater to a Substance Abuse Professional consistent with 49 CFR Part 40.

This policy must comply with requirements of the MTA Medical Services Section in determining FTA compliance. Contractors shall comply with modification and policy revision requests as deemed appropriate by MTA Medical Services.

D. The MTA designee responsible for contractor administration shall register contractors required to establish and maintain the above FTA drug and alcohol compliance policy. Contractor shall provide names, addresses and telephone numbers for the persons responsible for monitoring and maintaining daily compliance.

E. MTA contractors, which fall under FTA Authority, shall comply with all sections of 49 CFR Parts 40 and 655. MTA shall monitor compliance through on-site audits of personnel, facilities, record keeping and reporting requirements. Corrective action may be directed by the MTA at any time to ensure policy compliance or as otherwise required. Failure on the part of any contractor to comply with the requirements as outlined in this Appendix C, denying on-site access of MTA personnel to records, reports, and

supporting documentation, or failing to implement and maintain corrective action determined necessary by MTA, may result in the suspension of payment(s) until such time corrective action complies with MTA requirements. Further, failure to comply with the requirements in this Appendix C may result in the loss or suspension of the contract.

F. Contractors who outsource all or any portion of their drug and alcohol prevention program responsibilities to consultants, consortiums, third party administrator's (TPA) or others shall ensure that those parties will cooperate and comply with the requirements applicable to MTA contractors as contained herein.

G. Any contractor subcontracting any portion of its transit service contractual responsibilities (i.e. paratransit utilizing subcontracted vans and/or taxi cabs) shall ensure at it's own expense, that their 'subcontractors' are in full compliance with 49 CFR Parts 40 and 655. Further, all reporting, documentation, retention of records, access to records, on-site auditing by MTA, and access to any documentation to support FTA compliance as described herein Appendix C, is made available to the MTA. Any failure to comply or cooperate with the MTA may result in the suspension of payment to the contractor and may result in the loss or suspension of the contract.

H. [For the purposes of paragraph G above, and its impact on subcontracting with taxi drivers and other transportation providers, the FTA final ruling of Regulatory Information is provided for your review. Published on April 30, 2001, this ruling can be found in the notice of proposed rulemaking (NPRM) proposing changes to conform its drug and alcohol testing regulation (49 CFR Part 655) to the December 19, 2000 revision of DOT's transportation workplace testing procedures at 49 CFR Part 40.]

> "The intent of FTA's regulatory scheme is not to impose federal regulations on the taxi industry; however, taxi companies that contract with transportation service providers receiving federal transit funds are subject to compliance with the drug and alcohol rules. FTA policy continues to recognize the practical difficulty of administering a drug and alcohol-testing program to taxi companies that only incidentally provide transit service. Therefore, the drug and alcohol testing rules apply when the transit provider enters into a contract with one or more entities to provide taxi service. The rules do not apply when the patron (using subsidized vouchers) selects the taxi company that provides the transit service".

EXHIBIT I
CERTIFICATION OF COMPLIANCE
WITH AMERICAN DISABILITY ACT

EXHIBIT I

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

CERTIFICATE OF COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT

The Offeror shall certify that the overhauled vehicles and all ancillary equipment proposed to be provided meet all applicable requirements as contained in 49 CFR, Parts 27, 37 and 38, Final Rule; as published by the U.S. Department of Transportation implementing the transportation provisions of the Americans with Disabilities Act (ADA).

Authorized Signee: _____

Title: _____

Date: _____

Company: _____

EXHIBIT J
ELECTRONIC FUNDS TRANSFER

ELECTRONIC FUNDS TRANSFER

PAYMENTS TO CONTRACTORS BY ELECTRONIC FUNDS TRANSFER

Every solicitation for a contract expected to exceed $200,000 is required to contain the following provision:

The Bidder agrees to accept payments by electronic funds transfer unless the State Comptroller's Office grants an exemption. The selected Bidder shall register using the attached form COT/GAD X-10 Vendor Electronic Funds (EFT) Registration Request Form. Any request for exemption must be submitted to the State Comptroller's Office for approval at the address specified on the COT/GAD X-10 form and must include the business identification information as stated on the form and include the reason for the exemption.

Once a contractor registers to receive payments electronically, all State payments to the contractor (including payments under other State contracts regardless of value) will be disbursed via electronic funds transfer.

The following form should be used to apply for Electronic Funds with the State Comptroller's Office.

State of Maryland
Comptroller of Maryland

Vendor Electronic Funds Transfer (EFT) Registration Request Form

Date of request_____

Business identification information (Address to be used in case of default to check):
Business name_____
Address line 1_____
Address line 2_____
City_____ State_____
Zip Code □□□□□ - □□□□

Business taxpayer identification number:

Federal Employer Identification Number: □□ □□□□□□□
(or)
Social Security Number: □□□ □□ □□□□

Business contact name, title and phone number including area code. (And address if different from above).

Financial institution information:
Name and address_____
_____
Contact name and phone number including area code
_____
_____

ABA number □□□□□□□□□
Account number □□□□□□□□□□□□□□□□□
Account type □ Checking □ Money Market

A VOIDED CHECK from the bank account must be attached.

Transaction requested:
1._____ Initiate all disbursements via EFT to the above account.
2._____Discontinue disbursement via EFT, effective_____.

3._____Change the bank account to above information – a copy of the approved Registration Form for the previous bank account must be attached.

I am authorized by

*_____(hereinafter company)

To make the representations contained in this paragraph. Company authorizes the Comptroller and the Treasurer of Maryland to register it for electronic funds transfer (EFT) using the information contained in this registration form. Company agrees to receive all funds from the State of Maryland by electronic funds transfer according to the terms of the EFT program. Company agrees to return to the State of Maryland any EFT payment incorrectly disbursed by the State of Maryland to the Company's account. Company agrees to hold harmless the State of Maryland and its agencies and departments for any delays or errors caused by inaccurate or outdated registration information or by the financial institution listed above.

*Name of registering business entity

_____

Signature of company treasurer, controller or chief financial officer and date

Completed by GAD/STO

Date received_____

___

GAD registration information verified_____Date to STO_____

STO registration information verified_____Date to GAD_____

R*STARS Vendor No. and Mail Code Assigned:

_____ / _____ / _____ _____

_____

State Treasurer's Office approval date General Accounting approval date

_____

To Requestor:

Please retain a copy of this form for your records. Please allow approximately 30 days from the date of your request for the Comptroller's and Treasurer's Offices to process you request. Failure to maintain current information with this office could result in errors in payment processing. If you have any questions, please call the EFT registration desk at 410-260-7375.

Please submit form to: EFT Registration, General Accounting Division
Room 205, P.O. Box 746
Annapolis, Maryland 21404-0746

COT/GAD X-10

EXHIBIT K
INSURANCE REQUIREMENTS

INSURANCE REQUIREMENTS

The following requirements shall prevail:

A. The Contractor shall forward to the Procurement Officer prior to the execution of the Contract, a certificate of insurance issued by the Insurer (s), including special endorsements. If requested by the Engineer, the Contractor shall provide a certified copy of the actual policies and endorsement in addition to certificates. The contractor shall procure and pay for insurance specified herein issued by companies licensed and authorized to do business in the State of Maryland.

The Contractor shall furnish policies satisfactory to the Administration (hereinafter "Administration" refers to Maryland Transit Administration, Maryland Department of Transportation and the State of Maryland inclusively) as to contents and carrier; such insurance will contain the following provisions:

1. Sixty (60) day's prior notice to the Administration of cancellation.

2. Inclusion of the Administration, Engineer and their directors, officers, representatives agents and employees as additional Insured as respects work or operations in connection with the Contract.

3. Endorsement providing that such insurance is primary insurance and no insurance of the Administration will be called in to contribute to a loss.

4. The Contractor agrees to indemnify, defend, and hold harmless the Administration from and against all loss or expense (including costs and attorney's fees) by reason of liability imposed by law upon the Administration for damages because of bodily injury, including death, at any time arising therefore, sustained by any person or persons or on account of damage to property, including loss of use thereof arising out of or in consequence of the performance of this contract, whether such injuries to person(s) or damage to property is due or claimed to be due to the negligence of the Contractor, the Administration, their agents and employees, except only such injury or damage as shall have been occasioned by the sole negligence of the Administration. The above provisions are to be included in all subcontracts as specified herein under Paragraph D below.

B. If at any time above-required insurance policies should be canceled, terminated, or modified so that the insurance is not full force and effect as required herein, the Administration may terminate this Contract for default or obtain insurance coverage equal to the required herein, the cost of which shall be charged to the Contractor and deducted from any payments to the Contractor.

C. Insurance like that required of the Contractor shall be provided by or in behalf of all subcontractors of any tier and other entities to cover their operation(s) performed under this Contract.

D. Insurance Coverage: The coverage of insurance under such policy or policies shall be at policy limits not less than as specified herein.

1. Worker's Compensation and Employers' Liability (Coverage B): Providing statutory coverage in the State of Maryland, to include all States endorsement, United States Longshoremen and Harbor-Workers' Compensation Act, and employer's Liability (Coverage B), with a minimum limit of $500,000.00.

2. An occurrence form Comprehensive General Liability: To include Contractual Liability, Broad Form Property damage, Explosion, Collapse, and Underground Coverage, and Completed Operations Coverage. The Completed Operations Coverage shall remain in effect until two (2) years after the work has been accepted by the Administration. The Comprehensive General Liability Insurance shall have a minimum combined single limit of $2,000,000.00 and shall at no time have an aggregate limit of less than $2,000,000.00.

3. Comprehensive Business Automobile Liability: The policy or policies shall cover all automobiles defined as motor vehicles, whether owned, non-owned leased, or hired, to a minimum combined single limit for Bodily Injury and Property Damage of $2,000,000.00 and shall include, be endorsement, a waiver of subrogation with respect to the Administration.

4. Umbrella Liability: Provide an occurrence "umbrella" form of excess liability insurance containing coverage no less restrictive than that required in the underlying policies specified above. The required primary insurance shall be listed as underlying coverage in the first layer umbrella policy. The umbrella policies shall contain a minimum total occurrence and aggregate limit of: $5,000,000.

5. Contractor shall maintain in force for the full period of this contract insurance covering losses caused by pollution conditions that arise from the operations of the contractor described under the scope of services of this contract.

Insurance as required in paragraph 1 shall apply to bodily injury; property damage, including loss of use of damaged property or of property that has not been physically injured; cleanup costs; and defense, including costs and expenses incurred in the investigation, defense, or settlement of

claims. The policy of insurance affording these required coverage's shall be written in an amount of at least $5,000,000 per loss, with an annual aggregate of at least $5,000,000.

The policy of insurance as required in paragraph 1 shall be endorsed to include as an insured the MTA, its officers, and employees.

The policy of insurance as required in paragraph 1 shall be written by an insurer acceptable to the MTA.

If coverage as required in paragraph 1 is written on a claims-made basis, the Contractor warrants that any retroactive date applicable to coverage under the policy precedes the effective date of this contract; and that continuous coverage will be maintained or an extended discovery period will be exercised for a period of five (5) years beginning from the time that work under this contract is completed.

Contractor shall provide to MTA a certificate of insurance documenting the existence of coverage as required in paragraph 1 of this contract. The certificate shall be signed by a person authorized by the insurer to bind coverage on its behalf as described in the certificate. Such certificate shall be delivered to MTA before work under this contract commences.

If the scope of services as defined in this contract includes the disposal of any hazardous or non-hazardous materials from the job site, the Contractor must furnish to the MTA evidence of pollution legal liability insurance maintained by the disposal site operator for losses arising from the insured facility accepting waste under this contract. Coverage certified to the MTA under this paragraph must be maintained in minimum amounts of $5,000,000 per loss, with an annual aggregate of at least $5,000,000.

E. Within ten (10) calendar days, after notification of award, the Contractor shall provide, to the Contract Administration Division, a Certificate of Insurance. Said certificate shall verify that the Administration has been named an additional insured to the Contractor's above policies, and that the insurer, at its own expense will defend all parties insured, and that coverage is extended to cover all contractual obligations of the Contractor as contained in this Contract. (No work can commence until documentation is received for (D) above.)

F. If, at any time, the required insurance is canceled, terminated, or modified, so that coverage is not in full force and effect, the Administration may terminate the contract to that required - the cost of which shall be borne by the Contractor.

EXHIBIT L
EXPERIENCE REFERENCE FORM

EXHIBIT L – EXPERIENCE AND REFERENCES

Reference #1

Name_____

Address_____

_____

Contract Person_____

Phone Number_____

E-Mail Address_____

Period of Contract

From:_____

To:_____

Please describe what type of reference: (private or public entity, manufacturing, etc.) this is.

_____

_____

Please describe the nature of the services that you provided.

_____

_____

_____

Reference #2

Name_____

Address_____

_____

Contract Person_____

Phone Number_____

E-Mail Address_____

Period of Contract

From:_____

To:_____

Please describe what type of reference: (private or public entity, manufacturing, etc.) this is.

_____

_____

Please describe the nature of the services that you provided.

_____

_____

_____

Reference #3

Name_____

Address_____

Contract Person_____

Phone Number_____

E-Mail Address_____

Period of Contract

From:_____

To:_____

Please describe what type of reference: (private or public entity, manufacturing, etc.) this is.

Please describe the nature of the services that you provided.

EXHIBIT M
DEBARMENT CERTIFICATION

MARYLAND TRANSIT ADMINISTRATION
DEPARTMENT OF TRANSPORTATION

In accordance with UMTA Circular 2015.1, all potential contractors and subcontractors whose contract or subcontract is expected to exceed $25,000 are required to execute this Certification before such entity may participate in this Federally-funded contract.

CERTIFICATION OF PARTICIPANTS REGARDING DEBARMENT, SUSPENSION, AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

_____entity) certifies, by submission of this proposal, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declare ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. (If _____entity) is unable to certify to any of the statements in this certification, such participant shall attach an explanation to this Certification.

_____entity) CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET SEQ. ARE APPLICABLE THERETO.

Signature: _____

_____
Printed Name and Title of Authorized Official

State of _____: County (City) of _____:

On this ____ day of _____, 20____, before me,_____, the
(Name of Notary Public)

undersigned officer personally appeared, _____ , known to me to be the person described in the foregoing Affidavit and acknowledged that he (she) executed the same in the capacity therein stated and for the purposes therein contained. In witness whereof, I hereunto set my

hand and official seal. _____(Seal)
(Notary Public)

My Commission Expires: _____

EXHIBIT N
CERTIFICATE REGUARDING
LOBBYING

CERTIFICATION REGARDING LOBBYING

(To be submitted with each bid or offer exceeding $100,000)

The undersigned [Contractor] certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriate funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan or cooperative agreement.

(2) If any funds other than Federal appropriate funds have been paid or will be paid to any person for making lobbying contracts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form – LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to codified at 2 U.S.C. 1601, et seq.)]

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

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. & 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

[Note: Pursuant to 31 U.S.C. & 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each expenditure or failure.]

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, et seq., apply to this certification and disclosure, if any.

_____
Signature of Contractor's Authorized Official

_____
Name and Title of Contractor's Authorized Official

_____
Date

EXHIBIT O
REQUEST FOR APPROVED EQUALS

REQUEST FOR EXCEPTION/APPROVED EQUAL/CLARIFICATION

CONTRACT No.: T-8000-0399

NAME OF BIDDER:

TITLE OF DOCUMENT REFERENCE:

TYPE OF VEHICLE/EQUIPMENT:

PAGE & REFERENCE:

CONTRACT DOCUMENT REQUIREMENT:

BIDDER'S REQUEST:

APPROVED _____ DISAPPROVED _____

MTA RESPONSE:

NOTE:

Any request for an Approved Equal or Exception to the Specifications must be fully supported with technical data, test results and any other pertinent information available, as evidence that the substitute offered is equal to or better than the Specification Requirement. The MTA may require a bidder offering a substitute to supply additional descriptive material, a sample and/or a demonstration.

EXHIBIT P
CERTIFICATE OF LOWER TIER PARTICIPANTS

CERTIFICATION OF LOWER-TIER PARTICIPANTS
REGARDING
DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY
AND
VOLUNTARY EXCLUSION
(Applicable for subcontracts of $25,000 or more)

The Lower-Tier Participant (potential subcontractor under a major third party contract), _____, certifies, by submission of this proposal, that neither it nor
(Company Name)
its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(If the Lower-Tier Participant (potential subcontractor) is unable to certify to any of the statements in this certification, such participant shall attach an explanation of this proposal.)

THE LOWER-TIER PARTICIPANT (POTENTIAL SUBCONTRACTOR UNDER A MAJOR THIRD PARTY CONTRACT), _____,
(Company Name)

CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET SEQ. ARE APPLICABLE THERETO.

_____
Signature and Title of Authorized Official

_____
Company Name

_____
Address

_____
City, State, Zip Code

_____
Date

(FEDERAL - AID)

EXHIBIT Q
CERTIFICATE OF LOWER TIER PARTICIPANTS

STATE OF MARYLAND

DEPARTMENT OF TRANSPORTATION

MARYLAND TRANSIT ADMINISTRATION

DISADVANTAGED BUSINESS CERTIFICATE

Ref: Section 105(f) of the Surface Transportation Assistance Act of 1982 (U.S. Public Law 97-424) and Title 49 of the Code of Federal Regulations, Part 23, Subpart D.

The bidder or Offeror hereby certifies that, with regard to Contract No.**T-8000-0399**, the manufacturer, including second stage or final manufacturers have complied with the requirements of Section 23.67, Subpart D. of Title 49 of the Code of Federal Regulations, Part 23.

_____
Firm Name

BY: _____
Signature

_____
Print Name

_____
Title

EXHIBIT R
PROMPT PAYMENT
REQUIREMENTS

Prompt Pay Requirements

1. If a contractor withholds payment of an undisputed amount to its subcontractor, the Agency, at its option and in its sole discretion, may take one or more of the following actions:
    1.1 Not process further payments to the contractor until payment to the subcontractor is verified;
    1.2 Suspend all or some of the contract work without affecting the completion date(s) for the contract work;
    1.3 Pay or cause payment of the undisputed amount to the subcontractor from monies otherwise due or that may become due;
    1.4 Place a payment for an undisputed amount in an interest-bearing escrow account; or
    1.5 Take other or further actions as appropriate to resolve the withheld payment.
2. An "undisputed amount" means an amount owed by a contractor to a subcontractor for which there is no good faith dispute, including any retainage withheld, and includes an amount withheld because of issues arising out of an agreement or occurrence unrelated to the agreement under which the amount is withheld.
3. An act, failure to act, or decision of a procurement officer or a representative of the Agency, concerning a withheld payment between a contractor and subcontractor under this policy directive, may not:
    3.1 Affect the rights of the contracting parties under any other provision of law;
    3.2 Be used as evidence on the merits of a dispute between the Agency and the contractor in any other proceeding; or
    3.3 Result in liability against or prejudice the rights of the Agency.
4. The remedies enumerated above are in addition to those provided under COMAR 21.11.03.13 with respect to subcontractors that have contracted pursuant to the Minority Business Enterprise program.
5. To ensure compliance with certified MBE subcontract participation goals, the Agency may, consistent with COMAR 21.11.03.13, take the following measures:
    5.1 Verify that the certified MBEs listed in the MBE participation schedule actually are performing work and receiving compensation as set forth in the MBE participation schedule.
    5.2 This verification may include, as appropriate:

5.2.1 Inspecting any relevant records of the contractor;

5.2.2 Inspecting the jobsite; and

5.2.3 Interviewing subcontractors and workers.

5.2.4 Verification shall include a review of:

5.2.4.1 The contractor's monthly report listing unpaid invoices over 30 days old from certified MBE subcontractors and the reason for nonpayment; and

5.2.4.2 The monthly report of each certified MBE subcontractor, which lists payments received from the contractor in the preceding 30 days and invoices for which the subcontractor has not been paid.

5.3 If the Agency determines that a contractor is in noncompliance with certified MBE participation goals, then the Agency will notify the contractor in writing of its findings, and will require the contractor to take appropriate corrective action.

5.3.1 Corrective action may include, but is not limited to, requiring the contractor to compensate the MBE for work performed as set forth in the MBE participation schedule.

5.4 If the Agency determines that a contractor is in material noncompliance with MBE contract provisions and refuses or fails to take the corrective action that the Agency requires, then the Agency may:

5.4.1 Terminate the contract;

5.4.2 Refer the matter to the Office of the Attorney General for Appropriate action; or

5.4.3 Initiate any other specific remedy identified by the contract, including the contractual remedies required by this Directive regarding the payment of undisputed amounts.

5.5 Upon completion of the contract, but before final payment or release of retainage or both, the contractor shall submit a final report, in affidavit form under the penalty of perjury, of all payments made to, or withheld from MBE subcontractors.

EXHIBIT S
FTA CLAUSES

FLY AMERICA REQUIREMENTS
49 U.S.C. § 40118
41 CFR Part 301-10

Fly America Requirements

The Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation.

2. BUY AMERICA REQUIREMENTS
49 U.S.C. 5323(j)
49 C.F.R. Part 661

Buy America - The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, microcomputer equipment, software, and small purchases (currently less than $100,000) made with capital, operating, or planning funds. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic content.

A bidder or offeror must submit to the FTA recipient the appropriate Buy America certification (below) with all bids or offers on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

4. CARGO PREFERENCE REQUIREMENTS
46 U.S.C. 1241
46 CFR Part 381

Cargo Preference - Use of United States-Flag Vessels - The contractor agrees: a. to use privately owned United States-Flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to the underlying contract

to the extent such vessels are available at fair and reasonable rates for United States-Flag commercial vessels; b. to furnish within 20 working days following the date of loading for shipments originating within the United States or within 30 working days following the date of leading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of -lading in English for each shipment of cargo described in the preceding paragraph to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590 and to the FTA recipient (through the contractor in the case of a subcontractor's bill-of-lading.) c. to include these requirements in all subcontracts issued pursuant to this contract when the subcontract may involve the transport of equipment, material, or commodities by ocean vessel.

6. ENERGY CONSERVATION REQUIREMENTS
42 U.S.C. 6321 et seq.
49 CFR Part 18

Energy Conservation - The contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

7. CLEAN WATER REQUIREMENTS
33 U.S.C. 1251

Clean Water - 1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

2) The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

11. ACCESS TO RECORDS AND REPORTS
49 U.S.C. 5325
18 CFR 18.36 (i)
49 CFR 633.17

Access to Records - The following access to records requirements apply to this Contract:

2. Where the Purchaser is a State and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 633.17, Contractor agrees to provide the Purchaser, the FTA Administrator or his authorized representatives, including any PMO Contractor, access to the Contractor's records and construction sites pertaining to a major capital project, defined at 49

U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311. By definition, a major capital project excludes contracts of less than the simplified acquisition threshold currently set at $100,000.

12. FEDERAL CHANGES
49 CFR Part 18

Federal Changes - Contractor shall at all times comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Agreement (Form FTA MA(10) dated October, 2003) between Purchaser and FTA, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

15. RECYCLED PRODUCTS
42 U.S.C. 6962
40 CFR Part 247
Executive Order 12873

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

19. NO GOVERNMENT OBLIGATION TO THIRD PARTIES

No Obligation by the Federal Government.

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

2) The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

20. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS

31 U.S.C. 3801 et seq.
49 CFR Part 31 18 U.S.C. 1001
49 U.S.C. 5307

Program Fraud and False or Fraudulent Statements or Related Acts.

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

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

3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

21. TERMINATION

49 U.S.C. Part 18
FTA Circular 4220.1E

a. Termination for Convenience (General Provision) The (Recipient) may terminate this contract, in whole or in part, at any time by written notice to the Contractor when it is in the Government's best interest. The Contractor shall be paid its costs, including contract close-out costs, and profit on work performed up to the time of termination. The Contractor shall promptly submit its termination claim to (Recipient) to be paid the Contractor. If the Contractor has any property in its possession belonging to the (Recipient), the Contractor will account for the same, and dispose of it in the manner the (Recipient) directs.

b. Termination for Default [Breach or Cause] (General Provision) If the Contractor does not deliver supplies in accordance with the contract delivery schedule, or, if the contract is for services, the Contractor fails to perform in the manner called for in the contract, or if the Contractor fails to comply with any other provisions of the contract, the (Recipient) may terminate this contract for default. Termination shall be effected by serving a notice of termination on the contractor setting forth the manner in which the Contractor is in default. The contractor will only be paid the contract price for supplies delivered and accepted, or services performed in accordance with the manner of performance set forth in the contract.

If it is later determined by the (Recipient) that the Contractor had an excusable reason for not performing, such as a strike, fire, or flood, events which are not the fault of or are beyond the control of the Contractor, the (Recipient), after setting up a new delivery of performance schedule, may allow the Contractor to continue work, or treat the termination as a termination for convenience.

c. Opportunity to Cure (General Provision) The (Recipient) in its sole discretion may, in the case of a termination for breach or default, allow the Contractor [an appropriately short period of time] in which to cure the defect. In such case, the notice of termination will state the time period in which cure is permitted and other appropriate conditions

If Contractor fails to remedy to (Recipient)'s satisfaction the breach or default of any of the terms, covenants, or conditions of this Contract within [ten (10) days] after receipt by Contractor of written notice from (Recipient) setting forth the nature of said breach or default, (Recipient) shall have the right to terminate the Contract without any further obligation to Contractor. Any such termination for default shall not in any way operate to preclude (Recipient) from also pursuing all available remedies against Contractor and its sureties for said breach or default.

d. Waiver of Remedies for any Breach In the event that (Recipient) elects to waive its remedies for any breach by Contractor of any covenant, term or condition of this Contract, such waiver by (Recipient) shall not limit (Recipient)'s remedies for any succeeding breach of that or of any other term, covenant, or condition of this Contract.

e. Termination for Convenience (Professional or Transit Service Contracts) The (Recipient), by written notice, may terminate this contract, in whole or in part, when it is in the Government's interest. If this contract is terminated, the Recipient shall be liable only for payment under the payment provisions of this contract for services rendered before the effective date of termination.

f. Termination for Default (Supplies and Service) If the Contractor fails to deliver supplies or to perform the services within the time specified in this contract or any extension or if the Contractor fails to comply with any other provisions of this contract, the (Recipient) may terminate this contract for default. The (Recipient) shall terminate by delivering to the Contractor a Notice of Termination specifying the nature of the default. The Contractor will only be paid the contract price for supplies delivered and

accepted, or services performed in accordance with the manner or performance set forth in this contract.

If, after termination for failure to fulfill contract obligations, it is determined that the Contractor was not in default, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the Recipient.

g. Termination for Default (Transportation Services) If the Contractor fails to pick up the commodities or to perform the services, including delivery services, within the time specified in this contract or any extension or if the Contractor fails to comply with any other provisions of this contract, the (Recipient) may terminate this contract for default. The (Recipient) shall terminate by delivering to the Contractor a Notice of Termination specifying the nature of default. The Contractor will only be paid the contract price for services performed in accordance with the manner of performance set forth in this contract.

If this contract is terminated while the Contractor has possession of Recipient goods, the Contractor shall, upon direction of the (Recipient), protect and preserve the goods until surrendered to the Recipient or its agent. The Contractor and (Recipient) shall agree on payment for the preservation and protection of goods. Failure to agree on an amount will be resolved under the Dispute clause.

If, after termination for failure to fulfill contract obligations, it is determined that the Contractor was not in default, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the (Recipient).

h. Termination for Default (Construction) If the Contractor refuses or fails to prosecute the work or any separable part, with the diligence that will insure its completion within the time specified in this contract or any extension or fails to complete the work within this time, or if the Contractor fails to comply with any other provisions of this contract, the (Recipient) may terminate this contract for default. The (Recipient) shall terminate by delivering to the Contractor a Notice of Termination specifying the nature of the default. In this event, the Recipient may take over the work and compete it by contract or otherwise, and may take possession of and use any materials, appliances, and plant on the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to the Recipient resulting from the Contractor's refusal or failure to complete the work within specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the Recipient in completing the work.

The Contractor's right to proceed shall not be terminated nor the Contractor charged with damages under this clause if-

1. the delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include: acts of God, acts of the Recipient, acts of another Contractor in the

performance of a contract with the Recipient, epidemics, quarantine restrictions, strikes, freight embargoes; and

2. the contractor, within [10] days from the beginning of any delay, notifies the (Recipient) in writing of the causes of delay. If in the judgment of the (Recipient), the delay is excusable, the time for completing the work shall be extended. The judgment of the (Recipient) shall be final and conclusive on the parties, but subject to appeal under the Disputes clauses.

If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of the Recipient.

i. Termination for Convenience or Default (Architect and Engineering) The (Recipient) may terminate this contract in whole or in part, for the Recipient's convenience or because of the failure of the Contractor to fulfill the contract obligations. The (Recipient) shall terminate by delivering to the Contractor a Notice of Termination specifying the nature, extent, and effective date of the termination. Upon receipt of the notice, the Contractor shall (1) immediately discontinue all services affected (unless the notice directs otherwise), and (2) deliver to the Contracting Officer all data, drawings, specifications, reports, estimates, summaries, and other information and materials accumulated in performing this contract, whether completed or in process.

If the termination is for the convenience of the Recipient, the Contracting Officer shall make an equitable adjustment in the contract price but shall allow no anticipated profit on unperformed services.

If the termination is for failure of the Contractor to fulfill the contract obligations, the Recipient may complete the work by contact or otherwise and the Contractor shall be liable for any additional cost incurred by the Recipient.

If, after termination for failure to fulfill contract obligations, it is determined that the Contractor was not in default, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the Recipient.

j. Termination for Convenience of Default (Cost-Type Contracts) The (Recipient) may terminate this contract, or any portion of it, by serving a notice or termination on the Contractor. The notice shall state whether the termination is for convenience of the (Recipient) or for the default of the Contractor. If the termination is for default, the notice shall state the manner in which the contractor has failed to perform the requirements of the contract. The Contractor shall account for any property in its possession paid for from funds received from the (Recipient), or property supplied to the Contractor by the (Recipient). If the termination is for default, the (Recipient) may fix the fee, if the contract provides for a fee, to be paid the contractor in proportion to the value, if any, of work performed up to the time of termination. The Contractor shall promptly submit its termination claim to the

(Recipient) and the parties shall negotiate the termination settlement to be paid the Contractor.

If the termination is for the convenience of the (Recipient), the Contractor shall be paid its contract close-out costs, and a fee, if the contract provided for payment of a fee, in proportion to the work performed up to the time of termination.

If, after serving a notice of termination for default, the (Recipient) determines that the Contractor has an excusable reason for not performing, such as strike, fire, flood, events which are not the fault of and are beyond the control of the contractor, the (Recipient), after setting up a new work schedule, may allow the Contractor to continue work, or treat the termination as a termination for convenience.

22. GOVERNMENT-WIDE DEBARMENT AND SUSPENSION (NONPROCUREMENT)

Suspension and Debarment

This contract is a covered transaction for purposes of 49 CFR Part 29. As such, the contractor is required to verify that none of the contractor, its principals, as defined at 49 CFR 29.995, or affiliates, as defined at 49 CFR 29.905, are excluded or disqualified as defined at 49 CFR 29.940 and 29.945.

The contractor is required to comply with 49 CFR 29, Subpart C and must include the requirement to comply with 49 CFR 29, Subpart C in any lower tier covered transaction it enters into.

By signing and submitting its bid or proposal, the bidder or proposer certifies as follows:

The certification in this clause is a material representation of fact relied upon by **{insert agency name}**. If it is later determined that the bidder or proposer knowingly rendered an erroneous certification, in addition to remedies available to **{insert agency name}**, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment. The bidder or proposer agrees to comply with the requirements of 49 CFR 29, Subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

23. PRIVACY ACT
5 U.S.C. 552

Contracts Involving Federal Privacy Act Requirements - The following requirements apply to the Contractor and its employees that administer any system of records on behalf of the Federal Government under any contract:

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

2) The Contractor also agrees to include these requirements in each subcontract to administer any system of records on behalf of the Federal Government financed in whole or in part with Federal assistance provided by FTA.

24. CIVIL RIGHTS REQUIREMENTS

29 U.S.C. § 623, 42 U.S.C. § 2000
42 U.S.C. § 6102, 42 U.S.C. § 12112
42 U.S.C. § 12132, 49 U.S.C. § 5332
29 CFR Part 1630, 41 CFR Parts 60 et seq.

Civil Rights - The following requirements apply to the underlying contract:

1) Nondiscrimination - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

2) Equal Employment Opportunity - The following equal employment opportunity requirements apply to the underlying contract:

   a) Race, Color, Creed, National Origin, Sex - In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or

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

b) Age - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § § 623 and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

c) Disabilities - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

3) The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

25. BREACHES AND DISPUTE RESOLUTION
49 CFR Part 18
FTA Circular 4220.1E

Disputes - Disputes arising in the performance of this Contract which are not resolved by agreement of the parties shall be decided in writing by the authorized representative of (Recipient)'s [title of employee]. This decision shall be final and conclusive unless within [ten (10)] days from the date of receipt of its copy, the Contractor mails or otherwise furnishes a written appeal to the [title of employee]. In connection with any such appeal, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of its position. The decision of the [title of employee] shall be binding upon the Contractor and the Contractor shall abide be the decision.

Performance During Dispute - Unless otherwise directed by (Recipient), Contractor shall continue performance under this Contract while matters in dispute are being resolved.

Claims for Damages - Should either party to the Contract suffer injury or damage to person or property because of any act or omission of the party or of any of his employees, agents or others for whose acts he is legally liable, a claim for damages therefor shall be made in writing to such other party within a reasonable time after the first observance of such injury of damage.

Remedies - Unless this contract provides otherwise, all claims, counterclaims, disputes and other matters in question between the (Recipient) and the Contractor arising out of or relating to this agreement or its breach will be decided by arbitration if the parties mutually agree, or in a court of competent jurisdiction within the State in which the (Recipient) is located.

Rights and Remedies - The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law. No action or failure to act by the (Recipient), (Architect) or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

30. INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION (FTA) TERMS
FTA Circular 4220.1E

Incorporation of Federal Transit Administration (FTA) Terms - The preceding provisions include, in part, certain Standard Terms and Conditions required by DOT, whether or not expressly set forth in the preceding contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1E, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any (name of grantee) requests which would cause (name of grantee) to be in violation of the FTA terms and conditions.

EXHIBIT T
CERTIFICATE FOR FEDERAL-AID CONTRACTS

STATE OF MARYLAND

DEPARTMENT OF TRANSPORTATION

MARYLAND TRANSIT ADMINISTRATION

CERTIFICATION FOR FEDERAL-AID CONTRACTS

The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer of employee of any Federal agency, a Member of Congress, an officer of employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

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

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. 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.

The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such subrecipients shall certify and disclose accordingly.

Date: _____ By: _____

Title: _____

For: _____

EXHIBIT U
FASTNER CERTIFICATION

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION
CERTIFICATION OF FASTENER COMPLIANCE

The Offeror hereby certifies that all fasteners supplied for Contract No. **T-8000-0399** meet all applicable Federal, State, and local laws and ordinances, are appropriate for the intended application, and meet the requirements of this specification.

Date: _____

By: _____

Title: _____

For: _____

EXHIBIT V
BUY AMERICA CERTIFICATE

EA2.02
BUY AMERICA CERTIFICATE

Certificate of Compliance with 49 U.S.C. 5323 (j) (2) (C) .

The bidder or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323 (j) (2) (C) and the regulations at 49 CFR Part 661.

Date: _____

Signature: _____

Company Name: _____

Title: _____

OR

Certificate of Non-Compliance with 49 U.S.C. 5323 (j) (2) (C)

The bidder or Offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323 (j) (2) (C), but may qualify for an exception pursuant to 49 U.S.C. 5323 (j) (2) (B) or (j) (2) (D) and the regulations in 49 CFR 661.7.

Date: _____

Signature: _____

Company Name: _____

Title: _____

EXHIBIT W
TRUTH IN NEGOTIATION
CERTIFICATE

EXHIBIT W
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
TRUTH-IN-NEGOTIATION CERTIFICATE

For the work described as:
T-8000-0399
MARC III Kawasaki Coaches (63) Overhaul

I hereby certify that I am the _____ (Title) and duly authorized representative of the Contractor whose name is _____and whose address is: _____

In connection with the Contractor's price proposal for this negotiated or change order contract which is to be submitted to the Board of Public Works of the State of Maryland for approval, I hereby certify, to the best of my knowledge, information and belief, that:

(a) The wage rates and other factual unit costs supporting the firm's compensation, as set forth in the proposal, are accurate, complete, and current as of the time of the contracting.

(b) It is my understanding and the understanding of the Contractor I here represent that if any of the items of compensation under the above mentioned contract were increased due to the furnishing of inaccurate, incomplete, or non-current wage rates or other units of costs, the Administration is entitled to an adjustment in all appropriate items of compensation, including profit, to exclude any significant sum by which the price was increased because of the defective data. It is also my understanding and that of the Contractor I here represent that the Administration's right of adjustment includes the right to a price adjustment for defects in cost or pricing data submitted by a prospective or actual subcontractor.

(c) It is my understanding and the understanding of the Contractor I here represent that if additions are made to the original price of the contract, such additions may be adjusted to exclude any significant sums where it is determined the price has been increased due to inaccurate, incomplete or non-current wage rates and other factual costs.

_____ _____
Date Signature

SWORN TO AND SUBSCRIBED TO BEFORE ME this _____day of _____, 2013

Printed Name of Notary Public _____

Signature of Notary Public _____

My Commission Expires _____ **(SEAL)**

EXHIBIT X
VEHICLE INFORMATION
QUESTIONNAIRE

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

VEHICLE INFORMATION QUESTIONNAIRE

The following questionnaire is required to be completed and returned with the Proposal. The Questionnaire responses will be used by the MTA in evaluating technical responsiveness. If more than one manufacturer will supply equipment for a system, list the additional information on a separate sheet with reference to the applicable paragraph.

1. PRIME CONTRACTOR/MANUFACTURER

1. Name: _____
2. Address: _____
3. Parent Company (if applicable): _____
4. Address: _____

   _____
5. Project Manager: _____
6. Telephone:

2. STEPWELL SURFACE UPGRADE

1. Manufacturer: _____
2. Address: _____

   _____
3. Material: _____

3. PARKING BRAKE CABLE UPGRADE (OPTION)

1. Manufacturer: _____
2. Address: _____

   _____
3. Model: _____

4. SLIP-SLIDE CORRECTION SYSTEM (OPTION)

1. Manufacturer: _____
2. Address: _____
   _____
3. Model: _____

5. TOILET ROOM MODULE (OPTION)

1. Manufacturer: _____
2. Address: _____
   _____

6. HVAC TEMPERATURE CONTROLLER

1. Manufacturer: _____
2. Address: _____
   _____
3. Model: _____

7. HVAC SCROLL COMPRESSOR

1. Manufacturer: _____
2. Address: _____
   _____
3. Model: _____

8. INTERIOR LIGHTING LED UPGRADE (OPTION)

1. Manufacturer: _____
2. Address: _____
   _____
3. Model: _____

9. EXTERIOR LIGHTING LED UPGRADE (OPTION)

1. Manufacturer: _____
2. Address: _____
   _____
3. Model: _____

10. COMMUNICATION SYSTEM UPGRADE

1. Manufacturer: _____
2. Address: _____
   _____
3. Model: _____

11. PA AMPLIFIER

1. Manufacturer: _____
2. Address: _____
   _____
3. Model: _____

12. PA CONTROL HEAD

1. Manufacturer: _____
2. Address: _____
   _____
3. Model: _____

13. PASSENGER EMERGENCY INTERCOM (PEI)

1. Manufacturer: _____
2. Address: _____
   _____
3. Model: _____

14. AUTOMATIC ANNOUNCEMENT SYSTEM (AAS)

1. Manufacturer: _____
2. Address: _____

   _____
3. Model: _____

15. OPERATORS SEAT UPGRADE (OPTION)

1. Manufacturer: _____
2. Address: _____

   _____
3. Model: _____

EXHIBIT Y
SERVICE AND PARTS INFORMATION

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **STEPWELL SURFACE** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **SLIP-SLIDE CORRECTION SYSTEM** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **TOILET ROOM MODULE** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **HVAC TEMPERATURE CONTROLLER** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **HVAC SCROLL COMPRESSOR** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **OPERATOR'S SEAT** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **INTERIOR LIGHTING LED UPGRADE** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **EXTERIOR LIGHTING LED UPGRADE** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **COMMUNICATION SYSTEM UPGRADE** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **PA AMPLIFIER** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **PA CONTROL HEAD** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **PASSENGER EMERGENCY INTERCOM (PEI)** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION

SERVICE AND PARTS INFORMATION

The Proposer shall state below the representative responsible for assisting the MTA, as well as the location of the nearest distribution center which shall furnish a complete supply of parts and components for the repair and maintenance of the **AUTOMATIC ANNOUNCEMENT SYSTEM (AAS)** to be supplied.

I. Identification of nearest Technical Service Representative to be assigned to MTA through the duration of contract performance including warranty period:

Name: _____

Address: _____

Telephone: _____

II. Identification of Parts Representative and nearest Parts Distribution Center to MTA.

Name: _____

Address: _____

Telephone: _____

EXHIBIT Z
GENERAL PROVISIONS FOR
PURCHASE CONTRACTS

MARYLAND TRANSIT ADMINISTRATION

GENERAL PROVISIONS

FOR

PURCHASE CONTRACTS

MARC III KAWASAKI COACHES (63) OVERHAUL

CONTRACT NO. T-8000-0399

GENERAL PROVISIONS FOR PURCHASE CONTRACTS

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GENERAL PROVISIONS FOR PURCHASE CONTRACTS

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STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION

MARYLAND TRANSIT ADMINISTRATION
GENERAL PROVISIONS FOR PURCHASE CONTRACTS

1. Definitions and Abbreviation

Administration	-	Maryland Transit Administration
COMAR	-	Code of Maryland Regulations
MTA	-	Maryland Transit Administration
Procurement Officer	-	Any person authorized by a State agency in accordance with law or regulations to formulate, enter into, or administer contracts or make written determinations and findings with respect to them. The term also includes an authorized representative acting within the limits of authority.
State	-	Refers to the State of Maryland
FTA	-	Federal Transit Administration, United States Department of Transportation

2. Preparation of Bids:

a. Failure to examine any drawings, specifications and instructions will be at bidder's risk.

b. All prices and notations must be printed in ink or typewritten. All erasures or alterations shall be initialed by the signer in ink. Each addendum to the solicitation bid documents shall be acknowledged on the bid form.

c. Price each bid item separately. Unit prices shall be shown, and a total price shall be entered for each bid item. In the event of a discrepancy between the unit bid prices and the extensions (product of quantity and unit price), the unit price shall govern. In the event that the unit price is not included, the unit price shall be the extended price divided by the quantity.

d. Brand names: Any reference to brand names and model numbers in the specifications is descriptive, but not restrictive, unless otherwise specified. Bids on equivalent items meeting standards of quality thereby indicated will be considered, unless otherwise specified, providing the bid clearly describes the article offered. Unless the bidder specifies otherwise in his bid, it is understood that the bidder is offering referenced brand items as specified in the specifications. The MTA reserves the right to determine whether a substitute offer is equivalent to and meets the standards of quality indicated by the brand name references; and the MTA may require a bidder offering a substitute to supply additional descriptive material and a sample.

e. Time of delivery is a part of the bid and must be adhered to. Time, if stated in a

number of days, all mean calendar days.

3. Incorporation by Reference:

   All terms and conditions of the solicitation, and any amendments thereto, are made a part of this contract.

4. Explanations:

   Any explanation desired by a prospective bidder regarding any of the Bid Documents and their intent, or other request, shall state the Contract Number, and Name and shall be directed to the Maryland Transit Administration, Procurement Officer, William Schaefer Tower, 6 Saint Paul Street, 7th Floor, Baltimore, MD 21202-1614. Oral explanations or instructions will not be binding.

5. Submission of Bids:

   a. Bids must be signed in ink and delivered in a sealed envelope, with the Contract Number, Bidder's name and address, and Bid Opening date on the outside of the envelope.

   b. Bids and modifications or corrections thereof received after the Bid Opening time specified will not be considered. Exceptions may be made when a late bid is received before contract award and the bid, the modification, or withdrawal would have been timely except for the action or inaction of State personnel directing the procurement activity or their employees.

   c. Only bids submitted on bid form furnished by MTA or copies thereof will be considered.

   d. The MTA reserves the right to cancel its request for bids and to waive informalities and minor irregularities in bids received. Any and all bids may be rejected in whole or in part when it is in the best interest of the State to do so.

6. Taxes

   a. Sales to the MTA are exempt from sales tax under the Maryland Retail Sales Tax Act, except as otherwise specified in Article 81, Section 326(a), of the Annotated Code of Maryland. Tax Exemption Certificate No. 3000256-3.

   b. The MTA is registered for Tax-Free transactions under Chapter 32, Manufacturers Excise Taxes of the Federal Internal Revenue Code. Certificate of registry No. 52-77-0088k.

   c. The Comptroller of the Treasury of the State may not authorize payment to a contractor who has submitted an invoice if that contractor is indebted by virtue of unpaid taxes or other obligations owed in an amount of $50 or more to any state

agency.

d. If taxes or other obligations are owed to the State, payment shall be deferred and the Contractor shall be timely notified. Subsequent release of the deferred payment shall be promptly made when the taxes or other obligations are satisfactorily resolved. The taxes or other obligations shall be resolved either by set-off or the amount due the contractor against the amounts due the State or by direct payment.

7. Bid Guarantee:

If a bid guarantee is required by the solicitation bid documents, acceptable guarantee for the bid shall be limited to a Bid Bond on the form furnished by MTA and underwritten by a company licensed to issue bonds in the State of Maryland, or to a Bank Certified Check. Failure of a bidder to whom an award is made to execute in a timely manner the Contract and Contract Affidavit, and, if required, deliver an acceptable Performance Bond shall be just cause for annulment of award and forfeiture of the bid guarantee.

8. Performance and Payment Bond:

In the event a Performance Bond is required by the solicitation contract documents, it will be of a form furnished by the MTA, underwritten by a surety authorized to do business in the State of Maryland, and in an amount specified in the solicitation bid documents. Upon receiving notification of an award, the Contractor will deliver the Performance Bond to the MTA no later than the time the contractor executes the contract. Regardless of any provisions in the solicitation bid documents to the contrary, a Performance Bond will not be required for contracts in the amount of $100,000 or less.

9. Award of Contracts:

a. Contracts and purchases will be made or entered into with the lowest responsive and responsible bidder meeting the specifications, subject to the provisions herein. Where more than one item is specified in the specification, unless otherwise provided, the MTA reserves the right to make award or awards on a lump sum basis or an individual bid item basis, whichever is in the best interest of the MTA.

b. Award will be made within 90 days of bid opening, however if necessary the period of time may be extended by written agreement between the MTA and the Bidder. After a notice of award has been issued to a Bidder, the Contract between the MTA and the Bidder receiving the award shall be deemed to be in existence. The MTA will then forward the Contract form, the appropriate forms for the Contract Affidavit, the MBE/DBE forms, and, if required, the Performance and Payment Bonds to the Bidder for execution. The Bidder will then execute the required documents and return them to the MTA within 10 days after receipt of same. After receipt of these documents, properly executed, the MTA will execute the Contract within 60 days and forward the Contractor a copy; provided, however that the Board of Public Works of the State of Maryland has approved the Contract if such approval is required. In the event that the MTA fails to execute the Contract within the 60 day period, the Bidder

will have, as its sole remedy, the option to declare the Contract terminated or accept a further extended period for execution by MTA.

10. Registration:

Pursuant to §7.201 et seq. of the Corporations and Associations Article of the Annotated Code of Maryland, corporations not incorporated in the State shall be registered with the State Department of Assessments and Taxation, 301 West Preston St., Baltimore, Maryland 21201, before doing any interstate or foreign business in this State. Before doing any intrastate business in this State, a foreign corporation shall qualify with the Department of Assessments and Taxation.

11. Maryland Law Prevails:

The contract shall be interpreted, construed and given effect in all respects according to the laws of the State of Maryland.

12. Specifications:

All materials, equipment, supplies or services shall conform to federal and State laws and regulations and to the specifications contained in the solicitation.

13. General Indemnity:

The Contractor shall protect, defend, indemnify and save harmless the MTA, its officers, agents, employees, from any and all claims, demands, suits, loss, damage, injury and liability, including costs and expenses incurred in connection therewith, however caused, resulting from, arising out of, or in any way connected with the performance of this contract, including delivery and any loading of supplies and equipment.

14. Patent Indemnity:

The Contractor shall indemnify and save harmless the MTA, it's officers, agents and employees, from any and all liability of any nature or kind, including costs and expenses, for infringements or use of any copyrighted or uncopyrighted composition, secret process, patent or unpatented invention, article or application furnished or used in connection with the contract. Bidders may be required to furnish a bond or other indemnification to the MTA against any and all loss, damage, costs, expenses, claims and liability for patent or copyright infringement.

15. Covenant Against Gratuities:

The Contractor hereby certifies that no gratuities (in the form of entertainment, gifts, or otherwise) were offered or given by the Contractor, or any agent or representative of the

Contractor, to any officer or employee of the MTA with a view toward securing the contract or securing favorable treatment with respect to any determinations concerning the performance of the contract. For breach or violation of this certification, the MTA shall have the right to terminate the contract, either in whole or in part, and any loss or damage sustained by the MTA in procuring on the open market any items which the Contractor agreed to supply shall be born and paid for by the Contractor. The rights and remedies of the MTA provided in this article shall not be exclusive and are in addition to any other rights and remedies provided by law or under the contract.

16. Anti-Bribery:

Vendors and Contractors are required to be aware of State Finance and Procurement Article, Section 13-405 of the Annotated Code of Maryland which requires that any person convicted of bribery, attempted bribery, or conspiracy to bribe based upon acts committed after July 1, 1971, in the obtaining of a contract from the State or any of its subdivisions, shall be subject to disqualification pursuant to Finance and Procurement Article, Section 13-405, Annotated Code of Maryland from entering into a contract with the State, or any county or other subdivision of the State, for the supply of materials, supplies, equipment, or services by the person.

17. Conflict of Interest Law:

It is unlawful for any State officer, employee, or agent to participate personally in his official capacity through decision, approval, disapproval, recommendation, advise, or investigation in any contract or other matter in which he, his spouse, parent, minor child, brother, or sister, has any financial interest or to which any firm, corporation, association, or other organization in which he has a financial interest or in which he is serving as an officer, director, trustee, partner, or employee, or any person or organization with whom he is negotiating or has an arrangement concerning prospective employment, is a party, unless such officer, employee, or agent has previously complied with the provisions of Article 40A, Section 3-101 et. seq. of the Annotated Code of Maryland.

18. Financial Disclosure:

The Contractor shall comply with the provisions of Section 13-221 of the State Finance and Procurement Article of the Annotated Code of Maryland, which requires that every business that enters into contracts, leases or other agreements with the State of Maryland or it's agencies during the calendar year under which the business is to receive in the aggregate $100,000 or more shall, within 30 days of the time when the aggregate value of these contracts, leases or other agreements reaches $100,000, file with the Secretary of State of Maryland certain specified information to include disclosure of beneficial ownership of the business.

19. Time of Delivery and Liquidated Damages:

Time is of the essence under the contract. If delivery is not made within the time specified, damage will be sustained by the MTA. If liquidated damages are provided for in the

contract, the Contractor shall pay the amount specified to the MTA as liquidated damages for every day's delay in delivery, plus, in the event of termination for default, the Contractor shall pay the MTA such amounts as may be due pursuant to the Article entitled "Termination for Default".

20. Termination for Convenience:

The performance of work or delivery of equipment, materials or supplies under this contract may be terminated in whole or in part in accordance with this Article whenever the Procurement Officer determines that such termination is in the best interest of the State. After receipt of said notice the Contractor shall stop work on this contract on the date and to the extent specified in said notice and terminate all applicable orders and subcontracts and complete performance or work as shall not have been terminated by said notice. After receipt of said notice the Contractor shall submit to the MTA's Director of Contract Administration its termination claim as a result of said termination together with such information as may be required by the MTA to evaluate the claim. The State shall pay all reasonable costs associated with this contract that the contractor has incurred up to the date of termination and all reasonable costs associated with termination of the contract. However, the Contractor may not be reimbursed for any anticipatory profits which have not been earned up to the date of termination. In the event the Contractor and the MTA cannot reach agreement upon amount to be paid the Contractor, the Procurement Officer shall make a determination of the amount due and submit it to Contractor. In the even that Contractor wishes to pursue the matter further, the disagreement will be handled in accordance with the Article entitled, "Disputes".

Termination hereunder, including the determination of the rights and obligations of the parties, shall be governed by the provisions of COMAR 21.07.01.12A(Z).

21. Termination for Default:

a. The MTA may, subject to the provisions of paragraph c below, by written notice of default to the Contractor, terminate the whole or any part of this contract in any one of the following circumstances:

    1) If the Contractor fails to make delivery of the supplies or to perform the services within the time specified herein or any extension thereof or (2) If the Contractor fails to perform any of the other provisions of this contract in accordance with its terms, and in either of these two circumstances does not cure such failure within a period of 10 days (or such longer period as the Procurement Officer may authorize in writing) after receipt of notice from the Procurement Officer specifying such failure.

b. In the event that MTA terminates this contract in whole or in part as provided in paragraph a of this Article, the MTA may procure, upon these terms and in the manner as the Procurement Officer may deem appropriate, supplies or services similar to those so terminated, and the Contractor shall be liable to the MTA for any excess costs for similar supplies or services; provided, that the Contractor shall

continue the performance of the contract to the extent not terminated under the provisions of this Article.

c. Except with respect to defaults of subcontractors, the Contractor shall not be liable for any excess costs if the failure to perform the contract arises out of cause beyond the control and without the fault or negligence of the contractor. Such causes may include, but are not restricted to, acts of God or the public enemy, acts of the State in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather; be in every case the failure to perform shall be beyond the control and without the fault or negligence of the Contractor. If the failure to perform is caused by the default of a subcontractor, and if the default arises out of causes beyond the control of both the Contractor and subcontractor, and without the fault of negligence of either of them, the Contractor shall not be liable for any excess costs of failure to perform, unless the supplies or services to be furnished by the subcontractor were obtainable from other sources in sufficient time to permit the contractor to meet the required delivery schedule.

d. If this Contract is terminated as provided in paragraph a of this Article, the MTA, in addition to any other rights provided in this Article, may require the Contractor to transfer title and deliver to the Procurement Officer, (1) any completed supplies, and (2) such partially completed supplies and materials, parts, tools, dies, jigs, fixtures, plans, drawings, information, and contract rights (hereinafter called "manufacturing materials") as the Contractor has specifically produced or specifically acquired for the performance of such part of this contract as has been terminated; and the contractor shall, upon direction of the Procurement Officer, protect and preserve property in the possession of the Contractor in which the MTA has an interest. Payment for completed supplies delivered to and accepted by the MTA shall be at the contract price. Payment for manufacturing materials delivered to and accepted by the MTA for the protection and preservation of property shall be in an amount agreed upon by the Contractor and the Procurement Officer; failure to agree to such amount shall be a dispute concerning a question of facts within the meaning of the Article of this contract entitled "Disputes". The MTA may withhold from amounts otherwise due the Contractor for such completed supplies or manufacturing materials such sums as the Procurement Officer determines to be necessary to protect the MTA against loss because of outstanding liens or claims of former lien holders.

e. If, after notice of termination of this contract under the provisions of this Article, it is determined for any reason that the Contractor was not in default under provisions of this Article, or that the default was excusable under the provisions of this Article, the rights and obligations of the parties shall be the same as if the notice of termination had been issued pursuant to the Article entitled "Termination for Convenience of the State."

f. The rights of the State as provided in this Article shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

g. As used in paragraph c of this Article, the terms, "subcontractor" and "subcontractors" mean subcontractor(s) at any tier.

h. Termination hereunder, including the determination of the rights and obligations of the parties, shall be governed by the provisions of COMAR 21.07.01.11B.

22. Interest of Members of or Delegates to Congress:

No member of or delegate to the Congress of the Untied States shall be admitted to any share or part of this Contract or to any benefit arising therefrom.

23. Prohibited Interest:

No member, or employee of the MTA or of a local public body during his tenure or one year thereafter shall have any interest, direct, or indirect in this contract or the proceeds thereof. In this Article, "local public body" means the State of Maryland, any political subdivision of the State or any agency of the State or political subdivision.

24. Motor Vehicle Safety and Pollution:

If any motor vehicles are being procured under the procurement, the Bidder certifies that:

a. The motor vehicles will comply with the Motor Vehicle Safety Standards as established by the U.S. Department of Transportation.

b. The horsepower of the vehicle is adequate for the speed range and terrain in which it will be required to operate and also meet the demands of all auxiliary power requirements, and

c. All gases and vapor emanating from the crankcase of a spark-ignition engine are controlled to minimize their escape to the atmosphere.

d. Visible emissions from the exhaust shall not exceed #1 on the Ringlemann Scale when measured six inches from the tail pipe with the vehicle in steady operation.

e. When the vehicle has been idled for three minutes and then accelerated to 80% of rated speed under load, the opacity of the exhaust shall not exceed #2 on the Ringlemann Scale for more than five seconds, and not more than #1 on the Ringlemann Scale thereafter.

25. Equal Employment Opportunity:

a. Federal Regulations: In connection with the execution of this contract, the contractor shall not discriminate against any employee or applicant because of race, creed, religion, color, sex, age or national origin. The contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during their employment without regard to their race, religion, creed, color, sex, age or

national origin. Such actions shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay, or other forms of compensation; and selection for training including apprenticeship. The Contractor shall comply with the provisions of Executive Order 11246 of the President of the United States, entitled Equal Employment Opportunity as amended by Executive Order 11375, and as supplemented in the U.S. Department of Labor Regulations (41 C.F.R. Part 60). The Contractor shall include the provisions of this Article 19(a) as amended herewith in every subcontract or purchase order unless exempted by the rules, regulations, or orders issued by the Secretary of Labor pursuant to Executive Order 11246.

b. State Regulations: Nondiscrimination in Employment The Contractor agrees: (a) not to discriminate in any manner against an employee or applicant for employment because of race, color, religion, creed, age, sex, martial status, national origin, ancestry, or physical or mental handicap unrelated in nature and extent so as reasonably to preclude the performance of such employment; (b) to include a provision similar to that contained in subsection (a), above, in any subcontract except a subcontract for standard commercial supplies or raw materials; and (c) to post and to cause subcontractors to post in conspicuous place available to employees and applicants for employment, notices setting forth the substance of this clause.

26. Disadvantaged and Woman's Business Enterprise:

In connection with the performance of this Contract, the Contractor will cooperate with the MTA in meeting the MTA commitments and goals with regard to the maximum utilization of minority business enterprises and will use its best efforts to insure that Minority Business Enterprises shall have the maximum practicable opportunity to compete for subcontract work under this Contract.

Should any portion of this contract be funded by the Federal Transit Administration (FTA) the following requirements shall be met:

a. Policy: It is the policy of the United States Department of Transportation that disadvantaged and woman's businesses as defined in Title 49 of the Code of Federal Regulations (C.F.R.), Part 23, shall have the maximum opportunity to participate in the performance of this contract, which is financed in whole or in part with Federal Funds. This requirements of 49 C.F.R. Part 23, including Subpart D, apply to this contract. New Subpart D implements Section 105(f) of the Surface Transportation Assistance Act of 1982 (Public Law 97-424).

b. Obligation: The Contractor agrees to ensure that disadvantaged businesses as defined in 49 C.F.R. Part 23, Subpart D, and woman's businesses as defined in 49 C.F.R. Part 23 have the maximum opportunity to participate in the performance of subcontracts performed under this Contract. In this regard, the Contractor shall take all necessary and reasonable steps in accordance with 49 C.F.R. Part 23 to ensure that disadvantaged and woman's businesses have the maximum

c. opportunity to compete for and perform subcontracts. The Contractor shall not discriminate on the basis of race, color, national origin or sex in the award and performance of subcontracts.

d. The Contractor is advised that failure to carry out the requirements set forth in 49 C.F.R. 23.43(a) shall constitute a breach of contract, and after the notification of the U.S. Department of Transportation as provided in 49 C.F.R. 23.43, may result in termination of the Contract by the MTA or such remedy as the MTA deems appropriate.

27. Non-Hiring of Employees:

No employee of the State of Maryland or any unit thereof, whose duties as such employee include matters relating to or affecting the subject matter of this Contract, shall, while so employed, become or be an employee of the party or parties hereby contracting with the State of Maryland or any unit thereof.

28. Disputes:

This Contract shall be subject to the provisions of Title 15, Subtitle 2, State Finance and Procurement Article (Administrative and Civil Remedies) of the Annotated Code of Maryland and COMAR 21.10. Pending resolution of the claim, the Contractor shall proceed diligently with the performance of the contract in accordance with the Procurement Officer's decision.

29. Warranty of Work:

a. The Contractor warrants that the title conveyed under the terms of this Contract shall be good and its transfer rightful and that all goods, supplies, systems and equipment shall be delivered free from all security interests or other liens or encumbrances whatsoever. Contractor also hereby agrees to warrant and defend the same against all persons lawfully claiming whole or any part thereof.

b. The Contractor warrants that all goods, supplies, systems, equipment, design and work covered by this Contract shall be satisfactory for its intended purpose, shall conform to and perform as called for in the Contract requirements and specifications and shall be free from all defects and faulty materials and workmanship. Any goods, supplies, systems, equipment, design and work found to be defective within one year from the date of final acceptance shall be repaired, remedied or replaced hereinafter called "corrective work", by the contractor, free of all charges including transportation.

c. It is understood and agreed that time is of the essence in respect to all corrective work to be undertaken pursuant to the warranty herein contained, expressed or implied, and the Contractor shall promptly commence corrective work upon receipt of written notice from the MTA.

30. Shipping, Handling and Delivery:

a. The Contractor shall give the MTA 10 days advance notice before each shipment is made. Such notification will include estimated weight of materials, quantity, a description of the articles, and other information necessary for the MTA to make arrangements for unloading.

b. Prepare all materials and equipment in such a manner as to protect them from damage in transit and at delivery site,

c. Make delivery aboard the delivering carrier at the site or sites indicated in the Contract documents.

d. All deliveries shall be f.o.b. destination unless otherwise specified.

31. Inspections:

a. The product, materials and equipment will be subject to inspections by the MTA, at the Contractor's and Subcontractor's facilities, place of manufacture, the shipping point, and at the shipping destination. Inspection and tests by MTA will be performed in such a manner as to not unduly delay the work.

b. Whether or not the MTA inspects or tests any materials or equipment the Contractor will not be relieved of any responsibility regarding defects or other failures to meet the Contract requirements, nor will such inspection or testing be considered as a guaranty of acceptance of any material or equipment which may be delivered later.

32. Parts Purchased Separately for Maintenance and/or Repair of Original Equipment:

It is understood and agreed that the Administration may separately purchase, from time to time in the future, spare parts for the maintenance and/or repair of the original equipment being herewith offered and furnished and that any such purchased spare parts shall be supplied and delivered to the Administration under all the same terms and conditions contained in this Contract except for the price which shall be mutually negotiated at the time of each purchase.

33. Acceptance:

Unless otherwise specified in the contract documents, acceptance will take place upon completion of final inspection by the MTA of the materials or equipment at the delivery site. Within a reasonable time after delivery to the MTA, the Contractor will be notified by the MTA of any damage incurred during transit and any non-conformance of materials or equipment determined during final inspection. Upon notification by the MTA, the Contractor shall commence corrective action.

34. Payment:

The Contractor will be paid, upon the submission of proper invoices or vouchers, the prices stipulated for supplies for equipment delivered and accepted, less deductions, if any, as provided. Contractor shall indicate his federal tax identification or social security number on the face of each invoice or voucher billed to the MTA.

35. Cargo Preference -- Use of United States Flag Vessels:

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

b. The Contractor agrees to furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of-lading in English for each shipment of cargo described in this Article to the FTA Administrator, and the Maryland Transit Administration (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington D.C., 20230.

c. The Contractor agrees to insert the substance of the provision if this Article in all subcontracts issued pursuant to this contract.

36. Interest:

Notwithstanding any other provision in this Contract, the Contractor hereby waives the right to prejudgement interest in the event of an award of equitable adjustment.

37. Multi-Year Contracts:

If the General Assembly fails to appropriate funds or if funds are not otherwise made available for continued performance for any fiscal period of this Contract succeeding the first fiscal period, this Contract shall be cancelled automatically as of the beginning of the fiscal year for which funds were not appropriated or otherwise made available; provided, however, that this will not affect either the State's rights or the Contractor's rights under any termination clause of this Contract. The effect of termination of the Contract hereunder will be to discharge both the Contractor and the State from future performance of the Contract, but not from their rights and obligations existing at the time of termination. The Contractor shall be reimbursed for the reasonable value of any non-recurring costs incurred but not amortized in the price of the Contract. The State shall notify the Contractor as soon as it has knowledge that funds may not be available for the continuation of this Contract for each succeeding fiscal period beyond the first.

38. Public Information Act Notice:

Offerors should give specific attention to the identification of those portions of their proposals which they deem to be confidential, proprietary information or trade secrets and provide any justification of why such materials, upon request, should not be disclosed by the State under the Maryland Public Information Act, Sections 10-611, et. seq., State Government Article of the Annotated Code of Maryland.

39. Affidavits:

An Executed Bid/Proposal and Contract Affidavit on a form furnished by the MTA is an essential part of the Contract.

40. Sanctions Upon Improper Acts:

a. In the event the Contractor, or any of its officers, partners, principals, or employees, is convicted of a crime arising out of, or in connection with, the procurement of work to be done or payment to be made under this contract, the contract may, in the discretion of the MTA be terminated for default.

b. Section 16-203 of State Finance and Procurement Article of the Annotated Code of Maryland, and COMAR 21.08.01, which relate to contracts with persons convicted of bribery, attempted bribery or conspiracy to bribe are incorporated in this contract by reference.

c. Section 16-203 of State Finance and Procurement Article of the Annotated Code of Maryland, and COMAR 21.08.02, which relate to disqualification for unfair labor practices are incorporated into this contract by reference.

d. Section 11-205 of State Finance and Procurement Article of the Annotated Code of Maryland, and COMAR 21.08.03, which relate to collusion for the purpose of defrauding the State are incorporated into this contract by reference.

e. Subtitle 8 of Title 21 of COMAR, "Disqualification, Suspension, Debarment, Reinstatement and Sanctions", is incorporated into this contract by reference.

41. Buy America Requirements:

This Contract is subject to Section 165, "Buy America," of the Surface Transportation Assistance Act of 1982, U.S. Public Law 97-424, as implemented by the Code of Federal Regulations (49 C.F.R. Part 661) issued by the Federal Transit Administration of the United States Department of Transportation and amended by Title III of Surface Transportation and Uniform Relocation Act of 1987. A copy of the referenced part of the Code of Federal Regulations is included as an appendix of the Contract.

42. Assignment:

No portion of the Contract shall be assigned, sublet, or otherwise disposed of except with the written consent of the Administration and Surety(ies). Consent to assign, sublet, or otherwise dispose of any portion of the Contract shall not be construed to relieve the Contractor or Surety(ies) of any responsibility for fulfilling all the requirements of the Contract.

43. Changes:

a. The Procurement Officer may, unilaterally at any time, without invalidating the Contract and without notice to Sureties, by written order designated or indicated to be a Change Order, make alterations or modifications within the general scope of the Contract in quantities, drawings, specifications, time of performance, place of delivery or method of shipment or packaging. If any such order requires changes in other provisions of the contract, the Contractor shall notify the MTA promptly after receipt of such order but in no event longer than 30 days after receipt of such order.

b. If any change under Article 43 herein causes an increase or decrease in the Contractor's cost of, or the time required for the performance of any part of the work under this Contract, an equitable adjustment will be made and the Contract modified in writing accordingly. However, no allowance will be made for loss of anticipated profit on any portion of the work not performed by reason of a change in the work.

c. Within 30 calendar days of the Contractor's receipt of a change order, the Contractor will provide to the Administration a detailed change order proposal which includes adjustments to the contract price (reduced to cost elements), to the delivery schedule, or to any other provisions of the contract necessary to accomplish the change. The proposal submitted shall be subject to negotiation between the parties. Disagreements that cannot be resolved within the negotiations shall be resolved in accordance with the Article entitled "Disputes". Regardless of any disputes, the Contractor shall proceed with the duly authorized change order issued by the Administration, if so directed.

44. EPA Compliance:

Materials, supplies, equipment, or services shall comply in all respects with the Federal Noise Control Act of 1972, where applicable.

45. Compliance with Environmental Standards:

The contractor agrees to comply with all the following statues as well as applicable standards, orders, regulations, directives, or requirements issued by the Environmental Protection Agency (EPA) and other agencies: the National Environmental Policy Act of 1969, as amended, 42 U.S.C. Section 4321 et seq; the Clean Air Act, as amended (42 U.S.C. Section 7401 et seq and scattered sections of 29 U.S.C.; the Clean Water Act, as amended (scattered sections of 33 and 12 U.S.C.); the Resource Conservation and Recovery Act, as

amended, 42 U.S.C. Section 6901 et seq; the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. Section 9601 et seq. Additionally, to the extent applicable, the contractor, and its subcontractors, agree to comply with the requirements of Section 14 of the Federal Transit Act, as amended, 49 U.S.C. app. Section 1610; the Council on Environmental Quality regulations, 40 C.F.R. Part 1500 et seq; and the joint FHWA/FTA regulations, "Environmental Impact and Related Procedures," at 23 C.F.R. Part 771 and 49 C.F.R. Part 622. The contractor shall be responsible for reporting any violations of those laws, regulations, and orders to the FTA and the EPA Assistant Administrator for Enforcement (EN-329).

46. Energy Conservation:

The contractor shall comply with mandatory standards and policies relating to energy efficiency which are contained in the applicable state energy conservation plan issued in compliance with the Energy Policy and Conservation Act, 42 U.S.C. Section 6321 et seq.

47. Contract Work Hours and Safety Standards Act:

This contract, to the extent that it is of a character specified in the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333), is subject to that Act as supplemented by the United States Department of Labor regulations (29 C.F.R., Part 5). Under Section 103 of the Act, each contractor shall be required to compute the wages of every mechanic and laborer on the basis of a standard workday of 8 hours and a standard work week of 40 hours. Work in excess of the standard workday or workweek is permissible provided that the worker is compensated at a rate of not less than 1-1/2 times the basic rate of pay for all hours worked in excess of 8 hours in any calendar day or 40 hours in a workweek.

48. Delays and Extension of Time:

a. The MTA will grant relief to the Contractor on the contract delivery schedule requirements or time to perform services on an item by item basis subject to the following:

1) The delay in performance of the work arises from causes beyond the control and without the fault or negligence of the Contractor such as acts of God, unusually severe weather; acts of the public enemy, acts of either the State or Federal Government in their sovereign capacity or of the MTA in its contractual capacity; acts of another contractor in the performance of a Contract with the MTA; fires, floods, epidemics, quarantine restrictions, strikes, or freight embargoes; and including default of a subcontractor or a supplier, if such default arises out of causes beyond the control of the contractor and subcontractor or supplier, if such default arises out of causes beyond the control of the contractor and subcontractor or supplier and if the supplier services to be supplied by the subcontractor and supplier were not obtainable from other sources in sufficient time to meet contract requirements.

2) The Contractor, within ten days from the beginning of any such delay, notifies

the Procurement Officer in writing of the causes of delay. Within 30 days after the end of the delay, furnish the Procurement Officer with detailed information concerning the circumstances of the delay, the number of days actually delayed, the portion of the work affected by the delay and the measures taken to prevent or minimize the delay. Failure to submit such information will be sufficient cause for denying the delay claim. Extensions of time granted in accordance with this Article will not be the basis for additional compensation for any Contractor's costs incurred during the time of delay.

3) The procurement Officer shall ascertain the facts and the extent of the delay and adjust the Contract deliver schedule requirements or time to perform services when and to the extent the facts in his judgement justify. The Procurement Officer's Decision shall be final and conclusive on the parties subject only to appeal as provided in the "Disputes" Article of this Contract.

b. Adjustments in contract delivery schedule requirements for time to perform services shall be made by Change Order.

49. Air Pollution (Motor Vehicle Procurements):

The contractor agrees to comply with the joint FHWA/FTA regulations, "Air Quality Conformity and Priority Procedures for Use in Federal-Aid Highway and 49 C.F.R. Part 623. The contractor must certify that any facilities or equipment acquired, constructed, or improved as a part of the Project are or will be designed and equipped to limit air pollution as provided in accordance with the following EPA regulations: "Control of Air Pollution from Motor Vehicles and Motor Vehicle Engines," 40 C.F.R. Part 85; "Control of Air pollution from New and In-Use Motor Vehicles and New and In-Use Motor Vehicle Engines," 40 C.F.R. Part 85; "Control of Air Pollution from New and In-Use Motor Vehicles and New and In-Use Motor Vehicle Engines: Certification and Test Procedures," 40 C.F.R. Part 86; and "Fuel Economy of Motor Vehicles," 40 C.F.R. Part 600; in accordance with applicable Federally-approved State Implementation Plan(s) (in particular, the Transportation Control Measures); and in accordance with applicable Federal regulations, directives and other standards.

50. Late Payments:

a. Payment to the Contractor pursuant to this Contract shall be made no later than 30 days after the State's receipt of a proper invoice from the contractor. Charges for late payment of invoices, other than as prescribed by Title 15, Subtitle 1, of the State Finance and Procurement Article, Annotated Code Maryland, or by the Public Service Commission of Maryland with respect to regulated public utilities, as applicable, are prohibited. The Contractor's Federal Tax Identification or Social Security Number shall be included on all invoices. The State's failure to remit payment within 45 days from that date may entitle the contractor to interest at the rate of 10% per annum beginning on the 31st day.

b. A proper invoice shall include a description of the items or services provided; the date the goods were received or the inclusive dates the services were rendered; the contract price(s); retention, if any; the basis for the billing; the contract or purchase order number; the contract's Federal Employees Identification Number of Social Security Number; the name and address of the proper invoice recipient.

c. In order to receive payment of interest the contractor must submit a proper invoice for accrued interest within 30 calendar days after the payment date of the amount on which the interest is claimed to have accrued. Interest may not be claimed for more than one year following the 31st calendar day after the date that a proper invoice was received, or on amounts representing unpaid interest, or on an amount due under a contract remaining unpaid for any period prior to July 1, 1983, or if a claim has been filed under Section 17-201 of the State Finance and Procurement Article of the Annotated Code of Maryland.

d. For the purposes of this contract an amount will not be deemed due and payable if:

1) The amount invoiced is inconsistent with the contract.

2) The proper invoice has not been received by the party specified in the contract.

3) The invoice or performance under the contract is in dispute or the contractor has failed to otherwise comply with the provisions of the contract.

4) The item or services have not been accepted.

5) The quantity of items delivered is less than the quantity invoiced.

6) The items or services do not meet the quality requirements of the contract.

7) The contract provides for progress payments, the proper invoice for the progress payment has not been submitted pursuant to the schedule contained in the contract.

8) The contract provides for withholding a retainage and the invoice is for the retainage, all stipulated conditions for release of the retainage have not been met.

9) The contractor has not submitted satisfactory documentation or other evidence reasonably required by the procurement officer or by the contract concerning performance under the contract and compliance with its provisions.

51. Political Contribution Disclosure:

The Contractor shall comply with Article 33, §§14-101–14-104, Annotated Code of Maryland, which requires that every person that enters into contracts, leases or other agreements with the State, a county, or an incorporated municipality, or their agencies, during a calendar year in which the person receives in the aggregate of $100,000 or more, shall file with the State Board of Election a statement disclosing contributions in excess of $500 made during the reporting period to a candidate for elective office in any primary or general election. The statement shall be filed with the State Board of Election: (1) before a purchase or execution of a lease or contract by the State, a county, an incorporated municipality, or their agencies, and shall cover the preceding two calendar years; and (2) if the contribution is made after the execution of a lease or contract, then twice a year, throughout the contract term, on (a) February 5, to cover the 6-month period ending January 31; and (b) August 5, to cover the 6-month period ending July 31.

52. Pre-Existing Regulations::

In accordance with the provisions of Section 11-206 of the State Finance and Procurement Article, annotated Code of Maryland, the Regulations set forth in Title 21 of the Code of Maryland Regulations (COMAR) Title 21, in effect of the date of execution of the Contract are applicable to this Contract.

53. Retention of Records:

The Contractor shall retain and maintain all records and documents relating to this Contract for three years after final payment by the State hereunder or any applicable statue of limitations, whichever is longer, and shall make them available for inspection and audit by authorized representatives of the State, including the procurement officer or his designee, at all reasonable times.

54. Suspension of Work:

The procurement officer unilaterally may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as he may determine to be appropriate for the convenience of the State.

55. Compliance with Laws:

The Contractor hereby represents and warrants that:

a. It is qualified to do business in the State of Maryland and that it will take such act in as, from time to time hereafter, may be necessary to remain so qualified.

b. It is not in arrears with respect to payment of any monies due and owing the State of Maryland, or any department or unit thereof, including but not limited to the payment of taxes, employee benefits, and that it shall not become so during the them of this

Contract.

c. It shall comply with all federal, State and local laws, regulations, and ordinances applicable to its activities and obligations under this Contract; and

d. It shall procure, at its expense, all licenses, permits, insurance, and governmental approval, if any, necessary to the performance of this Contract.

56. Cost and Price Certification:

a. The Contractor by submitting cost or price information certifies that, to the best of its knowledge, the information submitted is accurate, complete and current as of a mutually determined specified date prior to the conclusion of any price discussions or negotiations for:

1) A negotiated contract, if the total contract price is expected to exceed $100,000, or a smaller amount set by the procurement officer; or

2) A change order or contract modification, expected to exceed $100,000, or a smaller amount set by the procurement officer.

b. The price under this Contract and any change order or modification hereunder, including profit or fee, shall be adjusted to exclude any significant price increases occurring because the Contractor furnished cost or price information which, as of the date agreed upon between the parties, was incomplete, inaccurate, or not current.

57. Scope of Contract:

The procurement officer has the unilateral right of the State to order in writing changes in the work within the scope of the contract.

58. Contingent Fee Prohibition:

The contractor, architect, or engineer warrants that it has not employed or retained any person, partnership, corporation, or other entity, other than a bona fide employee, bona fide agent, bona fide salesperson, or commercial selling agency working for the contractor, architect, or engineer, to solicit or secure this agreement, and that it has not paid or agreed to pay any person, partnership, corporation, or other entity, other than a bona fide employee, bona fide salesperson, or commercial selling agency, any fee or any other consideration contingent on the making of this agreement.

59. Fixed Asset Identification Clause:

The Contractor shall provide to the MTA a report which lists individual assets, and their associated costs, supplies to/or constructed for the MTA under this contract. The total cost of the assets listed shall be equal to the total amount earned by the contractor under this contract. The MTA's Resident Engineer/Contract Representative, with the MTA's

Accounting Department, will provide guidance to the contractor with respect to the level of detail required for individual asset identification. The report shall be submitted no later than final acceptance of the contract by the MTA.

60. Drug and Alcohol Free Workplace:

The Contractor warrants that the Contractor shall comply with COMAR 21.11.08 Drug and Alcohol Free Workplace, and that the Contractor shall remain in compliance throughout the term of this purchase order.

61. Conformance with Maryland Drive/Vehicle Laws & Regulations:

a. The Contractor shall comply with all Maryland driver licensing and safety, and vehicle safety and registration laws and regulations. Any vehicle which is operated on roadways which are open to traffic must meet these requirements. The applicable laws are summarized in a booklet entitled Trucking in Maryland Handbook available from the State Highway Administration Motor Carrier Division.

b. For general questions regarding vehicles registration and driver licensing requirements call the Motor Vehicle Administration's Customer Service Center (toll free Maryland only) 950-1682 or (410)729-1567. For questions regarding the International Registration Plan (IRP), call 1-800-248-4160 (Maryland only), or (410)787-2971. For driver/vehicle safety requirements for heavy trucks and buses call the State Highway Administration Motor Carrier Division at 1-800-543-4564 (Maryland only) or (410)787-2847.

c. While Maryland residents must register each motor vehicle or trailer driven on Maryland highways, there are some exceptions to this general requirement concerning non-residents. However, if a non-resident is operating a vehicle(s) in Maryland as described below, the vehicle(s) being operated must be titled and registered in Maryland.

    1) used for transporting persons for hire, compensation, or profit;
    2) regularly operated in carrying on business in this State;
    3) designed, used or maintained primarily for the transportation of property, or
    4) in the custody of any resident for more than 30 days during any registration year.

d. In addition to the titling and registration requirements for common vehicles, Maryland defines "Special Mobile Equipment" as a vehicle that:

    1) is not used primarily for highway transportation of people or property; and
    2) is operated or moved on a highway only as an incident to its non-highway use.

Special Mobile Equipment includes a road construction or maintenance machine, mobile crane, ditch digger, well driller, concrete mixer, etc., for which special registration plates

(class 4) must be obtained.

62. Title VI of the Civil Rights Act of 1964:

The contractor agrees to comply with, and assure compliance by its subcontractors under this contract, with all requirements of Title VI of the Civil Rights Act of 1964, 42 U.S.C. Section 2000d and U.S.DOT regulations, "Nondiscrimination in Federally-Assisted Programs of the Department of Transportation -- Effectuation of Title VI of the Civil Rights Act," 49 C.F.R. Part 21.

63. Labor Provisions:

a. Overtime Requirements:

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any work week in which he or she is employed on such work to work in excess of forty hours in such work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such work week.

b. Violation; Liability For unpaid Wages; Liquidated Damages:

In the event of any violation of the requirements of 29 C.F.R. § 5.5(b)(1), the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such district or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, and employed in violation of 29 C.F.R. § 5.5(b)(1) in the sum of $10 for each calendar day on which such individual was required or permitted on which such individual was required or permitted to work in excess of the standard work week of forty hours without payment of the overtime wages required by 29 C.F.R. § 5.5(b)(1).

c. Withholding For Unpaid Wages and Liquidated Damages:

MTA 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 moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other federal contract with the same prime contractor, or any other federally-assisted contract subject to the contract work hours and safety standards act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy and liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth at 29 C.F.R. § 5.5(b)(2).

d. Records:

The contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract.

Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of Wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. The records to be maintained under this clause shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of MTA, FTA, DOT, or the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

e. Subcontracts:

The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subsections 7.a. through 7.d. above and include also a clause requiring the subcontractors 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 subsections 7.a. through 7.d. above.

64. Access Requirements for Individuals with Disabilities:

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

U.S. DOT regulations: "Transportation Services for Individuals with Disabilities (ADA)," 49 C.F.R. Part 37; "Nondiscrimination on the Basis of Handicap in Programs and Activities Receiving or Benefitting from Federal Financial Assistance," 49 C.F.R. Part 27; "Americans with Disabilities (ADA) Accessibility Specifications for Transportation Vehicles," 49 C.F.R. Part 38.

Department of Justice regulations: "Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities," 28 C.F.R. Part 36; "Nondiscrimination on the Basis of Disability in State and Local Government Services," 28 C.F.R. Part 35.

General Services Administration regulations: "Construction and Alteration of Public Building," "Accommodations for the Physically Handicapped," 41 C.F.R. Part 101-19.

Equal Employment Opportunity Commission (EEOC): "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630.

Federal Communications Commission regulations: "Telecommunications Relay Services

and Related Customer Premises Equipment for the Hearing and Speech Disabled," 47 C.F.R. Part 64, Subpart F.

Federal Transit Administration regulations: "Transportation for Elderly and Handicapped Persons," 49 C.F.R. Part 609.

65. Changes in Requirements:

Federal requirements cited above may change and the changed requirements shall be applicable to this contract as required. It is understood by the contractor that all limits or standards set forth above to be observed in the performance of the contract services are minimum requirements.

EXHIBIT AA
CERTIFICATION REGARDING
INVESTMENTS IN IRAN

Investment Activities in Iran Act

State Finance & Procurement, §§17-701 – 17-707, Annotated Code of Maryland [Chapter 447, Laws of 2012].

A company listed on the Investment Activities in Iran list is ineligible to bid on, submit a proposal for, or renew a contract for goods and services with a State agency or any public body of the State. Also ineligible are any parent, successor, subunit, direct or indirect subsidiary of, or any entity under common ownership or control of, any listed company.

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Agencies must obtain a certification regarding investments in Iran from each bidder or offeror for new contracts and from each contractor seeking to renew an existing contract. Specifically, bidders, offerors, and renewing contractors have to certify that at the time the bid/proposal is submitted or the contract renewed that the company is neither identified on the Investment Activities in Iran list nor engaging in investment activities in Iran.

A company that cannot make the certification must supply the agency, under penalty of perjury, with a detailed written description of its investment activities in Iran.

False Certifications: If an agency, using credible information, determines that a company has submitted a false certification regarding its investments in Iran, the agency must notify the company and provide the company 90 days to demonstrate in writing that it is not engaged in investment activities in Iran. If the company fails to demonstrate that it is not engaged in investment activities in Iran in that time, the agency shall report the company to the Attorney General and to the Board of Public Works. (**See Attachment – Certification Regarding Investments in Iran**)

MARYLAND TRANSIT ADMNISTRATION
ATTACHMENT : - CERTIFICATION REGARDING INVESTMENTS IN IRAN

CERTIFICATION REGARDING INVESTMENTS IN IRAN

1. The undersigned certified that , in accordance with State Finance & Procurement Article, §17-705:

   (i) it is not identified on the list created by the Board of Public Works as a person engaging in investment activities in Iran as described in §17-702 of State Finance & Procurement; and,

   (ii) it is not engaging in investment activities in Iran as described in State Finance & Procurement Article, §17-702.

2. The undersigned is unable to make the above certification regarding its investment activities in Iran due to the following activities:

_____

_____

_____

_____

I do solemnly declare and affirm under the penalties of perjury that the contents of this affidavit are true and correct.

Date: _____

Bidder/Offeror Name: _____

By: _____

Name: _____

Title: _____

V. SPECIAL PROVISIONS

MARYLAND TRANSIT ADMINISTRATION
T-8000-0399
MARC III KAWASAKI COACHES (63) OVERHAUL

TABLE OF CONTENTS
SPECIAL PROVISIONS

A. SUMMARY OF WORK

A. SUMMARY OF WORK

A. GENERAL

The work shall be performed in accordance with the following documents:

A. The General Provisions

B. The Special Provisions

C. The Technical Specifications

D. Any forms, exhibits, and appendices included in the RFP

E. The Contractor's Proposal, including negotiated changes.

These documents (except Item E, the Contractor's Proposal) are contained in the Contract Specifications Book for the MARC III Coaches Overhaul issued by the Maryland Transit Administration (MTA) of the State of Maryland Department of Transportation.

Should the Proposer choose to take exceptions to the Contractual Documents, General Provisions, or Special Provisions, they should be submitted with the Technical Proposal in the same format as specified in Section C.2.

A.2 BID/PROPOSAL EQUIVALENCE

All occurrences of the words "Bid" or "Bids" in the Contract Documents are synonymous with the words "Proposal" or "Proposals," respectively. All occurrences of the words "Bidder" or "Bidders" in the Contract Documents are synonymous with the words "Proposer" or "Proposers," respectively. All occurrences of the word "Offeror" are synonymous with the word "Proposer."

A.3 DESCRIPTION OF THE WORK

A.3.1 Background

The MTA procured 63 Kawasaki bi-level commuter coaches in 1999. The cars have been running in MARC Penn Line service on the North East Corridor at speeds up to 125 mph and on MARC's Brunswick and Camden lines.

This document is a Request for Proposal (RFP) and represents the first step in a competitive sealed proposal procurement conducted by the MTA. At the conclusion of the procurement process, the MTA's goal is to select a qualified Contractor that will commence the MARC III Coaches Overhaul Program in accordance with the executed contract.

A.3.2 Contract Structure

The RFP for T-8000-0399 provides for the minor overhaul of up to sixty three (63) MARC III railcars.

A.3.3 Base Scope of Work

The Contractor shall perform all work detailed in this RFP, unless otherwise specified. The scope of work to be performed includes furnishing all materials, tools, equipment, transportation, supervision and performing all labor and services necessary and incidental to pick-up and delivery, overhauling, and testing the MARC III coaches in accordance with Contract requirements. The Contractor's work includes, but is not limited to, the following:

A. Performing a complete overhaul of specified systems, subsystems, and components including engineering interface with new equipment and replacement of obsolete components. Unless otherwise noted, this shall include the provision of all renewal or replacement components, consumables, disposables, and standard hardware by the Contractor, as necessary to complete the overhaul.

B. Performing detail design for new and upgraded equipment, engineering, manufacturing, and testing of MARC III coaches.

C. Validating that the overhauled MARC III coaches are able to operate in normal revenue service containing overhauled and non-overhauled MARC III coaches, and to be compatible in all respects with existing non-overhauled vehicles in the MARC fleet, unless noted otherwise.

D. Transporting the MARC III coach to the Contractor's facility and returning them to the Administration's property.

E. Providing technical data, software, samples, and mock-ups for new and upgraded items, as required.

F. Performing qualification and acceptance testing.

G. Providing training programs to the MARC operations and maintenance staff in the usage and maintenance of all new and upgraded systems.

H. Executing the preparation and configuration control of as-built drawings, material and process specifications, and all other engineering, design and manufacturing information required to present the final as-built design of the work as developed and approved. Performing MARC III coach configuration verification as specified.

I. Updating maintenance and operational manuals and delivering completed inserts for manuals, parts lists, tool lists, and special tools lists, in the numbers specified.

J. Providing special tools and diagnostic test equipment for new and upgraded

systems.

K. Delivering spare parts as specified.

L. Administering warranty and reliability programs.

M. Supporting the MTA's Safety and Security Certification Program.

A.4 TIME OF COMPLETION AND DELIVERY

This section details the dates for delivery of MARC III coaches, spare parts, manuals, and training. Notice to Proceed (NTP) will be issued up to, but not later than, 180 days following the closing date for proposals, or after receipt of Best and Final Offers (BAFO), whichever is later. NTP will be issued after receiving approval of the Contract by the Maryland Board of Public Works (BPW).

A.4.1 Delivery of Contract Deliverables Requirements List (CDRL)

The RFP delineates various deliverables, and documents that are required to be submitted by the Contractor after NTP for the MTA's review and approval. The documents include plans, programs, forms, schedules, manuals, reports, certificates, drawings, and other required data in accordance with the Contract Deliverables Requirements List (CDRL) of each technical specification section.

The RFP also delineates various documents that are required to be submitted with the Contractor's proposal.

A.4.2 Spare Parts

The Contractor shall ensure that an adequate supply of spare parts for new and upgraded equipment are available to keep the delivered MARC III coaches operational and in service without any outage of vehicles during acceptance, pre-revenue testing, or revenue service throughout the warranty period. Shipment of Mandatory and Recommended Spare Parts will be coordinated with the Administration's approval to ensure sufficient quantities of units to maintain all accepted vehicles in revenue service; no vehicle will remain out of service for more than 72 hours due to lack of mandatory spare parts and shall be subject to the provisions of Section F.4.4. If a vehicle is out of service in excess of 72 hours due to lack of mandatory spare parts, an equal amount of time [rounded up to 24-hour periods (1day)] will be added on to the warranty period of that vehicle(s).

A.4.2.1 Replacement Parts

In addition, the Contractor shall ensure that replacement spare parts are available, and assist the MTA in obtaining such parts, for five (5) years after NTP in order to support continued revenue service.

A.4.3 Delivery of MARC III Coaches and Other Deliverables

Upon completion of a pre-delivery inspection at the Contractor's facility by the MTA and approval by the MTA for shipment, each MARC III coach shall be shipped directly to the MTA's Martins yard facility on a designated delivery track. The Contractor is responsible for all expenses associated with shipment and delivery of all vehicles. The contact information and address of the delivery track location is:

MTA Martin Yard
ATTN: Rex Springston, MARC Train Service; 410-454-7297
2700 Eastern Blvd.
Middle River, MD 21220

The Contractor shall deliver all other contract deliverables such as, but not limited to, project documentation, spare parts, salvage material, manuals, drawings, and special tools to an MTA designated location that may include the MARC office or MARC maintenance shop(s) that are located in the MARC train service operating territory.

Delivery of MARC III coaches shall occur when (1) the vehicle has been received on the designated delivery track; (2) all equipment removed for shipment has been reinstalled and reassembled by the Contractor; (3) the Contractor has completed to the MTA's complete satisfaction all adjustments and preparations required by the MTA and its operating railroad in order to run the MARC III coach in revenue service; (4) the vehicle is certified by the Contractor as being in compliance with the Contract's specifications; and (5) the vehicle is, in the MTA's sole discretion, ready for acceptance testing in accordance with the Technical Specifications.

The vehicles and other deliverables shall be delivered in accordance with the completion of work schedule in Special Provisions Section A.4.5. All days listed are in Calendar Days commencing with the effective date stated in the Notice to Proceed (NTP), or in absolute calendar dates, as appropriate.

A.4.4 Release of MARC III Coaches to Contractor

The Contractor shall provide written notice of intent to access a MARC III coach, and the notice shall be received by the MTA 72 hours in advance of the Contractor's planned access.

Release of the first six MARC III coaches can, at the Contractor's request, occur at the earliest of NTP plus 10 days. Written notice of intent to access shall be received by MARC 72 hours in advance. Subsequent releases shall occur within 72 hours of receipt of a written request from the Contractor.

A.4.4.1 MARC III Coaches Out of Service

The Contractor's schedule should consider the requirements of this section as a constraint.

The Contractor shall be limited to a not-to-exceed of six MARC III coaches removed from MARC possession at any one time during the Contract; and the Contractor shall plan work according to this restriction. The not-to-exceed limit of two MARC III coaches includes MARC III coaches that are not available for revenue service due to Contractor activities such as acceptance testing and equipment retrofits. The MTA shall not allow more than two overhauled MARC III coaches to remain unaccepted on MTA property.

A.4.5 Completion of Work Schedule

ITEM OF WORK	REQUIREMENT
1. Deliver First (1st) Overhauled Vehicle – Trailer car	NTP + **270** days
2. Deliver Second (2rd) Overhauled Vehicle – Cab car	NTP + **270** days
3. Deliver Third (3rd) Overhauled Vehicle – Trailer w/Toilet	NTP + **270** days
4. Deliver Fourth (4th) through Sixty-third (63rd) Overhauled Vehicle	Access + **120** days or NTP + **920** days whichever occurs first
5. Deliver Draft Revision of Manuals for Training Purposes	NTP + **240** days
6. Complete Training	NTP + **260** days
7. Deliver Diagnostic and Test Equipment and Special Tools	NTP + **465** days
8. Deliver Mandatory Spare Parts	NTP + **465** days
9. Delivery Recommended Spare Parts	NTP + **850** days
10. Deliver Final Revision of Manuals	NTP + **920** days
11. Deliver As-Built Drawings and All Deliverables (Including Conformed Specification	NTP + **920** days

A.5 MTA-FURNISHED FACILITIES AND EQUIPMENT

MTA/MARC will make available to the Contractor certain facilities and equipment at a site for support of acceptance testing and warranty. Specifically, the MTA/MARC will provide the Contractor with the following.

A.5.1 MTA/MARC Facilities

MTA/MARC will provide the following facilities:

A. Access to one Yard track to unload, inspect, test, and prepare vehicles for delivery completion

B. Facilities for training, as required

C. Space for one (1) trailer, which shall be provided by the Contractor, and the Contractor shall be responsible for all costs associated with utilities

D. Shop space

E. Access on mainline track for acceptance testing during limited day time/night time and weekend hours.

A.6 COOPERATION WITH OTHER CONTRACTORS AND INTERFACES

The MTA may at any time perform, or cause to be performed by other Contractors, work related to the Work under this Contract.

A.6.1 Cooperation

The Contractor shall cooperate with such other contractors and shall conduct the operations in such a manner as not to cause any unnecessary delay or hindrance to the other contractor's work. The Contractor shall adjust and coordinate the work with theirs so as to permit proper and timely completion of all work.

A.6.2 Interfaces

When any contractor or subcontractor performing work under or pursuant to another MTA contract is employed on work that interfaces with the work under this Contract, the Contractor, at their expense, shall provide to the MTA all necessary drawings, dimensions, data, software code, and other information, pertaining to new and upgraded equipment, necessary to ensure the complete, integrated, and proper design, manufacture, installation, and operation of all interfacing and connecting parts or systems.

The exchange of information will be coordinated by the MTA and the Contractor and copies of all the Contractor's data, drawings and correspondence relating to the above for interchange among contractors shall be furnished in sufficient quantity as requested by the MTA.

A.6.3 Joint Use of Facilities

When the Contractor and any other contractors are employed on related work at the MTA's facilities, or are using the same storage areas or access routes, the Contractor shall be responsible for any damage or loss caused to the other by its action.

A.7 INTENT OF CONTRACT

The intent of the Contract is to have all work being procured complete in every detail indicated. Unless otherwise specified, the Contractor shall furnish all labor, supervision,

material, tools, equipment, and incidentals necessary to complete the work in conformance with the Contract requirements.

A.8 ABBREVIATIONS AND DEFINITIONS

Whenever in the Specifications or other Contract documents the following abbreviations and terms, or pronouns in place of them, are used, the intent and meaning shall be interpreted as specified herein. (**See also Article 1 of the General Provisions.)** These abbreviations and definitions are also applicable to the Technical Specification.

A.8.1 Abbreviations

AAR	Association of American Railroads
ADA	Americans with Disabilities Act
AGMA	American Gear Manufacturers Association
AIEE	American Institute of Electrical Engineers
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APTA	American Public Transit Association
AQL	Acceptable Quality Level
AREA	American Railway Engineering Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWG	American wire gauge
AW0	Empty vehicle weight
AW1	Empty vehicle weight plus passenger seated load
AW2	Empty vehicle weight plus passenger seated and normal rated standing load

AW3	Empty vehicle weight plus passenger seated and full rated standing load
AWS	American Welding Society
CDRL	Contract Data Requirements List
cfm	Cubic feet per minute
CFR	Code of Federal Regulations
COT&S	Clean, Oil, Test, and Stencil
CPM	Critical Path Method
dB	Decibel
DB	Dry Bulb
DBE	Disadvantaged Business Enterprise
DOT	United States Department of Transportation
DTE	Diagnostic and Test Equipment
EEI	Edison Electric Institute
EMI	Electromagnetic interference
FAI	First Article Inspection
FCC	Federal Communications Commission
FOB	Freight-on-Board
FRA	Federal Railroad Administration
FS	Federal specification (and standard)
FTA	Federal Transit Administration, United States Department of Transportation
HEP	Head End Power
HVAC	Heating, Ventilation and Air Conditioning
Hz	Hertz

ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IPCEA	Insulated Power Cable Engineers Association
IPS	Iron Pipe Size
ISO	International Standards Organization
JEDEC	Joint Electronic Device Engineering Council
JIS	Japanese Industrial Standard
LAHT	Low Alloy High Tensile Strength (steel)
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LLRU	Lowest level replaceable unit
MDOT	Maryland Department of Transportation
MPH	Miles per Hour
MIL	Military Specification (and standard)
MTA	Maryland Transit Administration
MTBF	Mean Time Between Failures
NBS	National Bureau of Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NOA	Notice of Award

NTP	Notice to Proceed
NTSB	National Transportation Safety Board
OCC	Operations Control Center
OEM	Original Equipment Manufacturer
OSHA	Occupational Safety and Health Administration, United States Department of Labor; Occupational Safety and Health Act
PA	Public address
PTFE	Polytetrafluoroethylene
PM	Preventive Maintenance
QA	Quality Assurance
QC	Quality Control
RFP	Request for Proposal
RMS	Root-mean-square
ROW	Right-of-Way
RTR	Ready to Run
SAE	Society of Automotive Engineers
SOW	Scope of Work
TBD	To Be Determined
TC	Train Control
TIR	Total Indicated Runout
TO	Train Operation
TOR	Top of (Running) Rail
TSC	Transportation Systems Center (DOT)
UHF	Ultra High Frequency

UL	Underwriters' Laboratories, Inc.
VDC	Volts Direct Current
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio
WB	Wet Bulb

A.8.2 Definitions

ACCEPTANCE – The act of a formal written acceptance by MTA that work, or legal obligations, or a specific portion thereof, under the Contract has been satisfactorily completed.

ACCESSIBLE – A car, car area or car feature that is ADA-compliant per 49 CFR 37 and 38.

ADDENDUM – A written interpretation, revision, supplement, or addition to any of the Contract documents.

ADHESION, PERCENT – During rolling contact, the maximum value of the ratio between the longitudinal tangential force and the normal force at the wheel-rail interface.

ADMINISTRATION – The Maryland Transit Administration of the State of Maryland Department of Transportation, including its duly authorized representative, the Procurement Officer and/or the Project Manager.

ADMINISTRATION-FURNISHED EQUIPMENT (AFE) – Equipment furnished by the Administration to the Contractor for installation in or on the vehicle.

ADVANCE POSSESSION – Prior to final acceptance of a vehicle, MTA, by written notice to the Contractor, may take possession and use of a vehicle or any other item of Work if, in its sole discretion, MTA determines that its possession and use has become essential in meeting revenue services operations. Upon receipt of such notice, the Contractor will be relieved of his responsibilities for maintenance and risk of loss, except those that result from the Contractor's own operations and negligence. The Contractor will remain responsible for completion of any item or correction of any defect in accordance with the Contract requirements and will still be responsible for timely performance. If a major defect (one which is not correctable within 72 hours or in the judgment of the MTA prevents the safe and reliable operation of the vehicle in service) is found during the initial thirty (30) calendar days the vehicle is available for revenue service after acceptance or advance possession, that 30-day period will be extended by as many days as required to correct the major defect to the satisfaction of the MTA and the date for

submission of the Contractor's invoice under Section H.4.2.A will be extended for the same number of days.

ALIGNMENT, HORIZONTAL – The horizontal location of a track as described by curves and tangents.

AMTRAK – National Railroad Passenger Corporation.

APPROVED/APPROVAL – Approved by MTA unless otherwise stated.

APPROVED EQUAL OR EQUIVALENT – An item, material, or method offered as a substitute for that designated herein, for which approval in writing has been obtained from MTA. The burden of proof that a substitute is, in fact, equal, shall rest with the Contractor.

AUXILIARY EQUIPMENT – Any mechanism or structure, other than the vehicle body, that performs a function at some time during the operation of the vehicle – e.g., heating and cooling subsystem, pumps, vehicle door mechanism, air compressor or hydraulic power unit, vehicle lighting.

AWARD – The decision by MTA to execute a contract to the selected Offeror after all necessary approvals have been obtained.

BID – The technical and management information and prices in response to the Invitation for Bids submitted in the prescribed format and on the prescribed forms.

BID BOND – The security, in the form approved by MTA, executed by the Bidder and Bidder's Surety as a guaranty that the Bidder will enter into Contracts with MTA, if awarded.

BIDDER – Any person or persons, firm, partnership, corporation, or combination thereof, submitting a bid for the procurement contemplated, acting directly or through a duly authorized representative.

BID ITEM – An item of work specifically described and for which a price, either unit or lump sum, is provided. It includes the performance of all Work and the furnishing of all labor, equipment, and materials described in the Contracts Document.

BRAKING, EMERGENCY – An irretrievable braking effort to fully stop a vehicle at a higher retardation rate than is obtained with a full service brake application.

BRAKING, FULL SERVICE –The normal maximum braking effort employed to stop a vehicle in the absence of an emergency stop signal.

CAB CAR – A car having a control station at one end, for the use in controlling a locomotive at the opposite end of the train.

CARSET – The quantity of equipment/components that is required for equipping one MARC III coach.

CHANGE ORDER – A written order, signed by MTA, directing changes in the Contract, within the changes clause of the Contract and establishing the basis of payment and time adjustments for the work affected by the changes.

CHECKED REDUNDANT – Equipment configurations that are generally implemented in complex hardware or complex hardware/software combinations (processors) that cannot be exhaustively analyzed by treatment of combination. Checked redundancy implies two, or more, independent parallel control units processing common input information. The results are subjected to a hardware voter or a voting processor to ensure that agreement exists between the parallel control units. The voting hardware or processor is required to be fail-safe. Any disagreement must cause the equipment to revert to a safe state that is self annunciation. In addition, the frequency of checking the parallel control units must be high enough to reduce the probability of multiple independent failures in the parallel control units during the interval between checks to an acceptably low in parallel control units due to common causes ("common mode failures") are not permitted.

CONDITIONAL ACCEPTANCE – Acceptance of an individual vehicle or other contract-related work by the Administration, subject to certain conditions and obligations that the Contractor is responsible for. If a major defect (one which is not correctable within 72 hours or in the judgment of the MTA prevents the safe and reliable operation of the vehicle in service) is found during the initial thirty (30) calendar days the vehicle is available for revenue service after acceptance or advance possession, that 30-day period will be extended by as many days as required to correct the major defect to the satisfaction of the MTA and the date for submission of the Contractor's invoice under Section H.4.2.A will be extended for the same number of days. (Also see Advance Possession.)

CONFORMED CONTRACT DOCUMENTS – The Contract Specifications Book revised to incorporate all changes made during the Bid period by Addenda and to incorporate information included in the Offer accepted by MTA.

CONSIST – The quantity and specific identity of vehicles that make up a train.

CONSOLE – The control panel located in the cab directly in front of the operator's seat.

CONTRACTS – The written agreements executed by MTA and the Contractor, covering the performance of the Work and furnishing of labor, materials, equipment, and tools, including work incidental to the procurement.

CONTRACT DATA REQUIREMENTS LIST (CDRL) – A matrix listing data, such as drawings, catalogs, reports, notices, and samples, required to be submitted by the Contractor. Wherever (CDRL) is seen throughout the specifications, refer to Section (i) of the Technical Specification for information.

CONTRACT SPECIFICATIONS BOOK – A document issued by MTA that includes the Invitation for Bids, Bid Forms, General Provisions, Special Provisions, Technical Specification, and other forms and exhibits.

CONTRACT TIME or COMPLETION DATE – The number of days set forth in the Specifications indicating the time allowed for completion of the work contemplated in the Contract. In case a calendar date of completion is specified in lieu of the number of days, such work shall be completed by that date.

CONTRACTOR –The person or persons, firm, partnership, corporation, or any combination thereof, who, as an independent Contractor, has entered into a Contract with MTA, agrees to furnish goods/services for a certain price.

CONTRACTOR'S QUESTIONNAIRE/PRE-AWARD EVALUATION DATA – The form upon which the Contractor shall furnish the information as to his ability to perform the Work, his experience in similar work, and his financial condition related to his ability to finance the Work, as well as certain technical information.

CORRECTIVE MAINTENANCE – Those actions performed, as a result of a failure, to restore an item to OEM-specified operating condition.

COT&S – Clean, Oil, Test & Stencil

COUPLER – A device for mechanically coupling vehicles together.

CSX – CSX Transportation, the legal successor to the B&O Railroad.

DAYS – Unless otherwise designated, means Calendar Days.

DRAFT GEAR – The energy-absorbing mechanism that attaches the coupler to the anchorage.

DWELL – The period of time measured from the instant a train stops at a station until the instant it resumes moving.

EXISTING MARC III COACH – As-built MARC III coach configuration prior to minor overhaul (a non-overhauled MARC III coach).

FAIL-SAFE – Equipment configurations that are implemented in hardware where each component has a known set of predictable failure modes that may be individually analyzed for their effect on equipment performance and function. Any failure or set of failures resulting from a single causative event must cause the equipment to revert to a state that is known to be safe with visual or audible warning devices displayed.

FAILURE – The inability of a system, subsystem, assembly, or component to perform its required function.

FAILURE RATE (λ)– The reciprocal of Mean Time Between Failures (MTBF).

FINAL ACCEPTANCE (Contract Work) – Upon due notice from the Contractor of completion of the Work except for warranty requirements, MTA will make an inspection. If at such inspection all Work provided for, and contemplated by, the Contract is found completed, such inspection shall constitute the final inspection and MTA will make the Final Acceptance as of that date and the Contractor will be notified of such acceptance in writing. After Final Acceptance, MTA will assume responsibility for materials and equipment, except where otherwise provided by the warranty.

FINAL ACCEPTANCE (Individual Vehicles) - Upon delivery and satisfactory completion of Acceptance Testing of each vehicle, the Contractor may present the vehicle to MTA for acceptance. If MTA finds upon inspection that the vehicle has been satisfactorily completed in compliance with the Contract, it may accept that vehicle as being completed.

GAUGE, TRACK – The distance between the inside face of rails, usually measured 5/8-inch below the top of the centerline of heads of running rails and at a right angle thereto.

GENERAL TERMS – Whenever the words "acceptable," "approved," "submitted," "designated," "established," "permitted," "required," "satisfactory," or "unsuitable" "unacceptable," "unsatisfactory," or "unsuitable" are used they shall be understood to imply "by the Administration" or "to the Administration" unless the context clearly indicates a different meaning. Whenever the verbs "submit," "designate," "notify," "bear," "use," "furnish," "install," "comply," and other like verbs are used, without being preceded by a subject, it shall be understood that the subject is the responsibility of the Contractor unless the context clearly indicates a different meaning.

HEADWAY – The time separation between two trains, both traveling in the same direction on the same track. It is measured from the time the front end of the leading train passes a given reference point to the time the front end of the train immediately following passes the same reference point.

HIDDEN DAMAGE – Structural Damage that is obscured by equipment, appurtenances, or accumulated debris, and affects the integrity and/or function of the structure. Cosmetic defects and dents shall not be considered as Hidden Damage. Structural Damage shall be considered as Hidden Damage only after completion of inspection and joint disposition by the MTA and the Contractor.

HIGH VOLTAGE – See PRIMARY POWER.

INDICATED – As described in the specifications, as-built drawings or as required by the other Contract documents.

INTERFACE – The point at which one system component or subsystem comes into physical or functional contact with another.

INTERLOCK – A condition whereby one function is dependent on the operation of another function.

JERK – The rate of change of acceleration or deceleration, normally measured in miles per hour per second per second.

L-10 LIFE – Rating life of anti-friction bearings, specified in millions of revolutions, during which 10 percent of the bearings in a bearing population will have failed. Conversely, the bearing life which 90 percent of the bearings in a population will achieve.

LATENT DEFECT – A defect that exists at the time of acceptance but cannot be discovered by a reasonable inspection.

LEAD CAR – In the direction of travel, the forward- most vehicle of the consist.

LOW VOLTAGE – The voltage used for auxiliary systems on the vehicle, is the nominal 72 VDC.

MEAN TIME BETWEEN FAILURES (MTBF) – The MTBF of an item is the ratio of the total operating time, *t*, accumulated by the total population of identical items to the total number of relevant failure, *F*, occurring within the population of identical items during time *t*. It is expressed quantitatively by the following equation:

$$MTBF = \frac{t}{F(t)}$$

NON-OVERHAULED MARC III COACH – As-built MARC III coach configuration prior to minor overhaul.

NON-RELEVANT FAILURE –

a. A failure caused by malfunctions of other equipment.
b. A failure caused by human error, except resulting from incorrect documentation.
c. A failure caused by accidents not associated with the normal operation of the item, such as collision, or striking a foreign object on the right-of-way.
d. A failure caused by operating the item outside of design or environmental limits.

NOTICE OF AWARD – A written notice to the Contractor of being the apparent awardee.

NOTICE TO PROCEED – A written notice to the Contractor of the date on or before which he shall begin the prosecution of the Work to be done under the Contract.

OFFEROR – See BIDDER.

OPERATOR (TRAIN ENGINEER) – Individual on board who is responsible for train operation in manual modes and overseeing train operation in any automatic mode.

OVERHAUL – Shall mean the restoration of items to an "as new" condition, or reconditioned functionally, as the case may be, per specification requirements. Overhaul shall include the complete disassembly of a subsystem, assembly or subassembly into its component parts and/or subassemblies. Overhaul shall include the cleaning, inspection, testing, adjustment, and lubrication; overhaul shall also include the repair or renewal of failed and/or worn component parts and/or subassemblies, with procedures and parts recommended by the OEM, and their reassembly into complete and functional assemblies. Component parts and/or subassemblies that cannot be repaired must be replaced with a new OEM part (unless otherwise noted). Component parts and/or subassemblies that can be repaired shall be repaired in accordance with procedures recommended by the OEM with no less than 30% of the original wear limit maintained, unless otherwise noted in the Specifications.

OVERHAUL PLAN - A system specific plan that details the work processes, procedures, and manufacturing work instructions required to complete the overhaul work for the particular system. This plan shall also identify and include the subcontractors/vendors information.

PARTIAL ACCEPTANCE – If at any time during the performance of the Work the Contractor completes a discrete portion of the Work, except vehicles, and makes delivery thereof, he may ask MTA to make a final inspection of that portion. If MTA finds upon inspection that the portion has been satisfactorily completed in compliance with the Contract, it may accept that portion as being completed and the Contractor may be relieved of further responsibility for that portion. Such Partial Acceptance shall in no way void or alter any of the terms of the Contract.

PERFORMANCE – The measure of output or results obtained by a component, system, person, team, and so forth, as specified.

PERFORMANCE GUARANTEE – The security, in the form approved by MTA, executed by the Contractor and his Surety, and paid for by the Contractor, guaranteeing complete performance of the Contract, and protecting MTA from loss due to the Contractor's inability to complete the Contract as agreed.

PROCUREMENT OFFICER – Any person authorized by a State agency in accordance with law or regulations to formulate, enter into, or administer contracts or make written determinations and findings with respect to them. The term also includes an authorized representative acting within the limits of authority.

PROJECT MANAGER – The Procurement Officer of the MTA or his/her designate.

PROPERTY – A railroad or transit agency.

PROPOSER – See BIDDER.

RAILROAD – The term "railroad" or "railroads" refers to any common carrier with whom the MTA has a contract, or other arrangement, providing the operation of its trains, or the maintenance of its equipment (presently Amtrak and CSX Transportation).

RELAY, VITAL – A relay whose function is necessary for the safe operation of the train and whose mode of failure is in the safe condition. Such relays must be approved by the AAR Committee E, Mainline Block Signals.

RELEVANT FAILURE –

a. A fault in the item while operating within its design and environmental specification limits.
b. Improper operation, maintenance, or testing of the item as a result of contractor-supplied documentation.

RELIABILITY – The probability of performing a specified function, without failure and within design parameters, for the period of time intended under actual operating conditions.

RENEW – Provide a new component or material that is identical to the existing component or material.

REPLACE – Provide an OEM-approved or Administration-approved substitute for an existing component or material.

REQUIREMENTS – The criteria that must be met in designing the vehicle.

REVENUE SERVICE – Service on established routes for use by the public, as distinct from pre-acceptance testing.

ROLL, BODY – The number of degrees in an arc, having its base at top-of-rail height and at the centerline of the track, swept by a point in the center of the roof as the vehicle sways from side to side during normal running at any speed on level tangent track.

SERVICE FAILURE - Any relevant failure occurring during revenue service operations, simulated revenue operations, or during equipment status checkouts to determine availability for revenue service, which results in one of the following:

a. Unavailability of a vehicle to start revenue service after successful completion of pre-departure checkout.
b. Removal of a vehicle from revenue service.
c. A schedule delay.

SERVICE PROVEN – The equipment shall offer a demonstrated history of satisfactory performance under duty cycle and equipment conditions similar to those encountered in the Administration's operations.

SINGLE FAILURE MODE – A single failure that inhibits the ability of a system, subsystem or component to perform its required function.

SLIDE, WHEEL – The condition is which the equivalent linear velocity of the wheel is less than the linear velocity of the vehicle.

SPECIFICATIONS – The directions, provisions, and requirements contained or referred to herein, together with all written agreements made, or to be made, that pertain to the product or process of performing the Work, or the quantities of Work and materials, to be provided under the Contract.

SPIN, WHEEL – The condition in which the equivalent linear velocity of the wheel is greater than the linear velocity of the vehicle.

STANDARD TRAIN – For performance test purposes, a specific consist size, configuration, and load.

SUBCONTRACTOR – Any individual, partnership, firm, or corporation who undertakes performance on the Contract, the partial or total design, manufacture, furnishing any material, or performance of any items of work required for the performance of the Prime Contract. As used herein, the terms subcontractor and subsupplier are synonymous.

SUBSYSTEM – A system that comprises functional elements interconnected within a system to perform a specific function.

SUPERELEVATION – On a curve, the vertical distance, measured in inches, that the outer rail is above the inner rail.

SURETY – The corporate body, licensed to issue bonds in the State of Maryland, bound with and for the Contractor for the full and complete performance of the Contract and for the payment for all debts pertaining to the Work. When applied to the Bid Bond, it refers to the corporate body acting as a guarantor that the Bidder will enter into a Contract with MTA.

TECHNICAL SPECIFICATION – The specifications, provisions, and requirements that detail the work and the materials, products (including the methods of manufacture, construction, assembly, and testing), and other requirements relative thereto.

TIME, REACTION – Time from the initiation of a step change of control signal to the first attainment of the new steady-state value of the controlled variable, within the designed accuracy.

TIME, RECOVERY – The time required for a system or condition to return to its original state (or some stated percentage of its original value) after being disrupted or de-stabilized.

TRAINLINE – The means of sending a signal or electrical power to all vehicles in a consist via a continuous electrical or fluid circuit connected through appropriate coupling devices.

TRAM – A condition of ideal truck geometry in which the axles are perfectly parallel and the wheels are longitudinally in perfect alignment. The centers of the journal bearings represent the corners of a perfect rectangle.

UPGRADE – Replacement of an existing component (or system) with a new component (or system) that has an improved design configuration and/or performance characteristics.

VEHICLE (MARC III COACH)– A MARC III coach whose configuration and performance are described by this specification.

VITAL – A function or a unit which is critical to overall system safety.

WARP, TRACK – The vertical distance between the plane of any three of four rail head contact points (two on each rail) forming a rectangle, and the remaining point.

WEIGHTS, ACTUAL – The measured weights of finished vehicles ready to run.

ZERO SPEED – Vehicle velocity of less than 2 mph for more than 1 second.

B. PROPOSAL REQUIREMENTS

B. PROPOSAL REQUIREMENTS

B.1 GENERAL

In addition to the General Provisions, this section specifies the general requirements for the preparation and submittal of Proposals in response to this Request for Proposals (RFP).

B.2 PREPARATION OF PROPOSAL

B.2.1 General

The MTA is soliciting an RFP that explains how the Proposer will meet the requirements of this procurement. Statements merely indicating that the Proposer will meet specific requirements are not acceptable. Technical descriptions should be such that the MTA is able to relate what is being offered to equipment that has been used in revenue service on other rail transit systems.

The MTA recognizes that there may be elements of the Proposal considered proprietary and confidential by the Proposer. The Proposal shall identify any specific information or design details that the Proposer considers proprietary. The Proposer shall clearly and prominently mark each and every page or sheet of such materials with "CONFIDENTIAL" and "PROPRIETARY," as it determines to be appropriate.

The MTA will disclose the information only in accordance with the Maryland Public Information Act. Under no circumstances, however, will the MTA be responsible or liable to the Proposer or any other party for the disclosure of such labeled material, for any reason whatsoever.

B.2.2 Issue Date

April 4, 2013

B.2.3 Issuing Office

This RFP is issued by the Office of Procurement of the Maryland Transit Administration and the sole point of contact for contractual questions. This office is the sole point of contact in the MTA for this RFP.

B.2.4 Inquiries

Inquiries concerning this proposal shall be submitted in writing to the Office of Procurement, Maryland Transit Administration, 1331 S. Monroe Street, Second Floor, Baltimore, Maryland 21230, Attention: Heidi J. Tarleton (410) 454-7895. All inquiries and the corresponding MTA response will be posted on the e-Maryland Marketplace web site. Closing date for receipt of inquiries is **May 13, 2013**.

B.2.5 Submittal of Proposals

Proposals shall be submitted under the following guidelines.

B.2.5.1 Closing Date

One (1) original bound Technical Proposal, six (6) bound copies, and one (1) unbound copy (suitable for photocopy reproduction) of the complete Technical Proposal shall be submitted. In addition, one (1) electronic copy in CDROM or DVD media (searchable *.pdf format) containing the Technical Proposal responses to Special Provisions Sections C.3 and C.4., shall also be submitted. The hard-copies and electronic copy must be submitted not later than **2:00 p.m.** local time, **June 24, 2013** addressed to:

Attn: Heidi J. Tarleton
Maryland Transit Administration
Office of Procurement
1331 S. Monroe Street, Second Floor
Baltimore, Maryland 21230

In addition, a separate sealed package containing **one (1)** original and **five (5)** copies of the Price Proposal must be submitted to the same office by the same time. Each package shall be clearly and separately labeled on the outside as **"Technical Proposal for Contract T-8000-0399"** or **"Price Proposal for Contract T-8000-0399"** as appropriate. There will not be a public opening of the Proposals. Proposals that are not delivered by the time and date stated, or marked as specified shall be rejected in accordance with applicable regulations. Electronic and fax proposals will not be accepted.

B.2.5.2 Addenda and Supplements

In the event that it becomes necessary to revise any part of this RFP, or if additional information is necessary to enable the Proposer to make an adequate interpretation of the provisions of the RFP, a supplement will be provided to firms who are identified as holders of the RFP.

B.2.5.3 Acknowledgment of Addenda

The Proposer shall acknowledge receipt of all addenda in the cover letter of the Technical Proposal. Failure to acknowledge all addenda shall cause the rejection of the Proposal.

B.2.5.4 Language Requirement

All language in the Proposal shall be prepared in English. All Contract documents, conferences, letters, technical information, and drawings shall be conducted or offered solely in the English language. All dimensions shall be in the U.S. inch/pound units and metric equivalent, if applicable.

B.2.5.5 Proposal Clarity and Completeness

To be considered, the Proposer is to submit a complete response to the RFP addressing the items requested. Proposal brevity and clarity are desired. The Proposer is advised that the MTA is not obligated to expend extraordinary effort if the Proposal is unclear, difficult to assess, and/or incomplete. At the sole discretion of the MTA such Proposals may be classified as unacceptable.

B.2.5.6 Oral Presentation

The Proposer may be required to make individual presentations or demonstrations in order to clarify their Proposals and to verify technical submissions. The MTA will not be responsible for any costs incurred by the Proposer in the preparation of oral presentations.

B.2.5.7 Incurring Costs

The MTA is not liable for any cost incurred by the Offeror in preparation of its Proposal for this Contract.

B.2.5.9 Multiple Proposals

If the Offeror has more than one (1) method or more than one (1) subcontractor for meeting the objectives of the RFP, multiple Proposals may be submitted. Additional Proposals may be prepared in an abbreviated form following the same format as the primary Proposal, but containing only that information which differs in any way from the primary Proposal. Each Proposal must be bound separately and submitted in accordance with Section B.2.5.1 above. In all cases, to be considered responsive, each Proposal must clearly meet the objectives and needs of the Administration.

B.3 ANTI-DUMPING ACT

Foreign Offerors shall represent and warrant that their prices do not violate the United States Anti-Dumping Act, U.S. Code, Title 19, Section 160 et seg., as amended. They shall agree to pay any duties assessed under the said Act and to indemnify and hold harmless the Administration from any loss or expense, including but not limited to reasonable attorney's fees that the Administration may incur from any claim, demand, or investigation of alleged violation of the said Act.

B.4 SUBMITTAL OF PRICE PROPOSALS

The Price Proposal and the Technical Proposal, and any other documents as may be specified when executed and submitted by the Offeror, will constitute his Proposal. Price Proposals not presented on the Unit Price Schedule will not be considered. The Price Proposal shall be filled out in ink or typewritten. If erasures or changes appear in the Price Proposal, each erasure or change shall be initialed and dated by the individual signing the Price Proposal.

All documents bound with or attached to the Proposal are considered a part thereof and shall not be detached or altered when the Proposal is submitted. Proposals shall be submitted in the manner specified.

The Offeror shall specify a price in U.S. dollars for each item given and shall show the products of the respective unit prices and quantities written in figures in the column provided for that purpose, together with the total amount of the Proposal obtained by adding the amounts of the several items.

B.5 PROPOSAL BID BOND

A Proposal Bid Bond is **NOT REQUIRED** for this contract.

B.6 ARREARAGES

By submitting a response to this RFP, an Offeror shall be deemed to represent that it is not in arrears in the payment of any obligation due and owing to the State of Maryland, including the payment of taxes and employee benefits, and that it shall not become so in arrears during the term of the contract if selected for contract award.

B.7 PRE-PROPOSAL CONFERENCE

A conference for all Offerors will be held on **April 17, 3013** at the **MARC Martins Maintenance Facility, 2700 Eastern Blvd., Middle River, Maryland 21220** beginning at **9:00 am** followed by a site inspection. The site inspection shall afford the Offerors an opportunity to inspect a representative vehicle(s). All Offerors are encouraged to attend this meeting, but attendance is not mandatory. Attendance should be limited to no more than four (4) representatives per proposing team.

B.8 DISCUSSIONS

The Administration may enter into discussions with all Qualified Offerors. The term "Qualified Offerors" includes only those responsible Offerors who submitted proposals initially judged by the Procurement Officer to be reasonably susceptible of being selected for award. Discussions shall be led by the Offeror's Project Manager and will consist of an oral presentation by the Offeror to the Administration's Evaluation Committee, questions from and negotiations with the Committee and Procurement Officer. Offerors shall be notified of the time, date, and location of the discussions. **Submission of a proposal does <u>not</u> guarantee an Offeror the opportunity to be invited in for discussions.**

The Administration retains the right, at its discretion, not to hold discussions with Offerors and may award a contract on the basis of technical and price proposals as submitted if, in the judgment of the Procurement Officer, the response to this RFP demonstrates sufficient competition so that acceptance of an initial offer without negotiation would result in a fair and reasonable price.

B.9 THE PROPOSALS

To be considered, Offerors shall submit a complete response to the RFP using the format provided. This proposal format is mandatory. Proposals should provide a straightforward, concise delineation of the Offeror's capability to satisfy the requirements of this RFP.

B.10 SIGNATURES

Each proposal shall be signed by an officer authorized to make a binding commitment for the firm(s) making the proposals.

B.11 MINORITY BUSINESS ENTERPRISE

1. It is the goal of MTA that Minority Business Enterprises (MBE) participate in all projects. The MTA hereby notifies all Proposers that in regard to any contract entered into pursuant to this RFP, MBEs will not be subject to discrimination on the basis of race, color, sex, or national origin in consideration for an award.

    a. An overall DBE subcontract participation of **9% of the total contract dollar amount** has been established for this procurement.

2. A fully executed "Certified DBE Utilization and Fair Solicitation Affidavit" and "DBE Participation Schedule" shall be submitted with the Technical Proposal. Failure to submit the required documents with the Offer shall result in the Proposer's Proposal as being not reasonably susceptible of being selected for award.

3. ALL DBE FIRMS PROPOSED MUST BE CERTIFIED BY MDOT hh TIME OF SUBMITTAL OF PROPOSAL. This process takes an average of six months. By submitting a response to this RFP, the Proposer agrees that, as a minimum, this percentage of the contract price will be allocated to DBEs.

4. MBE Participation in work performed under this contract will be monitored by the State and must be in accordance with **Exhibit E (Contract Exhibits)**.

5. Questions or concerns regarding the DBE requirements of this solicitation must be raised before the opening of bids or receipt of initial proposals.

6. A current directory of MBEs is available through the Maryland State Department of Transportation, Office of Minority Business Enterprise, P.O. Box 548, 7201 Corporate Center Drive, Hanover, Maryland 21076. The phone number is 410-865-1269 or 1-800-544-6056.

7. The directory is also available at http://www.mdot.state.md.us. Select the MBE Program label at the left side of the web site, half way down. The most current and up-to-date information on MBEs is available via this web site.

B.12 PROMPT PAYMENT OF SUBCONTRACTORS

This procurement and the contract to be awarded pursuant to this solicitation are subject to the Prompt Payment Policy Directive issued by the Governor's Office of Minority Affairs (GOMA) and dated August 1, 2008. Promulgated pursuant to Sections 11-201, 13-205(a), and Title 14, Subtitle 3 of the State Finance and Procurement Article (SFP), and Code of Maryland Regulations (COMAR) 21.01.01.03 and 21.11.03.01 et seq., the Directive seeks to ensure the prompt payment of all subcontractors on non-construction procurement contracts. The successful Offeror who is awarded a contract must comply with the prompt payment requirements. Additional information is available on the GOMA website at www.mdminoritybusiness.com.

B.13 COMPLIANCE WITH LAW

By submitting an offer in response to this RFP, the Proposer, if selected for award, agrees that it will comply with all Federal, State, and local laws applicable to its activities and obligations under the contract. By submitting an Offer in response to this RFP, the Proposer shall be deemed to represent that it is not in arrears in the payment of any obligation due and owing the State of Maryland or any department or unit thereof, including but not limited to the payment of taxes and employee benefits, and if selected for award, that it shall not become so in arrears during the term of the contract.

B.14 ACCEPTANCE OF TERMS AND CONDITIONS

By submitting an offer in response to this RFP, an Offeror shall be deemed to have accepted all the terms, conditions, and requirements set forth in this RFP.

B.15 CONFLICT OF INTEREST - CONFIDENTIALITY

The Proposer covenants that it presently has no interest, and shall not have any interest, direct or indirect, which would conflict in any manner with the performance of services under this RFP. Without limitation, the Proposer represents to and agrees with the State that the Proposer has no conflict of interest between providing the State services hereunder and any interest the Proposer may have with respect to any other person or entity (including but not limited to any Federal or State regulatory agency) which has any interest adverse or potentially adverse to the State.

The selected Proposer agrees that any information, whether proprietary or not, made known to or discovered by it during the performance of, or in connection with, this RFP will be kept confidential and not be disclosed to any person other than the State, its designated officials, employees, and authorized agents. The Proposer agrees to immediately notify the State in writing if it is requested to disclose any information made known to or discovered by it during the performance of or in connection with this RFP.

B.16 PROTESTS

Any protest relating to this solicitation or the award of a contract must be filed in accordance with Title 15, Subtitle 2, Part III of the State Finance and Procurement Article, Annotate Code of Maryland, and COMAR Title 21 (State Procurement Regulations), Subtitle 10, Administrative and Civil Remedies.

B.17 INCORPORATION BY REFERENCE

All terms and conditions of the RFP and amendments thereto; all provisions of the Offeror's proposal in response to the RFP, and amendments thereto; all applicable State and Federal laws, statutory and regulatory provisions and orders, are incorporated by reference and made a part of the contract to be entered into as a result of this RFP.

B.18 MEDIA ANNOUNCEMENTS

No media announcements written or oral, pertaining to this RFP or the services, study or project to which it relates shall be made without Administration approval and then only in coordination with the issuing office.

B.19 USE OF "E-MARYLAND MARKETPLACE"

"E-Maryland Marketplace" is an electronic commerce system administered by the Maryland Department of General Services. In addition to using the MTA web site (https://emaryland.buyspeed.com) and other means for transmitting the RFP and associated materials, the solicitation and minutes of the pre-proposal conference, proposer questions and MTA responses, addenda, and other solicitation related information will be provided via e-Maryland Marketplace.

B.20 SCHEDULE OF ACTIVITIES

The MTA has established the following schedule for progressing this RFP. The anticipated dates are only an estimate, and the MTA shall adjust the dates at its sole discretion.

ITEM	DATE
RFP Issue Date	**April 4, 2013**
Pre-Proposal Conference and vehicle inspection (**TBD**)	**April 17, 2013**
Proposal Inquiry Deadline	**May 13, 2013**
Closing Date for Receipt of Proposals (2:00 p.m.)	**June 24, 2013**
Discussions (if held)	**August 30, 2013**
Anticipated Selection Date	**September 17, 2013**
Anticipated Notice to Proceed	**December 3, 2013**

C. PROPOSAL FORMAT, ORGANIZATION AND CONTENT

C. PROPOSAL FORMAT, ORGANIZATION AND CONTENT

C.1 PROPOSAL GENERAL

Each proposal shall consist of a Technical Proposal and the Price Proposal. The Technical Proposal and the Price Proposal shall be submitted in separate sealed packages, and in accordance with the requirements of Special Provisions Section B.2.5.1.

C.2 PROPOSAL FORMAT AND ORGANIZATION

The requirements that follow, related to format, organization, and content of Proposals, have been purposely established to facilitate objective, timely, and efficient evaluation by the Administration. The Offeror is advised to ensure that Proposals comply with all such requirements.

C.2.1 Technical Proposal - General

The Offeror is reminded that this RFP describes a MARC III Coach overhaul, including new and upgraded equipment that will meet the Administration's requirements. However, more than one method for performing the work may be acceptable to the Administration. The Offeror shall be responsible for clearly identifying all exceptions taken to the RFP.

The Offeror is to refer to Special Provisions Section I–Contract Award and Evaluation for additional information on evaluation factors and criteria.

C.2.2 Technical Proposal Format and Organization

The Technical Proposal shall contain the items outlined in Section C.3. The format specified in this section is designed to ensure the complete and consistent submission of information essential to the comprehensive and objective evaluation of the Proposals, and therefore the specified Proposal Format must be followed.

The Technical Proposal shall be submitted in a three-ring loose leaf binder(s) or equivalent. All text shall be clear of binding and pages numbered by section. Index tabs shall be provided to facilitate referencing of sections and permit easy separation of sections during evaluation.

The Proposal shall be presented on 8-1/2 x 11 inch sheets, or on 11 x 17 inch sheets (that can be photocopied) for large-scale drawings. Proposals need neither be elaborate nor contain unnecessary art work; rather, they should be typewritten (minimum 12 characters-per-inch) and reproduced in an economical manner, yet present the required information. Product brochures may be used if the brochure contains the technical information required for the Proposal.

C.3 TECHNICAL PROPOSAL CONTENTS

The contents and requirements for the Technical Proposal are described in detail in the following sections. Each section shall be separated by an appropriate tab.

C.3.1 Title Page

The Technical Proposal must contain a Title Page.

C.3.2 Transmittal Letter

The Transmittal Letter must be signed by an officer authorized to make a binding commitment for the firm(s) making the Proposal.

C.3.3 Table of Contents

The Technical Proposal must contain a Table of Contents that delineates all the sections in the Proposal.

C.3.4 Executive Summary

The Executive Summary of the Offeror's Proposal shall not exceed five (5) pages.

C.3.5 General

Proposals shall provide a complete and full, accurate description of the corporate or other structure of the proposing entity, and in the case of a partnership or joint venture, a description of the entities comprising such partnership or joint venture.

The Offeror shall provide evidence demonstrating its ability to secure (i) a Performance Bond in the specified amount, and (ii) insurance at the specified levels.

C.3.6 Management and Manufacturing Capability

The Proposal shall describe the experience and background of the Offeror and associated firms or joint ventures, and provide information to demonstrate that the Offeror has the capability in terms of financial responsibility, facilities, and personnel required to accomplish the proposed work. The Offeror should describe its experience in managing and successfully completing projects similar to this Contract in terms of scope and complexity. This summary should include the following and is limited to 12 pages in length, excluding the pages used for resumes.

A. Key managerial and technical personnel to be assigned to the Contract, including information about background and experience, and the positions they will fill. Identify proposed Project Manager, On-site Representative, Lead Project Engineer, QA/QC Manager, Safety Engineer, and other key managerial and technical staff. Provide brief resumes for each of the proposed key staff identified.

B. Describe the current management structure, and supply an organization chart for executing this Contract.

C. Provide details about company resources including current manufacturing capability in terms of plant, location, capacity, and experienced work force. Provide the location(s) where major engineering, manufacturing, assembly, and local site coordination will occur.

D. Provide a description of current vendor relationships, including key subcontractor personnel. The subcontract list shall list all subcontractors proposed for this project, describe past joint experience on similar overhaul work, and shall also identify Disadvantaged Business Enterprise (DBE) participants. Identify the specialty and project role of each.

C.3.7 Delivery Schedule

Each Offeror will submit a Bar Chart Delivery Schedule, which shall, at a minimum, identify major milestones in time from Notice to Proceed (NTP). The schedule shall also include the following information:

A. Planning activity milestones

B. Procurement activity milestones performed by Contractor and key subcontractor(s)

C. Placement of Subcontract(s)

D. Submittal of Quality Assurance/Quality Control Program Plan

E. Submittal of Safety Program Plan

F. Submittal of System Overhaul Plans

G. Schedule for all engineering and design reviews

H. Schedule for all FAIs

I. Projected removal dates of vehicles from Administration property for overhaul

J. Start date for first MARC III coach overhaul

K. Milestones for key vehicle manufacturing activities at the Contractor facility

L. CPM Schedules for vehicle strip-down, in-line production, and final assembly

M. For systems/equipment that are disassembled from the vehicle by the Contractor and shipped to a subcontractor for overhaul; provide scheduled dates for shipping the material to the Subcontractor(s) facilities, and the receiving dates of the overhauled equipment from the Subcontractor(s)

N. Shipping dates to the Administration of the completely overhauled MARC III

coaches

O. Schedule for submission of Test Program Plan, including submission of Test Procedures

P. MTA on-site vehicle Qualification Test program dates

Q. Conditional acceptance dates for the vehicles

R. Remaining vehicles – shipping, delivery, and acceptance dates

S. Delivery dates for tools, equipment, spare parts, manuals, and training

T. Schedule for submission of CDRLs

U. Warranty Administration Plan submittal date

V. Schedule for submission of the following:

1. Design and engineering drawings
2. As-built drawings for final record
3. Vehicle Overhaul History Books
4. Updated Maintenance Manuals
5. Training Program

X. Monthly/quarterly submittals of Contract deliverables, such as, but not limited to, change order logs, Subcontractor's updates, DBE Reports, etc.

Y. All other items requiring MTA review and acceptance.

C.3.8 Proposed Vehicle Overhaul

The Offeror shall present sufficient management, technical, and schedule information to permit the Administration to evaluate the proposed approach for the MARC III coach overhaul. The Offeror is reminded that clarity and understandability are required. A variety of factors will be considered in assessing the technical merit of the proposal. All Offerors' submissions are subject to verification by the Administration.

Note that items requested for vehicle overhaul evaluation are delineated below. Each item shall be numbered accordingly and tabbed by section for easy reference.

C.3.8.1 General Understanding of the Proposed MARC III Coach Overhaul

A. Identify past work similar to that being proposed. Identify all differences and similarities between the past and the proposed work scope. The Offeror shall also provide evidence of having met or bettered the proposed delivery schedule for similar projects in the past.

B. Provide sufficient drawings and photographs to illustrate the proposed equipment upgrades and renewals. Be prepared to demonstrate the existing system upgrades.

C. Identify key subcontractors and suppliers, the relationship to the Offeror, and past joint experience on similar work.

D. Present the Offeror's schedule to complete the work and evidence to show that it will not be affected by other work being performed by the Offeror, key subcontractors, or key suppliers.

E. Provide the Offeror's program for dealing with the Administration from NTP through Warranty.

C.3.8.2 Differences between the Proposed MARC III Coach Overhaul Plan and the RFP

The Contractor shall specifically identify every variation between the proposed vehicle overhaul plan and the technical specification. This shall be done in the following manner.

A. Identify all specific exceptions to the Technical Specification. Number each exception sequentially, starting with Exception #1.

B. Identify the reason that an exception is being taken.

C. Provide explanation of benefits to the Administration for granting such a change.

D. Provide a suggested change to the Technical Specification. The method for presenting suggested changes to the Technical Specification is to submit proposed changes in a matrix or tabular format. The matrix shall be formatted in rows and columns, and shall include the following information:

1. Identify and delineate the existing RFP requirement for which an exception is taken by the Contractor and/or changes are proposed.

2. Delineate the proposed text in a second column.

3. Provide justification for the proposed change in a third column.

C.3.8.3 Carbody

A. Demonstrate that the Carbody system overhaul will meet or exceed the specification requirements.

B. Describe the proposed overhaul methodology for the Carbody system and associated equipment.

C. Provide a description of the proposed upgrades, modifications, and/or new items.

D. Describe the technical approach for inspecting and validating the structural integrity and welds of the carbody to include under frames, end frames, side frames, roof structures, under car brackets, equipment mounts, and equipment

enclosures.

E. Describe the proposed production process for car shell stripping, corrosion control, car shell cleaning, and finish process.

F. Describe the overhaul of interior components with an emphasis on meeting the smoke, fire, and toxicity performance requirements for all proposed new and upgraded materials.

G. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the carbody system in comparison to the recommended practices specified in the existing maintenance manuals.

C.3.8.4 Trucks and Suspension

A. Demonstrate that the truck and suspension overhaul will meet or exceed the specification requirements.

B. Describe the proposed overhaul methodology for the truck and suspension assembly and associated equipment.

C. Provide a description of the proposed upgrades, modifications, and/or new items. Identify suppliers and include technical data sheets, catalog cuts, and other pertinent information as applicable.

D. Identify the proposed subcontractor(s) and overhaul facility location(s).

E. Describe the technical approach for replacing the wheel/axle assemblies.

F. Describe the technical approach for inspecting and validating the structural integrity of the truck frames and bolster, critical welds, brackets, and mounts.

G. Describe the production process proposed for corrosion control, truck structure build-up, and finish paint process.

H. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the Truck system in comparison to the recommended practices specified in the existing maintenance manuals.

I. Provide a narrative addressing how the Offeror intends to warehouse, ship, and care for the trucks being shipped from the Administration.

C.3.8.5 Couplers and Draft Gear

A. Demonstrate that the Coupler and Draft Gear overhaul will meet or exceed the specification requirements.

B. Describe the proposed overhaul methodology for the Coupler and Draft Gear overhaul. Provide technical data, service history, and reliability data for proposed new equipment (as applicable).

C. Provide a description of the proposed upgrades, modifications, and/or new items. Identify suppliers and include technical data sheets, catalog cuts, and other pertinent information as applicable.

D. Identify the proposed subcontractor(s) and overhaul facility location(s).

E. Describe the technical approach for inspecting and validating the structural integrity of the couplers and draft gear

F. Describe the proposed production process for coupler and draft gear stripping, corrosion control, and finish paint process

G. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the Coupler and Draft Gear system in comparison to the recommended practices specified in the existing maintenance manuals.

C.3.8.6 Air Brake System

A. Demonstrate that the Air Brake System overhaul will meet or exceed the specification requirements.

B. Describe the proposed overhaul methodology for the Air Brake System overhaul and associated equipment. Provide technical data, service history, and reliability data for proposed new equipment.

C. Provide a description of the proposed upgrades, modifications, and/or new items. Identify suppliers and include technical data sheets, catalog cuts, and other pertinent information as applicable.

D. Describe the approach to complete the COT&S requirements.

E. Describe the technical approach to complete the replacement of the WABCO E-7 DECELOSTAT.

C.3.8.7 Electrical System

A. Demonstrate that the Electrical system overhaul will meet or exceed the specification requirements.

B. Describe the proposed overhaul methodology for the Electrical system overhaul and associated equipment.

C. Provide a description of the proposed upgrades, modifications, and/or new items. Identify suppliers and include technical data sheets, catalog cuts, and other pertinent information as applicable.

D. Describe the technical approach for overhauling the low voltage power supply.

E. Describe the technical approach for adding 120V passenger convenience outlets.

F. Describe the technical approach to overhaul the junction boxes. Identify the various boxes that will be overhauled.

G. Describe the proposed technical approach for testing the vehicle wiring.

H. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the Electrical system in comparison to the recommended practices specified in the existing maintenance manuals.

C.3.8.8 Interior

A. Demonstrate that the Interior system overhaul will meet or exceed the specification requirements.

B. Describe the proposed overhaul methodology for the interior system and associated equipment.

C. Provide a description of the proposed upgrades, modifications, and/or new items.

D. Describe the proposed production process for the stripping, and finish process.

E. Describe the overhaul of interior components with an emphasis on meeting the smoke, fire, and toxicity performance requirements for all proposed new and upgraded materials.

F. Describe the technical approach for complying with ADA requirements. Demonstrate that compliance with all applicable ADA requirements will be met.

G. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the carbody system in comparison to the recommended practices specified in the existing maintenance manuals.

C.3.8.9 Toilet Room

A. Demonstrate that the toilet room overhaul will meet or exceed the specification requirements.

B. Provide a description of the proposed upgrades, modifications, and/or new items.

C. Provide a description of the proposed toilet room overhaul. Identify the proposed supplier(s), and include technical data sheets and catalog cuts of proposed Toilet room upgrades. Describe where the proposed equipment has been used successfully in commuter rail applications; and include the operating experience and reliability data for those applications.

D. Provide a technical description of the proposed toilet room module replacement option. Identify any subsupplier and describe where the proposed equipment has been used successfully in commuter rail applications.

E. Describe the technical approach for complying with ADA requirements. Demonstrate that compliance with all applicable ADA requirements will be met.

F. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the carbody system in comparison to the recommended practices specified in the existing maintenance manuals.

C.3.8.10 Water and Waste Retention

A. Demonstrate that the Water and Waste Retention system overhaul will meet or exceed the specification requirements.

B. Describe the proposed overhaul methodology for the Water and Waste Retention system overhaul and associated equipment.

C. Provide a description of the proposed upgrades, modifications, and/or new items. Identify suppliers and include technical data sheets, catalog cuts, and other pertinent information as applicable.

D. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the Electrical system in comparison to the recommended practices specified in the existing maintenance manuals.

C.3.8.11 Door and Door Control

A. Demonstrate that the Door and Door Control system overhaul will meet or

exceed the specification requirements.

B. Describe the proposed overhaul methodology for the Door and Door Control system overhaul. Provide technical data, service history, and reliability data for proposed new equipment.

C. Provide a description of the proposed upgrades, modifications, and/or new items. Identify suppliers and include technical data sheets, catalog cuts, and other pertinent information as applicable.

D. Describe the technical approach to the disassembly and removal of the existing equipment.

E. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the Door and Door Control system in comparison to the recommended practices specified in the existing maintenance manuals.

C.3.8.12 HVAC

A. Demonstrate that the HVAC unit and controls overhaul will meet or exceed the specification requirements.

B. Describe the proposed overhaul methodology for the HVAC unit and controls overhaul. Provide technical data, service history, and reliability data for proposed new equipment.

C. Provide a description of the proposed upgrades, modifications, and/or new items. Identify suppliers and include technical data sheets, catalog cuts, and other pertinent information as applicable.

D. Provide a description of the proposed HVAC controller. Include technical data sheets and catalog cuts. Identify the proposed supplier(s), and describe where the proposed system has been used successfully in Commuter rail applications and the operating experience and reliability data in those applications.

E. Identify the proposed refrigerant and the proposed compressor. Include technical data sheets and catalog cuts.

F. Describe the physical attributes of the proposed HVAC compressor and coils and its configuration within the existing envelope.

G. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the Door and Door Control system in comparison to the recommended practices specified in the existing maintenance manuals.

C.3.8.13 Lighting

A. Demonstrate that the Lighting system overhaul will meet or exceed the specification requirements.

B. Describe the proposed overhaul methodology for the Lighting overhaul. Provide technical data, service history, and reliability data for proposed new equipment.

C. Provide a description of the proposed upgrades, modifications, and/or new items. Identify suppliers and include technical data sheets, catalog cuts, and other pertinent information as applicable.

D. Provide a description of the proposed LED lighting system upgrade option. Identify the proposed supplier(s), and include technical data sheets and catalog cuts of proposed LED lights. Describe where the proposed system(s) have been used successfully in commuter rail and/or transit applications; and the operating experience and reliability data in those applications.

E. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the Lighting system, in comparison to the maintenance practices specified in the existing maintenance manuals.

C.3.8.14 Communications

A. Demonstrate that the Communications System overhaul will meet or exceed the specification requirements.

B. Describe the proposed overhaul methodology for the Communications System overhaul. Provide technical data, service history, and reliability data for proposed new equipment.

C. Provide a description of the proposed upgrades, modifications, and/or new items. Identify suppliers and include technical data sheets, catalog cuts, and other pertinent information as applicable.

D. Provide a block diagram depicting the interfacing of communication equipment subsystems and components. Describe the technical approach to integrate Communication system components.

E. Describe the proposed PEI and AAS equipment. Identify the proposed supplier(s), and include technical data sheets and catalog cuts of the proposed system. Describe where the proposed equipment has been used successfully in Commuter rail/transit application and the operating experience and reliability data in that application.

F. Describe the power supply and other electrical characteristics of the proposed equipment. Provide schematic/control diagram(s) indicating the control system

and interlocks.

G. Describe the diagnostic capabilities of the PEI and AAS system.

H. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the Communication system, in comparison to the maintenance practices specified in the existing maintenance manuals.

C.3.8.15 Cab Equipment

A. Demonstrate that the Cab Equipment overhaul will meet or exceed the specification requirements.

B. Describe the proposed overhaul methodology for the Cab and associated equipment.

C. Provide a description of the proposed upgrades, modifications, and/or new items. Identify suppliers and include technical data sheets, catalog cuts, and other pertinent information as applicable.

D. Identify the proposed overhaul facility for the brake control equipment.

E. Identify the proposed supplier for the optional operator's seat.

F. Include a matrix identifying the key differences (if any) in performing preventive maintenance of the overhauled vehicles as applicable to the Engineer's Cab in comparison to the recommended practices specified in the existing maintenance manuals.

C.3.8.16 Testing

A. Provide a description of the Test Program Plan that will be used to meet the specification requirements.

B. Describe the process for developing and validating all test procedures.

C. Describe the technical approach for performing regulatory compliance equipment inspections including, 184-day inspections, FRA and APTA inspections, etc.

D. Describe the technical approach for performing Design Qualification tests at the Contractor and supplier facilities.

E. Describe the technical approach for performing Acceptance Testing of overhauled vehicles, at the Contractor facility as well as on-site after delivery to

MTA.

F. Describe the technical approach for performing compatibility testing of overhauled vehicles.

G. Describe the technical approach for performing noise and vibration testing of overhauled vehicles.

C.3.8.17 References

The Offeror shall provide five (5) customer references, or 5 years of experience, to demonstrate that relevant work has been successfully performed in the past. If a proposed subcontractor has performed work that is key to the qualifications of the Offeror's team, additional references shall be provided for the subcontractor. Each referenced project shall have:

A. Customer's name, address, and telephone number of a current client employee who is familiar with the Offeror's work. If the customer is overseas, an employee who can speak English shall be provided as the reference.

B. A brief description of the project, number of units involved, dollar value of the project, and the role performed by the Offeror [less than one (1) page].

C. A brief [less than one (1) page] statement of why the work performed on the referenced project is relevant to the Administration's current MARC III Coach overhaul program.

D. (For subcontractor references.) An explanation about the relationship between the Offeror and the proposed subcontractor.

C.3.8.18 Completed Forms

The following completed forms and attachments must be submitted with the Technical Proposal:

A. Contractor's Questionnaire
B. Vehicle Information Questionnaire
C. Recommended Spare Parts Listing, without pricing.

A fully completed Service and Parts Information form, may be submitted after the proposal stage, but prior to the execution of the Contract.

C.4 RELATIONSHIP BETWEEN THE PROPOSAL DOCUMENTS AND THE OFFEROR'S TECHNICAL PROPOSAL

When the contract is executed, the RFP including any addenda, supplements, revisions, and those exceptions taken by the Offeror (and agreed to by the Administration) shall serve as the basis for measuring successful completion.

The Offeror's Technical Proposal (including negotiated clarifications), shall be incorporated into the final Contract. The Proposal identifies specific hardware, functions, software, implementation methodology, and key personnel that the Offeror expects to use. The successful Offeror is required to provide all the items identified in their Technical Proposal.

In the event the successful Offeror has to provide additional hardware, software, or upgrades for new or upgraded equipment in order to meet the performance requirements of the Proposal Documents, these additional items shall be provided at no additional cost to the Administration.

C.5 PRICE PROPOSAL CONTENTS

C.5.1 Price Proposal - General

A separate Price Proposal package shall be submitted for each Technical Proposal package submitted by the Offeror. The successful Offeror will also be required to execute additional documents that have been identified in this section. The Price Proposal package shall also include the following information:

A. The Base Scope of Work includes the provision of six float cars in accordance with SP Section A.4.4.1. Should the MTA increase the float to seven, it is recognized that potential cost and schedule economies may be realized. The Offeror shall provide a narrative detailing the cost and schedule economies for a seven car float.

B. The Base Scope of Work includes the provision of six float cars in accordance with SP Section A.4.4.1. Should the MTA increase the float to eight, it is recognized that potential cost and schedule economies may be realized. The Offeror shall provide a narrative detailing the cost and schedule economies for an eight car float.

C. The Offeror shall provide a list of cost and labor categories, including annual escalation factors, that the Offeror proposes to use when submitting a request for Miscellaneous Work Allowance. At a minimum, the cost and labor category information shall include wage rates, overhead, general and administrative (G&A) costs, and profit rates. [Prices shall be fixed on a yearly basis based on the above information.]

C.5.2 Multiple Proposals – Price

The Offeror shall submit a complete, fully executed Price Proposal package associated with the primary Technical Proposal (sealed separately). If the Offeror has submitted multiple Technical Proposals, the Offeror shall also submit a separate Price Proposal for each of the optional Proposals. These abbreviated Price Proposals shall be submitted in separate sealed packages (properly identified and in the appropriate number of copies) and shall contain:

A. A cover letter describing the relationship between the optional Price Proposal and the primary Price Proposal.

B. A complete, fully executed Unit Price Schedule identified as being for optional Price Proposal

C.5.3 Miscellaneous Work Allowance

A. The work covered under this section includes the furnishing of all materials, equipment, and the performing of all labor to complete additional work directed by the Administration's Project Manager as a result of conditions not detailed and/or anticipated at the time of bid. This work may include, but is not limited to, potential technological-related improvements, potential variances in percentages of work estimated to be performed by the Administration prior to overhaul, an increase in spare parts or potential missing components needing replacement during overhaul.

B. Payments will be based on direct costs of actual labor, material, and equipment as approved by the Administration's Project Manager.

C. The payments will be deducted from the allowance listed in the Unit Price Schedule for Miscellaneous Work Allowance. This allowance is for the exclusive use of the Administration. All unused monies remaining in the allowance at contract close-out will be retained by the Administration.

D. All work to be performed under this section shall be approved in writing by the Administration's Project Manager prior to initiation of work. The Contractor shall supply to the Administration's Project Manager, prior to the initiation of any work, a written price proposal and the materials and methods proposed to be used in performing the work.

E. Any material and process utilized by the Contractor, will be subject to Administration approval. The Administration reserves the right to supply any missing part from its own stock, at its own discretion. Any work performed hereunder shall be performed in accordance with the materials and methods of construction provided in the contract.

F. The amount of this allowance is stated in the Unit Price Schedule, Line Item 8.

C.5.4 Price Proposal Requirements

A. A fully executed Unit Price Schedule

B. A fully executed MBE Form A and B

C. A fully executed Bid/Proposal Affidavit

D. A fully executed Certificate of Lower-Tier Participants

E. A fully executed Debarment Certificate

F. A Disadvantaged Business Certificate

G. A Certification for Federal-Aid Contracts

H. A Certification of Fastener Compliance

I. A completed Buy America Certificate

J. A Certification of Compliance with the Americans With Disabilities Act

K. A Recommended Spare Parts Listing, including pricing

L. A fully executed Conflict of Interest Affidavit and Disclosure

M. A fully executed Certificate Regarding Lobbying.

C.5.5 Forms and Documents for Information

The successful Offeror will be required to complete additional documents upon award of the Contract. These are presented here for information.

A. A Contract Agreement

B. A Contract Affidavit

C. A Performance Bond

D. MBE Documentation.

D. PROSECUTION AND PROGRESS

D. PROSECUTION AND PROGRESS

D.1 GENERAL

This section specifies the general requirements for prosecution of the Work including changes, time of completion, liquidated damages, final inspection and acceptance, claims, and disputes.

D.2 PRE-AWARD AUDIT

So that the Administration can determine that the successful Offeror possesses the capability and capacity to meet all Contract requirements, a pre-award audit will be held at the Contractor's principal place(s) of management and manufacturing to review all aspects of the Technical Specification, Contract requirements, Contractor's manufacturing plans, procedures and schedules, and Buy America compliance.

D.3 NOTICE TO PROCEED

The Administration will issue a Notice to Proceed, pursuant to the pre-award audit, to the Contractor within ten (10) days after the Contract has been executed by the Administration. The Notice to Proceed will stipulate the date on which the Contractor shall begin work. The specified Contract times shall begin on the day stipulated in the Notice to Proceed. Any work started, or materials ordered, before receipt of the Notice to Proceed shall be at the Contractor's own risk.

D.4 AUTHORITY OF THE ADMINISTRATION

In exercising the specific authority granted it under other provisions of the Contract and in any case not covered by such specific authority, the Administration shall have authority to decide all questions as to interpretation and fulfillment of Contract requirements, including all questions as to the prosecution, progress, quality, and acceptability of the work. The Administration shall provide a written response to submittals received from the Contractor within twenty (20) working days of receipt. The Administration may implement and enforce its decisions by orders, instructions, notices, and other appropriate means. The Contractor shall provide a written response to submittals received from the Administration within twenty (20) working days of receipt.

The Administration shall have access to the Work wherever it is being prepared or in progress, at all times. The Contractor shall provide all facilities for safe access to enable Administration to perform its functions and responsibilities under the Contract documents as well as access for authorized representatives of the Administration and FTA for the purpose of inspecting the work. The Administration shall have the right, at no additional cost, to obtain photographs of plant equipment and materials related to fabrication of the vehicles and the manufacture or production of elements to be incorporated into the Work wherever it is being prepared or in progress.

D.5 PRECEDENCE OF CONTRACT DOCUMENTS

The General Provisions, Technical Specification, and all other Contract documents are essential parts of the Contract. They are intended to be complementary and to describe the Work.

D.5.1 Hierarchy of the Documents

Any inconsistency in requirements of the Contract documents shall be resolved by giving precedence in the following order:

A. Executed Contract
B. General Provisions
C. Special Provisions
D. Technical Specification
E. Cited Codes and Standards
F. Contractor's Proposal
G. Any letters of agreement incorporated by contract or addenda.

D.5.2 Document Elaboration and Interpretation

Should it appear that the Work to be done or any of the matters relative thereto are not sufficiently detailed or explained in the Contract documents, the Contractor shall apply to the Administration for such further written explanations as may be necessary. If doubts or questions arise regarding the meaning of the Contract documents, the Contractor shall refer the matter to the Administration.

D.6 AFFIRMATIVE ACTION REQUIREMENTS

The successful Proposer shall certify that it has complied with the requirements of Section 23.67, Subpart D of Title 49 of the Code of Federal Regulations, Part 23.

Should the successful Proposer not have a certified program registered with the FTA, then the Proposer shall seek commitments from MDOT-certified MBEs by subcontract for supplies or services, businesses, or otherwise for supplies and services, the combined value of which equals or exceeds the established goals of the contract. A Proposer may count toward the MBE contract goal, 60% of its MBE contract goal to a certified business supplier who is regarded as a regular dealer and who performs a commercially useful function in the supply process. Within 15 days after notification, the apparent successful Proposer shall submit to the Administration's representative the information required.

D.7 BUY AMERICA

This contract is subject to Section 165, "Buy America", of the Surface Transportation Assistance Act of 1982, U.S. Public Law 97-424, as implemented by Title 29 of the Code of Federal Regulations, Part 661, issued by the Urban Mass Transit Administration (now FTA) of the U.S. Department of Transportation. A copy of the reference part of the Code of Federal Regulations and of the referenced part of the State Procurement Regulations is included herein. Pre-Award and Post-Delivery Buy America audits shall be conducted to confirm compliance.

D.8 CONTRACTOR'S REPRESENTATIVES

The Offeror shall designate in writing, with its Technical Proposal, the name, official mailing address, qualifications, and experience of the proposed Program Manager, who shall have complete authority to represent and to act for the Contractor.

At the time of designating the Program Manager for the Work, the Contractor shall also designate other key personnel, responsible to the Program Manager, with whom the Administration may communicate concerning design, manufacture, quality control, delivery and acceptance testing, and other activities in the absence of the Program Manager.

D.9 ASSIGNMENT

No portion of the Contract shall be assigned, sublet, or otherwise disposed of except with the written consent of the Administration and Surety(ies). Consent to assign, sublet, or otherwise dispose of any portion of the Contract shall not be construed to relieve the Contractor or Surety(ies) of any responsibility for fulfilling all the requirements of the Contract.

D.10 LIQUIDATED DAMAGES FOR TIMES OF COMPLETION

If all or any designated portion of the Work called for under the Contract is not completed and delivery is not made within the number of days set forth in Section A.4.5 or any subsequent revisions thereto by Change Order, damage will be sustained by the Administration. In such an event, the Contractor shall pay to the Administration the amount set forth in the following as liquidated damages per calendar day for every day's delay prescribed. The Administration may deduct the sum of liquidated damages from any monies due, or if such monies are insufficient, the Contractor or his Surety(ies) shall pay to the Administration any deficiency in monies within 30 days of demand therefore by the Administration.

If any of the following events result from the Contractor's actions in the performance of its contractual obligations, Administration will assess the following liquidated damages:

D.10.1 Liquidated Damages Amount (Items of Work Listed in the Following Refer to Section A.4.5, Completion Requirement)

Item	Requirement
1. Late Delivery of First (1st) Overhauled Vehicle - (**Item of Work 1**)	$300.00 per Calendar Day
2. Late Delivery of Second (2nd) Overhauled Vehicle (**Item of Work 2**)	$300.00 per Calendar Day
3. Late Delivery of Third (3rd) Overhauled Vehicle (**Item of Work 3**)	$300.00 per Calendar Day
4. Late Delivery of Fourth (4th) through Sixty-third (63rd) Overhauled Vehicle **Item of Work 4**) to be assessed beginning at the required completion date	$300.00 per Vehicle per Calendar Day

5. Late Delivery of As-Built Drawings, and all Deliverables, including Conformed Specification - (**Item of Work 10**)	$400.00 per Calendar Day

D.11 SUSPENSION OF WORK

The Procurement Officer unilaterally may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work for a period of time as the officer may determine to be appropriate for the convenience of the State.

If the performance of all or any part of the work is for an unreasonable period of time, suspended, delayed, or interrupted by an act of the procurement officer in the administration of this contract, or by the officer's failure to act within the time specified in this Contract (or if no time is specified within a reasonable time), an adjustment shall be made for any increase in the cost of performance of this Contract (excluding profit) necessarily caused by an unreasonable suspension, delay, or interruption and the Contract modified in writing accordingly. However, adjustments shall not be made for delay, or interruption to the extent that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor; or for which an equitable adjustment is provided for or excluded under any other provisions of this Contract.

No claim under this clause shall be allowed:

A. For any costs incurred more than 20 days before the Contractor shall have notified the procurement officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order); and

B. Unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of a suspension, delay, or interruption, but not later than the date of final payment under the Contract.

D.12 FINAL INSPECTION AND ACCEPTANCE

This section covers use and possession prior to completion, and final acceptance of Contract Work.

D.12.1 Partial Acceptance

If at any time during the performance of the Work the Contractor completes a discrete portion of the Work, except vehicles, and makes delivery thereof, the Contractor may ask the Administration to make a final inspection of that portion. If the Administration finds upon inspection that the portion has been satisfactorily completed in compliance with the Contract, it may accept that portion as being completed and the Contractor may be relieved of further responsibility for that portion. Such Partial Acceptance shall in no way void or alter any of the terms of the Contract.

D.12.2 Advance Possessions

Prior to final acceptance of a vehicle, the Administration, by written notice to the Contractor, may take possession and use of a vehicle or any other item of Work if, in its sole discretion, the Administration determines that its possession and use has become essential in meeting revenue services operations. Upon receipt of such notice, the Contractor will be relieved of his responsibilities for maintenance and risk of loss, except those that result from the

Contractor's own operations and negligence. The Contractor will remain responsible for completion of any item or correction of any defect in accordance with the Contract requirements and will still be responsible for timely performance. If a major defect (one which is not correctable within 72 hours or in the judgment of the Administration prevents the safe and reliable operation of the vehicle in service) is found during the initial thirty (30) calendar days the vehicle is available for revenue service after acceptance or advance possession, that 30-day period will be extended by as many days as required to correct the major defect to the satisfaction of the Administration and the date for submission of the Contractor's invoice under Section H.4.2.A will be extended for the same number of days.

D.12.3 Conditional Acceptance

Upon delivery and satisfactory completion of inbound inspection, qualification testing and/or Acceptance Testing, and successful completion of safety certification program; and the vehicle being in a condition to successfully operate in revenue service; the Contractor may present the vehicle to the Administration for conditional acceptance. If the Administration finds upon inspection that the vehicle has been satisfactorily completed in compliance with the Contract and ready to operate in revenue service, the Administration shall execute, in writing, the conditional acceptance of the vehicle. Conditional Acceptance by the Administration includes the acceptance an individual vehicle (or other contract-related work), subject to certain conditions and obligations (including establishing the punch list or open items list). If a major defect (one which is not correctable within 72 hours or in the judgment of the Administration prevents the safe and reliable operation of the vehicle in service) is found during the initial 30 calendar days the vehicle is available for revenue service after conditional acceptance or advance possession, that 30-day period will be extended by as many days as required to correct the major defect to the satisfaction of the Administration and the date for submission of the Contractor's invoice under Section H.4.2.A will be extended for the same number of days. (Also see Advance Possession.)

After Conditional Acceptance of the vehicle (or other contract-related work), the Administration shall assume responsibility, subject to the final acceptance provisions, warranty provisions, or other applicable provisions in the contract.

D.12.4 Final Acceptance

Upon delivery and satisfactory completion of Acceptance Testing, and resolution of all open items for each vehicle, the Contractor may present the vehicle to the Administration for final acceptance. If Administration finds upon inspection that the vehicle has been satisfactorily completed in compliance with the Contract, the Administration shall execute, in writing, the final acceptance of the vehicle (or other contract-related work).

After Final Acceptance of the vehicle (or other contract-related work), the Administration shall assume responsibility, subject to the warranty provisions, or other applicable provisions in the contract.

D.13 PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA – PRICE ADJUSTMENTS

This section shall become operative only with respect to any change or other modification of this Contract that involves a price adjustment in excess of $50,000 except where the price is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation. The right to price reduction in accordance with this section shall be limited to such price adjustment.

If any price, including profit or fee, negotiated in connection with any price adjustment under this Contract was increased by any significant sum because the Contractor or any subcontractor furnished incomplete or inaccurate cost or pricing data, or data not current as of the date of execution of Certificate of Current Cost or Pricing Data, then this price shall be reduced accordingly and this Contract shall be modified in writing to reflect such a reduction.

Failure to agree on a reduction shall constitute a dispute concerning a question of fact within the meaning of Article 28 of the General Provisions.

D.13.1 Audit – Price Adjustments

For purposes of verifying that certified cost or pricing data submitted in conjunction with such a Contract change or other modification were accurate, complete, and current, the Administration or any authorized representative shall, until three (3) years after the date of final payment under this Contract, have the right to examine those books, records, documents, papers, and other supporting data that will permit adequate evaluation of the cost or pricing data submitted along with the computations and projections used herein.

The Contractor agrees to insert this section in all subcontracts hereunder that, when entered into, exceed $50,000. When so inserted, changes shall be made to designate the higher-tier subcontractor at the level involved as the contracting and certifying party.

D.13.2 Subcontractor Cost and Pricing Data – Price Adjustments

The Contractor shall require subcontractors to submit cost or pricing data under the following circumstances: (1) before the award of any cost-reimbursement type, incentive, or price re-determinable subcontract; (2) before the award of any subcontract the price of which is expected to exceed $50,000; (3) before the pricing of any subcontract change or other modification for which the price adjustment is expected to exceed $50,000; except in the case of (2) or (3) where the price is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by laws or regulations.

The Contractor shall require subcontractors to certify that, to the best of their knowledge and belief, the cost and pricing data submitted in compliance with the above paragraph is accurate, complete, and current as of the date of execution, which date shall be as close as possible to the date of agreement on the negotiated price of the Contract modification(s).

D.14 PROSECUTION AND PROGRESS

The Contractor shall prosecute the Work in accordance with the approved schedule. If the Contractor falls behind the approved progress schedule, the Contractor, upon notification, shall take any and all steps necessary to improve its progress. The Administration may require the Contractor to submit for approval supplemental progress schedules detailing the specific operational changes to be instituted to regain the approved schedule, all without additional costs to the Administration. Specific operational changes include, but are not limited to, increasing the number of shifts, increasing overtime operations, and/or increasing the number of workdays in the workweek. The specific operational changes may occur at the Contractor and/or its subcontractor, vendor and supplier facilities; and/or to the Contractor's testing and warranty support activities performed on-site at the Administration.

D.15 FACILITIES FOR THE ADMINISTRATION

This section describes the required facilities for the Administration at the Contractor's plant and at the subcontractor, vendor, or supplier plant as well as maintenance and service requirements at these facilities for the Administration.

D.15.1 Contractor Facilities

The Contractor shall furnish office space and a parking area at both the Contractor's assembly and management/engineering facilities for the exclusive use of the Administration's staff. Office accommodations shall be at least equivalent to those utilized by the Contractor's staff. One office area in each facility shall be provided; this office space for one (1) person should be adjacent to the Contractor's engineering and assembly areas. The office areas shall contain an area of not less than 200 square feet of usable space. Parking spaces for at least one (1) automobile shall also be provided. The Contractor shall provide the following furnishings at each site.

A. One (1) desk, double pedestal

B. One (1) chair, swivel

C. One (1) filing cabinet1, five-drawer

D. One (1) IBM Dual Core Pentium 2 GHz (or better) compatible computer with at least 4 GB hard drive, laser printer, and 17-inch LCD color monitor. The computer shall be equipped with software including Microsoft Office Suite, internet access/browsing software, and virus protection software.

E. Access to high-speed internet connection. The access shall be made available (wired and/or wireless 802.11G) in the office space provided for the exclusive use of the Administration's staff.

F. One (1) plain paper facsimile machine

G. One (1) high resolution digital camera, having a minimum of 8 mega-pixel capability and be compatible with the PC mentioned above, and capable of flash media in-camera storage (4 GB minimum).

H. Two (2) dedicated phone lines – 1 fax line and 1 voice line.

D.15.2 Maintenance and Service

Maintenance and service shall be provided at each site by the Contractor throughout the duration of the Contract for the facilities for the Administration. Such maintenance and service shall include, but are not limited to:

A. Janitorial services for cleaning of the office and parking areas

B. All utilities, including, electrical power, heating, telephone lines, and internet access

C. During other than normal working hours, security measures and area protection equivalent to that used by the Contractor

D. Uniform lighting in the office of not less than 100 foot-candles at desk height

E. At a minimum, the Contractor shall provide the same level of maintenance and services as provided to its employees.

D.15.3 Subsupplier Facilities

The Administration may station personnel in a subsupplier's plant for inspection of work for conformance with contract requirements. When required, adequate facilities as approved by the Administration shall be provided by the subsupplier at its plant.

E. SUBMITTALS

E. SUBMITTALS

E.1 GENERAL

This section specifies the procedures for preparing and transmitting progress schedules and photographs for submission to the Administration. Other requirements for submittals are as specified under other applicable sections.

E.2 PROGRESS PHOTOGRAPHS

After overhaul operations have started on the first vehicle, the Contractor shall have an average of twenty-five (25) color digital photographs taken each month until delivery of the first vehicle. The photographs shall provide a pictorial summary of overhaul activities completed on the vehicles that are in the Contractor's possession. The actual number of photographs and location of views to be taken each month may also be designated by the Administration.

Three (3) CDs, each containing the electronic image files shall be submitted to the Administration within fifteen (15) days after it is taken. Each image will have an information box, nominally 1-1/2 inches by 3-1/2 inches, in the lower right corner, configured as follows:

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND TRANSIT ADMINISTRATION
MARC III COACH OVERHAUL

Contract Name and Number
(Contractor's Name) Photograph No.
Date (Information regarding the view such as location, direction of sight, and significant points of interest)

E.3 PROGRESS SCHEDULE

The Contractor shall prepare and maintain a detailed progress schedule in accordance with TS Section 20–Management and Support Systems. The approved progress schedule shall be the Contractor's working schedule and shall be used to plan, organize, and execute the Work, record and report actual performance and progress, and forecast remaining Work.

E.4 REFERENCED DOCUMENTS

All the documents specified in the applicable, individual sections of this Contract Specifications Book shall be of the issue in effect on the date of the formal Request for Proposals, unless otherwise specified in these Specifications. Later revisions of such documents may be used, subject to approval by the Administration.

E.4.1 Document Approval

Contractor documents, including all CDRLs, approved by the Administration shall not be changed without prior approval of the Administration. Substitute specifications, standards, and procedures developed by the Contractor or its subcontractors may be used in lieu of the listed documents, subject to Administration approval.

E.4.2 Unique Documents

For the duration of the contract, and as requested by the Administration, copies of applicable portions of specifications unique to the Contractor and/or used as reference sources by the Contractor, shall be supplied to the Administration for review.

E.5 USE OF THE ADMINISTRATION'S NAME IN THE CONTRACTOR'S ADVERTISING OR PUBLIC RELATIONS

The Administration prohibits the use of its name, likeness, or any other information about the Administration without prior written approval from the Administration. The Administration reserves the right to review and approve all Administration-related copy before publication. The Contractor agrees not to allow Administration-related copy to be published in the Contractor's advertising or public relations programs until receiving prior approval from the Administration. The Contractor agrees that published information on the Administration or the Administration's program shall be factual and in no way implies that the Administration endorses the Contractor's firm, service, or product. Under no circumstances will Administration-related copy be published or released without prior Administration approval.

E.6 ADMINISTRATION FURNISHED DOCUMENTS

For information purposes, the Administration will provide CDs containing the MARC III Coach Technical Documents and Drawings, which will be available upon request to the Procurement Officer. The documents on these CDs are for reference only, and are provided with no warranty or guarantee as to accuracy, readability, suitability, or fitness of purpose.

F. LEGAL REQUIREMENTS

F. LEGAL REQUIREMENTS

F.1 GENERAL

This section specifies the legal requirements applicable to the Work of this Contract, including liability, patents and copyrights, and warranty requirements.

F.2 LAWS TO BE OBSERVED

The Contractor shall keep fully informed of all Federal, State, and local laws, ordinances, and regulations of all authorities that in any manner affect those engaged or employed on the Work or in any way affect the conduct of the Work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees. The Contractor shall protect and indemnify the Administration and its representatives against any claim or liability arising from or based on the violation of any law, ordinance, regulation, order, or decree, whether by itself, its employees, or its subcontractors. Particular note should be made of all contractual requirements and General Conditions of this contract. The provisions of this Contract will be governed by the law of the State of Maryland in accordance with COMAR regulations and Section 41, General Conditions.

F.2.1 Discrepancies

If any discrepancy or inconsistency is discovered in the Contract Documents in relation to any such requirements of law, the Contractor shall immediately report the facts to the Administration in writing.

F.2.2 ADA Compliance

The Proposer shall include a Certification of Compliance with the Americans With Disabilities Act (see Special Provisions Section C.5.4) with the Price Proposal that the Proposer's Technical Proposal complies with the requirements of the Americans With Disabilities Act.

F.2.3 Hazardous Materials

Potential Proposers should note that asbestos may be present in the structure of the vehicle(s) to be overhauled. It is the Contractor's responsibility to lawfully remove, dispose, and/or perform asbestos abatement, as needed to accomplish the overhaul work. If any asbestos is found in the vehicle(s), the Contractor shall submit test data and other pertinent information indicating the location of asbestos. If any asbestos is found in the vehicle(s), asbestos abatement shall be addressed on a case-by-case basis and subject to the requirements of Special Provisions Section C.5.3, Miscellaneous Work Allowance.

Potential Proposers should note that hazardous materials may be present in the vehicle(s) to be overhauled. It is the Contractor's responsibility to lawfully remove and dispose of all hazardous materials, as needed to accomplish the overhaul work; and the work is considered to be part of its Price Proposal. The Administration will not accept change orders for removal and disposal of any hazardous material from the as-built vehicle(s).

All new material supplied by the Contractor that has MSDS shall be submitted as part of

the documentation.

F.3 PATENTED AND COPYRIGHTED DEVICES, MATERIALS, AND PROCESSES

If the Contractor is required or desires to use any design, device, material, or process either patent or copyrighted, it shall provide for such use by written permission of the patent or copyright owner and a copy of such permission shall be provided to the Administration. Said written permission shall be supplied to the Administration prior to use of said covered materials. The Contractor and the Surety(ies) shall defend, indemnify and save harmless the Administration, the State, any affected third party, and any political subdivision from any and all claims of infringement by reason of the use of any such patented design, device, material, or process, or any trademark or copyright, and shall indemnify the Administration and the State for any and all costs, expenses, claims, and damages that it may be obliged to pay, by reason of any infringement, at any time during the prosecution or following completion of the Work.

If the use of any such design, device, material, or process is held to constitute an infringement and its further use is enjoined, the Contractor shall, at its own expense and at its option, either procure for the Administration the right to continue using it, or replace or modify same to eliminate the infringement.

F.3.1 Notice of Impending Claim

The Contractor shall report to the Administration, promptly and in reasonable written detail, any impending claim or suit for patent or copyright infringement based on the performance of this Contract of which the Contractor has knowledge, and shall require its subcontractors to notify it of any such claim or suit.

F.3.2 Access to Contractor Information

In the event of any claim or suit against the Administration because of any alleged patent or copyright infringement arising out of the performance of this Contract or out of the use of any supplies furnished under this Contract, the Contractor shall furnish to the Administration, when requested by the Administration, all evidence and information pertaining to such suit or claim including all evidence and information in the possession of the Contractor. This notice and assistance requirement shall be included in all subcontracts. In its subcontracts, the Contractor shall require its subcontractors to provide all evidence, information, and assistance necessary to defend such suit or claim.

F.3.3 Agreement to Settle Claim

The Contractor may either defend or settle any claim or suit alleging patent or copyright infringement arising out of the performance of this Contract. The Contractor shall have no responsibility for any compromise or settlement made by the Administration without Contractor's prior written consent. The parties agree to cooperate with one another in the defense of any such claim and suit.

F.4 WARRANTY OF WORK

This section supersedes Article 29, "Warranty of Work," as set forth in the General Provisions.

F.4.1 General Warranty

The Contractor warrants that the title conveyed under the terms of this Contract shall be good and its transfer rightful and that all goods, supplies, systems, and equipment shall be delivered free from all security interests or other liens or encumbrances whatsoever. The Contractor also hereby agrees to warrant and defend the title against all persons claiming the whole or any part thereof.

The Contractor warrants that all goods, supplies, systems, equipment, design, and all work covered by this Contract, including subcontractors and suppliers (except Administration-furnished equipment), shall be satisfactory for their intended purpose, shall conform to, and perform as called for in, the Contract requirements and specifications, and shall be free from all defects and faulty materials and workmanship. Any goods, supplies, systems, equipment, design, and Work found to be defective within the warranty period shall be repaired, remedied, or replaced by the Contractor, free of all charges including transportation. Any latent defects discovered, including but not limited to goods, supplies, systems, equipment, design, and work shall be repaired, remedied, or replaced by the Contractor free of all charges, including transportation.

F.4.1.1 Warranty Period

The Contractor shall guarantee all replacement parts and systems of the MARC III coaches, as well as repaired parts, for a period of two (2) years for new and upgraded parts, and for a period of one (1) year for overhauled parts, from the date of conditional acceptance of each car. The guarantee on parts replaced or repaired under warranty shall extend from the time of replacement or repair. If a subsystem or component of a car has not been accepted when the car is placed into revenue service, the warranty on that subsystem or component shall extend two (2) years for new and upgraded items and one (1) year for overhauled items, after the subsystem or component has been accepted. If car is out of service in excess of 72 hours due to lack of spare parts, an equal amount of time rounded up to 24-hour periods (1 day) will be added onto the warranty period of that car.

F.4.1.2 Spare Parts

The warranty for both mandatory and recommended spare parts, hereinabove excepted in Section F.4.1.1, shall extend two (2) years from the placement of each spare part into service. The warranty period shall not exceed two (2) years after final acceptance of the 63rd overhauled MARC III coach.

F.4.1.3 Engineering Support

The Contractor shall, at its own expense, have a competent engineering staff available on request to assist the Administration's staff in the resolution of engineering or design problems within the scope of the specifications that may arise during the first two (2) years after the final acceptance of the last MARC III coach. The Contractor's engineering representatives shall be

available to assess problems on-site within 48 hours of notification during the Contract period if required by the Administration. Engineering support shall be made available to support the overhauled MARC III coaches during the remainder of their life span on terms mutually agreed upon by the Contractor and the Administration, with any applicable labor rate charges being no more than the Contractor's most favored customer.

F.4.1.4 Safety Defects

Any safety related defect identified by the Administration or the Contractor, which affects any products or services provided under the contract, shall be repaired by the Contractor using its own resources, work force, tools, equipment, and parts for a two (2) year period from the date of final acceptance of the last MARC III coach. Repairs shall be carried out in accordance with the requirements of Section F.4.4. This provision is in addition to any statutory rights available to the Administration.

F.4.2 Warranty Period – Specific Subsystems

In addition to the general warranties specified above, the Contractor warrants that the items listed in Section F.4.2.1 shall provide the indicated service in years or miles, whichever occurs first. The warranty period starts from the date of conditional acceptance of each MARC III coach by the Administration.

F.4.3 High Failure Rate

In addition to the above warranty, if any single failure mode on a single component of any new, upgraded, or overhauled subsystem develops and the number of such failures reaches 10 percent of the population of an item in any single year during the warranty period, the Contractor shall provide, at the Administration's option, full approved repairs, adjustments, or redesign and replacement, at no cost to the Administration. Such correction shall be to the Administration's satisfaction and shall include correction to all cars, including cars for which the warranty period has expired.

"Single year" is defined for the purpose of this section as a 12-month period starting at commencement of placing the first MARC III coach into revenue service until the warranty period expires. The failure rate shall be computed by using relevant failures as defined in Section A.8.2 of the Special Provisions, which shall be counted for the purposes of determining this statistic.

F.4.4 Corrective Work Requirements

The Administration will give the Contractor a written notice of observed defects or failures with reasonable promptness, but in any event not later than 30 days after observing the defect or failure. Unless otherwise directed in this notice, the Contractor shall commence corrective work at the time specified by the Administration, but in no event later than 2 working days after notification by the Administration of the defect or failure. The Contractor shall diligently pursue such corrective work to completion.

Replacement parts and repairs provided pursuant to corrective work hereunder shall be subject to prior approval of the Administration and shall be tendered and performed in the same manner and extent as items originally delivered.

To prevent delays and disruption to Administration's operations, the Administration shall have the right, when practical and feasible, in its opinion, to the continued use of any such goods, equipment, systems, and Work deemed defective or unsatisfactory, until they can be taken out of service pursuant to the corrective work hereby undertaken by the Contractor. In addition, the following provisions shall be applicable to this Contract:

A. If a defect or failure, in the opinion of the Administration, constitutes an emergency that will jeopardize or impair the operations and schedules of revenue service, the Administration shall provide the Contractor both verbal and written notice thereof and the Contractor shall commence corrective work within 24 hours after receiving verbal notice. Nothing herein shall be construed as preventing MTA's forces or the Contracting Railroad (Amtrak or their successor) from immediately commencing corrective work, with labor cost at the expense of the Contractor, provided that all such corrective work is performed in accordance with the Operations and Maintenance Manuals furnished by the Contractor.

   The Contractor shall reimburse the Administration or make replacement (at the option of the Administration) for any spare parts or materials required by the Administration to perform any corrective work with which it must proceed. Such corrective work by the Administration's forces shall not be construed to invalidate Contractor's warranties and other provisions contained in this Section.

B. Under such emergency conditions, the Contractor, with approval of the Administration, may utilize spare parts from the Administration's spare parts inventory, provided that the Contractor agrees to replace each spare part used under terms and within the time period to be prescribed by the Administration.

C. The warranty provisions described in Special Provisions Section F.4.1.2 shall be applicable to each spare part replaced by the Contractor for parts used pursuant to Special Provisions Section F.4.4(B).

D. During the delivery period and the general warranty period, the Contractor shall maintain qualified representatives at the Administration's site to be available for corrective work performed during delivery and for a period of one year after final acceptance of the last vehicle. The Contractor shall maintain sufficient resources to support the remaining warranty.

F.4.5 Reliability Requirements for Overhauled MARC III Coaches

The overhauled MARC III coaches shall meet the reliability program requirements specified in the Technical Specifications. The Contractor shall expand the reliability program as needed to take into account all overhauled, new, and upgraded equipment provided in the major vehicle subsystems as defined.

Under all conditions, the Contractor shall be responsible for the design, manufacture and installation (including retrofit of the entire fleet) of all changes into all overhauled MARC III coaches. In addition, such changes and corrections will be incorporated in any undelivered

cars prior to delivery. The Administration reserves the right to retrofit any or all changes on accepted cars using Administration personnel with compensation from the Contractor for the expenses based on reasonable maintenance times and prevailing hourly rates.

F.4.6 Costs

In addition to all other warranties, expressed or implied, the Contractor, at his sole expense, hereby agrees to bear all costs of corrective work, which shall include, but not be limited to, troubleshooting, removal, necessary disassembly, transportation, reassembly, repair, or replacement of the defective goods, supplies, systems, equipment, and Work; as well as necessary disassembly, reassembly, and repair of all adjacent facilities and structures of the Administration and its construction contractors damaged as a result of the malfunction of the herein warranted goods, supplies, systems, equipment, and Work, including the expense of restoring the aforesaid facilities and structures and the cost of providing ingress and egress to these facilities and structures to accommodate corrective work.

F.4.7 Failure to Perform Corrective Work

If the Contractor is unable or fails within the time prescribed to commence and diligently pursue and complete the corrective work, the Administration is by this provision authorized by the Contractor, at the option of the Administration and upon written notice to the Contractor and the Surety(ies), to contract with another or use their own forces to perform the warranty work. The Contractor hereby agrees to reimburse the Administration for all costs and expenses in connection with such corrective work, including, but not limited to, reasonable attorney's fees.

F.4.8 Timeliness

It is understood and agreed that time is of the essence with respect to all corrective work to be undertaken pursuant to the warranty herein contained, expressed or implied.

F.4.9 Performance Bond

The Contractor's Performance Bond shall continue in full force and effect during the period of the warranties herein specified; however, after Final Acceptance of the last MARC III coaches, a new Bond equal to twenty-five **(25)** percent of the contract value will be acceptable.

F.4.10 Other Legal Rights

The rights and remedies of the Administration under this Section are not intended to be exclusive and shall not preclude the exercise of any other rights or remedies provided for in this Contract, or by law or otherwise.

F.5 RISK OF LOSS

Risk of loss will pass to the Contractor upon release of the MARC III coaches to the Contractor. Risk of loss will pass to the Administration upon delivery of each overhauled vehicle, as defined in Special Provisions Section A.4.3, except that loss or damage to equipment resulting from acts of the Contractor shall be the responsibility of the Contractor.

F.6 NOTICE TO THE ADMINISTRATION OF LABOR DISPUTES

Whenever the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this Contract, the Contractor shall immediately give notice thereof, including all relevant information with respect thereto, to the Administration.

The Contractor shall insert the substance of this section in any subcontract hereunder. Each subcontract shall provide that if its timely performance is delayed or threatened by delay by any actual or potential labor dispute, the subcontractor shall immediately provide the subcontractor, on the next higher tier, or the Prime Contractor, as the case may be, with all relevant information regarding the dispute.

F.7 INSURANCE – LIABILITY AT ADMINISTRATION INSTALLATIONS

Throughout the entire period during which Work is performed under this Contract at Administration installations, the Contractor shall, at his expense, procure and maintain insurance covering liabilities that could result from such Work. The minimum insurance required by these provisions is described in sections F.7.1, F.7.2, and F.7.3.

F.7.1 Worker's Compensation

Insurance shall be sufficient to cover all claims payable under statutory requirements for Worker's Compensation. Self-insurance will be permitted if the Contractor can demonstrate to the Administration that all applicable approvals, regulations, and laws have been complied with.

Worker's Compensation Insurance (see Section IV-Proposal Exhibits; Exhibit K, Item D-Workers Compensation Insurance)

All States Endorsement

F.7.2 General Liability, Including Product Liability

General liability, including product and contractual liability, shall have a combine single limit of $10 million with product liability extending to 5 years after acceptance of the last coach. In lieu of a 5-year policy, such coverage may be an annual insurance policy renewable annually for 5 years. If coverage is not available, the Contractor shall warrant the $5 million combined single limit of liability for 5 years after acceptance of the last coach.

See Section IV-Proposal Exhibits; Exhibit K, Item D–Commercial General and Umbrella Liability Insurance.

F.7.3 Automobile Liability

See Section IV-Proposal Exhibits; Exhibit K, Item D–Automobile and Umbrella Liability Insurance.

F.7.4 Certificate of Insurance

At all times during the period specified above, the Contractor shall maintain with the Administration a current Certificate of Insurance showing the minimum insurance as required in Section F.7.1, F.7.2, and F.7.3 and provide 30 days written notice to the Administration by the insurance company prior to cancellation or material change in the policy coverage. The Contractor shall submit the Certificate of Insurance to the Administration at least 30 days before the planned performance of any work at the installation site.

F.7.5 Subcontractor Insurance

The Contractor shall require subcontractors at any tier who will perform work at an Administration installation to procure and maintain the insurance as specified in section F.7.1 and F.7.3 during the entire period of their performance at the Administration installation site. The Contractor shall furnish, or assure that there has been furnished to the Administration, a current Certificate of Insurance meeting the requirements of Section F.7.4 for each such subcontractor 5 days before the entry of subcontractor's personnel on the Administration's installation site. The Contractor shall ensure that each subcontractor is adequately covered under the provisions of F.7.2 by the Contractor's policy or by the subcontractor's own insurance.

F.7.6 Insurance Companies

In every instance, insurance shall be written and maintained with companies acceptable to the Administration and authorized to do business in the State of Maryland.

F.8 RIGHTS IN TECHNICAL DATA

Technical data means any and all information of a scientific or technical nature, regardless of form or characteristics, to be furnished by the Contractor pursuant to this Contract. It includes, but is not limited to, development or engineering work plus the information used to define a design or process or to procure, produce, support, maintain, or operate the goods, supplies, systems, and equipment furnished hereunder. Examples of technical data include research and engineering data, proprietary software, production drawings, engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identifications, and related information.

The Administration, its employees and consultants, shall have the unlimited right to use, duplicate and disclose, in whole or in part and without charge, all technical data, in any manner and for any purpose when, in the opinion of the Administration, such use is required by the Administration in the installation, operation, modification, maintenance, repair, replacement, overhaul, or training involved with the MARC III coach and its system, subsystem, equipment, or LLRU.

The Contractor hereby sells, assigns, conveys and grants to the Administration and its subsidiaries and affiliates, and any successor entities thereto, all of the Contractor's rights, title and interest in any software specifically developed under the Contract, and/or a previous version of the software that was modified or configured by the Contractor in connection with

the Contract, and provided hereunder, in all forms of expression whatsoever, including but not limited to:

A. Source and object code
B. Flow charts, block diagrams, and all related documentation
C. All copyrights, trade secrets, inventions (whether or not patentable)
D. Proprietary rights and intellectual property contained therein.

If the Contractor delegates the development of any of the software, licensed or otherwise, to any subcontractor, supplier or vendor, then the Contractor shall obtain from them, for the benefit of the Administration, a transfer of all rights in accordance with the terms of the Contract. The Contractor shall provide the Administration with documentation satisfactory to the Administration confirming the Contractor has acquired on the Administration's behalf all such rights. One time fee for licensing software shall apply to all new and upgraded vehicle equipment without additional charges.

All software, licensed or otherwise, provided by the Contractor in connection herewith and the ideas, processes, and methods therein contained shall be the property of the Administration, free from any claim or retention of rights thereto on the part of the Contractor, or Contractor's employees, Contractor's subcontractors or any third parties. The Contractor hereby warrants and represents that it possesses all right to and interests in the software and all portions thereof, or otherwise has the right to grant to the Administration the rights provided for in this Contract, without violating any rights of any third party, and there are currently no actual or threatened suits by any such third parties based on an alleged violation of such rights.

With respect to software that is provided to the Administration pursuant to this Contract, but was not specifically developed by the Contractor in connection with the Contract; the Contractor hereby grants to the Administration and its subsidiaries and affiliates, and any successor entities thereto ("Licensees") a perpetual, non-exclusive irrevocable license to use, reproduce, modify and maintain the licensed software, in any form whatsoever, including but not limited to source and object code, for any purpose whatsoever, except as may be set forth herein. As used above, "irrevocable" shall include, but not be limited to, the right of the Administration to continue using the licensed software irrespective of any breach or default pursuant to the terms hereof.

The Licensees may use the licensed software on any and all equipment configurations of whatever make, manufacturer and/or model, owned, controlled or contracted for by the Licensees, or any entities controlling, controlled by, under common control with the Licensees, or which may assume the responsibilities of the Licensees. Irrespective of the number of equipment configuration(s) upon which the licensed software is used, the licensees shall pay no additional license fee, in addition to the right to reproduce the licensed software, as it deems necessary and, subject to the limitations specified herein, to provide the licensed software, including the source and object code forms thereof and the documentation therefore, to any other person(s) or entity(ies) for their use in connection with providing goods and/or services to the Licensees.

Licensees shall not sell, distribute or otherwise disclose the licensed software to any third parties, provided that they shall have the right to sell, distribute or otherwise disclose the licensed software to its agents, contractors, vendors, and consultants for any purpose relating to the operation, evaluation, modification, and/or maintenance of the licensed software, or any equipment or systems related thereto.

Upon approval of the Administration, standard commercially available software packages may be embedded in the software, provided that the Contractor shall obtain for the Administration all licenses as necessary to use such embedded software in perpetuity without additional fee or cost. Except as specifically restricted in the applicable third-party license agreement, all terms of the Contract shall apply to the embedded software package. The Contractor shall identify and provide complete documentation for any embedded software packages. The Administration shall receive full rights to any modifications made by the Contractor to embedded commercial software.

The Administration expects to be able to maintain all software developed for the overhauled vehicles, including vehicle-related software. Therefore, documentation must be complete and accurate including all source code.

If the Contractor does not provide all documentation on commercial software packages and proprietary software packages, the Contractor shall provide a method whereby the Administration receives at no additional charge all modifications, updates, and query service from the Contractor and/or the original vendor.

F.9 AUDIT AND INSPECTION OF RECORDS

The Contractor shall permit the authorized representatives of the Administration, the U.S. Department of Transportation, and the Comptroller General of the United States to inspect and audit all data and records of the Contractor relating to his performance under this Contract for a period of up to 3 years following completion of this Contract.

F.10 INDEMNITY

In lieu of General Provision 13, General Indemnity, the Contractor shall indemnify and save harmless the Administration, and its officers, agents and employees, from any and all claims, demands, suits, loss, damage, injury and liability, including costs and expenses incurred in connection therewith, resulting from, arising out of, or in any way connected with the performance of the Contract, including delivery and any loading of supplies and equipment.

Such indemnification shall not be construed to include damages or injuries arising or occurring from the sole negligent acts of the Administration, its officers, agents and employees.

G. PRODUCTS

G. PRODUCTS

G.1 GENERAL

This section specifies general conditions for products, including handling, transportation, storage, and the use of trade names and alternative materials.

G.2 TRADE NAMES AND ALTERNATIVES

Solely for convenience, and for no other reason, certain materials and equipment to be incorporated in the Work may be designated under trade names or the names of manufacturers and their catalog information. Use of alternative products without prior approval is strictly prohibited.

G.2.1 Burden of Proof

The burden of proof as to the quality and suitability of alternatives shall be upon the Contractor to provide all information as required by the Administration at no additional cost. The Administration will make the final determination as to the quality and suitability of alternative materials and its decision shall be final.

G.2.2 Effects of Redesign

Where use of an alternative material involves redesign of or changes to other parts of the Work, the cost and the time required to affect such redesign or changes will be considered in evaluating and suitability of the alternative material.

G.2.3 Request in Writing

The Administration will make no tests nor take any action relating to the approval of substitute materials until the request for substitution is made in writing, accompanied by complete data as to the equality of the materials proposed. The Contractor shall make such a request to the Administration in ample time to permit the approval without delaying the Work.

G.2.4 Independent Laboratory Reports

Whenever classification, rating, or other certification by a body such as UL, NEMA, ASTM, AREMA, etc., is a part of the specification for any materials, proposals for use of alternative materials shall be accompanied by reports from the listed, or equivalent independent, testing laboratory indicating compliance with specified conditions.

G.2.5 Cost of Testing

The Contractor shall bear the cost of all testing required to prove equality of the material proposed.

G.2.6 Limited Approval

Use of any alternative material must have the written pre-approval of the Administration. Approval of an alternative material shall be only for the characteristics or use named in such approval and shall not be used to change or modify any contract requirement or to establish approval for material to be used on any other phase of the Work.

G.3 SHIPPING AND HANDLING

The provisions of this section in no way abrogate the Administration's rights or remedies under the Contract as to guarantee, latent defects, and liquidated damages.

G.3.1 Shipping Notification

The Contractor shall give the Administration 10 days advance notice prior to dispatching any shipment which may require special handling or equipment to unload. At the time notice is given, the Administration shall be furnished copies of the shipping notices including bills of lading numbers, a description and listing of the articles, and the shipping weight of each item. The Contractor shall have the Administration's approval before release for shipping from the shipment's origination location.

G.3.2 Shipping and Delivery – Other Than Vehicles

The Contractor is responsible for shipping all approved deliverables to sites specified in Special Provisions Section A. The Contractor shall provide for adequate surveillance work and inspection instructions for handling, storing, preserving, packaging, packing, marking, and shipping to protect the quality of products as required by the contract.

Within ten (10) business days after delivery to the Administration, the Contractor will be notified by the Administration of any damage incurred during transit. Upon notification by the Administration, the Contractor shall commence repairs or replacement of the damaged parts or items.

G.3.3 Shipping and Delivery – MARC III Coaches

Shipping, delivery, and unloading will be performed by the Contractor. Shipping and delivery shall occur in accordance with the requirements specified in Special Provisions Section A.

G.3.4 Shipping and Delivery – Salvage Material

All Administration-approved salvaged material, components, and equipment shall be packaged and shipped to the Administration. The Contractor is responsible for appropriate packaging, loading, and shipping all approved salvage material to the Administration, and the destination location shall be Baltimore, Maryland.

G.4 ADMINISTRATION-FURNISHED MATERIALS

The Contractor is responsible for shipping all Administration-furnished materials including spares and float material, from Baltimore, Maryland to the Contractor's facility. The Contractor shall be responsible for preparing the material for shipment, which shall include preserving, packaging, packing, marking, and shipping.

G.4.1 Cost of Handling

The cost of handling, storing, and protecting Administration-furnished materials after they are delivered to the Contractor shall be considered as included in the Contract price for the item or items in which the materials are used.

G.4.2 Responsibility for Delivered Materials

The Contractor shall be responsible for all materials delivered to it. Deductions will be made from any monies due to the Contractor, to make good any shortages, deficiencies, damages, and demurrage charges from any cause whatsoever that may occur after such delivery.

H. MEASUREMENT AND PAYMENT

H. MEASUREMENT AND PAYMENT

H.1 GENERAL

In addition to the Payment provisions of the General Provisions, this section specifies the measurement of quantities and the provisions for payment.

H.2 MEASUREMENT OF QUANTITIES

For purposes of payment, the Work performed under this Contract will be measured by Special Provisions Section A.4.5, and the Unit Price Schedule (UPS).

H.3 SCOPE OF PAYMENT

The Contractor will be paid at the prices indicated in the Unit Price Schedule. The compensation provided shall be full payment for all costs including furnishing all materials, supervision, labor, incidentals, tools, services, equipment, permits, licenses, insurance, and for performing all Work under the Contract in a complete and acceptable manner.

H.4 PROGRESS PAYMENTS

The Administration will make payments consistent with the Payment provisions of the General Conditions, Section 44, Payment of State Obligations, as the Work proceeds on payment estimates submitted by the Contractor, as approved by the Administration.

H.4.1 Method of Payment

In accordance with Advisory Number 2003-3 issued by the Maryland Board of Public Works (BPW), electronic funds transfer will be issued by the State to pay the Contractor for this Contract and any other State payments due the Contractor unless the State Comptroller's office grants the Contractor an exemption. This Advisory is available on the BPW web site at www.bpw.state.md.us.

H.4.2 Invoices

A. The Contractor shall submit, no later than the fifteenth (15th) day of each month, a certified invoice in the amount reflecting the progress payment for completed work.

B. The invoice shall be prepared in such form and detail as the Administration may require and shall be supported by copies of invoices, reports, and other evidence required for establishing the invoiced progress payment amount.

H.4.3 Basis for Computation

The basis for determining the amount due the Contractor for the progress periods will be as listed below.

H.4.3.1 Contract Item 1 - Management, Engineering, Tooling, and Testing

Contract Item No. 1, Management, Engineering, Tooling, and Testing – progress payments will be made upon satisfactory completion by the Contractor and acceptance by the Administration of the milestones in accordance with the milestone allocation percentages listed below:

(Contract Item No. 1)

Milestone	Percentages
1. Submittal and approval of all of the following: a. Management Plan b. Quality Plan	12%
2. Submittal and approval of the Baseline Progress schedule	12%
3. Submittal and approval of all of the following: a. System Work Plans for Carbody, Air Comfort (HVAC), and Communication systems	7%
4. Submittal and approval of all of the following: a. System Work Plans for all Vehicle systems excluding the specific Work Plans listed under Special Provisions Section H.4.3.1., Item # 3	10%
5. Submittal and approval of all of the following: a. Safety Program Plan b. Test Program Plan	12%
6. Submittal and approval of the Conceptual Design Review (CDR) Document; and Completion of the CDR	2%
7. Submittal and approval of the Preliminary Design Review (PDR) Document; and Completion of the PDR	2%
8. Submittal and approval of the Final Design Review (FDR) Document; and Completion of the FDR	2%
9. Submittal and approval of all of the following: a. Reliability Estimates b. Training Program Plan c. System Support Plan	5%
10. Submittal and approval of the First Article Inspection (FAI) Plan	2%
11. Completion of all FAIs	5%
12. Submittal and approval of all Acceptance Test procedures	4%
13. Submittal and approval of all Qualification Test procedures	5%
14. Completion of Qualification Tests for New/Upgraded Systems	5%
15. Completion of Vehicle Qualification Tests at MTA (First overhauled vehicle of each type)	5%
16. Completion and furnishing of Assembly and Production As-built Drawings	10%

H.4.3.2 Contract Item 1a - Management, Engineering, Tooling, Testing – Mobilization

The Contractor may submit an invoice for Contract Item 1a at the effective date of the Notice To Proceed (NTP).

H.4.3.3 Contract Item 2 - MARC III Coach Overhaul

Progress payments for Contract Item 2 on the Unit Price Schedule will be made based on the Unit Price and upon satisfactory completion, and Administration acceptance, of each milestone in accordance with the percentage allocation listed below. The percentage allocation is on a per vehicle basis, based on the Unit Price for Contract Item 2, as detailed on the Unit Price Schedule.

Milestone	Percentages Per Unit Price
(1) Submittal and Approval of Monthly Project Progress Report. The Contractor may invoice against this milestone each month, during the 30-months succeeding the NTP date.	(15%/Vehicle)/30
(2) Placement and acceptance of subcontracts (or other contractual agreements, if prime contractor is also the supplier), with equipment supplier for the overhaul of the following systems, with delivery schedules compliant with the Administration's requirements for Vehicle delivery:	
a. Carbody b. Trucks and Suspension c. Couplers and Draft Gear d. Air Brake e. Doors f. HVAC g. Communications	10%/Vehicle
(3) Delivery of all material, components and subsystems to vehicle assembly line	12%/Vehicle
(4) Carbody dissasembly; completion of carshell repair, re-seal and water test	4%/Vehicle
(5) Completion of vehicle interior overhaul	4%/Vehicle
(6) Completion of underfloor overhaul and installation of all underfloor equipment	5%/Vehicle
(7) Completion of specified acceptance and performance tests and adjustments	10%/Vehicle
(8) Administration's approval for shipment of overhauled Vehicle from final assembly site to Administration property	15%/Vehicle
(9) Conditional Acceptance of overhauled Vehicle by the Administration	10%/Vehicle
(10) Completion of initial thirty day acceptance period, post Conditional Acceptance of the overhauled Vehicle	10%/Vehicle
(11) Final Acceptance of Vehicle by the Administration	5%/Vehicle

H.4.3.4. Contract Item 3 - Spares (New Spares and Overhaul of Existing Spares –including two spare trucks)

Payments, as approved by the Administration, will be made upon completion of the specified Contract Item. For this Contract Item, the Contractor may request partial payment(s), which shall also comply with SP Section H.4.4 requirements.

H.4.3.5 Contract Item 4 - Special Tools and DTE (New Special Tools and DTE and Overhaul of Existing Special Tools)

Payments, as approved by the Administration, will be made upon completion of the specified Contract Item.

H.4.3.6. Contract Item 5 - Training

Payments, as approved by the Administration will be made upon completion of the specified Contract Item.

H.4.3.7. Contract Item 6 - Manuals

Progress payments for Contract Item 6 on the Unit Price Schedule will be made based on the Unit Price and upon satisfactory completion, and Administration acceptance, of each milestone in accordance with the percentage allocation listed below. The percentage allocation is based on the Lump Sum Price for Contract Item 6, as detailed on the Unit Price Schedule.

Milestone	Percentages
(1) Completion of Configuration Audit	15%
(2) Submittal of Preliminary Manual Outline	20%
(3) Submittal of Initial Draft Manuals	20%
(4) Submittal of Final Draft Manuals	20%
(5) Periodic Updates/Revisions during Warranty period	10%
(6) Submittal of all Final Manuals	15%

H.4.3.8 Contract Items 8 - Miscellaneous Work Allowance

Progress payments as approved by the Administration will be in accordance with the requirements set forth in Section C.5.3.

H.4.3.9 Contract Item 9 - Hidden Damage Allowance

Payments, as approved by the Administration, will be made in accordance with an approved work control plan for Work satisfactorily completed and/or delivered during the progress period.

H.4.4 Estimated Cost Breakdown

The Contractor shall furnish for approval a breakdown of the Contract price for every item or lump sum item in the Unit Price Schedule, except where milestones are specified, for which it is anticipated that partial payment will be requested. Milestone H.4.3.1(8), Final Design Review, must be successfully completed before payment will be made for subsequent Milestones (9) through (11) in Section H.4.3.1 and Milestones (8) through (10) in Section H.4.3.3. Items for each main classification of Work shall be included in the estimated cost breakdown and the amount of the proposal item totaled. The Contractor shall submit the estimated cost breakdown to the Administration at least 60 days before the anticipated partial payment request.

H.4.5 Payment Provisions

Progress payments may be submitted on a monthly basis for items contained in Section H.4.3. The Administration will pay the Contractor for the Contract value of the Work, as defined in the approved progress payment request, less retention. Unless otherwise specified, progress payments may be withheld if the Contractor has not complied with the contract documents. The Contractor shall certify on each invoice that the total costs invoiced do not exceed the total costs incurred.

H.4.6 Retention Provisions

In addition to amounts, if any, withheld pursuant to other provisions of the specification, the Administration will retain an amount equal to 5 percent of the value of all work done and materials furnished. Whenever the work is substantially complete, the Administration, if it considers that the amount retained is in excess of amount adequate for its protection, may release to the Contractor all or a portion of this excess amount.

H.4.7 Minimum Acceptable Value

A progress payment will not be considered acceptable if the total value of Work done, as shown on the estimate, is less than $25,000. However, no estimate accepted, or payment of such estimate, shall be construed to be an acceptance of any defective Work or use of improper materials.

H.4.8 Title to Material

When any progress payment is made under this contract, title to material acquired and Work performed under this Contract shall vest in the Administration. The Contractor, however will be responsible for risk of loss for such material and Work until delivery is made pursuant to Section A.4.

In addition, when any portion of Work for a vehicle, equipment, or spare parts is included in partial payment estimate, the Contractor shall deliver free and clear title to such portion. The form of the title instrument shall be as approved by the Administration.

H.5 FINAL PAYMENT

When the Contract has been completed and all vehicles and other deliverables accepted by the Administration, the Contractor shall complete a final estimate of remaining monies due and submit to the Administration within 30 days of such acceptance. In addition to monies due, this final estimate shall include statements setting forth the Work and time charged by Change Orders, the number of days that have been charged against the Contract, and any other valid deductions or charges.

Upon receipt of the final estimate from the Contractor, the Administration will review the final estimate for correctness and reduction of any other charges or liquidated damages which may have been imposed. If the Administration's final estimate is in agreement with the Contractor's final estimate, the Administration will approve the final estimate, and will prepare the final payment forms and furnish them to the Contractor for execution. If the Contractor agrees with the final payment amount, the Contractor shall execute these forms and return

them to the Administration within 10 calendar days from the date the forms are received, whereupon the Administration will process them for final payment.

H.5.1 Final Payment Dispute

If the Contractor disagrees with the Administration's final estimate, it shall notify the Administration of its protest and non-acceptance within 10 days after receipt of the Administration's final estimate. The Administration then will pay the Contractor for a semifinal estimate with deductions for all prior payments and a retainage equal to 1-1/2 percent of the total estimated value of the Contract. The acceptance of the semifinal estimate shall not be considered a wavier on the part of the Contractor of his right to pursue his protest and press for an acceptance and final payment.

Following payment of the semi-final estimate and proper notification from the Contractor that the Contractor has outstanding claim or claims properly filed and detailed, the Administration and the Contractor shall confer at a mutually convenient time and endeavor to reconcile all points of disagreement. If reconciliation is accomplished, the Administration will proceed with acceptance and final payment on the reconciled basis.

If reconciliation is not accomplished within 30 days, the Administration will prepare the final estimate and final payment forms, together with whatever data the Contractor may have submitted in support of the protest regarding the various factors in dispute. These items will be sent to the Contractor by the registered mail. The Contractor may then submit to the Administration, within 10 days after receipt of said registered mail, a written statement for review and final action. The decision of the Administration shall be final and no further appeal will be considered except as provided in Article 28 of the General Provisions. Such decision and payment by the Administration shall be deemed to constitute acceptance and final payment.

H.5.2 Adjustment for Overpayment

All prior partial estimates and payments will be subject to correction at the time of acceptance and final payment and if the Contractor has been previously overpaid, the amount of such overpayment will be set forth in the final payment forms and the Contractor agrees that he will reimburse the Administration for such overpayment within six months of receipt of such advice, and the Contractor's Surety(ies) will not be granted release from obligations under the terms of the Contract until reimbursement has been made in full.

H.5.3 Due Date for Final Payment

Payment for the full apparent value of the Contract thus determined shall become due and payable to the Contractor within 90 days after Final Acceptance of the Work.

H.5.4 Release Claims

As a condition precedent to final payment the Contractor shall execute a general release of all claims against the Administration airing out of or in any way connected with the Contract.

H.5.5 Fixed Price

The price quoted by the Offeror and accepted by the Administration shall be fixed for the duration of the Contract and not subject to adjustment.

H.6 SPARE PARTS

The Offeror shall submit, as part of the Price Proposal, a completed Mandatory Spare Parts form and a recommended spare parts listing.

H.6.1 Mandatory Spare Parts

Mandatory spare parts furnished pursuant to the Unit Price Schedule will be measured on a lump sum basis; however, the Administration reserves the right to modify the unit quantities by plus or minus 20 percent or 1 unit, whichever is greater. Adjustments will be identified no later than 30 days after final design approval and shall be subject to General Provisions, Article 43, Changes. Delivery schedule for mandatory spare parts is defined in Section A.4.5.

H.6.2 Checkout and Acceptance Testing

No separate payment will be made for spare parts furnished to conduct checkout and acceptance testing of equipment. All such costs shall be considered included in the items of Work to which they pertain.

H.6.3 Parts Purchased Separately for Maintenance and/ or Repair of Original Equipment

It is understood and agreed that the Administration may separately purchase, from time to time in the future, spare parts for the maintenance and/or repair of the new equipment being herewith offered and furnished, and that any such purchased spare parts shall be supplied and delivered to the Administration under all the same terms and conditions contained in this Contract except for the price, for which the Administration shall be charged no more than the Contractor's most favored customer. Such parts shall be made available for ten (10) years after NTP in order to support continued revenue service in Baltimore, Maryland.

I. CONTRACT AWARD AND EVALUATION

I. CONTRACT AWARD AND EVALUATION

I.1 GENERAL

This section specifies the general requirements for the evaluation and award of contract, including bond requirements.

I.2 DISCRETIONARY RIGHTS

The Administration reserves, in its sole discretion, the right to cancel this Request for Proposals (RFP); accept or reject any and all Proposals, in whole or in part, received in response to this RFP; to waive or permit cure of minor irregularities; and to conduct discussions with all qualified or potentially qualified Offerors in any manner necessary to serve the best interests of the Administration, other provisions in the Contract documents notwithstanding. The Administration also reserves the right, in its sole discretion, to award a Contract based upon the written Proposals received without prior discussions or negotiations.

I.3 INCURRED EXPENSES

The Administration will not be responsible for any costs incurred by an Offeror in preparing and submitting a Proposal, in making an oral presentation, in providing a demonstration, or in performing any other activities relative to this solicitation.

I.4 PROCUREMENT METHODOLOGY

This procurement is being conducted in accordance with the Code of Maryland Regulation (COMAR), Title 21, State Procurement Regulations, COMAR 21.05.03, Procurement by Competitive Sealed Proposals. In accordance with COMAR 21.05.03.03F, the Administration intends to award a Contract to the selected responsible Offeror(s) whose Proposal is determined to be the most advantageous to the Administration, considering price and the evaluation factors set forth herein. A responsible Offeror is one who has the capability in all respects to perform fully all Contract requirements and who has the integrity and reliability that will assure good performance.

I.5 EVALUATION OF PROPOSALS

The Proposals will be processed in accordance with Maryland State law.

I.5.1 Proposal Evaluation and Selection Committees

The Technical Proposals and Price Proposals will be separately evaluated by the designated Administration Committees for conformance with the requirements of the RFP. The evaluation criteria will be as detailed in the following sections. The Committees may request additional assistance and information from any source. Selection of the Contractor will be based upon both technical factors and price, with technical being more important than price.

I.5.2 Qualification of Offerors

The Offeror must be a person, firm, or corporation that:

(a) Has in operation, or has the capability to have in operation, a manufacturing plant adequate to assure delivery of all equipment within the time specified under this Contract.

(b) Has adequate management, engineering and service personnel, or has the capability to have such personnel, to successfully complete the project

(c) Has adequate management, engineering and service personnel, or has the capability to have such personnel, to provide support and resolve any engineering or service problems that may arise during the warranty period

(d) Has the necessary facilities and financial resources, or has the capability to obtain such facilities and resources, to complete the contract in a satisfactory manner within the time required.

(e) Has the necessary experience and a satisfactory performance record in completing similar or related projects.

The Administration reserves the right to conduct an audit of the Offerors during the evaluation process.

I.5.3 Proposal Classification

For the purpose of conducting negotiations, Proposals can be initially classified as:

(a) Acceptable

(b) Potentially acceptable; that is, reasonably susceptible of being made acceptable

(c) Unacceptable.

Offerors whose Proposals are unacceptable shall be so notified, and their Proposal will be eliminated without further evaluation.

I.5.4 Qualifying Proposals

Technical Proposals and Price Proposals will be reviewed to ensure completeness and conformance with the requirements of this RFP.

A Proposal with two or more alternative subsystems will be subject to a full and independent evaluation of that portion which differs from the Primary Proposal.

In all Proposals, the Offeror must assume full responsibility for addressing all necessary technical and operational issues in meeting the needs and objectives of the RFP. Failure to respond appropriately may disqualify a proposal from further consideration.

Minor irregularities in Proposals which are immaterial or inconsequential in nature may be waived whenever it is determined to be in the Administration's best interest.

I.5.5 Rejection of Proposals

The Administration reserves the right to reject any and all proposals in accordance with State Procurement Regulations .

I.6 TECHNICAL PROPOSAL EVALUATION

After the Administration has initially classified the Proposals, the Technical Evaluation Team will conduct its evaluation of the technical merit of the Proposals.

Technical factors to be considered are listed in descending order of importance:

1. **Technical Adequacy** – This shall consider the degree to which the Offeror is proposing service-proven equipment and how well the Offeror is expected to meet the requirements contained in the Technical Specification.

   Proposed Vehicle Overhaul Plan, System Features, Capabilities, and Integration including:

   (a) Demonstrated ability to execute a complete vehicle overhaul, including the specified new equipment designs and upgrades.

   (b) *For systems being upgraded:* Demonstrate system engineering, integration, compliance with performance standards, testing, diagnostic capabilities, reliability and maintainability requirements, and previous successful operating experience.

   (c) *For systems being overhauled:* Proposed overhaul methodology, documented repair procedures, adherence to materials and workmanship standards, and demonstrated ability to meet or exceed reliability requirements.

   (d) Management approach that will result in vehicles overhauled on schedule and in accordance with Contract requirements including the ability to maintain delivery schedule.

   (e) Comprehensiveness of test program plans including qualification and acceptance test plans, including evidence of procedures for similar work.

   (f) Technical approach and demonstrated capability in manufacturing and production engineering. Adequacy of the business and engineering processes for developing and executing manufacturing and production work instructions.

2. Managerial Approach and Qualifications, including:

(a) Financial capability
(b) Manufacturing capabilities
(c) Personnel resources, including qualifications and experience of key personnel proposed for assignment to the project
(d) Quality assurance program
(e) System support, including quality of publications, suitability of test equipment, warranty plans and procedures, and field service support
(f) Risk management including Safety Certification program support capabilities
(g) Qualifications of proposed Subcontractors in performing work of a similar nature, including qualifications of key personnel and product support
(h) Project schedule development and management for both the Baseline Schedule and the monthly updates.

4. Past Performance on Similar Projects:

(a) Delivering a quality product meeting the requirements of the customer
(b) Ability to perform the work in the time allotted for the project
(c) Design qualification plans and management systems assurance procedures
(d) Ability to produce and deliver projects within budget.

I.7 PRICE PROPOSAL EVALUATION

After the Evaluation Committee has initially classified the Proposals, the Price Evaluation Committee will conduct its evaluation of the Price Proposal and will establish a financial ranking of all proposals.

I.8 TECHNICAL AND PRICE DISCUSSIONS/NEGOTIATIONS

The Administration may conduct Proposal Discussions/Negotiations with responsible Offerors (those firms who submitted proposals that are acceptable or potentially acceptable). Proposal Discussions/Negotiations may include both technical and price discussions so that the Administration is able to facilitate arrival at a Contract that is most advantageous to the State. Any clarifications of a Proposal shall be submitted in writing by the Offerors.

I.9 ORAL PRESENTATIONS

Offerors may be required to make oral presentations to Administration representatives. Significant representations made by an Offeror during the oral presentation must be reduced to writing. All such representations will become part of the Offeror's Proposal and are binding if the Contract is awarded. The Procurement Officer will notify Offerors of the time and place of oral presentations. Typically, oral presentations occur approximately two to four weeks after the Proposal due date.

I.10 FAILURE TO RESOLVE DIFFERENCES THROUGH DISCUSSIONS

If the Administration and the Offeror are unable to resolve issues in a timely fashion through discussions, and the Administration has determined that adequate competition still exists, the Administration may classify the Proposal as unacceptable. The unacceptable Proposal will not be considered further.

I.11 BEST AND FINAL OFFERS

When in the best interest of Administration, the Procurement Officer may permit qualified Offerors to revise their initial Proposals by submitting Best and Final Offers in accordance with COMAR 21.05.03.03. The Administration will establish a common date and time for the submission of Best and Final Offers. More than one Best and Final Offer may be requested.

If an Offeror has submitted more than one alternative in his Proposal that has been found to be acceptable, the Administration reserves the right to limit Best and Final Offers to the Proposal that is in the best interest of the Administration.

The Administration may provide instructions specific to each Offeror, defining the conditions applicable to the Offeror's Best and Final Offer.

Offerors are advised that the Administration may award a contract on the basis of the initial Proposals without requesting a Best and Final Offer.

I.12 DURATION OF OFFER

Proposals and BAFOs (if required), submitted in response to this solicitation are irrevocable for 180 days following the later of (i) the closing date for the receipt of proposals, or (ii) date of the receipt of BAFOs, if any. This period may be extended at the Procurement Officer's request only by a Proposer's written agreement; provided, however, that the irrevocability period will be automatically extended during the pendency of any protest.

I.13 AWARD

In lieu of Article 9 in the General Provisions, Award will be made as follows. The selection of a successful Offeror for award of this Contract will be made in accordance with procurement policies and requirements specified in the Finance and Procurement Article of the Annotated Code of Maryland, and in the Code of Maryland Regulations, Section 21, State Procurement Regulations.

The Administration's Evaluation Teams will submit the results of their evaluations, including suggestions, oral presentations, reference checks, and other discussion clarifications, if any, to the Procurement Officer. In determining the final ranking of the proposals, technical factors will be given more weight than cost. Pursuant to COMAR 21.05.03.03, the Procurement Officer shall make a determination recommending award of the Contract to the responsible Offeror whose Proposal is determined to be the most advantageous to the State, considering the price and evaluation factors set forth in the RFP.

Contract award is subject to the approval of the MTA Administrator, upon recommendation of the Procurement Officer and will be subject to approval by the Maryland Board of Public Works (BPW).

I.14 EXECUTION OF CONTRACT

After Notice of Award has been issued to an Offeror, the Administration will then forward within ten (10) days the formal Contract forms for execution. The Offeror shall then execute the Contract Forms and return them to the Administration within ten (10) days after receipt of same.

I.15 FAILURE TO EXECUTE CONTRACT

Failure by the Contractor to execute the Contract and file acceptable Affidavit and Bonds within the time aforesaid shall be just cause for the annulment of the awards and the forfeiture of any Proposal Bonds, and Surety(ies) shall pay the full amount to the Administration, not as a penalty but in liquidation of the best Proposer, or the Work may be re-advertised and the Work performed under Contract or otherwise as the Administration, as sole judge, may decide. The Administration may then award the contract to the next highest rated Offeror.

I.16 CONTRACTOR'S AFFIDAVIT

The successful Offeror shall, at time of execution of the Contract, furnish a Contractor's Affidavit in the form included in the RFP.

I.17 CANCELLATION OF AWARD

The Administration reserves the right to cancel award of the Contract at any time before execution of the Contract when the Administration deems such cancellation to be in its best interest. In no event will the Administration have any liability for the cancellation of such award. The Offeror assumes sole risk and responsibility for all expenses prior to execution of the Contract by the Administration and shall not commence work until receipt of the Notice to Proceed.

I.18 PERFORMANCE GUARANTEE

The successful Proposer shall, at time of execution of the Contract, furnish a Surety Bond or Bonds in a sum equal to twenty-five **(25 percent) of the amount shown as the Scope of Work Total Price [Unit Price Schedule, Line Item A]**, on the forms furnished by the Administration. The name of the underwriting agency(ies) for said Bonds shall be shown thereon. The Bond shall be of a form furnished by the Administration, underwritten by a surety authorized to do business in the State of Maryland, and in the amount specified by this solicitation. Upon receiving notification of contract award, the Contractor shall deliver the bond to the Administration no later than the time the Contractor executes the contract.

SECTION VI

TECHNICAL SPECIFICATIONS

MARYLAND TRANSIT ADMINISTRATION
T-8000-0399
MARC III KAWASAKI COACHES (63) OVERHAUL

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TECHNICAL SPECIFICATIONS

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SYSTEM REQUIREMENTS

0.1 GENERAL SYSTEM DESCRIPTION

This section defines the requirements for the minor overhaul and selective upgrades of the MARC III bi-level vehicles, including the operational parameters, structural, performance, vibration, acoustical, and environmental requirements. The overhauled vehicles shall meet the requirements specified, unless otherwise specified.

0.2 PHYSICAL CHARACTERISTICS

The vehicle's physical characteristics are specified in this section for reference only. Any changes to the existing dimensions, when applicable, shall be approved by the Administration. Actual dimensions and tolerances are shown in the vehicle as-built documentation and will be made available by the Administration. For reference purposes only, Exhibit 0-1 shows the differences in interior arrangements for each car type.

Reference Dimensions

- Consist – Push-pull service: 1 – 11 cars
- Length over pulling face of couplers.: 85′- 0″
- Length, between truck centers: 59′ – 6″
- Maximum Width of car: 10′ – 6″
- Height of car, rail to top of vestibule floor (new wheels): 51-9/16″
- Height maximum: rail to top of roof (new wheels): 15′- 6 ½″
- Weight (AW0)
  - Cab Car: 135,000 pounds
  - Trailer Car with Toilet: 133,000 pounds
  - Trailer Car with Snack Bar: 130,000 pounds
  - Trailer Car: 130,000 pounds
- Truck wheelbase: 8′ - 6″

- Wheel diameter (new) 36″
- Wheel diameter (worn) 33″
- Maximum Curve Radius, coupled cars 250′-0″
- Most restrictive cross-over To be negotiated with eight cars coupled: 12′-2″ #8 Crossover Track Centers
- Maximum Speed 125 mph
- Minimum clearance, parts on carbody, above tracks 1.5″
- Minimum clearance, parts on trucks, above tracks 2.75″
- Operating Air Pressure 125 to 140 psi
- (Main Reservoir)
- Trainline HEP power 480 VAC
- Battery power 74 VDC
- Auxiliary power 120 VAC

Seating Capacity:

- Cab Car 130 seated, 108 standing, 238 total
- Trailer Car with Toilet 130 seated, 108 standing, 238 total
- Trailer Car with Snack Bar 132 seated, 108 standing, 240 total
- Trailer Car 135 seated, 106 standing, 241 total

Car Numbers:

Car numbers, classes, and quantities shall be as follows and shall remain with original car:

<u>Kawasaki MARC III Cars:</u>

- Cab Car Nos. 7845 through 7854, Qty. 10
- Trailer Car with Toilet Nos. 7890 through 7896, Qty. 7

- Trailer Car with Snack Bar Nos. 7870 through 7876, Qty. 7
- Trailer Car Nos. 7800 through 7825, Qty. 26

VRE Acquired Cars:

- Trailers Car Nos. 7826 through 7834, Qty. 9
- Cab Car Nos. 7855 through 7858, Qty. 4

0.3 DESIGN CONSIDERATIONS

The following data are provided to assist the Contractor with the overhaul of MARC III cars. If any of this data is critical to the design, the Contractor shall request the Administration to reconfirm the specific data. If any other data not provided here is essential for the required overhaul, the Contractor shall submit a written request to the Administration to provide the necessary additional data.

The carbody, trucks, and equipment are designed so that under the most extreme combinations of broken and deflated springs, lateral and vertical motion, and roll permitted by the suspension system, the maximum possible outline shown in the current Amtrak Clearance Drawing is not exceeded. It is the purpose of this section to ensure that the overhauled car can operate at-speed, unrestricted in the Northeast Corridor.

A clearance of at least 1-1/2 inches, exclusive of positive stops provided between truck parts, and carbody parts under the most unfavorable condition of track curvature, wheel wear, lateral and vertical motion and roll, and broken and deflated springs. No part of the trucks, except wheels, is less than 2-3/4 inches above the plane of the tops of the rails under any combination of conditions including fully worn wheels and primary and secondary spring deflection.

Under the most restrictive combination of track conditions, curves, switches, etc., the clearance between adjacent coupled cars (except at the buffers, diaphragms, and couplers) is a minimum of 3 inches under maximum buff conditions. Car end angles are designed to provide this clearance.

General seating arrangements are included in Appendix A for reference.

0.4 WEIGHT CRITERIA

The Contractor shall maintain the weight of all cars in accordance with the requirements specified in TS Section 17, Management Systems and Support.

0.5 STRENGTH REQUIREMENTS

The car structure shall be capable of resisting, without permanent deformation or failure, the loads inherent in the type of service for which it is intended. The car structure, including the

floor structure, shall not deform in a manner that would impair system function under normal static and dynamic loads and operating conditions. Any structural modifications made to the critical parts of the car structure subject to possible fatigue, shall be specifically designed, subject to the Administration's approval, for the repeated loads, specified service life and environment for which the car is designed. Any such modifications shall have the approval of the Administration before installation.

0.6 FLAMMABILITY, SMOKE EMISSION, AND TOXICITY

Compliance shall be demonstrated for all new equipment and upgraded components by meeting the applicable U.S. standards and tests and the requirements of 49CFR238.103, as specified in TS Section 18.2. The Contractor may submit prior test results within the last 3 years of identical materials that have met these standards and tests for Administration approval.

0.7 ENVIRONMENTAL REQUIREMENTS

The cars are capable of being operated at specified performance levels or stored without equipment degradation under environmental conditions specified below. They are designed to serve in the geographic area bounded by Cumberland (Maryland), Richmond (Virginia), and New York (New York). The following are generalizations of the climate extremes in the bounded area:

A.	Ambient temperature:	-5°F (-21°C) to 105°F (41°C)
B.	Relative humidity:	20% to 100%, including conditions of condensation
C.	Maximum rainfall:	8 inches in 24 hours
D.	Maximum snowfall:	15 inches in 24 hours
E.	Maximum wind speed:	140 mph (operational), 120 mph (storage)
F.	Glaze or freezing rain:	Two or three times per year

The temperatures shown only represent ambient temperature conditions. The effects of increased temperatures due to solar radiation on the carbody and heat produced during operation of equipment under the environmental extremes specified above shall not result in degradation of equipment performance or equipment reliability.

The operating environment shall be considered to be a subtropical marine environment. It shall be considered to actively support the growth of fungi and various corrosion reactions on metals.

0.8 VIBRATION AND NOISE

The Contractor shall ensure that new and upgraded equipment is designed and built and that the equipment to be overhauled is properly rebuilt so that the noise and vibration limits specified in this section are not exceeded. All of the noise level and vibration criteria stipulated herein have been established on the basis of maximum levels measured during tests of existing

cars. Methods shall be incorporated in the design of new equipment to attenuate equipment noise or vibration. Particular attention shall be given in the design of all new equipment and mounting to ensure minimum generation of noise and vibration, and in the overhaul of the car for attenuation of airborne and structure-borne vibration, along with the paths from source to passengers. The Contractor has no responsibility for the noise and vibration of existing equipment that is not overhauled.

0.8.1 Interior Noise Levels (Passenger Areas)

When a single, completely assembled and operating car is moving at any speed up to 125 mph on tangent, at-grade, ballast-and-tie track with clean, smooth rail, with all auxiliaries operating simultaneously at normal conditions, and with the car operating in any specified mode of acceleration, deceleration, or coasting, the noise level in the car's interior (without passenger load) shall not exceed 76 dBA (referred to 0.0002 microbar) at any point not less than one foot from the ceiling, floor, end walls, or side walls. Compliance with this requirement shall be demonstrated using a Type 2 sound level meter as defined ANSI S1.4, "Specification for Sound Level Meters," using the slow meter scale.

0.8.2 Exterior Noise Levels

With the car stopped and all car systems operating simultaneously at normal conditions, the noise level measured 50 feet horizontally from the centerline of the roadway at the axle centerline elevation shall not exceed 75 dBA on the flat response scale of a standard sound level survey meter, as defined in TS Section 0.8.1, at any point along the length of the car on either side.

0.8.3 Vibration Criteria

Equipment and auxiliaries mounted anywhere on the car, carbody, or trucks shall not cause vertical or horizontal vibrations anywhere on the car floor, walls, ceiling panels, and seat frames in excess of 0.10-inch peak-to-peak amplitude, in excess of 0.01g peak acceleration for the frequency range from 0 Hz to 14 Hz; and in excess of 0.045 inches per second peak vibration velocity for the frequency range above 14 Hz.

All new and upgraded car equipment shall be designed to operate without damage or degradation of performance when subjected to vibration and shocks encountered during normal service. Carbody-mounted components shall be designed to withstand vibrations of not less than 0.2g at frequencies up to 100 Hz, and randomly oriented shock loads of 2g.

0.9 COMPATIBILITY WITH EXISTING CARS

The cars shall be overhauled, manufactured, and adjusted to operate in-train and be compatible in all respects with the Administration's existing fleet.

0.10 INTERFERENCE AND COMPATIBILITY

The Contractor shall identify the design changes, apparatus or equipment that may have an impact on electromagnetic compatibility (EMC) and develop an appropriate mitigation program.

The purpose is to ensure that proper emphasis is placed on the control of interference and adequate attention is given to interface and FCC requirements from the earliest stages of new and upgraded equipment design and equipment overhaul.

The Contractor's Electromagnetic Compatibility (EMC) Plan shall be in compliance with 49 CFR 238.105 and APTA Standard SS-E-010-98, "Standard for the Development of An Electromagnetic Compatibility Plan, and IEEE Std 16. The EMC plan shall include: limits for both emissions and susceptibility, conducted and radiated emissions, responses of various systems and subsystems to variations in their electrical environment and shall be submitted to the Administration for review and acceptance. **[CDRL 001]**

0.10.1 Electromagnetic Interference

The Contractor's approach to electromagnetic interference shall be to ensure that the electrical, electronic, cab signal system/ATC, and communication systems and subsystems will operate in their intended operational environments without either suffering or causing harmful interference because of unintentional electromagnetic radiation or response.

The Contractor shall control the electromagnetic interference and/or the susceptibility of purchased and subcontracted equipment and components. In addition, the Contractor shall install and progressively test the various subsystems and components to demonstrate protection against false energy mis-codes, improper codes, and cross-talk from adjacent and nearby track circuits. Testing for these purposes shall be performed under the appropriate fault conditions.

The limits of radiated interference shall be 109 dB over one microvolt/meter/MHz at 150 kHz to 84 dB over 1 microvolt/meter/MHz at 30 MHz (straight line, semi log); 58 dB over 1 microvolt/meter/MHz from 30 MHz through 90 MHz and 68 dB over 1 microvolt/meter/MHz from 90 MHz through 400 MHz. These limits shall not be exceeded when measured at a distance of 50 feet.

0.10.2 Interference Compatibility

All new and upgraded equipment shall be protected from damage due to electrical line transients. These transients may be generated by a number of sources, including but not limited to, over/under Hz, step wave voltage sources. The Contractor shall, at designated design reviews, demonstrate through display of technical information and test results, the functional capability of the equipment, as well as the compatibility of the total car system with its operating environment.

The Contractor shall develop design criteria for the limitation of equipment-generated voltage transients, and for equipment tolerance to such transients. The Contractor shall submit the

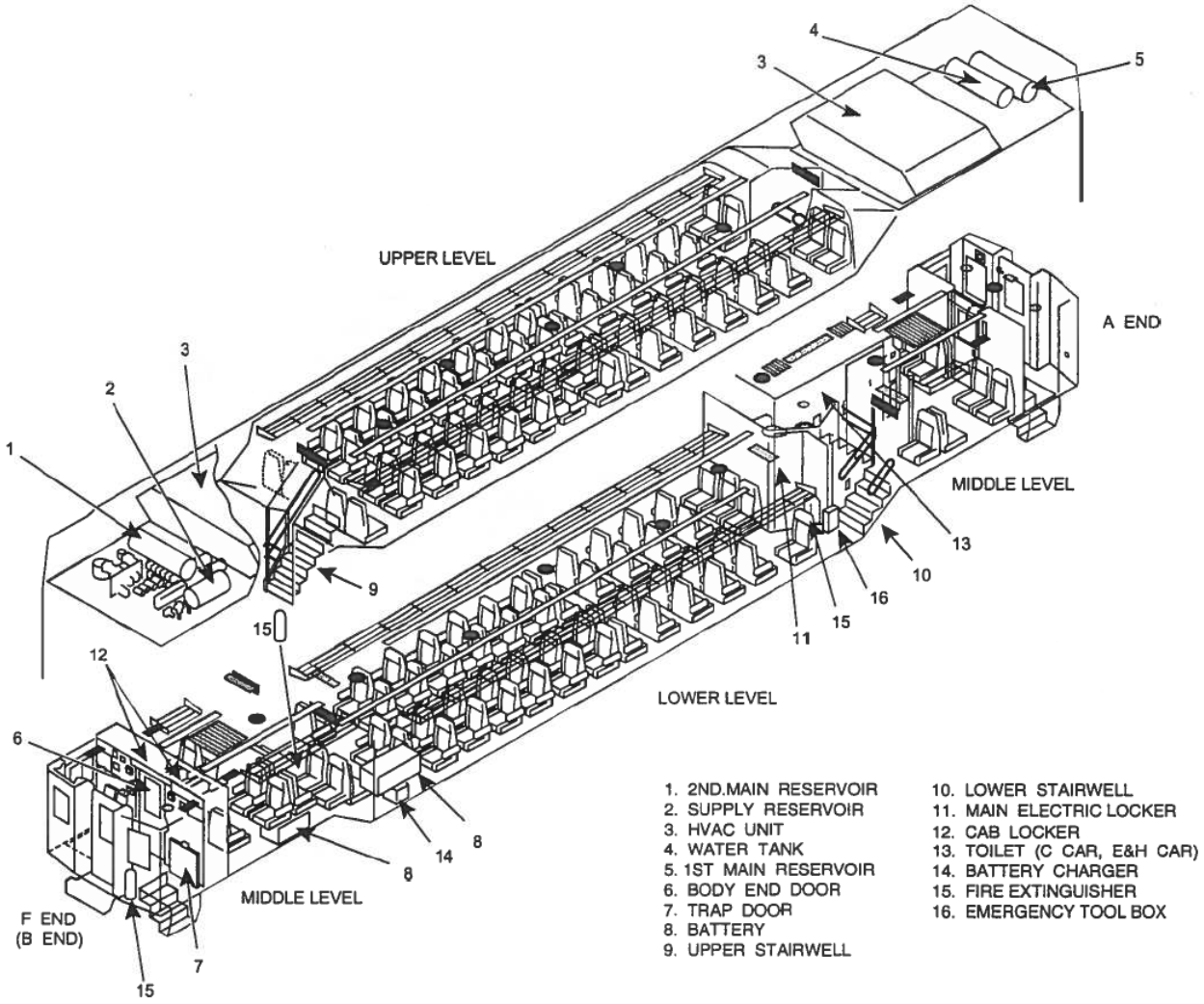
criteria to the Administration for review and approval as part of the EMC Plan. The considerations necessary to evaluate the functional interfaces between subsystems include power source levels and variations, load and source impedances, grounding and continuity, and subsystem controls, etc.

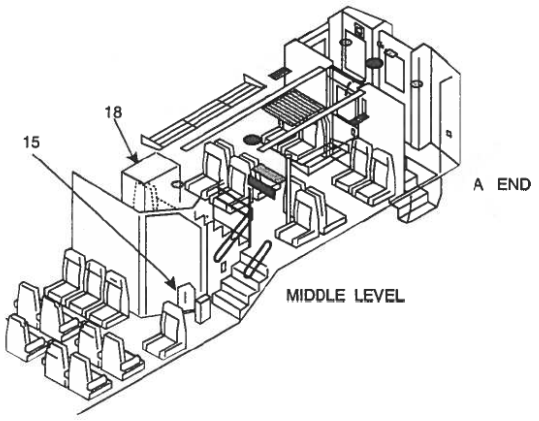
0.11 REQUIRED CDRLS

The following CDRL items are referenced in this section:

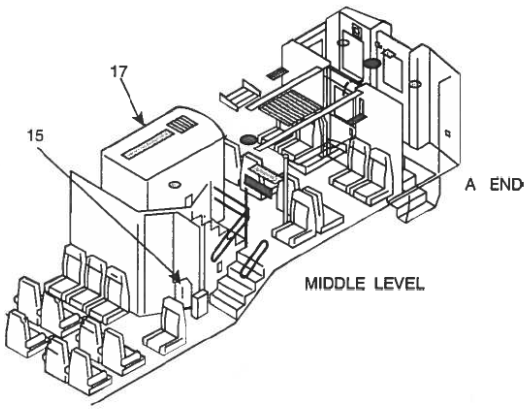
001 The EMC plan shall be submitted to the Administration for review and acceptance, within 180 days of Contract Award.

EXHIBIT 0-1 – Interior Arrangements by Car Type (for reference purposes only)





T CAR



S CAR

17. SNACK BAR
18. LUGGAGE SPACE

SECTION 01
CARBODY

SECTION 01
CARBODY

SECTION 01
CARBODY

1.1 GENERAL SYSTEM DESCRIPTION

The carbody shell is a three level semi-monocoque structure in which the longitudinal members, vertical and transverse framing members, as well as the skin sheeting, consist of low carbon content stainless steel.

1.2 OVERHAUL REQUIREMENTS

The carbody shall be cleaned, inspected, and overhauled to repair all damaged or defective areas of the structure and car shell. At a minimum the Contractor shall submit a Carbody Overall Overhaul Plan that includes cleaning, inspection, and overhaul procedures for all areas of the carbody structure and car shell identified in this section for Administration approval prior to start of work **[CDRL 101].**

The exterior of the carbody shall be thoroughly inspected for cracks, deformations, and corrosion. Defects discovered shall be brought to the attention of the Administration and repaired in accordance with the approved procedures. The Contractor shall bid on repairing a minimum of twenty (20), 12-inch by 24-inch carbody exterior areas. The number of 12-inch by 24-inch areas will be determined at the outbound inspection for each car.

It is the Contractor's responsibility to survey each car and itemize the defect locations and repairs required.

Replacement of body parts or underfloor equipment shall preserve all external clearance requirements and clearance requirements between the trucks and car body or underfloor equipment.

New apparatus, such as material or configuration changes, supplied during the overhaul shall be the same for all vehicles and shall be fully interchangeable.

1.2.1 Sides and Ends

End frames and side frames are composed primarily of framing members and skin sheet of low carbon content stainless steel.

Sides and ends shall be inspected, cleaned, and overhauled with all decals removed and renewed with new decals.

The Contractor shall clean, repair, and overhaul the car body side and end sheets, including covering small superfluous mounting holes**.**

1.2.2 Underframe

The underframe primary members at the mid floor level at the car ends consist of HSLA structural steel for the end sills, draft pockets, and body bolsters. Underframe members and skin sheet in the center and transition areas consist of low carbon content stainless steel.

The Contractor shall clean, repair, and overhaul all exposed areas of the underframe, including the end and center sections, draft gear, coupler pockets, and the areas around the truck bays.

All critical welds, where readily accessible: end underframe to sideframes, draft pockets, body bolsters, end sills, end plates, underframe transitions, anti-telescoping plates, collision posts, and corner posts shall be inspected, documented, and repaired if required.

1.2.3 Weld Inspection Plan

In the Carbody Overall Overhaul Plan, the Contractor shall submit a plan for the weld inspections of critical areas to include locations, type of inspections, and criteria and weld repairs.

All end underframe carbody and equipment connections (welded or bolted) shall be inspected for cracks, corrosion, or material deterioration and repaired. In the Carbody Overall Overhaul Plan, the Contractor shall submit a plan for inspection of connections, including criteria for renewal.

All areas of the buffer wings and stairwell support members showing evidence of corrosion shall be cleaned and repaired. Buffer wear plates and their fasteners shall be renewed with new wear plates and fasteners per OEM requirements. Buffer stems shall be disassembled, cleaned, inspected, and springs renewed.

Visible portions of end underframe crossmembers and floor beams are to be cleaned, inspected for damage, cracks, loss of section to corrosion, and repaired. End underframes are to be overhauled, primed and then given 3 coats of black enamel after inspection and repairs.

Strip and inspect the center underframe for any cracks or openings in the corrugated sheet. Overhaul by repairing cracks in members or welds or by overlaying of corrugated sheet and repaint with approved undercoating material. In the Carbody Overall Overhaul Plan, the Contractor shall submit repair procedures for each configuration and material review and approval before start of repairs.

Remove all covers of the undercar 480 VAC duct bank and wiring and ducts. Inspect and clean all cleat block connections, cable connections, and separators. Recondition duct bank covers and reinstall.

Inspect and overhaul existing jacking pads as needed. Any failed welds shall be identified and repaired.

In the Carbody Overall Overhaul Plan, the Contractor shall submit a repair procedure for jacking pad welds to the Administration for review and approval.

Replace any damaged car body thermal insulation with same density aluminum faced insulation, or Administration approved equal.

1.2.4 Bolster Anchor Brackets

Existing bolster anchor brackets and fasteners shall be cleaned, visually inspected, overhauled, and painted.

Suspected cracks or separation shall be examined by dye penetrant inspection. If crack or separation is confirmed, the bracket shall be renewed.

If the structural integrity of the bolster anchor bracket is compromised by loose fasteners, evidence of two halves slipping or by damage to existing welding, it shall be renewed.

1.2.5 Undercar Boxes

All undercar boxes shall be cleaned, inspected, and repaired if dented, pierced, or deformed. Undercar box seals and gaskets shall be renewed for water tightness.

New cotter keys shall be applied to drain holes.

Mounting brackets shall be inspected overhauled, repaired as needed, and new mounting fasteners applied to OEM specified torque values.

End of car trainline junction boxes shall be inspected overhauled, and repaired as needed. Seals and gaskets shall be renewed for water tightness.

1.2.6 Collision Posts and Corner Posts

The accessible portions of collision posts, corner posts, and adjacent structure at each end of the car shall be cleaned and inspected for corrosion, cracks, and weld separation on every car.

Drain holes shall be cleaned; hoses, and/or fittings shall be renewed.

1.2.7 Roof

All roof levels shall be cleaned, water tested, and inspected. Any damaged side and top roof sheets shall be repaired.

A minimum of four upper level ceiling panels and six light fixtures shall be removed to view interior roof insulation during the water test.

Water leak areas shall be repaired using a cover plate of matching sheet configuration. In the Carbody Overall Overhaul Plan, the Contractor shall submit repair procedures for each configuration and material prior to start of repairs.

Overhaul low roof HVAC mounting feet, air intake, HVAC shrouds, latches, hinges, spall shields, and renew the seals.

Clean, inspect and re-seal existing low to high transition seams.

1.2.8 Windows

All existing passenger side window and windshield glazing, sash glass, and mounting rubber shall be removed. All glazing shall be inspected and cleaned. The Contractor shall submit a criteria document for determining if the window glazing requires replacement. **[CDRL 102]** As part of this plan, the Contractor shall submit replacement material specifications for Administration review and approval. **For estimating purposes it is expected that 25% of glazing will be replaced.**

All mounting rubber and strip fillers shall be renewed.

All passenger side window openings shall be provided with emergency units on each side of all levels of the car. Not all of the passenger side windows are emergency units. Those that are emergency units shall remain emergency units and be overhauled per the rest of the section.

Emergency window units shall utilize two handles per unit, with a handle to remove the removable glazing rubber, and a handle to remove the window glass for emergency evacuation purpose.

The window glass removal handle shall be located behind the handle for removal of the glazing rubber.

All windows and windshields shall comply with all current requirements of 49 CFR223 and 49 CFR238.

1.2.9 End Vestibule

Vestibule interiors and plenum areas above ceilings shall be thoroughly cleaned, inspected, and overhauled to restore original functionality.

Existing safety bars and retainers shall be cleaned and overhauled.

Vestibule floors shall be thoroughly cleaned, inspected, and overhauled to restore original functionality and appearance.

The Contractor shall clean, inspect, repair any corrosion damage.

1.2.10 Stepwells and Trapdoors

A. Stepwells. Clean, inspect, and overhaul all visible parts of the stepwell, supports, and step treads.

   Inspect all hardware and renew if missing, damaged, or loose. Replace all reflective tape and decals with new.

   As an option, the Contractor shall propose a replacement stepwell surface as an improvement to the OEM design. The Contractor shall submit the proposed design and installation procedures for Administration approval. **[CDRL 103]**

B. Trap Doors. Existing trap doors and related hardware shall be removed, cleaned, and overhauled.

   Trap door heaters shall be disassembled, overhauled with all wiring renewed, reinstalled, and tested. The Contractor shall propose a design modification to replace the trapdoor heater wiring and loop design between the car body and heater to address the problem of wear and breakage for Administration review and approval. **[CDRL 104].** Broken or incomplete welds shall be repaired. Torsion springs shall be renewed. All weather stripping and thresholds shall be renewed. Trap doors shall be re-installed and adjusted for proper operation.

1.2.11 Safety Appliances and Handholds

Inspect and overhaul all interior and exterior stair handholds and verify that all safety appliances meet all current FRA Safety Appliances regulations.

1.2.12 Diaphragms and Safety Curtains

Remove safety curtains and housings. The empty tapped holes in collision posts shall be filled with decorative buttons or pan head fasteners before repainting.

All diaphragms shall be renewed. In the Carbody Overall Overhaul Plan, the Contractor shall submit mounting overhaul and installation procedures approval.

1.3 REQUIRED CDRLS

101 Carbody Overall Overhaul Plan to the Administration for approval

102 Criteria for replacement of window glazing and replacement material specifications and designs

103 Submittal of design and installation procedures for stepwell surfaces

104 Submittal of design modification for trap door heater wiring

SECTION 02

TRUCKS AND SUSPENSION

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SECTION 02
TRUCKS AND SUSPENSION

2.1 GENERAL SYSTEM DESCRIPTION

Existing trucks are four-wheel, steel fabricated, outboard frame, with roller bearings, currently qualified to run at all MARC operational speeds up to a maximum speed of 125 mph.

The truck frames and bolsters are made of low alloy high tensile steel plate. The car is supported by two air springs per truck. The air springs are located on top of the truck bolsters. Leveling valves are mounted under the car body with linkages connected to the bolsters. There is one leveling valve per truck. Primary suspension units are coil inner and outer spring sets, with the outer coil spring incased in rubber. There are four primary spring sets per truck. Primary springs are located between each of the axle journal bearing assemblies and the truck frame.

Journal bearings are Timken class F (AP) lubricated tapered roller bearings. All journal bearings include a 100-tooth gear wheel for magnetic speed sensors.

Each truck has four friction brake units with two friction rings mounted to each axle. A truck also has four tread brake units

2.2 OVERHAUL REQUIREMENTS

The trucks shall be overhauled per OEM procedures, qualifications, and criteria.

The contractor shall submit a Truck Overall Overhaul Plan to the Administration for review and approval. **[CDRL 201]** The plan shall include all procedures for repair and subsequent stress relieving of the truck frame. The Truck Overall Overhaul Plan shall include all procedures to repair welds and cracks. Cracks shall be unacceptable, regardless of size or location. All weld repairs shall be in accordance with OEM requirements and applicable AWS codes.

All parts of the trucks and related assemblies, not described herein, shall be thoroughly cleaned and overhauled. Trucks shall be re-assembled in accordance with OEM requirements and performance criteria.

Overhauled trucks shall be complete with all equipment. The Contractor shall furnish all labor and unless specified, all material required, including the repair and replacement of all damaged or missing parts.

All work performed on and material applied to, overhauled trucks shall be in compliance with the most recent release of the AAR Wheel and Axle Manual and the AAR Roller Bearing Manual, including all amendments.

Where specific work is required to be performed per items above, the work shall be performed in AAR certified facilities. The Contractor shall not be permitted to use alternative shops to perform the work without prior Administration approval.

2.3 RECONFIGURATION

The Contractor is responsible for ensuring the overhauled truck and suspension system configuration is in compliance with the latest OEM specifications and requirements. The Contractor shall revise the appropriate As-Built drawings and documentation (as required in TS TS Section 17, Management and Support Systems within this Specification) to ensure configuration control; and that the proper documentation reflects all changes made to the As-Built configuration. This may include, but is not limited to OEM equipment/components, design modifications/upgrades, and approved modification/upgrades performed during this overhaul.

2.4 SCOPE OF WORK

The truck system overhaul shall be in accordance with OEM requirements and performance criteria. All inspection; testing; assembly and disassembly; repair and/or replacement of components; and adjustment and lubrication, as applicable, shall be in strict compliance with the OEM recommendations.

2.4.1 Frame

Frames shall be abrasive blasted clean to bare metal, removing all corrosion, and then visually inspected for damage. Openings shall be masked to prevent damage from abrasive media. After inspection the frames shall be immediately painted in accordance with the OEM's process and paint specification.

Frames shall be magnafluxed per ASTM-E-709.

Frames shall be trimmed for proper alignment. Proper alignment is defined as the difference in diagonal measurements being less than 1/16 inch. Tram points shall be permanently identifiable.

Incorrect tram shall be corrected using industry accepted methods. Tram procedure(s) shall be submitted to the Administration for review and approval before any actual work.

All critical dimensions of each truck frame shall be measured and recorded. The recorded dimensions shall be included as part of the Car History Book.

Mounting holes shall be cleaned and repaired as required.

Threads in tapped holes shall be repaired as required.

Spring pockets or spring suspension counter bores and mounting holes requiring repair shall be built up with weld. Reamed holes and seats shall be restored.

Tramming marks shall be restored.

Center bearing pin bushing shall be renewed.

Side bearing friction plates shall be renewed in sets as specified by the OEM for MARC operational speeds. Side bearing friction plates shall be conditioned for coefficient of friction as specified by OEM using OEM recommended equipment. Appropriate shimming shall be applied or removed per OEM procedures for wheel diameter compensation.

Journal box hangers shall be removed, cleaned, inspected, and repaired if found damaged. If the journal box hanger is beyond repair, it shall be replaced.

Journal box hangers shall be returned to original truck position after overhaul or replacement.

Special care and inspection shall be given to the radius arm seat and bolt holes. Damaged seats and bolt holes shall be weld repaired and re-machined. As part of the Truck Overall Overhaul Plan, the Contractor shall develop a procedure to repair the welds, and re-machine the seats.

A. **Name and Number Plates.** Existing name plates shall be removed, cleaned, repainted and reapplied. Damaged or missing name plates shall be replaced.

   Existing number plates shall be removed, cleaned, repainted and reapplied. Damaged or missing number plates shall be replaced. Number plates shall be masked until all painting on the truck is completed.

B. **Radius Arm Caution Plate.** Four red "radius arm torque value" caution plates shall be applied to each truck after all painting on the truck is completed. The location of the Caution Plate shall be in accordance with OEM.

2.4.2 Bolster

Bolsters shall be abrasive blasted clean to bare metal, removing all corrosion, and then visually inspected for damage. Openings shall be masked to prevent damage from abrasive media. After inspection the frames shall be immediately painted in accordance with the OEM's process and paint specification provided in TS Section 3.11.2.

Bolsters shall undergo a dimensional measurement inspection. All results shall be measured and recorded. The recorded dimensions shall be included as part of the Car History Book.

Bolsters shall be magnafluxed per ASTM-E-709.

Bolsters shall receive a 100% magnetic particle inspection in all welds. All welds shall be of an acceptable quality otherwise subject to repair.

Any crack shall be unacceptable, regardless of size or location. All weld repairs shall be in accordance with AWS applicable codes.

All mounting holes shall be repaired as required.

Steel wear plates shall be inspected and repaired or replaced as necessary per the OEM procedures. Existing body side bearing plates may be re-machined flat removing a maximum of 0.125 inches of the original plate thickness. The stainless wear plates shall be re-welded to AWS procedures and sealed per OEM instructions. All welding processes shall be to OEM procedures and criteria and meet AWS standards.

Existing center casting portion of bolster and frame shall be overhauled to OEM dimensions.

Lateral Shock Absorber shall be replaced with OEM or Administration approved equivalent.

Replace lateral bumpers with OEM or Administration approved equivalent.

Hanger plates and pins shall be inspected for damage and repaired as required. Cotter pins shall be replaced.

2.4.3 Bolster Anchor Rods

Existing bolster anchor rod assemblies shall be overhauled. All bolster anchor rod rubbers are to be replaced if found worn, or damaged. Reinstall new rubbers per OEM procedures. Inspect bolster anchor rod for cracks, distortion, or other damage. Repair or replace damaged bolster anchor rods.

2.4.4 Radius Arms

The radius arm assembly shall be overhauled per OEM procedures. Note: the two halves of the radius arm are serialized. They two halves are match drilled as a set, and shall not be interchanged with halves from other radius arms.

Radius arm rubbers shall be replaced if found worn, or damaged.

All cotter pins, nuts, and bolts shall be replaced.

The drilled bolt used in the attachment of the end cap to the radius rubber holder shall have a hole sufficient for the cotter pin and shall not affect the strength of the bolt.

Existing roller bearing seats of the radius arms shall be cleaned, inspected, and overhauled in accordance with the OEM recommendations or shall be renewed.

2.4.5 Journal Bearings and Boxes

All journal bearings shall be removed and overhauled in accordance with OEM procedures and methods by an AAR certified facility. If the journal bearing cannot be re-conditioned it shall be renewed with an OEM bearing. **For estimating purposes, it is anticipated 5% of bearings shall be replaced.**

All bearings, whether new or rebuilt, shall be fully lubricated with grease meeting AAR specification M-942 latest revision. Bearings shall not require any field lubrication.

Lubricant fitting shall be removed and a plug applied in the axle end cap.

Toothed gear wheels for speed sensors shall be cleaned, inspected and repaired if damaged.

Bearings that are not needed to complete trucks shall be overhauled and returned to the Administration.

2.4.6 Wheels and Axles

All wheels shall be replaced with new wheels in accordance with the requirements of this section and in accordance with AAR Manual of Standards and Recommended Practices for Wheels and Axles, Section G.

New wheels shall be a nominal 36 inches in diameter, with flange angle and tread profile in accordance with APTA 340 (APTA SS-M-015-06), and conforming to AAR #B-36 heat treated wrought carbon steel, multiple wear type.

New wheels shall be manufactured to AAR Standards and shall conform to the current revisions of Title 49 CFR Part 238.119 and APTA SS-M-012-99, Standard for the Manufacture of Wrought Steel Wheels for Passenger Cars and Locomotives.

Wheels shall have undersize bores to permit maximum re-use of existing axles.

New wheel sets shall be grouped and applied in truck sets.

New Wheels shall be dynamically balanced to within 0.50 pounds-force (0.23 kg) at the outside diameter of the rim. Balancing shall be achieved by machining the wheel.

Detail drawings and specifications for the new wheels shall be submitted to the Administration for approval. **[CDRL 202]**

Journal seat repairs may be made by the electro-chemical deposition process if done within the scope of rule 2A-5 of the AAR Wheel and Axle Manual.

Reject Axles shall be replaced with new axles. **For estimating purposes, it is anticipated 12 axles will require replacement.**

Reject Axles shall be stored and protected until released for disposition by the Administration.

A permanent record shall be kept of all wheel pressings, serial numbers, axle stampings, tape sizes, tonnage and all other dimensions taken, including runout readings. The records shall be included in the car history book.

2.4.7 Suspension

A. **Primary Suspension.** The existing primary spring is a nested matched set of inner and outer coil springs. The outer coil spring is a rubber coated steel coil spring that has non-linear spring rate characteristics.

Existing rubber coated coil springs shall be inspected for damage and replaced if bulged, torn, peeled, or cracked with OEM or Administration approved equivalent. Replacement springs shall meet the exact OEM specifications. Replacement primary springs shall be free issued by the Administration.

During car leveling, primary spring empty weight installed heights shall be shimmed to OEM requirements using OEM procedures. All resulting measurements shall be recorded on forms and included as part of the Car History Book.

Primary springs not meeting the installed measurement requirements shall be removed and replaced.

Primary springs shall have markings indicating the manufacturer and date of manufacture on outside surface of one end of each rubber coated spring coil.

An OEM or Administration approved equivalent design top cap shall be placed on the truck frame hole above the primary spring to prevent debris entering the seat and spring assembly. The top cap shall not be easily removed by hand.

B. **Secondary Suspension.** Existing air springs shall be inspected for damage and replaced in accordance with OEM procedures and criteria.

1. The Administration shall free issue replacement air springs to the Contractor.
2. O-rings shall be replaced when replacing air springs.
3. Existing air spring adapter plates shall be overhauled.
4. All air suspension hoses shall be replaced.

C. **Leveling Valves, Compensating Valves, and Double Check Valve.** See Air Brake TS Section 4 for secondary suspension leveling valves and associated pneumatic components.

2.4.8 Electrical, Electrical Conduit, and Piping

New magnetic wheel slide speed sensor cable assemblies shall be installed.

New event recorder/alerter and automatic announcement system speed sensor shall be installed.

A new axle generator shall be installed as part of the new 9-aspect cab signal/ATC system installation work being performed by WABTEC with their PTC installation program.

A. **Electrical Conduit.** Existing conduits, junction boxes and fittings shall be removed and inspected. Any damaged parts shall be replaced with new OEM material.

   Terminals, cables, and connectors shall be cleaned and inspected. Any damaged parts shall be replaced with new OEM material.

   All magnetic speed sensor cables shall include the following:

   1. All speed sensor and cable assemblies shall have a fixed pigtail with integral environmentally sealed connection at the sensor.
   2. New cable clamps shall be installed to securely retain the cable arrangement on the truck frame.
   3. Cable clamps and cable routing shall be arranged to permit the full range of truck rotation relative to the carbody and maximum dynamic vertical displacement of the journal boxes relative to the truck frame.
   4. The cable shall have a quick disconnect, Canon style plug connector. The proposed speed sensor cables and installation shall be submitted for Administration review and approval. **[CDRL 203]**

B. **Air Piping.** Existing air piping shall be cleaned inside and outside and capped to prevent contamination from entering. Any damaged, bent, dented air piping shall be replaced. Replacement piping shall be seamless steel tubing per ASTM A53 SEAMLESS GRADE B.

   Pipe clamps, fittings and unions shall be cleaned and overhauled. If any part cannot be repaired it shall be replaced.

   All air leaks shall be repaired.

2.4.9 Brake Equipment

Brake equipment overhaul including the removal of the sanding system shall be covered in Air Brake TS Section 4.

2.4.10 Electrical Grounding

Axle end grounding contacts shall be overhauled or replaced. Carbon brushes shall be replaced. Spring supports shall be replaced. Sealing O-ring shall be replaced.

All ground straps and their fasteners shall be replaced with OEM material. Appropriate conductive grease shall be applied at all bolted connections.

2.4.11 Painting

Before re-assembly of the truck, one coat of approved metal primer shall be applied to all individual metal parts.

A final coat of approved silver enamel truck paint shall be applied. The paint shall not conceal cracks that may develop in service. Care shall be taken to mask off areas of the radius arm seat from paint. The proposed paint shall be subject to Administration approval.

Wheels, axles, exposed rubber and name/number plates shall not be painted.

2.4.12 Lubrication

All truck, handbrake and air brake components requiring lubrication shall be lubricated before shipment of cars.

Truck parts shall not be lubricated during truck assembly.

Journal bearings are to be lubricated by the AAR certified roller bearing repair shop.

2.4.13 Carbody Leveling

Leveling the trucks and carbody shall be done on straight, level, tangent track. The track shall be solidly supported with the top elevation of the track maintained within 0.125 inches tolerance at all truck and wheel centers.

The Contractor shall submit the car leveling procedures for Administration review and approval **[CDRL 204].**

2.5 SPARE TRUCKS

The Administration has eight (8) spare truck assemblies (truck frame and bolster) that shall be part of this scope of work. The Contractor shall build complete, ready to run truck assemblies with those components. The spare trucks shall be capable of MARC operational speeds, using the procedures and required processes as identified this Specification.

The Contractor shall be responsible for providing all missing material to produce complete ready-to-run truck assemblies, including but not limited to, wheels, axles, roller bearings, brake equipment, brake actuators, piping, wiring, primary springs, elastomeric elements and air springs.

Spare trucks shall be used as floats and installed on completed cars during the course of this project.

2.6 REQUIRED CDRLS

201 The contractor shall submit a Truck Overhaul Plan.

202 Detail drawings and specifications of the proposed new wheel replacements.

203 The proposed speed sensor cable and installation.

204 The Contractor shall submit the car leveling procedures.

SECTION 03
COUPLERS AND DRAFT GEAR

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SECTION 03
COUPLERS AND DRAFT GEAR

3.1 GENERAL SYSTEM DESCRIPTION

The existing cars are equipped with two (2) AAR Type "H" coupler assemblies, yoke-draft gear assemblies, spring support assemblies, and uncoupling devices, one set at each end.

3.2 OVERHAUL REQUIREMENTS

Coupler assemblies shall be removed from the cars and overhauled in accordance with APTA RP-M-004-98 Recommended Practice for Second Hand and Reconditioned Type H-Tightlock Couplers. If the coupler assemblies are deemed not repairable, they will be renewed.

Prior to starting the overhaul, the Contractor shall submit a Coupler and Draft Gear Overall Overhaul Plan to the Administration for review and approval. **[CDRL 301].** The plan shall address the Coupler Assembly, Yoke and Draft Gear Assembly, Carrier Assembly and Uncoupling Levers. The Contractor shall be responsible for any and tests as required by the AAR and APTA standards.

3.2.1 Overhaul of Coupler Components

All components shall be overhauled per the Coupler and Draft Gear Overall Overhaul Plan.

3.2.2 New Couplers

New Couplers, where required, shall be fully interchangeable with those installed on the Administration existing coaches.

3.2.3 Yoke and Draft Gear Assemblies

A. Yoke Assembly

All components shall be overhauled per the Coupler and Draft Gear Overall Overhaul Plan.

B. Draft Gear

All existing rubber draft gear shall be renewed with new Waughmat spring elements, in both the buff and draft groups.

Follower plates and divider plates are to be visually inspected. Bent or damaged components are to be renewed, as needed.

The draft gear support plates, which cover the exposed sides of the yoke draft gear packs, shall be examined for excess wear. They shall be renewed if they are worn more than 25 percent of their original sheet metal thickness.

3.2.4 Carrier Assemblies

All components shall be overhauled per the Coupler and Draft Gear Overall Overhaul Plan.

3.2.5 Uncoupling Levers

All components shall be overhauled per the Coupler and Draft Gear Overall Overhaul Plan.

3.3 REQUIRED CDRLS

301 The Contractor shall submit a Coupler and Draft Gear Overall Overhaul Plan to the Administration for its review and approval.

SECTION 04
AIR BRAKE

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SECTION 04
AIR BRAKE

4.1 GENERAL SYSTEM DESCRIPTION

Each MARC III car is equipped with a brake system built around basic WABCO 26-C Type Brake System equipment. The Cab Control cars are also equipped with a 26-C Cab Control Unit and 26-C brake valve for manual control of the trainlined brake pipe pressure in the consist. The normal operation of the train's brake system is a locomotive equipped with 26-L brake valve or from a Cab Control car equipped with a 26-C brake valve.
The brake system includes a cable operated handbrake which activates the brake on two disc brake units per car.

The brake system includes a load sensing feature, which reads the car's air spring pressure, and modulates maximum brake cylinder pressure in both service and emergency braking in order to keep braking demand within normal adhesion limits, and to achieve the specified braking rates. Cab Control cars are equipped with a sanding system which applies sand to both rails at the wheels on the lead axle No. 1 of the F-end. Sanding is automatically controlled by the Forward/Reverse key on the master controller so that sand is always delivered ahead of the leading wheels of the train. Sand application is inhibited on the Cab Control car when the locomotive is forward.

The brake system includes WABCO E-7 DECELOSTAT wheel slide detection and correction equipment that shall keep the braking rate as nearly constant as is physically possible under varying adhesion conditions.

4.1.1 Performance Requirements

The existing car performance is and shall remain as follows, after the overhaul:

A. **<u>System Pressure</u>**: The maximum design pressures for the air brake system are:
Main Reservoir: 150 psi (1034 kPa) with the locomotive governor set at 125 to 140 psi (861 to 965 kPa)
Brake Pipe: 110 psi (758 kPa)
Max. Brake Cylinder: l00 psi (689 kPa)

B. **<u>Deceleration Rates:</u>**
The brake system shall be overhauled so that the original As-Built deceleration rates are achieved. An average full service brake deceleration rate of 2.00 mphps (0.89 m/s^2) shall be achieved from stops initiated at all speeds up to 125 mph (202 km/h).

The maximum instantaneous car deceleration rate during the full service stop shall not exceed 2.75 mphps (1.23 m/s^2). The maximum change in service brake deceleration (Jerk Rate) during service brake application shall not exceed 1.5 mphpsps (0.67 m/s^3).

In addition to achieving the deceleration rates as specified above, the brake system shall produce a maximum single car deceleration rate of 2.50 mphps (1.12 m/s^2) during emergency brake applications.

The Contractor shall verify by testing the overhauled air brake equipment by performing a type tests and routine tests as required in TS Section 14. The Contractor shall provide a test plan for Administration review and approval per TS Section 14.

System responses and results shall meet the Specification values for all weather conditions. Rail conditions may be taken into account by the Administration on a case by case basis during adverse weather.

Braking shall be considered to have begun at the instant of brake handle movement. The train shall be considered stopped upon energization of the zero speed relay.

4.2 OVERHAUL REQUIREMENTS

The Contractor shall submit an Air Brake Overall Overhaul Plan to the Administration for approval **[CDRL 401].** The plan shall include all cleaning, inspection, repair, and testing procedures. In general, the brake system shall be overhauled per OEM heavy repair maintenance requirements. Overhauling requirements are discussed in the sections below including; base scope of work, modifications, additions and options.

An option to replace the WABCO E-7 DECELOSTAT system with a KNORR MGS2 wheel slide control system is further discussed below.

The entire brake system shall be overhauled to comply with all applicable requirements of 49 CFR 238.231 and facilitate performance of the APTA approved Single Car Test, 49 CFR 238.311 and Class I Brake Test defined in 49 CFR 238.313. The entire brake system shall be inspected and tested as required by 49 CFR 229.25, 229.27, 229.31 and 229.29 and 49 CFR 238.309. In addition, Form FRA 6180-49A shall be updated.

4.3 RECONFIGURATION

The Contractor is responsible for ensuring the overhauled air brake system configuration is in compliance with the latest OEM specifications and requirements. The Contractor shall revise

the appropriate As-Built drawings and documentation (as required in TS Section 17, Management and Support Systems within this Specification) to ensure configuration control; and that the proper documentation reflects all changes made to the As-Built configuration. This may include, but is not limited to OEM equipment/components, design modifications/upgrades, and approved modification/upgrades performed during this overhaul.

4.4 SCOPE OF WORK

The following existing air brake system components and associated air system components shall be removed from the vehicles, overhauled, and reinstalled per OEM procedures and recommendations: The Original Equipment Manufacturer (OEM) of the existing air brake system is WABCO (now named Wabtec Corporation, Passenger Transit). The air brake system shall be tested in accordance with TS Section 14.

- **A.** D-7 Operating Unit – including all control portions, valves, cocks, filters, and pressure switches.
- **B.** The 26-C Cab Control Unit – including the 26-C Brake Valve portion and all control portions, valves, and electrical devises.
- **C.** Laminated brake pipe manifolds
- **D.** B-3-B Emergency Brake Valves
- **E.** VX Vent Valves
- **F.** A-1 Charging Valve
- **G.** E-3 Brake Application Valves
- **H.** N-1-D Magnet Valves
- **I.** Air Filters and Air Filters with Choke
- **J.** H-5 and HB-5 RELAYAIR Valves
- **K.** N-3-E Magnet Valve
- **L.** Filters, Strainers and Check Valve
- **M.** Check Valves and Check Valves with Choke
- **N.** Air Suspension Double Check Valves
- **O.** Air Suspension Compensating Valves
- **P.** Air Suspension Leveling Valves
- **Q.** Sanding Control Valves and Sanding Nozzles (Cab Control Cars)
- **R.** Horn Valve (Cab Control Cars)

All component identification labels or decals shall be cleaned or renewed.

4.4.1 WABCO E-7 Decelostat

The existing WABCO E-7 DECELOSTAT, wheel slip-slide detection and correction controller located in the Electric Locker shall be replaced with a KNORR MGS2 system or Administration approved equivalent.

Slide detection and correction shall be independent of load condition AW0 through AW3.

Slide detection shall be performed on all four axles and corrections made on a per truck basis.

The contractor shall propose compatible magnetic speed sensors to replace the existing units. The contractor shall use the existing axle mounted interfaces and toothed gear wheels.

All speed sensors, connectors, and cable assemblies shall be sealed to prevent water intrusion and shall. Speed sensors shall comply with the requirements of TS Section 2.4.8.

The Contractor shall submit the details of the slip-slide correction system with all electrical and pneumatic system schematics, component drawings and specifications, interfaces, software documentation, and testing for review and approval of the Administration. **[CDRL 404]**.

4.4.2 Reservoirs

Main and supply reservoirs shall be inspected and tested in accordance with 49 CFR 229.31. All other reservoirs, including equalizing and combined reservoirs shall be inspected and tested in accordance with ASME's Boiler and Pressure Vessel Code.

Failed reservoirs shall be replaced with new reservoirs.

Successfully tested reservoirs shall have the exteriors primed and painted and stenciled with white letters and numerals. The interiors shall be cleaned and de-scaled.

Drain valves shall be inspected, tested, and overhauled, or replaced.

Automatic drain valves shall be inspected, tested, and overhauled or replaced.

Any replacement air reservoirs shall be pressure vessels conforming to the latest revision of ASME Boiler and Pressure Vessel Code, as required in TS Section 15. Main and supply reservoirs shall include telltale holes, as called out in 49 CFR 229.31(c). Test reports and certification for each pressure vessel shall be included in the Car History Book.

4.4.3 Truck Mounted Brake Units

Tread brake units shall be overhauled per OEM specifications. Mechanical linkages shall be evaluated for wear and renewed per OEM specifications.

Disc brake calipers units shall be overhauled per OEM specifications. Mechanical linkages shall be overhauled per OEM specifications.

Disc brake friction rings shall be replaced with OEM friction rings or Administration approved equivalent. Friction ring mounting hubs shall be visually inspected for cracks or other damage and shall be replaced if found to be damaged.

All tread brake shoes and disk brake pads shall be renewed.

4.4.4 Pipe Work, Hoses, and Pneumatic Components

The following existing air brake components shall be removed from the vehicles, overhauled per OEM procedures and reinstalled:

- **A.** Brake Cylinder Pressure Switches
- **B.** Duplex Air Gages
- **C.** All Cutout Cocks
- **D.** All Drain Cutout Cocks
- **E.** All Angled Cocks
- **F.** All Cutout Cocks with Locking Handles and Vents
- **G.** Car end brake pipe and main reservoir pipe cutout cocks are ball type with locking handles and shall be overhauled per OEM specifications or renewed.
- **H.** Cutout cocks to the brake cylinder pipe on each truck shall be overhauled per OEM specifications or renewed.
- **I.** Cutout cocks to other air operated equipment shall be overhauled per OEM specifications or renewed.
- **J.** Renew existing end of car brake pipe angle cocks and main reservoir cutout cocks.
- **K.** All pneumatic brake indicators shall be overhauled including, hoses, air cylinder, fittings, seals, and colored plunger end.
- **L.** All existing steel pipe shall be thoroughly flushed and cleaned and inspected. All steel piping shall be dried and capped to prevent the infiltration of moisture or debris. All missing pipe clamps shall be renewed. Air piping shall be tested in accordance with TS Section 14 requirements.
- **M.** All copper lines and fittings shall be thoroughly flushed and cleaned and inspected. All copper lines shall be dried and capped to prevent the infiltration of moisture or debris. All missing pipe clamps shall be renewed.
- **N.** All hoses shall be renewed and dated no less than one year prior to acceptance. Brake pipe trainline hose connections shall be in accordance with AAR Specification M-601, latest revision and shall be less than one (1) year old from date of manufacture at the time of delivery of car to MARC.
- **O.** Main reservoir trainline connections and any other air system hoses shall be a wire reinforced type in accordance with AAR Specification M-618, latest revision and shall be less than one (1) year old from date of manufacture at time of delivery of car to the Administration.
- **P.** All brake pipe welding repairs shall be done in accordance with AAR S-402. Prior to the installation of any valves, after welding and assembly, all piping shall be blown clean while being mechanically excited by shaking in accordance with AAR S-402. The pipe system, including hoses and couplings, shall then be charged to not less than 125% of the working pressure and all pipe joints or fittings shall be tested with a soap solution. All air leaks shall be corrected and retested before any further

assembly is performed. Maximum leakage allowable shall be 5 psi in 10 minutes following a 5 minute settlement period.

Q. Brake pipe installation, access for maintenance, and fittings shall comply with Part E of the AAR Manual of Standards and Recommended Practices.

R. All pneumatic test fittings shall be inspected, overhauled or replaced.

Air pipe system from the main reservoirs utilized for auxiliary functions in addition to the brake system shall be included in the overhauling.

4.4.5 Handbrake

The handbrake system shall be overhauled per OEM procedures. All linkages, bushings, and pins shall be evaluated for wear, renewed or replaced. The hand lever shall be overhauled, cleaned, and painted.

Parking brake cables to the disc brake actuators shall be renewed with new cables. **As an OPTION**, a new cable design having demonstrated reliability and durability, and shall be submitted to the Administration for review and approval **[CDRL 402]**.

Parking brake chains shall be evaluated for wear, cleaned, or replaced.

The parking brake electrical micro-switch and wiring shall be overhauled, or replaced.

All rubber seals and gaskets shall be renewed.

Securely mounted padding material provided to shield chain weights from car structure and vestibule equipment shall be renewed per OEM.

4.5 SANDING SYSTEM REMOVAL

The Contractor shall submit a procedure for the removal of the sanding system for Administration approval. **[CDRL 403]** Both sand boxes shall be removed from each Control Cab car F-end. The existing sanding magnet vales shall be removed. The existing sand traps, sanding nozzles and hoses shall be removed. All carbody air pipe ends shall be plugged with the appropriate pipe plugs and shall be leak proof.

4.5.1 Sanding Controls

The ability to command sand from the control cab to the locomotive sanders shall remain. The sanding control to the Control Cab car sanders shall be disabled.

The sanding selector toggle switch (forward or reverse) on the cab console switch panel shall be removed.

The non-latching "wobble" manual sanding switch on the cab control console to manually control sanding on the locomotive shall be renewed.

The indicator light on the cab console switch panel that illuminates when the locomotive or car is calling for sanding shall be renewed.

4.6 REQUIRED CDRLS

401 The Air Brake Overall Overhaul Plan shall be submitted to the Administration for approval.

402 An optional new parking brake cable design shall be submitted to the Administration for review and approval.

403 The Contractor shall submit a procedure for the removal of the sanding system for Administration approval.

404 The Contractor shall submit the details of the replacement slip-slide system for review and approval of the Administration.

SECTION 05
ELECTRICAL

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ELECTRICAL SYSTEM

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SECTION 05
ELECTRICAL

5.1 GENERAL SYSTEM DESCRIPTION

This section describes the various pieces of existing and new apparatus, panels and switches that perform the required electrical functions on the car.

The electrical system comprises both the low voltage and high voltage power distribution and control components. The high voltage power system is at a nominal 480 VAC and receives power from the locomotive. The high voltage system supplies power to the HVAC heaters and compressor, blower motors, and transformers. The vehicle provides auxiliary power at a nominal 120VAC. The low voltage system is at a nominal 74 VDC and receives power from the vehicle's battery charger and from the storage batteries. The low voltage system supplies power to systems, which include doors, lights, HVAC, and brakes.

Vehicle Voltages

The vehicles have three distinct voltage systems, as follows:

A. 74 VDC battery (64 VDC, nominal) – derived from the 480 VAC buss through a LVPS/BC or transformer rectifier and typically used for "local" vehicle control and car function DC trainline commands.

B. 120 VAC, 60 Hz – derived from the 480 VAC HEP trainline buss through isolation transformers and typically used for low voltage functions such as lighting, convenience outlets and HVAC controls.

C. 480 VAC 60 Hz – HEP trainline power obtained from the powering locomotive and typically used for HVAC power, floor heat and is the source for the 74 VDC and 120 VAC circuits. Single phase, phase reversal, and ground fault protection is not currently provided on each car. The Contractor shall add these features to the 480 VAC system

Locomotive Supplied HEP Power Quality:

A. The HEP power supplied by the MARC diesel locomotive fleet is generated by an independent diesel engine-alternator package producing 3-phase, 480 VAC, 60 Hz power with 1% THD (Max), over a voltage and frequency range of 475-485 VAC and 59-61 Hz, respectively.

B. The HEP power supplied by the MARC electric locomotive fleet is generated by a static inverter package (GTO or IGBT) producing 3-phase, 480 VAC, 60 Hz power with 5% THD (Max), over a voltage and frequency range of 470-490 VAC and 59-61 Hz, respectively.

C. Any new component applied to the vehicle systems shall be designed to use this type of power.

5.2 OVERHAUL REQUIREMENTS

The overhaul requirements are discussed in the sections below; base scope of work, modifications, additions and options are also discussed in sections below. The Contractor shall submit an Electrical Overall Overhaul Plan for the electrical system inspection, and testing to the Administration for approval. **[CDRL 501]**

In general, the Contractor shall overhaul the electrical system per OEM specifications and requirements.

5.2.1 Switch and Circuit Breaker Panel and Compartment

All switch and circuit breaker panels and compartments shall be cleaned, inspected and overhauled.

All switches shall be inspected and tested. Any device not functioning in accordance with its intended purpose shall be renewed with OEM material.

All circuit breakers shall be inspected and tested. All circuit breakers' thermal and magnetic trip overload protection portions shall be inspected and tested. Any device not functioning in accordance with its intended purpose shall be renewed. The Contractor shall estimate that five (5) DC and five (5) AC circuit breakers will need to be renewed on a per car basis.

All wiring on the panels shall be inspected for damage (burns, pinch points, broken conductors, splices, etc.) and renewed.

All broken or illegible nameplates shall be renewed.

All panel wiring shall meet all recommendations of APTA RP-E-002 (latest revision).

All new circuit breakers shall be sized in accordance with NEC requirements.

5.2.2 Auxiliary Transformer

All auxiliary transformers shall be cleaned, inspected and tested.

All transformer installation brackets shall be cleaned, inspected and overhauled.

Any defective transformer shall be renewed. The Contractor shall estimate that ten (10) transformers will need to be renewed on a per fleet basis.

5.2.3 Convenience Outlets

All outlets shall be replaced and shall have stainless steel covers plates.

The outlets shall meet all requirements of the latest revision of Section 4.6 in APTA SS-E-005 (latest revision) and IEEE Std. 16.

Wiring shall be installed by the Contractor to accommodate any new GFI outlet circuits.

The convenience outlets boxes shall be cleaned, inspected, and renewed.

All outlet wiring shall be inspected for damage. All damaged wiring shall be renewed.

As an OPTION, the Contractor shall provide a proposal to the Administration, with a cost and design concept for installation of a GFI protected duplex or strip electrical outlet at each seat location. **[CDRL 502]**

At a minimum, the Contractor's design concept shall show the outlet's location at the seat (side wall or seat pedestal); different seats may require different installation locations.

The Contractor shall also provide an estimate of the vehicle's increased power demand, (assume 50% usage by a laptop PC at each seat row)

5.2.4 74 VDC Low Voltage System

A. **Batteries.** The batteries shall be cleaned, inspected and tested to the OEM procedures.

Batteries shall be renewed if they are two (2) years or older than from the Contract Award date or having fail the OEM testing requirements. The Contractor shall estimate that ten (10) car set of batteries will need to be renewed on a per fleet basis.

All batteries shall be charged in accordance with the OEM's procedures before the vehicles are shipped back to the Administration**.**

B. **Battery Boxes and Trays.** All battery boxes shall be cleaned, inspected and repaired as necessary.

All battery box hinges and latches shall be cleaned, inspected and lubricated. If any latch is found to be defective it shall be renewed.

All battery trays shall be cleaned and inspected and repaired as necessary.

All battery tray roll-out mechanisms shall be renewed.

All battery inter-cell cables shall be renewed.

The vehicle battery leads within the battery box shall be inspected for damage and renewed as necessary. These leads shall be properly supported at the rear of the battery box so as not to be pinched between the battery box rear wall and the battery tray frame.

C. **Low Voltage Power Supply/Battery Charger.** All LVPS/BC's shall be removed from the vehicles and returned to the product OEM for re-qualification and or repair.

The LVPS/BC OEM manufacturer shall renew all electrolytic capacitors and fuses.

The OEM shall perform a dielectric test on the transformer and filter inductor. Any transformer or inductor that fails shall be renewed.

5.2.5 Relays, Contactors and Other Components

All relay and contactors shall be cleaned, inspected and tested to ensure functionality at the device's nominal operating voltage.

All contactors, transfer switches, etc., with renewable contact tip shall have them renewed.

All discrete passive devices (isolation diodes, resistors, MOVs, free-wheeling diodes, capacitors, etc.) shall be renewed.

All passenger compartment overhead and floor heating elements shall be cleaned, inspected and tested. All space heater modules (Operator, Observer and toilet compartment) shall be cleaned, inspected and tested. Any damaged or failed components shall be renewed. See any additional requirements as noted in TS Section 15.

All magnet valves and pressure switches shall be renewed. See any additional requirements as noted in TS Section 04.

All cab signal/ATC axle generators shall be replaced with new PHW cab signal/ATC axle generators with a minimum of two (2) speed sensors. The Contractor shall install any additional wiring that may be required.

All end-of-axle ground brush assemblies shall be renewed. All ground straps and cables shall be renewed. This includes but is not limited to the following:

A. Carbody-truck frame;

B. Truck frame –bolster;

C. Truck frame-journal box;

D. Journal box-axle ground brush.

All indication light circuits actuated by means of a micro-switch (hand brake and Toilet Occupied) shall be cleaned, inspected and tested. Any failed component shall be renewed.

All bells, alarms and buzzers throughout all vehicle types shall be replaced.

All hand dryers in the toilet compartment shall be replaced with Excel "XLERATOR" Model XL-SB hand dryers.

All trap door heating elements and wiring shall be renewed back to each door location's junction box.

5.2.6 Wire and Cable

All wire and cable used by the Contractor shall conform to the requirements of TS Section 15.

5.2.7 Electro-Magnetic Compatibility (EMC)

The Contractor shall follow the EMC requirements provided in TS Section 0.10.

5.2.8 Terminal Strips

All terminal strips shall be cleaned and inspected.

Damaged or deteriorated terminal strips and device identification labels shall be renewed.

Replacement terminal strips shall be revenue service-proven and comply with all recommendations of the latest revision of Section 4.6 in APTA RP-E-002 (latest revision).

Illegible terminal strip markings and device identification labels shall be renewed.

5.2.9 Trainlines (Reference Tables T 05-1 and T 05-2)

A. **Locomotive Control.** The two (2) BLACK MU Control receptacles and wiring back to the trainline junction box shall be renewed. The MU receptacle assemblies shall be Clement National CRA-27180-MU-BK. Receptacle covers shall be marked with 1 inch white stencil lettering, "MU". New OEM wire markers shall be applied when the MU trainlines wires are re-terminated in the trainline junction boxes

The two (2) YELLOW MU DUMMY receptacles shall be renewed. The DUMMY receptacle shall be Clement National CRA-MU-Y. Receptacle covers shall be marked with 1 inch black stencil lettering, "DUMMY"

One (1) new BLACK MU trainline jumper cable shall be provided with each car. The jumper cable shall be Clement National CPA-2760-MU-BK.

B. **Door and Communication.** The two (2) BLUE COMM receptacles and wiring back to the trainline junction box shall be renewed. The MU receptacle assemblies shall be Clement National CRA-27180-AMTK. Receptacle covers shall be marked with 1 inch white stencil lettering, "COMM". New OEM wire markers shall be applied when the COMM trainlines wires are re-terminated with OEM terminals in the trainline junction boxes.

The two (2) WHITE COMM DUMMY receptacles shall be renewed. The DUMMY receptacle shall be Clement National CRA-AMTK-W. Receptacle covers shall be marked with 1 inch black stencil lettering, "DUMMY".

One (1) new BLUE COMM trainline jumper cable shall be provided with each car. The jumper cable shall be Clement National CPA-2760-AMTK.

C. **Head End Power.** The four (4) fixed Head End Power (HEP) single ended trainline jumpers shall be renewed. The HEP jumper assemblies shall be Clement National MPA-1SR-0128 and shall be colored RED.

The four (4) HEP receptacle housings shall be inspected, cleaned and repaired as needed. The HEP receptacles are the locking type, Clement National MRA-BH and shall be colored RED.

The four (4) HEP receptacle assembly inserts shall be renewed. The HEP receptacle inserts shall be Clement National MRA-1-0077 and shall be colored RED.

The HEP cable pigtails shall be long enough to be spliced back into the carbody mounted HEP cabling behind the step wells; these splices are the only ones permitted on the vehicles.

1. The splices shall use a two (2) bolt connection covered with two layers of heat-shrink tubing with sealant.

2. A new protective rubber sleeve tube from PowerRail Distribution Inc., (p/n E8350968) shall then be applied over each splice which will be secured at each end by means of an appropriate diameter stainless steel hose clamp.

New "DANGER 480 VOLT" decals shall be applied adjacent to the HEP receptacles and jumper assemblies, in the same location as originally installed.

The Phase rotation of the 480 VAC cabling on the cars shall be maintained. It shall be 1 – 2 – 3 in the counter-clockwise direction when looking into the MALE HEP receptacle on either end of the car.

For HEP load balancing, within the HEP trainline junction box, the HEP phases will be rotated by one phase going to the F/B-end of the car, i.e. P1 to P2, P2 to P3 and P3 to P1

When the HEP cabling is re-terminated using OEM terminals at the HEP junction boxes, new OEM style wire markers and heat shrink Phase Color Coding bands shall be applied. The color coding of the HEP cables for each phase, 1, 2, and 3 shall be determined during the design reviews.

The HEP Trainline Control wiring shall only use Pin 1 from end to end for the Trainline Complete Circuit. Within the MU and COMM trainline junction boxes, HEP Control Pins 2 and 3 shall be grounded coming from the carbody receptacle and jumper end, and shall not be connected coming from the opposite end of the car's MU and COMM junction boxes.

5.2.10 Junction Boxes

All junction boxes (exterior and interior) shall be cleaned and inspected.

Any interior paint which is damaged shall be repaired with an Administration approved WHITE insulating paint. Exterior paint shall be repaired as appropriate.

All box cover gaskets shall be renewed.

All box cover fasteners and hardware shall be renewed.

5.2.11 Trainline Wiring

All exposed trainline wiring (including the 480 VAC HEP cabling run in the undercar wire trays) shall be cleaned and inspected for damage. Any damaged or previously repaired wire or cabling shall be renewed. Splices are prohibited.

All trainline wiring (MU, COMM and HEP) shall be tested for grounds. All trainline wiring shall have an insulation resistance to ground tested as per the requirements of APTA SS-E-001. Any wiring not having this level of insulation resistance shall be renewed.

Continuity tests shall be performed on every car, after completion of assembly and equipment installation, to confirm that:

A. Continuity exists between all intended contacts of all receptacles;

B. Continuity exists between trainlines and each vehicle connection to the trainline circuit;

C. Continuity exists from one end to the other of all spare wires;

D. No wires are unintentionally grounded (this includes spares);

E. No wires are shorted or cross connected to unintended circuit.

Each conductor of each trainline shall be exercised to ensure the equipment to which it is connected transmits/receives the trainline signal correctly.

Pin F/B-End	Pin A-End	Function	Marker	Size AWG No.
1	1	11kV-25Hz (Tap Changer)	1T	12
2	2	Alarm (SG)	2T	12
3	3	D Valve-Engine Speed (DV)	3T	12
4	4	Negative (N)	4T	10
5	5	Emergency Sand (ES)	5T	12
6	6	Generator Field (Motor Control) (GF)	6T	12
7	7	C Valve-Engine Speed (CV)	7T	12
9	8	Forward (FO)	8T	12
8	9	Reverse (RE)	9T	12
10	10	Wheel Slip (WS)	10T	12
11	11	Auto Power Reduction	11T	12
12	12	B-Valve-Engine Speed (BV)	12T	12
13	13	Positive (PC)	13T	10
14	14	Pantograph DOWN / Fuel Pump	14T	12
15	15	A Valve-Engine Speed (AV)	15T	12
16	16	Engine Run (ER)	16T	12
17	17	SPARE	17T	12
18	18	25kV-60Hz (Tap Changer)	18T	12
19	19	Traction Motor Excessive Current Indication	19T	12
20	20	Dynamic Brake Warning (Diesel)	20T	12
21	21	SPARE	21T	12
22	22	SPARE	22T	12
23	23	Manual Sand (SA)	23T	12
24	24	SPARE	24T	12
25	25	SPARE	25T	10
26	26	Fault Reset	26T	12
27	27	No Power Brake Indication	27T	12

NOTE:

1. Wire crossovers (8/9) are to be made at F/B-End of car.

TABLE T 05-1

Locomotive MU Control Train Line

Pin Assignments, Wire Markers, and Wire Sizes

Pin F/B-End	Pin A-End	Function	Marker	Size AWG No.
1	1	PA Wire SHIELD	PAS	12
2	2	Car Battery NEGATIVE	TB	10
3	3	PA Audio	PA1	14
4	4	PA Audio	PA2	14
5	5	IC Audio	PA3	14
6	6	IC Audio	PA4	14
7	7	PA Control	PA5	14
8	8	PA Control	PA6	14
9	9	Radio	VC1	14
10	10	Radio	VC2	14
11	11	SP-1 (EP Brake Application - Future)	SP1	12
12	12	SP-2 (EP Brake Release - Future)	SP2	12
13	13	Emergency Brake	EB	12
15	14	Door Control Right OPEN	D1	12
14	15	Door Control Left OPEN	D2	12
17	16	Door Control Right CLOSE	D3	12
16	17	Door Control Left CLOSE	D4	12
23	18	Engineer's Door CLOSED Light	DC1A	12
19	19	Handbrake Release Light	BRB	12
20	20	Engineer's Brake Applied Light	BAB	12
21	21	Door Override	DOR	12
22	22	Conductor's Door Signal Buzzer	CS	12
18	23	Conductor's Door CLOSE Light	DC2A	12
24	24	Trainline Information System	ER1	14
25	25	Trainline Information System	ER2	14
26	26	Conductor's Door CLOSE Light	BLS	12
27	27	No Motion	ZS	12

NOTE:

1. Wire crossovers (14/15, 16/17 and 18/23) are to be made at F/B-end of the car.
2. Shield terminations are to be made at the F/B-end of the car.
3. Wires 3&4, 5&6, 7&8, 9&10 and 24&25 are to be 2-conductor, Twisted-Shielded Pairs.
4. Wires 11 and 12 are provisions for FUTURE conversion to EP Brake.

TABLE T 05-2

Door & Communication Control Train Line

Pin Assignments, Wire Markers, and Wire Sizes

5.3 REQUIRED CDRLs

501 The Contractor shall submit an Electrical Overall Overhaul Plan to the Administration for approval.

502 The Contractor shall provide a proposal to the Administration, with a cost and design concept for installation of duplex or strip electrical outlet at each seat location.

SECTION 06
INTERIOR FURNISHINGS

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SECTION 06
INTERIOR FURNISHINGS

6.1 GENERAL SYSTEM DESCRIPTION

There are four types of Bi-Level trailer cars involved in this overhaul; Cab with Toilet, Trailer, Trailer with Snack Bar, and Trailer with Toilet. The information in this section shall apply to all four types, unless specifically stated otherwise.

This section will cover the overhaul requirements for the following subsystems: Floor Panels, Floor Coverings, Wall Panels, Frieze Panels, Ceiling Panels, Stairs, Seats, Fire Extinguishers, and Signage. Unless otherwise specified, all interior parts accessible or visible to passengers and not discussed in other parts of this specification shall be overhauled.

Refer to TS Section 01 - Carbody for overhaul requirements for Windows, Window Glazings, Vestibule End Doors, and Passenger Boarding Doors. Refer to TS Section 07 – Toilet Room and TS Section 08 Water and Waste Retention for overhaul requirements for Toilet Rooms, Water Supply Systems, and Waste Retention Systems.

6.2 OVERHAUL REQUIREMENTS

An Interior Furnishings Overall Overhaul Plan shall be submitted to the Administration for review and approval prior to starting the overhaul. **[CDRL 601]** All interior components shall be cleaned, repaired and returned to their as-built OEM condition. All enclosures and equipment areas shall be cleaned and returned to OEM condition.

The Contractor is responsible to conduct a complete overhaul of the vehicle interior furnishings. The objective of this overhaul is to repair, replace or reconfigure components in order to return the cars to their as built configuration and functionality. The vehicle interior may have been modified by running repairs during the service life of the vehicles and it is the Contractor's responsibility to obtain the complete interior specification and overhaul requirements from the OEM.

An inspection shall be performed before each car ships from MARC to determine if any interior components are damaged beyond repair or missing. The Contractor shall advise the Administration, in writing, of those missing or damaged beyond repair components within 7 days of the pre-shipment inspection.

6.2.1 Materials

All materials that are overhauled, replaced, repaired, or renewed shall conform to the smoke and flammability requirements of 49 CFR PART 238. Conformance to this requirement is the responsibility of the contractor.

Where side or end linings are attached to the structure, low smoke neoprene shall be provided between the panels and the structure.

Where linings cover apparatus requiring even infrequent maintenance, they shall be fastened with accepted fasteners in a manner allowing ready removal and replacement.

The Contractor shall submit the proposed method of attachment of linings to the Administration for review and acceptance. **[CDRL 602].**

No exposed fasteners shall be added to the interior of the coaches unless specifically requested of and accepted by the Administration.

Interior linings and moldings shall be free of undulations. The maximum acceptable variation from a straight line, on all interior surfaces subject to passenger view, shall be 0.125" in 36" (3.2 mm/m) measured in any direction.

In compliance with 49 CFR 238.233, sharp edges within the car, if unavoidable, shall be padded to mitigate the consequences of an impact with such surfaces.

To the extent possible, all interior fittings in the passenger car, except seats, shall be recessed or flush mounted.

Any replaced and/or renewed interior fittings shall be verified to be in full compliance with 49 CFR 238.233. All fittings attached to the car body shall withstand the following accelerations acting on the mass of the fitting:

Longitudinal: 8g

Vertical: 4g

Lateral: 4g

6.2.2 ADA Accessibility

Any modifications to the car design shall strive to maximize the accessibility for patrons in wheelchairs per 49 parts CFR 27, 37 and 38, Transportation Services for Persons with Disabilities.

No modification shall reduce the current ADA accessibility of the coaches.

For any modifications that may affect ADA accessibility, the Contractor shall submit scale drawings showing the general arrangement for ADA access for review and approval by Administration. **[CDRL 603]**

6.2.3 Emergency Signage and LLEPM Requirements

At the beginning of the contract the Contractor shall make an assessment of each type of car to assure the vehicles conform to the latest requirements of APTA SS-PS-004 (latest version), "Standard for Low Level Exit Path Marking", and APTA SS-PS-002 (latest version), "Standard for Emergency Signage for Egress/Access of Passenger Rail Equipment".

A. The Contractor shall submit their test procedures for testing the emergency signage and low level exit path marking requirements required above, as per TS Section 14.

B. The Contractor shall then submit an assessment report to the Administration summarizing the deficiencies, if any, and required changes to bring the cars into conformance with the standards. This requirement shall be completed prior to the start of car type overhaul**. [CDRL 604]**

All signage made with high performance photoluminescent material (HPPL) shall be renewed. The HPPL material shall meet the requirements of APTA SS-PS-002 (latest version). For estimating purposes, 100% of all HPPL material will be replaced.

6.2.4 Preparation and Inspection

All seats and seat pedestals shall be removed from the car exposing all interior floors, walls and ceiling, on all levels.

All ceiling panels shall be removed.

See Section 12 Communications for information regarding speakers.

6.2.5 Cleaning Agents

The interior shall be thoroughly cleaned with Administration-approved cleaners. A list is provided at the end of this section.

Administration-approved cleaners shall be used to thoroughly remove dirt, markings, or graffiti, and thereby restore the components to their original appearance to the extent possible.

6.2.6 Subfloor Panels

All subfloor panels shall be inspected for soft spots or plymetal panel delaminations. Any subfloor panel identified as defective shall be reported to the Administration for disposition.

Procedures for replacement of defective panels shall be submitted on a one-for-one basis to the Administration for approval. **[CDRL 605].**

6.2.7 Snack Bar Area

On snack bar cars, the Contractor shall inspect, clean, and overhaul the snack bar area to as-built OEM condition.

6.2.8 Floor Covering

Floor coverings in the upper and lower passenger levels shall be fully cleaned and overhauled to its original appearance.

All existing floor covering shall be inspected for damage, security, and possible hazards to personnel. Particular attention shall be paid to stair treads and areas where the floor covering curves into a vertical section. Any damaged sections shall be repaired and resealed. Resealed areas shall be watertight.

Floor covering is manufactured by Freudenberg Building Systems, Inc. under the trade name of Nora Rubber Flooring. The floor covering is of 'LAGO' floor tiles, each measuring 40.8 in. x 40.8 in. (1000 mm x 1000 mm), Nora Part No. 43274/180/388. The base color is 'Night Sky' with a 5% Ruby Red fleck. All floor areas of a car are covered with similar material, including stair treads and risers.

The Administration shall supply the Contractor with floor covering material to complete the overhauling of the floors.

6.2.9 Stair Coverings

At the upper ends of all interior stairs there shall be a non-slip, HPPL warning strip with a distinctive slip resistance surface. The Contractor shall submit alternate material samples and colors of the warning strip material to the Administration for review and approval. **[CDRL 606]** Tread and riser material shall be formed so as to provide a smooth front edge surface and eliminate tripping hazard.

Step edges (nosing) shall be incorporated into the one-piece step tread with stainless steel backing, and shall have a band of non-slip raised anti-slip material.

Each step tread shall incorporate a HPPL strip, running the full width of each step, near the front edge of the nosing, to delineate each step tread and riser, or adjacent floor, per ADA

requirements. Step nosing shall be of one-piece construction, matching material to the step treads with stainless steel backing.

Step tread and nosing shall be fully supported by solid structure.

The basic tread color shall match the colors currently installed on all series cars.

As information, the existing stair nosing is supplied preformed, in a tan colored material, Nora Part No. T5019E0561. A radius cove former, Nora Part No. H 9010 is inserted at the junction of stair treads and risers to provide a smooth transition for floor covering before it is laid.

The Contractor shall use the manufacturer's recommended installation procedures. For estimating purposes, it is anticipated 75% of stair nosings will be replaced.

6.2.10 Eyeline Panels

Eyeline panels are those panels that are at eye level when standing, situated on the edge of the luggage racks, and below the window masks. Eyeline panels are ruby red melamine covered aluminum panels attached in a manner similar to the wainscot panels.

The Contractor shall clean and overhaul these panels.

6.2.11 Luggage Racks

Luggage racks consisting of longitudinal extruded aluminum extrusions are cantilevered from the sidewalls just above the window surrounds.

The Contractor shall clean and overhaul the luggage racks.

6.2.12 Window Masks

Window masks surround the windows and are made from thermoform C-PVC sheet, colored antique white. Window masks are held in place by aluminum extrusions, screws and Dual Lock fasteners and are kept separated from the structure by anti-squeak rubber glazing strips and tape. Window mask panels which adjoin one another are held in place with thermoform trim strips that are affixed to the car structure.

Window panel blanks provide blanking panels and are made from thermoform C-PVC sheet, colored antique white. Blank panels are held in place by aluminum extrusions, screws and Dual Lock fasteners and are kept separated from the structure by anti-squeak rubber glazing strips and tape.

The Contractor shall clean and overhaul these panels.

6.2.13 Wall Panels

The car sidewalls are similar in all seating areas. The primary feature is a single piece thermoformed plastic window surround. Below this sits a textile faced aluminum sheet wainscot panel, which extends down to a floor level stainless steel heater cover.

Above the window surrounds are variously profiled melamine faced aluminum sheet (metalcore) panels that extend to the ceiling.

Partitions, access panels, and other non-sidewall panels are also made of melamine faced aluminum sheet (metalcore) panels.

The Contractor shall clean and overhaul these panels.

6.2.14 Wainscot Panels

Below the window surround sits a textile faced aluminum sheet wainscot panel, which extends down to a floor level stainless steel heater cover.

Wainscot paneling is covered with low-pile carpeting (Gro-point), all edges held captive with moldings.

The Contractor shall clean and overhaul these panels.

6.2.15 Floor Heaters and Grills

Refer to TS Section 10.3.9 for floor heaters and grills.

6.2.16 Kickstrips

The bottom of all exposed bulkheads, partitions, and sidewall panels are fitted with a kickstrips. Kick strips are made from stainless steel with a brush finish and held in place with oval headed screws. Kick strips are positioned at the bottom of a panel for protection of the panel.

The Contractor shall overhaul all kickstrips in accordance with the OEM procedures.

Any kickstrip that cannot be overhauled shall be renewed. For estimating purposes, it is anticipated 5% of kickstrips will be replaced.

6.2.17 Handrails

Stainless steel handrails are attached to the stair sidewalls for use with the stairs giving access to the upper or lower level. Each handrail is fixed to the stair sidewall panel with four fixing plates and countersunk screws.

The Contractor shall overhaul all handrails in accordance with OEM procedures.

6.2.18 Ceiling Panels

Combined lights and air-conditioning diffuser units run the length of the seating areas, above the center aisles.

A. Melamine faced aluminum honeycomb of 3/8 inch thickness form air-conditioning ducts between these diffusers and the upper sidewalls.

B. The ceiling space between diffusers in upper and lower passenger areas is finished with a metalcore center panel.

C. Center ceilings in the mid-level are of 1/4 inch melamine faced aluminum honeycomb and are hinged for access to the HVAC equipment.

The Contractor shall clean all ceiling panels and renew as needed.

6.2.19 Advertising Card Frames

Advertising card frames shall be cleaned or, if broken or missing, renewed. Any advertising material which has been adhesively bonded to walls shall be removed and discarded; the walls shall be cleaned to remove any residue adhesive material.

6.2.20 Lights and Fixtures

Refer to TS Section 11 – Lighting.

6.2.21 Air Diffusers and Ductwork

Refer to TS Section 10.3.8 for air diffusers and ductwork.

6.2.22 Interior Trim and Moldings

All trim and moldings shall be cleaned and overhauled to restore the original surface finish.

6.2.23 Seats

Seat System Overview:

A. The seats are of three main types: Reclining, fixed, and flip-up seat. Each seat type is mounted into the car through a combination of wall-mount brackets, pedestal bases, and box mounts. The number of armrests varies according to the seat types from none to three. There are a total of 19 different seat configurations. As listed in the table, below.

B. Right hand and left hand seats are distinguished by which side the car wall is on while sitting in the seat. (A right hand seat will be on the right wall).

Table 6.1- Seats description

DESCRIPTION	TYPE	ARM RESTS	GRAB HANDLE	MOUNTING
Reclining 2-passenger RH	A2a	3	Y	Pedestal + Sidewall
Reclining 2-passenger LH	A2b	3	Y	Pedestal + Sidewall
Reclining 1-passenger LH	Alb	2	Y	Pedestal + Sidewall
Fixed 2-passenger RH	B2a	1	Y	Pedestal + Sidewall
Fixed 2-passenger LH	B2b	1	Y	Pedestal + Sidewall
Fixed 2-passenger Generic	D2c	0	N/A	Box
Fixed 3-passenger RH	D3a	1	N/A	Box
Fixed 2-passenger RH	E2a	0	N/A	Pedestal + Sidewall
Fixed 2-passenger LH	E2b	0	N/A	Pedestal + Sidewall
Fixed 2-passenger RH	F2a	0	N/A	Pedestal + Box
Fixed 2-passenger RH	F2b	0	N/A	Pedestal + Box
Flip-up 2-passenger RH	C2a	0	N/A	2 Pedestals { 1 High + 1 Short)
Flip-up 2-passenger LH	C2b	0	N/A	2 Pedestals (1 High + 1 Short)
Flip-up 2-passenger Generic	C2c	0	N/A	2 High Pedestals
Flip-up 1-passenger RH	C1a	0	N/A	2 Pedestals (1 High + 1 Short)
Flip-up I -passenger LH	Clb	0	N/A	2 Pedestals (1 High + 1 Short)
Flip-up 1-passenger Generic	C1c	0	N/A	2 High Pedestals
Flip-up 2-passenger RH	C2d	Same as C2a except 1 crashpad on left side		
Flip-up 2-passenger Generic	C2c	Same as C2c except 2 crashpads on left and right		

C. Overhaul Requirements:

1. The Contractor shall inspect all seats for cleanliness and general condition.

D. All seat cushions, seat backs, head rests, hand grips, and arm rests shall be inspected for cuts, tears, rips, graffiti, staining or other damage that would render them unusable. Usable seats shall be thoroughly cleaned and overhauled. The Contractor shall replace

any damaged seat fabric coverings, and repair or renew other fabric covered components as necessary. **For estimating purposes, it is anticipated 5% of seat cushions will be replaced.**

E. Hard, painted surfaces, like backshells, arm rests and seat frames shall be inspected for scratches, dents, scuffing, discoloration, corrosion, or other defects which would render them unsuitable for reuse without repair. The Contractor shall overhaul any defective components by painting or thorough cleaning; any material that cannot be overhauled shall be renewed. If a painting process is to be utilized, the Contractor shall submit its painting procedure(s) and paint samples to the Administration for approval. **[CDRL 607]**

1. Stainless steel seat pedestals shall be thoroughly cleaned and overhauled.

2. The contractor shall replace all seat components, as originally installed, after floors and interior linings are overhauled.

6.2.24 Fire Extinguishers

A fire extinguisher is mounted in a lower level enclosure located beneath the upper stairway. The extinguisher is held in place with a mounting bracket and is accessible by removing the clear plastic front cover, which is held in place with Velcro strips along the edges.

All fire extinguishers shall be removed and retained at the Administration, before shipping cars to the Contractor's facility.

Fire extinguisher storage cases shall be overhauled to ensure that the fire extinguishers are properly secured, but accessible for use.

The Contractor shall replace all clear plastic covers.

To prevent further loss of covers, at all fire extinguisher locations the Contractor shall add a lanyard between the fire extinguisher cubical and the plastic cover. The lanyard shall be a 12" long wire rope lanyard, made of uncoated Type 302/304 Stainless Steel Wire Rope, 7 x 19 Strand Core, 0.125" diameter, with a crimped eyelet termination on each end. The lanyard shall be fully contained within the fire extinguisher enclosure when the cover is installed. The Contractor shall submit the proposed design to the Administration for approval. **[CDRL 608]**

6.2.25 Under Seat Trash Bin and Shroud

An under seat trash bin is fitted at the back to back seats on either side of the car on both the upper and lower passenger areas. It consists of a metal shroud which fits under the seat and is screwed to the floor and a metal trash bin which fits into the shroud.

The Contractor shall clean, inspect and overhaul or repair the under seat trash bin and its method of fixation.

6.2.26 Electrical Outlets

All 120 VAC electrical outlets shall be replaced with new duplex receptacles.

All floor 120 VAC electrical outlets shall have new stainless steel cover plates applied.

Refer to TS Section 5.2.3 for the option of installation of a duplex or strip electrical outlet at each seat location.

6.2.27 Nameplate

The Contractor shall apply a "REBUILDERS NAMEPLATE" adjacent to the OEM carbuilder's plate. The nameplate shall be cosmetically similar to the OEM nameplate, using similar materials, lettering, and color finishes.

The nameplate shall include the name of the rebuilder, place of remanufacture, and the year of remanufacture.

6.3 REQUIRED CDRLS

601 An Interior Furnishings Overall Overhaul Plan shall be submitted to the Administration for review and approval prior to starting the overhaul.

602 The Contractor shall submit the proposed method of attachment of linings.

603 The Contractor shall submit scale drawings showing the general arrangement for ADA access for review and approval.

604 The Contractor shall submit an LLEPM assessment report to the Administration summarizing deficiencies.

605 Procedures for replacement of subfloor defective panels shall be submitted on a one-for-one basis for approval.

606 The Contractor shall submit alternate material samples and colors of the warning strip material for review and approval.

607 The Contractor shall submit painting procedure(s) and paint samples to the Administration for approval.

608 The Contractor shall submit details of the fire extinguisher lanyard.

ADMINISTRATION APPROVED

CLEANING AGENTS

COMPONENT	RECOMMENDED CLEANING AGENT	PREPARATION AND TECHNIQUE	SUPPLIER
Carpet covered panels	ZEP R3194 Railcar carpet and surface cleaner	Mix 1 : 32 Apply solution with Sponge on cloth. Rinse well.	ZEP Manufacturing Company, PO Box 2019, Atlanta, Georgia, 90301. Tel 404-352-1680
Window masks and wall panel boards (Schneller)	ZEP R3194 Railcar carpet and surface cleaner	Mix 1 : 32 Apply solution with sponge on cloth. Rinse well.	ZEP Manufacturing company, PO Box 2019, Atlanta, Georgia, 90301 Tel 404-352-1680.
Eyeline panels Ceiling panels, Air conditioning panels, partition panels	FR 2194 Alkaline cleaner	Mix 1 : 10	FO Fine, Organics Corp, 205 Main St, Lodi NJ, 07644. Tel 800-526-7480.
Stainless steel Kickstrips Handrails	SW/65	Shake well, spray directly on surface or on wet cloth. Wipe clean and polish with clean dry cloth.	BETCO Corp, Toledo Ohio, 1001 Brown avenue, 43607. Tel 419-241-2156.
Vinyl guards	NELCO vinyl guard	Shines and conditions vinyl.	NELCO INC, PO box 369, Chestnut hill MA, 02167. Tel 817-232-9709.
Window masks	E-clean plastic cleaner, mild alkaline cleanser		NELCO products INC, PO box 850, Providence highway, Denham MA, 02026.

ADMINISTRATION APPROVED

CLEANING AGENTS

COMPONENT	RECOMMENDED CLEANING AGENT	PREPARATION AND TECHNIQUE	SUPPLIER
Melamine door pocket panels	Spot remover RID-A-GUM. Complex mixture of Petroleum hydrocarbons		RID-A-GUM INC, 160 Westcott Blvd, Staten island NY, 10314
Toilet sink	A-33 liquid detergent/ disinfectant	Mix 1 : 8	AIRKEM Professional products division of ECOLAB INC, St Paul MN, 55102.
All toilet room equipment	A-33 liquid detergent/ disinfectant	Mix 1 : 20	AIRKEM Professional Products division of ECOLAB INC, St Pails MN, 55102. Tel 817-232-9709.
Toilet panels	NELECO Graffiti remover		NELCO INC, PO box 369, Chestnut hill MA, 02167.

SECTION 07
TOILET ROOM

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Toilet Room

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SECTION 07
TOILET ROOM

7.1 GENERAL SYSTEM DESCRIPTION

The Toilet Room is a self-contained area located on the mid-level, A-end of Cab cars and Trailer cars with toilet. It contains a flushing toilet system, a toilet tissue dispenser, a wash basin with soap dispenser and water tap, a mirror, an electric hand dryer, an ADA transfer seat, and hand rails.

The toilet room is also equipped with fluorescent ceiling light, a ceiling speaker for public address announcements, an air conditioning diffuser, a convenience outlet, an exhaust fan and a toilet occupied light.

7.2 OVERHAUL REQUIREMENTS

The Contractor shall submit a Toilet Room Overall Overhaul Plan to the Administration for review and approval, prior to starting the overhaul. **[CDRL 701]** The plan shall include all procedures for inspection, cleaning, and repair of the toilet room area and associated components.

The Contractor shall ensure the Toilet Room meets the requirements of 36 PART 1192— Americans with Disabilities Act (ADA) Accessibility Guidelines For Transportation Vehicles, 49 CFR 37 - Transportation Services For Individuals With Disabilities (ADA), and 49 CFR 38 - Americans With Disabilities Act (ADA) Accessibility Specifications For Transportation Vehicles

Unless specifically stated otherwise, the toilet room equipment is to be cleaned using the detergent/disinfectant cleaning agents specified in Exhibit 7-1 – "Recommended Cleaning Agents".

7.2.1 Wash Basin Assembly

The wash basin assembly has a worktop, a water tap, a soap dispenser tap, and wash bowl. The contractor shall overhaul all sink basin assembly components. Any component which is damaged shall be renewed. **For estimating purposes, it is anticipated 10% of wash basin parts will be replaced.**

The Contractor shall ensure that the basin top is securely attached to the compartment structure, and that the laminate facing is intact. The contractor shall repair this area as necessary.

The Contractor shall check all visible pipe work for signs of leakage, and repair this are as necessary.

7.2.2 Stainless Steel Mirror

The stainless steel mirror shall be cleaned and overhauled to its original finish. Any damaged mirrors shall be renewed. For estimating purposes, it is anticipated 10% of mirrors will be replaced.

7.2.3 Hand Dryer

The toilet room hot-air hand dryer shall be replaced with an EXCEL "XLERATOR" Model XL-SB.

7.2.4 Waste Receptacle

The Contractor shall thoroughly clean and sanitize the waste receptacle and overhaul the product.

7.2.5 Toilet Tissue Dispenser

The Contractor shall thoroughly clean, sanitize and overhaul the toilet tissue dispenser. The Contractor shall ensure that the dispenser is fitted tightly to the toilet wall.

7.2.6 Electrical Outlets and Cover Plates

Refer to Electrical TS Section 5.2.4.

7.2.7 Handrail

A stainless steel handrail is attached along the outboard sidewall panel and extends along the back of the transfer seat and around the rear of the toilet assembly. The Contractor shall remove the handrail from the sidewalls to protect the sidewalls from damage while it is being cleaned and overhauled

If any part of a handrail is damaged to the point where harm to the passenger may result, then renewal or replacement is required. This may include burrs or the introduction of sharp edges on the rail and/or its mounting cover, as a result of abuse. Repairable conditions are burrs and sharp edges, which can be dressed with emery paper (No. 150).

The Contractor shall re-attach the handrail to the sidewalls after sidewalls are cleaned.

7.2.8 Transfer Seat

A stainless steel transfer seat is mounted on the outboard sidewall. The transfer seat is hinged along the sidewall and folds upward for storage. The Contractor shall clean, sanitize and overhaul the transfer seat and ensure that it is securely attached to the structure.

The Contractor shall re-attach the transfer seat to sidewalls after sidewalls are cleaned.

7.2.9 Lighting

Refer to Lighting TS Section 11.

7.2.10 Exhaust Ventilator and Ductwork

Exhaust vents shall be removed and thoroughly cleaned and overhauled. The Contractor shall replace the motors and fans. The Contractor shall renew any component which cannot be overhauled. **For estimating purposes, it is anticipated 5% of exhaust ventilator and ductwork will be replaced.**

Refer to TS Section 10 for overhaul or ventilation ductwork.

7.2.11 Toilet Assembly

The Contractor shall overhaul the toilet assembly to OEM specifications. The Contractor shall ensure that the toilet operates in accordance with current Administration specifications.

The Contractor shall overhaul the filter regulator-lubricator assembly, which is located in the air line ahead of the air/water sequence valve, to OEM standards using OEM lubrication (Microphor Part Number 24704). The Contractor shall ensure that the filter regulator is set to 60 pounds per square inch.

7.2.12 Toilet Bowl and Shroud Assemblies

All toilet bowls and fairing shrouds shall be disconnected and removed from the toilet room for thorough cleaning, sanitation and overhauling.

The Contractor shall renew all missing screws and access panels. **For estimating purposes, it is anticipated 35% of toilet bowl and shroud assemblies will be replaced.**

7.2.13 Air Cylinder

The Contractor shall clean and overhaul the entire Air Cylinder assembly mounted on the side of the Hopper to OEM specifications. The Contractor shall adjust the air cylinder to OEM specifications.

7.2.14 Air/Water Sequence Valve

The Contractor shall clean and overhaul the air/water sequence valve to OEM specifications.

7.2.15 Remote Flush Assembly

The Contractor shall clean and overhaul the entire remote flush.

7.2.16 Toilet Seat and Cover

The Contractor shall renew all toilet seats and cover assemblies.

7.2.17 Toilet Room Door and Mechanism

The Contractor shall clean, inspect and overhaul the toilet door. Any door that cannot be overhauled shall be renewed.

7.2.18 Door Hanger and Closure Assembly

The Contractor shall clean and overhaul the door hanger and closure assembly in accordance with OEM specifications. The Contractor shall ensure that the door slides easily in both directions over its full range of travel without binding or snagging. The maximum force required should be approximately 10 pounds-force. If defective, the mechanism shall be replaced with Remick Part No. RE 100276.

7.2.19 Ventilated Kick Strips

The Contractor shall clean and overhaul the stainless steel ventilated kick strips. Any damaged units shall be renewed.

7.2.20 Toilet Room Wall Panels and Access Panels

The Contractor shall clean and overhaul all toilet room wall and access panels, including all support channels.

Any panel not capable of being overhauled shall be renewed. For estimating purposes, it is anticipated 2% of toilet room wall panels and access panels will be replaced.

7.2.21 Door Lock

The Contractor shall clean, inspect, lubricate and overhaul the toilet room door lock. If defective, the Contractor shall renew the lock with JL Howard Part No. 2776-S. **For estimating purposes, it is anticipated 2% of Door Locks will be replaced.**

7.2.22 Pull Handle Assembly

The Contractor shall clean, inspect, lubricate and overhaul the Pull Handle assembly. If defective, the Contractor shall renew the assembly with JL Howard part no. 2336-a. For estimating purposes, it is anticipated 2% of Pull Handle Assembly will be replaced.

7.2.23 Door Seals

All door seals shall be renewed.

7.2.24 Bottom Door Guide Rails

The Contractor shall clean and overhaul the outer and inner guide rails. All Nylatron guides at the bottom of the door shall be renewed.

7.2.25 Floor Pan

The Contractor shall clean, sanitize and inspect for damage and proper securement of the floor pan. Any soft spots in the floor, which may indicate a damaged or delaminated plymetal floor panel, shall be reported to the Administration for disposition.

The Contractor shall include procedures for replacement of defective panels, on a one-for-one basis, in the Toilet Room Overall Overhaul Plan.

7.2.26 Kickstrips

The Contractor shall clean and sanitize all kickstrips.

7.2.27 Occupied Indicator Light

An indicator light located on the toilet room exterior provides visual indication that the toilet room is occupied. The Contractor shall replace all occupancy indicator lamps with new LED indicators. The Contractor shall submit its proposal for replacing this lamp. **[CDRL 702]**

The Contractor shall test the indicator light circuit for proper function. The Contractor shall overhaul or renew any defective component or wiring.

7.2.28 Drinking Water Cup Dispenser/Holder and Trash Receptacle

The Contractor shall remove and discard the Drinking Water Cup Dispenser/Holder and trash bin from the exterior toilet room partition. The Contractor shall install a blanking plate to cover the hole in the wall where the equipment was removed. The Contractor shall submit the design

of blanking plate, and the method of attachment, to the Administration for review and approval. **[CDRL 703]**

7.2.29 Signs and Decals

All toilet room signs and decal shall be renewed if the optional toilet room module (refer to TS Section 7.3) is not exercised.

7.3 [OPTION] TOILET ROOM MODULE

As an **OPTION**, the Contractor shall propose an replacement to the existing toilet room with a modular toilet room design for Administration review and approval. **[CDRL 704]**

All toilet room appointments and their location shall be maintained, using the aforementioned overhaul requirements.

7.4 REQUIRED CDRLS

701 The contractor shall submit a Toilet Room Overall Overhaul Plan to the Administration for review and approval.

702 The Contractor shall submit the design to replace all toilet room occupancy indicator lamps with new LED indicators.

703 The Contractor shall submit the design of blanking plate, and the method of attachment, to the Administration for review and approval.

704 The Toilet Room Module replacement design shall be submitted to the Administration.

EXHIBIT 7-1

RECOMMENDED CLEANING AGENTS

COMPONENT	RECOMMENDED CLEANING AGENT	PREPARATION AND TECHNIQUE	SUPPLIER
Carpet covered panels	ZEP R3194 Railcar carpet and surface cleaner	Mix 1 : 32 Apply solution with Sponge on cloth. Rinse well.	ZEP Manufacturing Company, PO Box 2019, Atlanta, Georgia, 90301. Tel 404-352-1680
Window masks and wall panel boards (Schneller)	ZEP R3194 Railcar carpet and surface cleaner	Mix 1 : 32 Apply solution with sponge on cloth. Rinse well.	ZEP Manufacturing company, PO Box 2019, Atlanta, Georgia, 90301 Tel 404-352-1680.
Eyeline panels Ceiling panels, Air conditioning panels, partition panels	FR 2194 Alkaline cleaner	Mix 1 : 10	FO Fine, Organics Corp, 205 Main St, Lodi NJ, 07644. Tel 800-526-7480.
Stainless steel Kickstrips Handrails	SW/65	Shake well, spray directly on surface or on wet cloth. Wipe clean and polish with clean dry cloth.	BETCO Corp, Toledo Ohio, 1001 Brown avenue, 43607. Tel 419-241-2156.
Vinyl guards	NELCO vinyl guard	Shines and conditions vinyl.	NELCO INC, PO box 369, Chestnut hill MA, 02167. Tel 817-232-9709.
Window masks	E-clean plastic cleaner, mild alkaline cleanser		NELCO products INC, PO box 850, Providence highway, Denham MA, 02026.

EXHIBIT 7-1 (Continued)

RECOMMENDED CLEANING AGENTS

COMPONENT	RECOMMENDED CLEANING AGENT	PREPARATION AND TECHNIQUE	SUPPLIER
Melaminedoor pocket panels	Spot remover RID-A-GUM. Complex mixture of Petroleum hydrocarbons		RID-A-GUM INC, 160 Westcott Blvd, Staten island NY, 10314
Toilet sink	A-33 liquid detergent/disinfectant	Mix 1 : 8	AIRKEM Professional products division of ECOLAB INC, St Paul MN, 55102.
All toilet room equipment	A-33 liquid detergent/disinfectant	Mix 1 : 20	AIRKEM Professional Products division of ECOLAB INC, St Pails MN, 55102. Tel 817-232-9709.
Toilet panels	NELECO Graffiti remover		NELCO INC, PO box 369, Chestnut hill MA, 02167.

SECTION 08
WATER AND WASTE RETENTION

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Water and Waste Retention

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SECTION 08
WATER AND WASTE RETENTION

8.1 GENERAL SYSTEM DESCRIPTION

Each car equipped with a toilet has a water and waste retention subsystem as part of the toilet system that consists of a waste treatment system, water storage system, and water heater. This subsystem reduces raw sewage and flush water from the toilet, to a liquid effluent in the treatment tank. In the treatment tank the effluent percolates through a media and is biologically decomposed. The decomposed liquid is chlorinated and then stored in holding tanks. A thermostatically controlled heater is located at the treatment tank drain to protest against freezing in cold weather. The flush water is obtained from the water storage tank. The water storage tank is located on the ceiling of A-end side vestibule of cars equipped with toilets. The tank stores water for flushing toilets, hand washing, and water cooler. A fill adapter is located right near the A-end step well and supplies water. The tank(s) are made of 300 series stainless steel, and have a capacity of 126 gallons, each.

The subsystem has a drinking water cooler located in the toilet room area. The water cooler shall be removed.

8.2 OVERHAUL REQUIREMENTS

The Contractor shall conduct a complete overhaul of the water and waste retention system. The objective of this overhaul is to repair, replace or reconfigure components in order to return the cars to their as built configuration and functionality. It is the Contractor's responsibility to obtain the complete water and waste retention system specification and overhaul requirements from the OEM. A Water and Waste Retention Overall Overhaul Plan shall be submitted to the Administration for approval, prior to starting the overhaul. **[CDRL 801]**

All components shall be overhauled to return them to their as-built OEM condition. All enclosures and equipment areas shall be cleaned and returned to OEM condition.

8.2.1 Waste Treatment System

The Contractor shall have the OEM, Microphor (a Wabtec company); overhaul the treatment system to the latest revisions and configuration

The Contractor shall clean, inspect and overhaul the treated water discharge piping.

The Contractor shall overhaul all the electrical circuitry associated with the treatment tank.

The Contractor shall renew the thermostatically controlled heater, which is located at the treatment tank drain to protect against freeze-up during cold weather.

8.2.2 Water Storage System

The Contractor shall ensure that all water supply, and waste treatment and retention equipment on the cars shall meet the requirements of 21 CFR 1250 - Interstate Conveyance Sanitation.

The Contractor shall access and clean each tank with a mixture of chlorine bleach and water as per the FDA requirements using the OEM specified procedure.

To prevent freezing, a cable heater is installed along the water pipes exposed underfloor and inside the vehicle. In addition, the pipes are wrapped with closed-cell foam rubber insulation. All cable heater assemblies and any damaged or missing foam rubber insulation shall be replaced.

Automatic dump valves are provided to drain the water system when freezing temperatures are present and the car is off power. The Contractor shall overhaul all dump valves.

8.2.3 Water Cooler

The Contractor shall remove the water coolers from all cars. The Contractor shall remove all associated wiring, piping, foam rubber insulation and controls from water cooler cabinet. The Contractor shall discard all components.

Any holes shall be covered with a pattern matching blanking plate. The thermal insulation, heater trace tape, and piping going to toilet and hand basin shall be retained.

The vacated cabinet shall be cleaned and overhauled, as required.

8.2.4 Water Heater

The water heater is located behind the wall on the side where toilets are installed. It produces hot water for hand-washing. The water heater is accessed by removing the panels located behind the toilet in the passenger room on the lower floor. The Contractor shall replace the water heater.

The Contractor shall ensure that the hot water is supplied at a temperature between 100° F and 111° F. The Contractor shall adjust the thermostat on top of the heater assembly to attain the required temperature.

The Contractor shall replace all mounting hardware with stainless steel hardware.

The Contractor shall overhaul all water piping.

8.3 REQUIRED CDRLS

801 A Water and Waste Retention Overall Overhaul Plan shall be submitted to the Administration for approval.

SECTION 09
DOOR AND DOOR CONTROL

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DOOR AND DOOR CONTROL

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SECTION 09
DOOR AND DOOR CONTROL

9.1 GENERAL SYSTEM DESCRIPTION

Each MARC III car is equipped with side doors, end doors and vestibule doors. The side doors utilize existing door operators with controls at each door and in the cab. The non-cab and cab end doors are fully mechanical and are equipped with locking mechanisms. The vestibule doors are electrically powered by an overhead door operator and will have a proposed alternate design using linear synchronous motor technology or permanent magnet type synchronous motor technology and microprocessor control.

9.2 OVERHAUL REQUIREMENTS

The Contractor is responsible to conduct a complete overhaul of the doors and door control systems. The objective of this overhaul is to repair, replace or reconfigure components in order to return the cars to their as built configuration and functionality. The door control system may have been modified by running repairs during the service life of the vehicles and it is the Contractor's responsibility to obtain the complete door control system specification and overhaul requirements from the OEM.

A Door and Door Control Overall Overhaul Plan shall be submitted to the Administration for review and approval prior to starting the overhaul. **[CDRL 901]** All components of the door system shall be overhauled to return them to their as-built OEM condition. All enclosures and equipment areas shall be cleaned and returned to OEM condition.

All doors and door control systems shall be tested to verify the function of the door control system in both the signal car and multiple car configurations as specified in TS Section 14, Testing and OEM procedures.

All equipment shall retain the OEM equipment label or may be renewed in kind retaining the OEM information. All wiring removed during the overhaul of equipment shall be tagged for identification during re-installation of the equipment. All wiring and wire terminations shall be inspected and replaced as needed. Wire terminations shall be properly torqued to OEM specifications during re-installation of the equipment. All new components and wiring shall be labeled and identified in accordance with the OEM schematic diagrams format.

The Contractor shall be responsible for all proper interfaces and functionality of the entire door system.

This plan shall name all subcontractors performing overhaul work on the Doors and Door Controls, including their scope of work, and it shall provide recommendations to control overhaul cost and the basis for the necessary component replacement.

All inspections are to follow APTA RP-I&M-003-98, Rev 1 "Recommended Practice for Door System Periodic Inspection and Maintenance," and based on the OEM manuals. All work shall be performed to the OEM Criteria and comply with the Materials, Workmanship and Standards TS Section 15 of this Specification.

Any reconfiguration of the Door Control equipment must be presented to the Administration for review and approval prior to the start of the overhaul.

9.3 SCOPE OF WORK

All overhauled, refurbished or replaced door and door control components shall meet the requirement and performance criteria of the OEM. All work shall be conducted in strict compliance with the OEM requirements and recommendations. All procedures shall be included in the Door and Door Control Overall Overhaul Plan.

9.4 SIDE DOORS

A. Side Doors Panels. The Contractor shall overhaul the door panels as required to fully restore functionality and appearance. The door pockets, including the bottom tracks, door guides, drains, and inside walls shall be cleaned, inspected, and overhauled to restore original functionality. All existing hardware shall be overhauled and seals shall be renewed, including the pocket weather seals, and Teflon guides. Side door hangers shall be renewed and adjusted as required to provide free operation. **For estimating purposes, it is anticipated 20% of hangers will be replaced.**

B. Electric Door Operators. The Contractor shall remove all door operators from the car. The door operators shall be overhauled by the OEM or an Administration approved equivalent. The operators, connection rods, and extension arm assemblies shall be overhauled. All rubber parts, gaskets, and springs shall be renewed or replaced. All parts requiring repainting shall be painted according to accepted practices. The overhauled unit shall be checked and tested to the latest OEM specifications and procedures and certified to OEM performance criteria.

C. Motors. The Contractor shall clean and inspect the door operator motors for proper operation. Motors shall be inspected and tested at a minimum for malfunction, bad bearings, burned or worn commutators and serviced in accordance with OEM specifications. All non-repairable motors shall be replaced with new motors. All motor brushes shall be replaced with brushes meeting OEM specifications.

D. Gear Box. The gear box shall be removed, cleaned, and inspected. The gears shall be inspected to assure that the gears rotate freely and mesh accurately without backlash. All gaskets shall be replaced.

E. Mechanical Lock Assembly. The mechanical door lockout assembly shall be removed cleaned and inspected. The operation of the cutout switch shall be verified.

F. Limit Switches, Cams and Resistors. The Contractor shall replace all limit switches and resistors. The proper operation of the cams shall be verified.

G. Door Operator Cutout Switch. The Contractor shall verify that the door operator cutout switch functions properly. Doors shall not be operable when the switch is in the cutout or bypass position. When the switch is in the normal position the door function shall be re-established.

H. Master Door Controllers. The Master Door Controller Assembly shall be removed, cleaned and overhauled. All switches and relays shall be replaced with devices meeting OEM specifications. The Contractor shall replace the indicator lights with service proven LED indicator lights. The LED Indicator Lights shall be approved by the Administration. **[CDRL 902]**

The overhauled Master Door Controller Assembly shall be inspected and tested to the latest OEM specifications and procedures and certified to OEM performance criteria.

I. Motorman's Door Controller. The Motorman's Door Control Assembly shall be removed, cleaned, and overhauled. All switches, relays, and indicator lights shall be replaced with devices meeting OEM specifications. The Contractor shall propose the use of service proven LED indicator lights to the Administration as part of CDRL 902. The renewed Motorman's Door Control Assembly shall be inspected and tested to the latest manufacturer drawings and procedures and certified to OEM specifications.

J. Emergency Door Release Assemblies. The Contractor shall inspect all Emergency Door Release Assemblies for function and ease of use. All cable assemblies shall be inspected. The Contractor shall test that all interior and exterior emergency releases operate in accordance with APTA Standard SS-C&S-012-02. The Administration shall be allowed to witness the test.

K. Emergency Pull Handles. The Contractor shall inspect and overhaul all emergency release pull handles. The Contractor shall ensure all handles are properly secured to the cable.

L. Emergency Door Release Signs. All emergency door release signs shall be cleaned to ensure that the signs are clearly visible and readable per OEM requirements. Signs that are worn or damaged shall be replaced. Replacement signs shall comply with current FRA, ADA and APTA requirements and shall be approved by the Administration. **[CDRL 903]**

M. Sensitive Edge Assembly and Switch. The Contractor shall renew the sensitive edge assembly and pressure wave switch with an OEM switch or Administration approved equal. The proper mounting and routing of the pneumatic tubing between the sensitive edge assembly and the pressure wave switch shall be verified.

N. Door Control Relay Panel. The Contractor shall overhaul the relay panel per OEM requirements. All relays and suppression devices shall be replaced. The Contractor shall test the proper function of the relay panel and verify all interfaces.

O. Door Closing Warning. The Contractor shall verify the proper functionally of the door closing warning circuits. The audible and visual alarms shall be validated in accordance with the OEM requirements.

P. Crew Switch. The Contractor shall renew the interior and exterior crew switches. Their functionality shall be validated to OEM requirements. All exterior crew switch covers and gaskets shall be renewed.

Q. Outside Signal Lights. The outside door indicator lights shall be replaced with LED indicators mounted in low profile housings. The indicators shall be visible in bright daylight from the end of an eight (8) car consist.

R. Conductors Buzzer. The Contractor shall verify the function of the Conductors buzzer in each vestibule in accordance with the OEM requirements.

S. Override Relay. The Contractor shall verify that the override relay prevents the door operation by cutting off the power to door control trainlines and door control switches.

T. Side Doors Panels. The Contractor shall remove all side doors. All mechanical parts and mechanisms shall be inspected for proper function. All elastomeric materials shall be renewed. All exterior weather stripping and seals including those mounted to the carbody shall be renewed. All door panels shall be cleaned and inspected. Damaged panels shall be repaired or renewed. Superficial damage to the door panels shall not be repaired. Door shall be water tight and pass a leak tasked in accordance with specification TS Section 14.

U. Miscellaneous Equipment. The Contractor shall perform functional checks on all miscellaneous door control system components and replace any broken, missing, or worn-out parts, and test them in accordance with OEM requirements.

9.5 END DOORS

Non-cab and cab end doors shall be overhauled to fully restore functionality and appearance.

All hardware shall be overhauled and seals shall be renewed including door rubber and weather seals.

On cab cars the F-End pneumatic door seals shall be overhauled and renewed as needed. All air plumbing, fittings, and hardware shall be inspected, replaced as needed, and leak checked. The three-way air valve shall be overhauled and tested. If necessary the air pressure shall be adjusted to OEM requirements.

Threshold and drains shall be cleaned and overhauled to restore original functionality.

Inspect, clean, test, overhaul, or renew if required, and reinstall the door lock assembly.

9.6 VESTIBULE DOORS

Vestibule doors panels shall be overhauled to fully restore functionality and appearance. The door pockets, lower tracks, drains, inside walls shall be cleaned, inspected, and overhauled to restore original appearance and functionality. All hardware shall be overhauled and seals shall be renewed, including weather seals and Teflon guides. The door hangers, upper guide, sills, lever, arms, and base shall be overhauled or renewed to restore original functionality. For estimating purposes, it is anticipated 20% of hangers, guides, and arms will be replaced.

The Contractor shall propose an alternate design to the existing electrically operated overhead door operator and touch switch. **[CDRL 904]** The alternate design shall utilize linear synchronous motor technology or permanent magnet type synchronous motor technology and microprocessor control. The alternate design shall maintain the OEM door panel Carbody interfaces and utilize the existing door panel design in the alternate proposal. As part of the alternate door proposal, the contractor shall propose a new vestibule door OPEN touch switch design for Administration approval. All vestibule door touch plates shall be replaced with the new design.

The alternate door control and touch switch design shall meet all the requirements of the existing OEM door controls including:

1. Time opening sequence that responds to the current push plate; Door Opens upon activation and remains open for 15 seconds (adjustable from 10 seconds in 1 second intervals)

2. Détente which will hold the door closed during loss of power regardless of car motion and vibration with up to a 6 inch super elevation.

3. Hold open feature to prevent door oscillations during the open interval when the car leans toward the door closing direction with up to 6 inch super elevation.

4. A pressure wave sensitive edge capable of sensing a flat bar 3 inches wide by ¼ inch thick, perpendicular to door panel, and between the door panel and the door jamb. The sensitive edge shall sense the obstruction over the entire length of the door panel, with the exception of the 3 inches from the top of the door panel and 1 inch from the bottom of the door panel.

5. Three-Position guarded switch located near the door in the passenger compartment with the following positions:

    a. "OPEN" (spring return) allows for a 5 minute door open duration when activated by the momentary switch. The mode returns to "NORMAL" after the 5 minutes times out. The 5 minute open duration shall be canceled by briefly moving the switch to the MANUAL position and then to the NORMAL position.

    b. "MANUAL" (un-powered) allows for the unpowered door to be opened and closed manually.

    c. "NORMAL" Allows for the door to operation as described.

6. 3 Position guarded switch located in the vestibule near the door which shall function similar to the passenger compartment switch.

7. The door operator and controls shall operate from the 74 VDC car battery system and be able to be operated down to the car load shed voltage without damage to the door operator motor and controls.

8. The maximum force required to move an unpowered door shall not exceed a force of 20 pounds-force.

9. The drive mechanism shall be designed and constructed to minimize the torque applied to the door panel.

10. Mechanical failure of the door drive mechanism shall not impede the manual movement of the door panel.

11. The door opening and closing force shall not exceed 25 pounds-force over the travel of the door.

12. The door shall open and close with a 60 pounds-force applied normal to the center of the interior door surface at a height of 56 inches above the floor.

13. Stall protection shall be provided to prevent damage or degradation to the door operator should the door panel become immobilized for extended periods of time.

14. Doors shall not require adjustment more often than every 2 years after the initial break-in period.

15. The door motor, drive assembly and controls shall not require maintenance between heavy overhaul periods.

9.7 TRAP DOORS

The Contractor shall clean, inspect and restore the stairwell trap door to the OEM requirements. When in the down position, the spring tension of the trap door shall be adjusted so that the

door will raise a minimum of ten inches. When in the up position, the spring tension of trap door shall be adjusted as to prevent the door from slamming shut or creating a pinch hazard.

9.8 REQUIRED CDRLS

901 A Door and Door Control Overall Overhaul Plan shall be submitted to the Administration for review and approval prior to starting the overhaul.

902 The LED Indicator Lights shall be approved by the Administration.

903 Replacement signs shall comply with current FRA, ADA and APTA requirements and shall be approved by the Administration.

904 The Contractor shall propose an alternate design to the existing electrically operated overhead vestibule door operator and touch switch**.**

SECTION 10
HVAC

SECTION 10
HEATING, VENTILATING AND AIR CONDITIONING (HVAC) UNIT AND CONTROLS

Section **Page Number**

SECTION 10
HEATING, VENTILATING AND AIR CONDITIONING (HVAC) UNIT AND CONTROLS

10.1 GENERAL SYSTEM DESCRIPTION

Each MARC III car is equipped with HVAC package units located on the roof at each end of the vehicle. The HVAC System specification for each unit is:

A. Voltages: 480 VAC/3 phase, 120 VAC, 24 VDC
B. Weight: 1,975 Pounds (898 Kgs.)
C. Overhead heating capacity: 24 kW per unit
    1. Two 12 kW Stages
    2. Open coil elements
D. Refrigerant Type: R-22, 14 lbs/unit
E. Cooling Capacity: 10.5 Tons (126,000 btu/hr) per unit
   Two 5.25 Ton Refrigerant Circuits
F. Air Flow: 1,800 CFM per Unit (600 CFM Fresh Air)
   A Temperature Control Panel automatically maintains the car interior temperature between 69 and 73 of the vehicle by providing necessary levels of heating and cooling powers.

10.2 OVERHAUL REQUIREMENTS

Much of the existing HVAC equipment shall be retained and overhauled. Overhauling requirements are discussed in the sections below; base scope of work modifications, additions and options are also discussed in sections below. The Contractor shall submit an HVAC Overhaul Plan to the Administration for review and approval prior to starting the overhaul **[CDRL 1001]**.

10.3 SCOPE OF WORK

10.3.1 Temperature Controller

The existing temperature control controller, manufactured by Stone Service Corporation shall be replaced with a microprocessor controller compatible with the existing control voltages and control logic developed by the OEM. The contractor shall provide a minimum three spare digital inputs and outputs and one spare analog input and output on the controller. The microprocessor controller shall be capable of detecting and logging system faults which may be retrieved by maintenance personnel using a portable test unit (PTU) supplied by the contractor. The retrieved fault logs shall be in file format that is compatible with Microsoft Excel. The controller shall have sufficient RAM memory to store faults logged between regular six-month maintenance intervals as agreed with the Administration. If the fault storage reaches capacity

the existing faults shall be overwritten on first in first out (FIFO) sequence. The fault logs shall be capable of being cleared by the PTU. Active faults shall be indicated and displayed on or in close proximity to the microprocessor controller for convenient viewing by the crew or maintenance personnel without the use of a PTU. The contractor shall provide a list of faults that will be detected and stored by the microprocessor controller to the Administration for approval. **[CDRL 1002]** The methodology of detecting the faults shall be presented for approval as part of the HVAC controls design review.

The contractor shall submit the following documents during the design reviews for approval by the Administration. The documents shall comply with the requirements of TS Section 16.2, and CDRL 1601:

1. Software Requirements Specification (including list of faults)
2. Software Development Plan
3. Software Quality Plan
4. Software Validation Test Plan

10.3.2 HVAC Control Panel

The control panel shall be removed and cleaned. All contactors, overloads and control devices shall be renewed. Circuit breakers shall be cleaned and tested. The renewed panel shall be tested to the OEM requirements.

10.3.3 HVAC Unit

Air Conditioning System. The existing air conditioning system is rated for operation on nominal 480 VAC, 3-phase 60 Hz power and 120 VAC supplied by the existing fleet of MARC locomotives. The existing HVAC units were originally manufactured by Stone Service Corporation. The existing system utilizes refrigerant R-22. The existing system shall be modified and designed for use with refrigerant R-407c. The contractor shall present details of any required unit modification for the refrigerant change to the Administration for review. The HVAC unit shall be inspected and unless otherwise specified, items such as mounting studs, mounting brackets, covers, clamps, weld nuts, threaded inserts; support bars, latches, drain tubes, and other components that may be found to be worn or damaged shall be overhauled or renewed. All resilient mounts shall be renewed. Unless otherwise specified all mounting hardware shall be renewed.

The HVAC Unit and carbody brackets shall be inspected and repaired if damage is found. All HVAC unit cover and vehicle interface sealing gaskets shall be inspected for permanent set and poor adhesion to the cover or unit. If defects are found, the cover or unit substrate shall be cleaned and the gasket renewed.

10.3.4 Condenser-Compressor Section

The compressor-condenser section of the unit shall be inspected for damage and cleaned. The condenser section cover shall be inspected for damage and cleaned. All insulation shall be renewed. All insulation substrates shall be cleaned prior to the application of adhesive for the renewed insulation.

The scroll compressors shall be replaced with new scroll compressors that are sized for and compatible with the R-407c replacement refrigerant. The compressor isolation mounts and hardware shall be renewed. All Rotolock fittings shall have their seals renewed. The compressor crankcase heaters shall be renewed. Vibration eliminators shall be cleaned inside and out and inspected for damage.

The condenser coils shall be replaced with new. The new coils shall have the same dimensional features and performance criteria as the OEM coils. The frame and center support shall be constructed of stainless steel and the end plates shall be pierced and flared to support the tubes. The tube and fin material shall be copper. The tubes shall be mechanically expanded to secure the fins. The coils shall be pressure tested in accordance with the OEM requirements. All condenser section piping shall be inspected for wear or damage and cleaned inside and out. Particular attention should be given to clamped and pass-through areas during inspection. All flexible refrigerant hoses shall be replaced with low-permeation hose. All service valves, shut off valves, and check valves shall be renewed.

All elastomeric material used for piping clamps and pass-through grommets shall be renewed. The condenser fan shall be inspected cleaned and inspected. The condenser fan motor and hardware shall be renewed. The fan and motor assembly shall be balanced in accordance with the OEM requirements. Electrical conduit gaskets shall be renewed.

10.3.5 Evaporator Section

The evaporator section of the HVAC unit shall be cleaned and inspected for damage. Damaged insulation shall be replaced in kind. The evaporator coil shall be removed cleaned inside and out and pressure tested in accordance with the manufacturers requirements and overhauled. All bent fins shall be straightened. All evaporator section piping shall be inspected for wear or damage and cleaned inside and out. Particular attention should be given to clamped and pass through areas during inspection.

The following devices and components shall be renewed:

1. All Shutoff Valves, Service Valves and Test Ports (Schrader Valve Caps shall have retaining chains)
2. Sight Glass Moisture Indicator and Glass Gasket

3. Thermal Expansion Valves
4. Low and High Pressure switches
5. Low and High Pressure Gauges
6. Refrigeration Control Panel Test Switch
7. Liquid Line Solenoid Valve and Coil
8. Filter/Dryer Core
9. Air Filters
10. Fresh Air Temperature Sensors

The evaporator blower assembly shall be removed cleaned and inspected. The blower motor shall be renewed. The blower assembly shall be balanced by adding weights to the fins of the blower wheels. The maximum head displacement shall not exceed 0.2 mils peak to peak. The flow switch shall be renewed. The contractor may propose and alternate method of detecting air flow to the Administration for consideration.

10.3.6 Overhead Heater

The overhead heater assembly located in the evaporator section of the HVAC unit shall be cleaned and inspected for damage and have the following components renewed:

1. Heating Elements
2. Over Temperature Limit Switches
3. Cracked, chipped or damaged Insulators
4. Damaged wire terminations

10.3.7 Temperature Sensors

The return air, fresh air, duct limit, layover and air distribution temperature sensors shall be renewed. Housing and support brackets shall be cleaned and inspected for damage. Damaged housings and support brackets shall be renewed.

The contractor shall renew all fans installed on the air distribution temperature sensor.

10.3.8 Ducts and Diffusers

All supply air, return air and fresh air ducts shall be inspected and cleaned. Damaged insulation shall be renewed. Return air grills shall be cleaned and inspected. Broken or defective latching (primary and secondary) hardware shall be renewed. Sealing gaskets that are worn, torn or have taken a permanent set shall be renewed. If the supply air diffusers are removed for cleaning the contractor shall record the cars number and location that the diffuser was removed from. If adjustable dampers are present on the diffuser they shall also record the damper setting. Supply air diffusers shall be reinstalled in their OEM positions with the OEM damper setting.

Supply air diversion dampers shall be cleaned and inspected. The damper diverter shall be checked for freedom of movement and overhauled if found defective. The damper motor shall be renewed.

10.3.9 Floor Heaters and Grills

Floor heater covers, grills, and protective plates shall be cleaned and replaced as needed. The floor heater strips shall be tested to the OEM requirements. The Contractor shall overhaul the heater; care must be taken to assure heat transfer fins are not damaged. Defective heater strips shall be renewed. All electrical connections are to be torqued to OEM specifications. All hardware and insulators shall be renewed.

Any heater element that is found to be defective or that cannot be overhauled shall be renewed. **For estimating purposes, it is anticipated 10% of heater elements will be replaced.**

The fan heaters located on the mid-level shall be cleaned and overhauled to OEM requirements. The fan motors shall be renewed.

10.3.10 Cab Heater

The cab heater shall be replaced.

10.3.11 Testing

In addition to the testing requirements in TS Section 14, the Contractor shall submit an On-vehicle Climate Control Validation Test plan for approval. **[CDRL 1003]**
In accordance with TS Section 14.3, the contractor shall submit for approval a design qualification test plan to validate that the microprocessor controller meets or exceeds the OEM interior climate control requirements and fault detection and logging requirements of this technical specification.

10.3.12 Spares

The Administration has four (4) spare HVAC units that shall be part of this scope of work. The Contractor shall be responsible for the overhaul of spare HVAC units in accordance with this specification.

Spare HVAC units shall be used as floats and installed on completed cars during the course of this project.

10.4 REQUIRED CDRLS

1001 The Contractor shall submit an HVAC Overhaul Plan to the Administration for approval.

1002 The Contractor shall provide a list of faults that will be detected and stored by the microprocessor controller to the Administration for approval.

1003 The Contractor shall submit an On-vehicle Climate Control Validation Test plan for approval.

SECTION 11
LIGHTING

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LIGHTING

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SECTION 11
LIGHTING

11.1 GENERAL SYSTEM DESCRIPTION

The lighting system includes both interior, including control cab, vestibule and toilet areas, stepwells, and exterior lights and is powered by both 120 VAC, 60 Hz and 72 VDC. The interior OEM lighting is mostly made up of fluorescent lamps and fixtures. Exterior lighting includes marker, ditch, platform, and side signal indicator lights on all cars. Exterior lighting also includes headlights and oscillating lights on Cab cars.

11.2 OVERHAUL REQUIREMENTS

The Contractor shall submit a Lighting Overall Overhaul Plan that includes cleaning, inspection, and testing procedures for all interior and exterior lighting for Administration approval prior to start of work. **[CDRL 1101]** The Plan shall include testing each of the four car types to assure the cars conform to the latest requirements of APTA RP-E-012 (latest version), "Recommended Practice for Normal Lighting System Design for Passenger Cars", and APTA RP-E-013(latest version), "Standard for Emergency Lighting System Design for Passenger Cars". The Contractor shall include procedures to overhaul and upgrading lighting units not meeting these standards.

11.2.1 Lights and Fixtures

The Contractor shall remove all the light fixtures and diffuser units in the passenger areas, vestibules, and stepwells. The Contractor shall thoroughly clean and overhaul the lighting lenses, diffusers, connectors, and housings. All lamps shall be replaced. Locker, compartment, and snack bar lighting shall be cleaned and tested. All lamps shall be replaced. Fluorescent lamps tubes shall be disposed of in accordance with the applicable EPA guidelines.

All car exterior lighting shall be cleaned and overhauled. All cab cars with ditch lights shall have the controller tested to OEM specification. All headlight, ditch light, and oscillating light bulbs shall be renewed. The oscillating light mechanism on cab cars shall be cleaned, inspected, lubricated, and tested. Any failed component shall be renewed. All marker lights shall be cleaned, overhauled and have bulbs replaced.

All car number sign lights shall be cleaned and overhauled. All light bulbs shall be replaced.

As an **OPTION,** the contractor shall provide a proposal to replace all interior, including control cab, vestibule and toilet areas, and exterior incandescent lighting, with new LED replacement units meeting the performance requirements of APTA RP-E-012, (latest revision), "Recommended Practice for Normal Lighting System Design for Passenger Cars". The option

for LED shall exclude the headlights, ditch lights and oscillating light. The Contractor shall provide specifications and samples of proposed LED lighting system to the Administration for review and approval. **[CDRL 1102]** The Administration may elect not to include specific lights if they are deemed to be adequate in the OEM condition.

11.3 REQUIRED CDRLS

1101 The lighting test procedures shall be submitted and approved prior to testing.

1102 The Contractor shall provide specifications and samples of proposed LED lighting system to the Administration for review and approval.

SECTION 12

COMMUNICATIONS

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COMMUNICATIONS

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SECTION 12
COMMUNICATIONS

12.1 GENERAL SYSTEM DESCRIPTION

The existing communication system includes a PA amplifier, AAR base, speakers, control head panels, interior and exterior destination signs, a sign controller, radio, and Radio/PA/IC control head.

The MARC III passenger information signs are LED displays interconnected to the sign control unit over a RS485 network. The signs are from Daktronics, Inc.; 331 32nd Ave; Brookings, SD. Part numbers of the signs are as follows:

- 0Z-6639-01C - Interior LED Master
- 0Z-6639-01A - Interior LED Slave
- 0Z-6639-03C - Exterior LED Master
- 0Z-6639-03D - Exterior LED Slave

Cab Cars are equipped with a GPS and wireless modem from ENSCO, Inc.; 5400 Port Royal Rd.; Springfield, VA; model RM-MU-4-R0DUAL. This system is available for the Contractor's use in aiding in the determination of vehicle location and to communicate data to and from the wayside. The contractor shall include in their scope of work any expansion of the AVL necessary to meet the Overhaul requirements.

There are eight (8) passenger compartment speaker assemblies installed per car.

12.2 OVERHAUL REQUIREMENTS

Communication system components including PA amplifier, AAR base, sign controller and control head panels shall be replaced with new assemblies that meet the functional requirements of this section. The contractor shall submit a Communications Overall Overhaul Plan for Administration review and approval **[CDRL 1201]**. The plan shall include all software documentation requirements in TS Section 16.2.

An Automatic Announcement System Upgrade (AAS) is to be installed in order to provide additional capabilities to the MARC III cars. The upgraded AAS is to provide the following functionality:

1. Provide audio and textual messages to train passengers as described in this section
2. Permit transmitting ad hoc messages from any authorized AAS user to any selected vehicle(s).

3. Be fully compatible with MARC IV cars outfitted with the Axion Technologies communication system, which will be operated in a mixed fleet environment.
4. Be compatible with current MARC III destination signs.

The AAS and other supplied communication equipment must be designed and built to comply in all respects with all applicable laws, regulations, standards, and recommended practices of the following agencies and organizations:

A. US Department of Transportation (USDOT)
B. Federal Railroad Administration (FRA)
C. Federal Transit Administration (FTA)
D. US Public Health Food and Drug Administration (FDA)
E. America Public Transportation Association (APTA)
F. State of Maryland
G. District of Columbia
H. Association of American Railroads (AAR)

Where there is a conflict, the most restrictive shall apply. The equipment shall be suitable in all respects for use in the Administration's vehicles, and fixed installations related to their commuter rail system.

Although the required warranty is defined elsewhere in the Contract Documents, the design of the AAS and the level of quality and durability of the AAS components shall be consistent with minimum useful life of fifteen (15) years.

Unless otherwise stated, the requirements within the Specification apply both to vehicle and fixed equipment supplied under this Contract.

12.3 SCOPE OF WORK

A new communications system, complete with passenger emergency intercoms, automatic announcement system, and exterior speakers shall be provided that is compatible with the Axion MARC IV PEI and AAS. The system shall control the functions identified in this section.

The communications system shall permit the train crew to make announcements and to page the passengers and other train crew members by use of the speakers in the passenger areas of the cars. It shall permit two-way radio communication between the train crew/Operator and other trains and wayside installations. It shall permit private two-way intercommunication between any two (2) communication control panels within the train; e.g. between train crew and Operator. It shall also accommodate recorded or digitized human speech messages for announcements or other passenger information in accordance with the requirements of 49 CFR

38 and enable announcements to be interfaced with the interior destination sign for visual broadcasting. Passengers shall have the capability to communicate with the train crew members via the Passenger Emergency Intercom System. In addition, the system shall be capable of receiving and displaying on the interior signs arbitrary text messages addressed to the passengers and/or crew (paging system). Each cab car shall include cellular communications capabilities incorporated with the radio communications and capabilities to record all PA announcements. The communications system shall also provide for transfer of data between the train and wayside installations using a cellular modem and/or via wireless LAN.

All trainline communication shall be compatible with existing MARC cars. The PA/IC functions shall be included in the digital audio trainlines in the cabling for the digital train network (DTN), while the conventional baseband audio trainlines shall be included in the door and communications trainline system. The cars shall utilize analog communication for intra-car communication. All cabling shall be shielded twisted pairs capable of digital communication transmission.

The communication system shall utilize audio for trainline transmission of voice signals, along with conventional baseband audio trainlines for backward compatibility with older MARC rolling stock. The digital audio subsystem shall be compatible with MARC IV cars.

The PA, radio, and wayside to train communication equipment shall be provided with separate circuit breakers. Apparatus requiring power conversion devices, because of voltage range requirements, shall have those devices designed integral to the apparatus. Power conversion devices, external to the apparatus, shall not be acceptable.

Suppliers of the communication systems shall have proven experience in the successful design and manufacture of apparatus of this type for similar railcar application, and the Contractor shall follow the manufacturer's recommendations for its installation.

12.3.1 Radio

The radio shall be inspected and repaired or replaced as necessary per the OEM procedures.

12.3.2 Public Address and Intercom System

A. **PA Amplifier.** The PA amplifier and AAR base shall be replaced. The Amplifier shall be functionally equivalent to the equipment found in the MARC IV cars operated by the Administration, upgraded to perform based on the requirements of this section. The amplifier shall be mounted in the electric locker of all cars. The power amplifier shall have sufficient power to drive all speakers within the car, with 25% reserve power.

   With normal speech input, the amplifier shall operate continuously, at full output, at

rated input voltage, without degradation. The compression amplifier shall produce a minimum compression range of 35 dB, with a maximum output level variation of 2 dB and a maximum total harmonic distortion of 3% at the compressor output. The compression amplifier shall operate satisfactorily with the speaker being 1" to 12" from the microphone.

The PA system shall include an internally switched selectable method of controlling the audio output level in each car, based upon the ambient noise level.

1. Each car shall be automatically controlled, independent of other cars, to provide a comfortable, intelligible sound level at all seating locations.

2. At no time shall an increase in audio levels result in audio feedback.

Each PA announcement made by a crew member shall be recorded and stored digitally in the cab car and/or locomotive. The announcements shall be digitally recorded, vox controlled, and stored in non-volatile memory. The storage memory shall have sufficient capacity to store not less than eight (8) hours of PA announcements with a memory organized in a "first in first out" basis. The system shall permit the downloading of announcement information to PC and removable PC memory card (PCMCIA or USB), and via the wireless wayside to train link. The following shall be maintained for each PA announcement:

1. Announcement
2. Train Number
3. Time of Announcement
4. Train Consist including Road Numbers for All Cars
5. Car Number where Announcement was initiated
6. Location of train

Details of the design, arrangement, and installation of the PA system shall be included in the Communications Overall Overhaul Plan.

B. **Interior Speakers.** All speakers shall be inspected and tested and reused if good. A speaker inspection and test procedure shall be included in the Communications Overall Overhaul Plan. Speakers that do not pass the inspection and test shall be replaced. **It is estimated that approximately 25% of all speakers shall be replaced.**

C. **Exterior Speakers.** To comply with the requirements of 49 CFR 238.121, exterior speakers shall be installed in each side of the coach.

A minimum of two speakers shall be installed in each coach side. They shall be positioned at a height and longitudinal location that assures that a passenger standing on a station platform, anywhere along the length of a coach, is able to hear PA announcements. If necessary, to provide satisfactory performance, a third speaker shall be installed at the longitudinal center of each side of the coach.

The speakers shall be specifically designed for external use and the speaker enclosures shall be watertight. Each speaker shall be covered with a stainless steel grille that matches the coach surface finish and shall be secured by tamper-proof fasteners.

The audio level of the exterior speakers shall be adjustable separately from the interior speakers.

The design of the PA system shall allow selection of manual PA announcements over interior and/or exterior speakers at the conductor control head. The logic for speaker control shall be through the trainline communication network. Automated announcements shall be configurable to play on internal, external, or both via the AAS database.

D. **PA Control Head.** Control heads shall be replaced, and functionally equivalent to the control head currently used by the Administration, with expanded functionality to meet the functional requirements of this section. Control panels shall remain at the existing locations. The system shall be designed such that feedback or interference from nearby speakers to an active microphone shall be minimized. Functionality of the control heads shall be expanded to allow the manual selection of internal, external, or both speakers, and to allow communication and control of Passenger Emergency Intercom calls.

12.3.3 Passenger Emergency Intercom

The coaches shall include a new Passenger Emergency Intercom (PEI) system. The PEI system shall permit emergency communication between passengers, the Operator and the Train Crew between the PEI station panels and the intercom system. The PEI system shall comply with the requirements of 49 CFR 238.121. The PEI system shall function identically and be fully interoperable with the PEI system outfitted on the MARC IV railcars.

A PEI station, for passenger use, shall be located in each middle level and in each toilet room. The exact mounting location for each panel shall be included in the Communications Overall Overhaul Plan. Each station shall be equipped with the following:

1. A flush mounted microphone and intercom speaker behind a perforated vandal-proof grille.

2. A push to call push button. When the PEI panel's push button is depressed, the PEI lights on all the communication panels in the consist shall flash and the audible signal shall be activated. A distinctive tone shall be sounded in the cab when a signal is initiated from the PEI system.

3. An LED to indicate to the passenger that a call has been placed. The LED shall flash when the push button is pressed and shall change to steady illumination after the call is answered by a crew member.

4. Operating instructions shall be provided adjacent to the panel in photo luminescent material per APTA Standard SS-PS-001-98.

System design, layout, and functionality shall be included in the Communications Overall Overhaul Plan.

12.3.4 Automatic Announcement System (AAS)

The Contractor shall provide all necessary hardware and software to allow the AAS system to perform the functions listed below:

A. **Route and Station Information.** The Administration's MARC service current route and station information are provided in Tables 1 through 4, following. Distances are approximate and the Contractor shall be responsible for obtaining accurate distance data.

Station Number	Accumulated Mileage	Station-to-Station Mileage	Station Name
01	0.0	(-)	Union Station, Washington
02	7.5	(7.5)	Silver Spring
03	11.0	(3.5)	Kensington
04	12.3	(1.4)	Garrett Park
05	16.7	(4.3)	Rockville
06	20.8	(4.1)	Washington Grove
07	21.6	(0.8)	Gaithersburg
08	23.6	(2.0)	Metropolitan Grove
09	26.4	(2.8)	Germantown
10	28.9	(2.5)	Boyds
11	33.4	(4.5)	Barnesville
12	35.5	(2.1)	Dickerson
13	42.8	(7.3)	Point of Rocks
14	49.8	(7.0)	Brunswick
15	55.7	(5.9)	Harpers Ferry
16	62.0	(6.3)	Duffields
17	74.0	(12.0)	Martinsburg

Table 1. BRUNSWICK LINE

Station Number	Accumulated Mileage	Station-to-Station Mileage	Station Name
01	0.0	(-)	Union Station Washington
02	9.0	(9.0)	New Carrollton
03	11.3	(2.3)	Seabrook
04	16.6	(4.8)	Bowie State
05	22.4	(5.8)	Odenton
06	29.7	(7.3)	BWI Rail Station
07	33.0	(3.0)	Halethorpe
08	37.5	(4.5)	West Baltimore
09	40.3	(2.8)	Penn Station, Baltimore
10	52.0	(11.7)	Martin Airport
11	60.9	(8.9)	Edgewood
12	70.5	(9.6)	Aberdeen
13	76.5	(6.0)	Perryville

Table 2. PENN LINE

Station Number	Accumulated Mileage	Station-to-Station Mileage	Station Name
01	0.0	(-)	Union Station, Washington
02	7.5	(7.5)	Silver Spring
03	11.0	(3.5)	Kensington
04	12.3	(1.4)	Garrett Park
05	16.7	(4.3)	Rockville
06	20.8	(4.1)	Washington Grove
07	21.6	(0.8)	Gaithersburg
08	23.6	(2.0)	Metropolitan Grove
09	26.4	(2.8)	Germantown
10	28.9	(2.5)	Boyds
11	33.4	(4.5)	Barnesville
12	35.5	(2.1)	Dickerson
13	42.8	(7.3)	Point of Rocks
14	53.7	(11.9)	Monocacy
15	56.1	(2.4)	Frederick

Table 3. FREDERICK LINE

Station Number	Accumulated Mileage	Station-to-Station Mileage	Station Name
01	0.0	(-)	Union Station, Washington
02	5.9	(5.9)	Riverdate
03	7.0	(1.1)	College Park
04	9.2	(2.0)	Greenbelt
05	13.3	(4.1)	Muirkirk
06	17.1	(3.8)	Laurel
07	17.6	(0.5)	Laurel Racetrack
08	20.3	(2.7)	Savage
09	22.6	(2.3)	Jessup
10	25.3	(2.7)	Dorsey
11	29.6	(4.3)	St. Denis
12	36.4	(6.8)	Camden Station, Baltimore

Table 4. CAMDEN LINE

B. <u>On-board Route and Station Information.</u> The AAS shall automatically visually and audibly announce train route and station information based on the train number entered by the train crew. The AAS shall automatically perform the following functions:

1. Display the train number and final destination on the exterior destination signs.
2. At an Administration programmable distance before a scheduled station stop, the interior destination signs in all cars of the consist shall display "The next station is…" and the station name. The system shall simultaneously broadcast the same message over the PA system on the entire consist.
3. Once the train has stopped at a scheduled station stop and the passenger doors are opened, the interior destination signs in all cars of the consist shall display "This station is…" and the station name. The system shall simultaneously broadcast the same message over the PA system on the entire consist.

4. At an Administration programmable distance after departing from a scheduled station stop, the interior destination signs in all cars of the consist shall display "The next station is…" and the station name; the same message shall be heard over the PA system on the entire consist.

5. The system shall be capable of making train connection announcements when applicable. When programmed to do so, it shall automatically audibly announce and display passenger connection information, such as "Change here for train to …", "The train to … is on track …", etc.

6. The AAS shall perform the above within an accuracy of 30 meters.

7. It shall be possible for the Administration to change any of the messages either on-board via a laptop computer, USB memory device, or via the wireless data link to the wayside.

8. The station stop sequencing associated with any given train number is subject to change several times per year as schedules are adjusted. There shall be an automated, centralized mechanism for updating this database on each vehicle. There shall not be a necessity to update each vehicle individually to accomplish this periodic updating. This centralized update shall apply to both the on-board audio as well as the displayed text information. Schedule updates shall be capable of having an affectivity date in order to allow for advanced transmission of the changes.

C. <u>Wayside to Train Communication.</u> The AAS shall allow bidirectional data transfer from the wayside to the train. The wayside portion of the AAS shall use the cab car numbers as the basis for identifying vehicles with which to communicate. The Administration will use the cab car number to identify the train number.

The contractor may utilize the existing ENSCO system equipment as a source of the wireless data connection or supply and install a separated data modem and antenna.

The AAS shall allow the OCC to send textual paging messages to interior destination signs and/or audio messages over the vehicles PA system as follows:

- Selected trains, using train numbers of vehicle numbers;
- All vehicles based on geographic location (all vehicles within defined radius of a particular point or within a defined geographic area);
- The entire vehicle fleet.

These messages shall be either selected from a predetermined list of prerecorded messages or dynamically generated and transmitted from the OCC on an ad-hoc basis.

The wayside to train communication shall also allow the update of on-board software, databases, and other files including audio messages.

It shall be possible to interrogate the AAS to determine train location, system status, software revision, and other diagnostic functions via the wayside to train communication.

D. Train Position. The AAS shall determine the location of the head-end car in the consist with an accuracy of plus or minus 30 meters. When the consist is operating in a locomotive leading mode the train position shall be calculated to reflect the first passenger car after the locomotive.

Train position information shall be based on GPS location. When the GPS data is not available due to loss of the satellite signals or other reason the train position information shall be determined by inertial navigation or an independent speed sensor to be supplied and installed on each cab car as part of this contract.

The system shall maintain the last known vehicle location in memory to allow the system to quickly respond to a power loss or power-up when the GPS data is not available.

The contractor may utilize the existing ENSCO system equipment as a source of the GPS data or supply and install a separated DGPS receiver and antenna. If the contractor opts to supply a separate DGPS receiver and antenna the contractor shall supply an analysis to show that the location of the antenna does not interfere with or is not affected by other existing antennas on the vehicle.

E. System Response Time. The AAS system shall respond to user command in the minimum time possible. The Contractor shall prepare an analysis for Administration approval for any command that cannot be executed within 50 ms.

There shall be a visual and or audio feedback to indicate to the user the status and completion of each command or function requested. The maximum time from power-up to system ready shall be 30 seconds. (Note: this time does not include the time required to acquire the GPS satellite data if the Contractor supplies a stand-alone GPS receiver).

In the event of loss of power to the AAS, the system shall retain its current position and route information. No user intervention shall be required to restart the AAS on reapplication of power.

F. Security. The wayside to train communication system shall be secured against unauthorized access or attack, both from the vehicle itself and from the wayside. Security requirements shall apply both when the vehicle is in revenue service and

when the vehicle is out of service for maintenance or storage. Security measures shall be consistent with industry best practices at the time of design.

To demonstrate compliance, the Contractor shall prepare and submit at the FDR, for approval by the Administration, a Wayside to Train Communication System Vulnerability Assessment identifying all potential system vulnerabilities; associated risk (including exploit likelihood and consequences); countermeasures applied; and resulting mitigated risk. **[CDRL 1202]** The report format shall be similar to that of a hazard analysis; a representative sample of the proposed report format shall be submitted for approval.

Exploits to be considered shall include, but are not necessarily limited to, the following, as appropriate:

1. Vandalism;
2. Eavesdropping;
3. Device/user impersonation;
4. Dictionary attacks;
5. Message modification;
6. Session hijacking;
7. Buffer overflow;
8. Denial of service;
9. Jamming (physical layer denial of service);
10. Virus/worm infection;
11. Unauthorized software installation; and
12. Unauthorized root/administrator access.

Security measures shall include, but are not necessarily limited to, the following, as appropriate:

1. Restricting physical access to communication and control system components to all but authorized personnel;
2. Use of access control lists (ACL);
3. Use of device and/or user authentication;
4. Use of encryption;
5. Use of hardware keys in conjunction with passwords/pass-phrases;
6. Access logs;

7. Intrusion detection/prevention;
8. Antivirus;
9. Proper isolation of security critical system functions from other functions;
10. Application of secure coding practices; and
11. Use of secure operating systems.

Security measures shall be designed and implemented such that their effect on reliability, availability, and basic system operation is minimized.

The Contractor shall make available any security updates to the Administration over the life of the Contract without charge. The Contractor shall notify and make available to the Administration any recommended security upgrades over the service life of the AAS.

G. OCC User Functions. The AAS shall allow an OCC user to perform the following functions in real time:

1. Modify on-board route and station sequence information;
2. Initiate and address wayside to train messages;
3. Display or generate a report on the diagnostics and error handling information for the AAS.
4. Display or generate a report on messages sent over the AAS

H. On-board User Functions. The AAS system shall allow the on-board (vehicle) user to perform the following functions:

1. Initiate pre-recorded paging system messages;
2. Enter the train number;
3. Pause or silence all on-board announcements;
4. Adjust on-board announcement volume (password protected);
5. Access system diagnostic tools (password protected);
6. Provision to permit the train crew to disable the AAS input to the PA in the event of a faulted AAS, while still maintaining the functionality of on-board, manual, PA messages;
7. Resynchronize the train location in the event of the loss of the GPS data.

I. On-board Equipment:

1. Destination signs - The contractor shall utilize the existing Electronic Interior and Exterior Destination Signs. All signs shall be inspected and repaired or replaced as necessary per the OEM procedures.

2. Operator's Control Panel - The operators control panel shall allow the train crew to control the AAS functionality and allow the maintenance staff password access to diagnostic control functions.

   The control panel shall be equipped with a keypad and a 25 character two row alpha numeric display, at a minimum. The display and keypad shall be vandal proof.

   The display shall be capable of being read under all lighting conditions. The keypad and display may be combined into one touch screen display if approved by the Administration.

   The operator control panel shall be equipped with a connector for the connection of a portable memory transfer unit. The connector and memory transfer unit shall be approved by the Administration during the design reviews.

   The MARC III operator's control panel shall be installed in the same location as the existing operator control panel.

   The keypad shall be placed at a suitable height for easy operation.

   The operators control panel shall allow the train crew in control the AAS functionality and allow access to diagnostic control functions from any vehicle in a train consist. The control of message display throughout the train shall be accomplished over the data network.

   The Control panel shall allow the train crew to perform the following functions from any point in the consist:

   1. To enter the train number which will be used to select the current train route and station announcements. The current train number shall be stored in non-volatile memory so that in the event of a power interruption the system will automatically continue to function when the power is restored.

   2. To program all side signs, and interior signs with different messages from any operator's display keypad.

   3. To initiate any prerecorded audio message to be played throughout the train consist.

4. To resynchronize the location of the train in the event that the system does not have the correct train location.

5. Modify on-board route and station sequence information

6. Adjust on-board announcement volume (password protected)

7. Access system diagnostic tools (password protected)

8. To permit the train crew to disable the sign messaging via the operators control panel in the event of a system fault. The sign may default to either a fixed message or a blank.

The Control panel shall be capable of displaying the following information:

1. Train Number

2. Next Station Name

3. General health information (GPS available, time and date, etc.)

The design and operation of the operator's control panel shall be included in the Communications Overall Overhaul Plan.

J. GPS Receiver and Antenna. The contractor may utilize the existing ENSCO system equipment as a source of the GPS data or supply and install a separated DGPS receiver and antenna. Should the Contractor provide a separate DGPS receiver and antenna, the following requirements apply.

The Contractor shall provide a Differential Global Positioning System (DGPS) receiver and antenna. The DGPS receiver shall be Wide Area Augmentation System (WAAS) and differential beacon-capable. The system shall utilize the GPS mode with the lowest Dilution of Precision available at each moment in time.

The GPS receiver may be installed as part of sign control unit, or operators control panel. The antenna shall be a combined GPS and data modem antenna with a low profile that shall not exceed the clearance envelope of each type of vehicle in the fleet.

The GPS data shall be used to trigger the automatic station announcements.

K. Wireless Modem and Antenna. The data modem shall be CDMA/1xEV-DO of a type approved by the Administration and supported by at a minimum two wireless data service providers in the area that the Administration will operate the trains.

The Wireless modem may be installed as part of sign control unit, or operators control panel.

The antenna shall be a combined GPS and data modem antenna with a low profile that shall not exceed the clearance envelope of each type of vehicle in the fleet.

The wireless modem shall be used for all train to wayside communications. The wireless modem design and installation should be such to allow updates to alternative modems without requiring software upgrades of any on-board systems.

L. Speed Sensors. The Contractor shall supply and install an active speed sensor and cabling as required.

The speed sensor shall be designed and produced to comply with Section 6 of EN 50155.

The sensor shall utilize a threaded installation to the supporting apparatus. The thread shall be 0.625-18 UNF-2A. A hex-shaped jam nut, 1/4-in. high, shall be furnished with the speed sensor to lock it in place. Wrench flats shall be provided on the sensor body to allow holding the sensor body while the jam nut is tightened. The Supplier shall specify torque limit for the wrench applied to the sensor body.

The speed sensor shall withstand ± 100 g acceleration in any axis without damage or loss of service life.

The speed sensor shall be designed for a fatigue life of 107 cycles under loads produced by ± 50 g acceleration in any axis.

The sensor design shall accommodate a reasonable run-out in the gear wheel used for sensor excitation and shall allow, to the extent practicable, some lateral offset of the tooth and the sensor pole face. The Contractor shall specify the requirements for the air gap between the pole face and exciter tooth, subject to the Administration's approval. The intent is for the sensor to operate at gaps up to 0.10 in. (2.5 mm). The pole wheel exciter for the sensor will have a diametral pitch, DP = [(no. of teeth + 2)/(outside diameter of wheel in inches)] 11-1/4. The sensor must operate successfully with an air gap between 0.025 and 0.050 in.

The sensor case shall be constructed of 303-grade stainless steel. The sensor shall be environmentally sealed. Combined with the electrical connector, the sensor shall meet or exceed the protection code of IP66 (IEC) or type 4X (NEMA). The pole face end of the sensor shall be sealed and the sensor assembly shall not be affected by repeated thermal cycling between the specified temperature limits.

The electrical connections shall be by a multi-pin connector conforming to MIL-C-5015 or Buyer approved equal. Electrical contacts shall be 30 mil gold plate over 50 mil low stress nickel. Wire connections to the connector shall be soldered and potted. There shall be no electrical connection of the two shields within the sensor or the connector. It is acceptable to have two galvanically isolated channels, with the

power supply inputs connected external to the sensor, within the interface connector.

The sensor shall be designed to meet the environmental requirements specified in IEEE Std 1478, for condition E1.

The sensor shall operate in any ambient temperature between –40C to 120C without any adverse affect on service life.

The speed and distance calculations shall be based on nominal 34.5 inch wheel diameter with a 100 tooth gear. Actual wheel diameter is 36 in. new and 33 in. worn; the maximum car speed is 125 mph.

The speed sensor shall be mounted on the trailing axle (axle number 2) of the F end truck in the existing mounting hole unless approved by the Administration.

The speed sensors shall be used to determine train location when the GPS data is not available. The speed sensor output will provide vehicle speed and direction. At the contractor's option, inertial navigation can be used as an alternative to or in addition to the installation of the speed sensor.

M. Networks. The contractor shall provide the following data networks to allow the AAS to transfer data from one vehicle to another within the consist and to each destination sign.

The MARC III trains are equipped with two networks. The train network, which communicates between the cars in a consist, is a Lonworks powerline network based on the PLT10a transceiver which is now obsolete. The sign network is based on the RS-485 protocol.

The contractor shall propose a new train network to provide compatibility with the MARC IV cars, which may be used in a mixed consist environment. In these instances, it should not be necessary to program multiple sign controllers for proper operation of the destination signs.

The contractor may utilize the existing RS-485 sign network or propose an alternative network design.

All networks shall be design to have adequate capacity. The contractor shall provide a network traffic analysis to show that no more than 25% of the networks capacity is unitized at any time.

All networks shall have a maximum of 200 ms inauguration or re-inauguration time and shall automatically re-inaugurate if one node is non-responsive. The network

shall automatically re-inaugurate when there is any change in the number of nodes on the network (e.g., a car is added or removed from the consist).

All networks must be an open network non-proprietary design to allow the Administration to, at a later date, to purchase equipment that will be compatible with these networks and data structures. The networks chosen shall be designed to be immune for electromagnetic interference and transients.

The Contractor shall provide a non-proprietary open Interface Control Document (ICD) describing all aspects of the networks. The Contractor shall provide a detailed verification and validation test procedure to prove the ICD is complete. **[CDRL 1203]**

The system shall be operated from any operator's display keypad located in a cab car.

It shall be possible for only one (1) operator's display keypad unit on the train to be in use at any given time to select messages. It shall be possible to program all side signs, interior signs, and front signs with programmed messages from any operator's display keypad. The design of the destination sign system, including location and operation, shall be included in the Communications Overall Overhaul Plan.

Provision shall be included in the AAS to permit the train crew to disable the sign messaging in the event of a system fault. The sign may default to either a fixed message or a blank.

N. Memory Transfer Unit. A standard MS Windows compatible PC shall be used to update the message listing and all memory devices in the sign control units in each vehicle through the use of a PCMCIA card or USB memory device. It shall also be possible to update the system through the wireless link.

Software programs shall be provided, which shall enable authorized MARC personnel to change the message and voice databases using a standard PC.

The message listing created in the computer shall be transferred directly to each sign control unit via a PCMCIA card, USB memory device, or wireless link.

The resulting modified database in that vehicle shall remain in force until locally updated further or upon the implementation of the next fleet wide update, at which time, the locally unique database will be overwritten by the latest fleet wide update.

O. Audio Announcements. The AAS shall be designed and interface to each vehicle type's existing PA system in such a way that it meets the following requirements:

A. Shall not interfere with any of the existing functionality.

B. Audio volume of the announcements will be constant throughout the consist regardless of the consist's length of makeup.

C. Has the following performance characteristics:

1. Frequency Response: ±3 dB minimum from 80 Hz to 8,000 Hz
2. Total Harmonic Distortion (THD): less than 1% over entire frequency range
3. Signal to Noise Ratio > 100: 1
4. There shall be no pop or click sound when a message is started or ended.

D. Messages will be given the following priority:

1. Manual crew initiated messages.
2. Wayside initiated messages.
3. Station and route messages.

12.4 REQUIRED CDRLS

1201 Contractor shall submit the Communications Overall Overhaul Plan to the Administration.

1202 Wayside to Train Communication System Vulnerability Assessment

1203 A complete set of all interface control documents and detailed verification and validation procedures for the Communication System.

SECTION 13
CAB EQUIPMENT

SECTION 13
CAB EQUIPMENT (OPERATING POSITION CAB CAR)

SECTION 13
CAB EQUIPMENT (OPERATING POSITION CAB CAR)

13.1 GENERAL SYSTEM DESCRIPTION

Each Cab car contains a cab control section in the F-End. This section allows the train operator to control the consist acting in place of the locomotive in push mode. The cab equipment contains all operating controls, switches and indicators. This includes the master or throttle controller, reverser switch, air brake valve, horn and bell controls, radio, alerter display, ATC aspect display unit, PTC display, air gauges, etc. The section also contains the observer's area. It is the Contractor's responsibility to obtain the latest configuration and recent equipment modifications to the cab equipment from the Administration and the OEM's. The Contractor shall be responsible for ensuring that all vehicle functions remain unchanged, except for local sanding, which shall be removed.

13.2 OVERHAUL REQUIREMENTS

The contractor shall submit a Cab Equipment Overall Overhaul Plan to the Administration for review and approval. **[CDRL 1301]** The plan shall include all procedures for cleaning, inspection, testing, and repair. In General the overhaul plan shall follow OEM requirements and procedures. The plan shall include procedures for any recent equipment modifications and options exercised by the Administration during this overhaul. The WABTEC I ETMS Positive Train Control System shall be cleaned, inspected, and tested to OEM specifications and procedures.

13.2.1 Location

The right hand side of the F-end of the Cab Car contains all of the operating controls.

13.2.2 Operator's Control Station

All of the Operator's controls and indicating equipment installed shall be renewed, overhauled or replaced, as noted.

All components shall be, to the greatest degree possible, physically interchangeable and operationally compatible with the existing equipment listed below.

If the controls are a new application (i.e., manufacturer/hardware is not currently installed on the car), the Contractor shall submit three (3) product samples, data sheets and integration drawings for these new products shall be included in the Cab Equipment Overall Overhaul Plan.

All of the stainless steel surfaces shall be cleaned and overhauled.

Any stainless steel surface that has engraved lettering shall be maintained and shall be overhauled.

Any surface scratches shall be buffed out with minimal effect to the surrounding surface material.

All access panel and component mounting fasteners and hardware shall be renewed. Fasteners and hardware shall comply with all TS Section 15 requirements.

The following operator's controls shall be overhauled or renewed to OEM specifications. The Administration will free issue to the Contractor major parts or equipment if found defective.

Device	**Type or Label**	**Action**
Master-Controller	Wabtec, single-handle desktop mounted controller with eight notches of power and IDLE	Overhaul
Reverser	Wabtec, Forward/Neutral/Reverse/Off with locking of Master Controller and key removal in Off; integral with Master Controller	Overhaul
26-C brake automatic brake	Wabtec, air brake control equipment and valves, as specified in TS Section 4.	Overhaul
Horn valve	Graham-White/Salem,	Renew
Bell valve	Graham-White/Salem,	Renew
Traction Current/Line Voltage Monitor	Bombardier CVM.	Clean, Inspect and Test
Air Brake Gauges (MR/EQMR) and (BP, BC) and Airflow.	Wabtec	Overhaul
Voice Radio	General Electric, 12R Series II	Overhaul
Alerter Display	Bach Simpson TMS Alerter Display	Clean, Inspect and Test
Windshield wiper controls, motor and blade mechanism	Sprauge,	Renew

Device	Type or Label	Action
ATC ADU	PHW 9-aspect ADU	Clean, Inspect and Test
I-ETMS PTC display	Wabtec I-ETMS.	Clean, Inspect and Test

The following operating control circuit breakers and switches shall be renewed or overhauled to OEM specifications.

	Type or Label	Action
LOCO Control CB, PANTO/FUEL PUMP switch, CAB MAKE UP key switch, Generator Field (Motor Control) switch, Manual Sanding pushbutton, Sand Selector switch, Defroster switch, Headlight switch, Cab Heater switch, HEP Fault Reset switch, Attendant Call switch, Door Override pushbutton, Alarm Bell Reset pushbutton and MU Engine Emergency Shutdown switch.	These controls are currently mounted in the Upper LEFT-hand cab control panel.	Renew. Refer to TS Section 4 for modification to sanding controls
Oscillating Light switch, Oscillating Motor switch, Cab Light switch and BELL	These controls are currently mounted in the front, middle cab control panel.	Renew
Alerter/Cab Signal/ACSES Acknowledge pushbutton	These controls are currently mounted in the Lower LEFT-hand cab control panel, below the Radio.	Renew

The following Operator's indicator lights shall be renewed, overhauled to OEM specifications or replaced as indicated. All indicators shall be replaced with a LED design with smaller sized devices.

Device	**Type or Label**	**Action**
Air Brake panel gauge lights	Brake cylinder/brake pipe gauge WABTEC (top position) and main reservoir-equalizing/reservoir gauge WABTEC (bottom position).	Renew
Brake Suppressed and Brake Applied indicating lights	These controls are currently mounted in the Upper RIGHT-hand cab control panel below the air brake gauges. All incandescent indicating lights are to be replaced with an LED design. The size of the indicators shall be minimized in area.	Replace
Battery Charger, CPR By-pass, DEC Malfunction, and PCR OPEN indicating lights	These controls are currently mounted in the Lower RIGHT-hand cab control panel below the ADU.	Replace
Door Close, Handbrake Release, Control Power, HEP Fault, Sanding, Cab Heater Overheat indicating lights.	These controls are currently mounted in the Upper LEFT-hand cab control panel All incandescent indicating lights are to be replaced with an LED design.	Replace
Auto Power Reduction, No Power Brake, Wheel Slip, Diesel DB Warning and TM Excess Current indicators	These controls are currently mounted in the Middle LEFT-hand cab control panel, adjacent to the Radio.	Replace
Radio/PA/IC/PEI control head(s)	New, as approved by the Administration	Overhaul

13.2.3 Brake Control Equipment

All the brake valves in the operating cab, which require periodic maintenance, shall be removed and sent to an Administration approved maintenance facility/vendor for the appropriate overhauling and COT& S service and dating. Refer to TS Section 4 for overhaul requirements.

This includes but is not limited to, the 26-C brake valve, Air Flow, MR/EMR and BP/BC air gauges, N-1-D magnet valve (in the ceiling).

13.2.4 Safety Control

The TMS alertness system from Bach-Simpson shall be cleaned, inspected, and tested per OEM procedures. The Administration will free issue to the Contractor major parts or equipment if found defective.

The Event Recorder System from Bach-Simpson shall be cleaned, inspected, and tested per OEM procedures. The Administration will free issue to the Contractor major parts or equipment if found defective.

13.2.5 Train Control Locker

The Cab Signal/ATC System from PWH shall be cleaned, inspected, and tested per OEM procedures. The Administration will free issue to the Contractor major parts or equipment if found defective.

The I-ETMS PTC System from Wabtec shall be cleaned inspected, and tested per OEM procedures. The Administration will free issue to the Contractor major parts or equipment if found defective.

13.2.6 Windshields

All cab windows and windshield glazing and mounting rubber shall be renewed. This includes:

- Operator's heated windshield
- Observer's windshield
- Operator's emergency side
- Observer's side window

Glazing materials and mounting material specifications shall be included in the Cab Equipment Overall Overhaul Plan. Refer to TS Section 1.2.8 for glazing requirements.

13.2.7 Windshield Wiper

The operator and observer's windshield wipers (controls, motors, arms and blades) shall be renewed.

13.2.8 Sun Visor

The sun visor shall be inspected for damage and proper operation, then cleaned and lubricated.

Any damaged material shall be renewed.

13.2.9 Horns

The horn shall be inspected for damage. Any damaged or missing material (snow guards) shall be renewed.

The Contractor shall test the horn to ensure compliance to 49 CFR229.129

The horn operating valve in the operator's cab shall be renewed.

The circuit between the horn, crossing bell and oscillating light shall be maintained; activation of the horn shall start ringing the bell and start the oscillating light (or ditch lights).

13.2.10 Bell

The bell clapper mechanism and BELL actuating valve shall be renewed.

13.2.11 Operator's Seat

The operator's seat assembly shall be overhauled.

The seat bottom and back pads shall be renewed with FRA compliant material.

The operator's seat assembly compartment shall be cleaned, inspected, and overhauled. A new latch shall be applied to the access panel.

As an **OPTION,** the Contractor shall propose a replacement operator's seat for Administration review and approval. **[CDRL 1302]** The Contractor shall propose all replacement seating equipment and installation procedures.

13.2.12 Vestibule Heaters (Cab Heaters)

Refer to TS Section 10.3.10 for the cab heaters.

13.2.13 Miscellaneous

Missing or damaged coat hooks shall be renewed.

13.3 REQUIRED CDRLS

1301 The contractor shall submit a Cab Equipment Overall Overhaul Plan to the Administration for review and approval.

1302 Contractor shall propose a replacement operator's seat for Administration review and approval.

SECTION 14
TESTING

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SECTION 14
TESTING

14.1 GENERAL SYSTEM DESCRIPTION

This section establishes the requirements for an integrated vehicle test program and specifies the test requirements for qualification and acceptance testing.

14.2 TEST PROGRAM

The Contractor shall ensure, through an integrated test program, that all components, subsystems, systems, and vehicles are fully tested. The Contractor shall ensure that all components, subsystems, and systems are qualified and accepted prior to their installation on the vehicles. The test program shall include the vehicle as a stand-alone unit and as part of a train consist. The purpose of this integrated test program shall be to substantiate the overhauled vehicle's performance characteristics, ensure operational compatibility, and provide for subsystem functional verification prior to vehicle acceptance and revenue service.

14.2.1 Limitations

The Contractor shall be responsible for determining each vehicle's readiness for normal operation in revenue service, and shall investigate any faults and determine the action required to correct them. The Contractor shall be responsible for all testing within the scope of the specification. If any components or subsystems, not specifically addressed by the Technical Specification, are found to be defective, the Contractor shall notify the Administration immediately for disposition. The Administration may elect to provide the necessary spare parts from its maintenance stock.

14.2.2 General Requirements

The test program shall be structured in a manner so as to provide a total integrated test program. It shall be the responsibility of the Contractor to plan, integrate, and manage this program with appropriate review and approval by the Administration. The Administration shall witness and approve all tests.

The Contractor shall perform qualification and acceptance testing on overhauled vehicles after they are completely reassembled and before acceptance by the Administration, in addition to the component and subsystem tests described in other sections of the Technical Specification. The Contractor shall ensure by appropriate testing that all vehicles are overhauled in accordance with the Technical Specification and that all operating devices, working and moving parts, subsystems, and systems are in a proper and fully operating condition. The Contractor shall perform these tests on each vehicle to verify the efficacy of the overhaul and demonstrate proper installation, adjustment, calibration, functionality, and performance of equipment. The Contractor at a minimum shall:

A. Demonstrate through qualification testing that all performance requirements have been met.

B. Conduct acceptance testing to verify each vehicle/subsystem functionality and performance during the production cycle and after delivery to the Administration.

14.2.3 Test Plan

The Contractor shall submit a complete Test Plan to the Administration for approval. **[CDRL 1401]** The purpose of this plan is to ensure that all requirements of the specification are met and the vehicles will perform as intended. The Contractor shall designate a Test Program Manager who shall function as the focal point for all test activities for this contract and shall be responsible to the Program Manager for all testing matters. The Contractor shall submit (as outlined below) a test plan, test schedule, and list of tests as follows:

A. The Test Plan shall include as a minimum an outline of the test program, equipment, facilities, personnel, and data to be collected, and any additional information required to illustrate the test program.

B. The test schedule shall include, as a minimum, qualification and acceptance tests listed in this section and shall display sequence, location, and vehicle numbers to be tested.

C. The test list shall be a comprehensive list to include all tests, whether listed in this section or not, which are necessary to meet the requirements of the specification.

14.2.4 Test Requirements and Facilities

The Contractor shall provide qualified personnel and test equipment to conduct the required tests. The Contractor shall use suitably level track of proper gauge, length, and alignment to permit the pre-delivery functional check of the appropriate sub-systems. The electrical power source(s) for these tests shall have specified characteristics consistent with those characteristics specified herein.

All working and moving parts, and all operating devices and controls of each vehicle, shall be tested and put in proper operating condition by the Contractor and approved by the Administration, before vehicles are shipped from the Contractor's facility.

The Contractor shall perform tests to verify trainline integrity by coupling another car or locomotive at both ends. The vehicle shall be capable of receiving all signals from the lead locomotive as well as passing the signals through to the next car.

All acceptance and qualification test results shall be included in the Vehicle Overhaul History Book. Sub supplier test results shall be approved by the Contractor prior to submittal to the Administration. Use of Administration tracks for testing other than that described herein shall be held to a minimum and shall be approved.

14.2.5 Manufacturing Tests and Adjustments

The Contractor shall incorporate into the quality assurance program all those repetitive tests and inspections that are necessary and customary in the industry to ensure that the overhauled vehicles meet all contract requirements.

14.2.6 Procedures

A detailed test procedure for each test requirement shall be submitted for Administration approval 30 days prior to the start of each test. **[CDRL 1402]** The test procedures shall be based on the methods prescribed in the OEM manuals, whenever possible and appropriate. As a minimum, each procedure shall specify the following:

A. Scope, objectives, and pass/fail criteria.

B. Operational parameters and responsibilities, including environment, equipment, personnel, services, and setup.

C. Prerequisite tests and activities.

D. Microprocessor software test procedures and test cases designed to uncover software errors, as appropriate.

E. Test constraints, including equipment, personnel, and support required from subcontractors, as appropriate.

F. Operational monitoring requirements including instructions for performing the test, permissible adjustments during the test, and representative test data sheets with instructions.

G. Provisions for retest in cases of test failure or modification of the tested item.

H. Means of updating test procedures based upon results of other tests.

The procedures for these acceptance tests shall be continually updated. The basis for changes to these procedures shall be the feedback from actual running experience on the Contractor's test track or on the Administration's property. The procedures may be expanded to include checkpoints in areas that have proven to be troublesome. All test procedure revisions shall be subjected to the Administration's approval.

14.2.7 Test Reports

Written test reports shall be submitted for all tests performed on the vehicles, as follows:

A. The test report format shall have adequate means for permanently recording test data, results, faults and corrective actions, and Contractor and Administration inspection approvals.

B. All approved acceptance test reports shall be included in the Vehicle Overhaul History Book. Originals of test data, whose copies are submitted, shall be made available to the Administration upon request.

C. For each qualification test, a preliminary test report shall be submitted for the Administration's review. It shall be followed by the submittal of a final report for the Administration's approval. **[CDRL 1403]**

14.3 QUALIFICATION TESTING OF NEW AND UPGRADED COMPONENTS/ SUBSYSTEMS

All new and upgraded components/subsystems shall be subjected to design qualification testing once, if successfully completed, to demonstrate conformance with the requirements included in the specification. The Contractor may request a waiver for a specific component/subsystem test, subject to the Administration's approval, if the Contractor demonstrates that the component/subsystem has successfully completed a test with the same or more stringent requirements as set forth in the technical specifications. If any component/subsystem fails during qualification testing, it shall be retested at the Contractor's expense only after implementing corrective actions to eliminate faults.

14.4 ACCEPTANCE TESTING

14.4.1 General

Acceptance tests shall be conducted on all new, upgraded, overhauled systems, rebuilt subsystems and equipment, and vehicles whether performed at a subsupplier's facility, the Contractor's facility, or on the Administration's property. Acceptance tests shall verify that each subsystem/component, system, vehicle is functioning properly throughout the various stages of production and after delivery.

14.4.2 Acceptance Tests at Subsupplier's Facilities

Where equipment is removed from the vehicle for overhaul, upgrade, or replacement, functional testing shall be performed at each subsupplier's facility to verify that the component/subsystem is in conformance with the Technical Specifications and to demonstrate that the equipment is operating properly prior to being shipped to the Contractor's facility.

14.4.3 Acceptance Tests at Contractor's Facility

Acceptance testing shall be performed on each vehicle at the Contractor's facility during the production cycle, and prior to shipment to the Administration. The Contractor shall verify the proper operation of the subsystems and the overhauled vehicle's readiness for shipment and placement into revenue service. As a minimum, the following tests shall be performed:

A. **Trainline Test**. The Contractor shall conduct trainline electrical tests on each overhauled vehicle. The Contractor shall verify the accuracy of the vehicle trainline connections by the use of a trainline tester.

B. **Wire Continuity Check**. Where electrical equipment has been removed for cleaning, overhaul, upgrade, or replacement, all circuits shall be tested to ensure wire continuity, correct polarity of equipment and devices, and proper termination to correct positions of each equipment. All frame grounds and terminal connections shall be checked for tightness.

C. **Insulation Resistance Test**. Perform insulation resistance (megohmmeter) test to confirm insulation resistance of electrical circuits, including carbody wiring and electrical equipment.

D. **Hi-Pot Electrical Test**. For all new wiring installed during this overhaul, the Contractor shall perform Hi-Pot tests to confirm the dielectric strength of each circuit.

E. **Carbody Dimension/Clearance Measurement.** The Contractor shall verify critical dimensions and adjust the appropriate clearances after completion of overhaul for each vehicle.

F. **Electrical Function Test.** The Contractor shall perform full functional checks on all systems and equipment to confirm proper operation. As a minimum, the Contractor shall check the following: battery charging voltage, transformer voltage, lighting system, air conditioning and heating system, communication system, door operation test, and other auxiliary equipment.

G. **Battery Load Test.** All batteries shall be subjected to a load test per OEM instructions.

H. **Hand Brake Test.** The Contractor shall perform testing to verify the function of the hand brake system.

I. **Communication System Test.** The Contractor shall perform testing to verify the communication system.

J. **Door Operation Test.** The Contractor shall perform functional verification of the door system to verify proper operation.

K. **Air Conditioning and Heating Tests.** The Contractor shall perform full operational tests of the air conditioning, heating, layover, cab heater/defroster systems, and safety devices related to each, to verify proper operation.

L. **Water System Test.** The Contractor shall check the water leakage from water piping and equipment. Operation of the toilet system shall all be verified. The function of drain valves shall be verified.

M. **Operating Compartment Accessories.** The Contractor shall confirm the function of all operating compartment accessories including but not limited to horn, bell, and windshield wipers.

N. **Cab Control Circuit System Test.** The Contractor shall verify the function of the cab control circuit.

O. **Carbody Water Leakage**. All external components that are renewed, overhauled, or upgraded, shall be given a local water test. The spray application shall consist of a flow rate of 0.625-gallons-per-minute and shall be delivered to each square foot of surface being tested with a nozzle discharge velocity of 75 mph. The test shall run for 10 minutes before the inspection of leaks begin and shall run continuously during the inspection.

P. **High Voltage**. The Contractor shall energize the high voltage system and verify the proper sequence of operation and functionality of all associated equipment.

Q. **Alerter System Test.** The Contractor shall verify the functionality of the alerter system.

R. **Trainline Information System.** The Contractor shall verify the proper functionality of the trainline information system.

S. **Air Supply and Friction Brake System**. A functional test shall be performed to ensure proper operation of the air supply system and the friction brake system. All valves shall be verified for proper adjustment and functionality. The air piping shall be subjected to a leak-down test. The brake system shall be adjusted and tested until performance, which complies with OEM, FRA, and Administration requirements, is achieved.

T. **Equipment Heating**. A functional test shall be performed to verify proper operation of all equipment heaters.

U. **Trucks and Suspension**. The completed truck system shall be checked for proper equipment interface and clearance, tram, leveling, turning radius, and verify all electrical, mechanical and pneumatic connections.

V. **Coupler**. A functional check shall be performed to verify proper height adjustment and operation.

W. **Lighting System**. A functional test shall be preformed to verify proper operation of the lighting system, which includes exterior, interior, emergency, and LLEPM systems.

14.4.3.1 FRA and APTA Inspections

It is the intent of this section that the Cab cars be delivered with all periodic inspections required in Subpart B-49 CFR 229.23 through 49 CFR 229.29 performed. The Contractor shall perform periodic inspections and maintenance as required by APTA SS-I&M-0005-98, APTA SS-I&M-007-98, APTA SS-I&M-0013-99, and inspections as required in the OEM-supplied manuals. All completed work shall meet the OEM performance criteria, and comply with Technical Specifications.

For all vehicles, within 5 calendar days of the Contractor's scheduled shipping date for delivery to the Administration, the Contractor shall complete the standard 184-Day Inspection, and for Cab cars the standard 92-Day Inspection, as required and in compliance with MARC requirements. An FRA-QMP (qualified per 49 CFR 238.107) inspector, utilizing MARC MAP Forms MAP 238-MD, MAP MD-10, and MAP MD WH-1, shall be completed and certify the inspections for each overhauled vehicle.

The Contractor shall complete the various FRA and APTA-required tests and inspections, as specified elsewhere in the specification, for the respective subsystems. For each Cab car, the Contractor shall furnish to the Administration three copies of FRA Form 6180-49A (Blue Card), "Periodic Locomotive Unit Inspection and Repair Report," which shall be completely filled out and notarized for submission to the FRA, for display in the Cab car, and for the Administration's files. **[CDRL 1404]**

14.4.2 Acceptance Tests on Administration Property

The Contractor shall be responsible for conducting acceptance testing (on Administration property) on each vehicle using an approved procedure. The cost of conducting braking and dynamic tests on the Administration's railroad contractor's property shall be borne by the Administration, which is limited to test costs associated with test vehicle operation, vehicle movement, test train makeup, provision of functioning non-overhauled vehicles, and track time. All other testing costs shall be the responsibility of the Contractor. Qualification testing shall be successfully completed prior to beginning acceptance testing of the first vehicle.

At delivery, the Administration shall conduct a receiving inspection. The receiving inspection shall include visual inspection to determine specification conformance and to ensure that any shipping damage is identified, and corrected by the Contractor. Final acceptance testing shall commence after completion of the receiving inspection.

A. **Final Acceptance Testing**. The Contractor shall make all necessary post-delivery adjustments prior to the start of the test on Administration's property. The vehicle shall be complete and ready for revenue service. The Contractor at a minimum, but not limited to, shall perform the following tests:

1. **A static functional test** of all vehicle subsystems shall be performed and proper operation verified

2. **A locomotive functional test** shall be performed to verify the trainline functions of the overhauled vehicle with a locomotive.

3. **A functional test of the cab signal equipment**. The Contractor shall perform these tests to detailed test plans approved by the Administration.

4. The Contractor shall verify that the deceleration **braking and emergency braking** is in compliance.

5. The Contractor shall perform a **dynamic test** of the overhauled vehicle with a locomotive at appropriate speeds to verify compliance with the performance requirement of TS Section 0.

6. System Requirements. A test shall verify the vehicle brake rates are in compliance with existing brake rates. Three brake runs shall be made. Runs may be modified at the discretion of the Administration. Testing shall be conducted on Amtrak's North East Corridor (NEC) between Washington, D.C. and Philadelphia, PA; or at a location on the NEC approved by the Administration. Each vehicle shall be tested in all modes of operation. At a minimum, each vehicle shall be instrumented to record the following signals simultaneously on a multiple channel recorder during dynamic testing:

   a. Brake cylinder pressure, per truck
   b. Speed
   c. Brake rates

d. Deceleration
e. Acceleration
f. Brake pipe pressure
g. Main reservoir pressure

An alternate means of instrumentation may be recommended by the Contractor, but must be approved by the Administration.

14.4.3 Noise and Vibration Tests

Noise and vibration tests shall only apply to equipment that has been upgraded or redesigned. The Contractor shall prepare a list of equipment that requires noise and vibration testing for the Administration's review and approval. **[CDRL 1405]**

The Contractor shall perform the following tests on the first overhauled vehicle. These tests shall be performed at the Contractor's facility or on the Administration's property, as appropriate.

A. **Noise Tests**

1. **Test Conditions**. Conformance with the specifications is to be based on measurements taken in essentially a free-field environment such as outdoors, away from any reflecting surfaces other than the ground on which the vehicle is resting. All measurements shall be made at locations where reflected sound, such as reflections from nearby walls, floor, or other equipment, will not influence the directly radiated sound from the equipment measured by more than 2 dB. All measurements shall be made with an ambient sound level in the vicinity of the test measurement locations of 10 dB or more below the noise produced by the equipment being measured, when evaluated using the same weighting or octave band. For equipment noise measurements with the vehicle stationary or on jacks, the vehicle shall be located outdoors on a ballast-and-tie, at-grade trackbed in an area free of barriers or other sources of interference.

2. **Equipment Noise Test Procedure**. Using sound level metering and analysis equipment as specified in TS Section 0–System Requirements, the Contractor shall measure the sound level produced by equipment in the operating mode at the distances and directions specified and using the scales and frequency ranges specified.

3. **In-Vehicle Noise Test Procedure**. Using sound level metering and analysis equipment as specified in TS Section 0–System Requirements, the Contractor shall measure the sound levels inside the vehicle with all equipment energized and all components operating; shall measure the noise levels inside the vehicle with each individual equipment system energized; and shall; and shall measure the sound levels inside the vehicle moving at speeds up to 125 mph. The sound readings shall be obtained at sufficient locations along the vehicle centerline to determine that the specified noise level limits are not exceeded.

14.4.4 EMI/EMC Tests

The Contractor shall perform an EMI/EMC test on the first overhauled vehicle to demonstrate compliance with the EMI/EMC requirements as specified in TS Section 0.10

14.5 REQUIRED CDRLS

1401 Test Plan (14.2.3)

1402 Test Procedure for Each Test Requirement (14.2.6)

1403 Preliminary and Final Test Reports (14.2.7)

1404 Three copies of FRA Form 6180-49A, "Periodic Locomotive Unit Inspection and Repair Report (14.4.3.2)

1405 List of Equipment Requiring Noise and Vibration Testing (14.4.5)

SECTION 15
MATERIALS, WORKMANSHIP, AND STANDARDS

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SECTION 15
MATERIALS, WORKMANSHIP, AND STANDARDS

15.1 GENERAL SYSTEM DESCRIPTION

The following standards of materials and workmanship apply to work performed by the contractor. All new material that is required due to new design or upgrades shall meet the requirements listed in this section. Existing designs need not be modified to conform to these requirements unless otherwise specified. All new material that may have resulted by new design, replacement, and/or renewal, shall meet the smoke and flame and toxicity requirements listed in this section. All new material shall be compatible with existing material to which it may interface. All new material that may have resulted by new design or renewal, shall meet the flammability, smoke emissions, and toxicity requirements cited in TS Section 15.20 and TS Section 18.2.

15.1.1 Quality

All materials used in the construction and equipment of these vehicles shall be of first-class quality. All workmanship shall be of high-grade and shall conform to the best manufacturing practices in all respects for railway passenger vehicles. All materials exposed to cleaning operations shall be unaffected by the agents used.

15.1.2 Standards

The following standards and specifications define materials for this contract: Federal and Military Specifications or Standards, the Specifications of the Aluminum Association of America, AAR, APTA, ANSI, ASME, ASTM, FRA, IEEE, JIS and additional requirements, as specified herein. Where other or foreign standards are proposed by the Contractor, the Contractor shall submit documentation for Administration review and approval that demonstrates the proposed standards are the equivalent of the foregoing standards and specifications. Proposed substitute specifications shall be submitted in both English and the language of the country of origin.

15.2 JOINING AND FASTENING

15.2.1 General

Certain combinations of materials require particular care in joining to avoid the possibility of corrosion. Isolating and moisture-proofing materials, appropriate to the materials being joined, shall be used at all times where these combinations exist.

15.2.2 Joint Fitting

Joints shall be properly fitted, whether exposed or concealed.

15.2.3 Metal-to-Metal Connections

Where metals contact each other, the contact surfaces shall be free of dirt, grease, rust, and scale. Unless specified otherwise, the contact surfaces shall be coated with a metal based primer which conforms to Federal Specification TT-P-664. Metal primer may be omitted for austenitic stainless steel to austenitic stainless steel joints.

15.2.4 Wood-to-Metal Connections

Where wood and metal surfaces are placed together, the wood shall be coated with aluminum paint conforming to Federal Specification TT-P-38, and the metal shall be coated with a primer which conforms to Federal Specification TT-P-664.

All bolts or rods passing through wood shall be coated with aluminum paint conforming to Federal Specification TT-P-38.

15.2.5 Wood-to-Wood Connections

Where wood surfaces are placed together, both abutting surfaces shall be coated with aluminum paint conforming to Federal Specification TT-P-38.

15.3 FASTENERS

15.3.1 General

All fasteners utilized in the overhaul and/or assembly of the vehicle, subassemblies, or components procured under this Contract, including the Contractor, Subcontractor, and other suppliers that are responsible for supplying fasteners to this overhaul program, shall comply with all applicable Federal, State, and local laws and ordinances and shall be appropriate for the intended application.

To the maximum extent possible, the Contractor shall procure and deliver fasteners made in the United States for use in the assembly and/or overhaul process. At a minimum, fasteners made in the Unites States shall be used for all safety-related application, including but not limited to, those applied to trucks, bolsters, carbody-to-truck interface, brake equipment, and couplers. Also, all structural bolts used for undercar and overhead mounted equipment shall be made in the United States. The steel shall be of high quality and for use in general and critical applications. At a minimum, Grade 5 bolts, nuts, flat and lock washers shall be utilized in all critical applications, including but not limited to underframe equipment, mounts, and trucks.

The Contractor and suppliers are responsible for selecting fastener types, sizes, styles, lengths, materials, grades, and finishes that will meet the requirements of this Specification. The Contractor shall minimize the number of different sizes and styles of fasteners used. The Administration reserves the right to request the Contractor to randomly test fasteners at the Contractor's expense, to ensure that fasteners meet the applicable standards. The Contractor shall ensure that counterfeit fasteners are not permitted. Should the Administration find that the Contractor or its suppliers have provided counterfeit fasteners of any type, the Contractor may be declared in default, in accordance with the contract documents.
In order to comply with Federal Regulations, all shipments must be fully traceable for laboratory testing, heat treatment, and steel requirements. A code shall be assigned and marked

on each package that will trace the purchase order and all assigned certification and testing conducted and germane to products offered.

The Contractor shall, upon request by the Administration, produce the manufacturer's test, traceability requirements, and certifications for the following:

A. Process and layout inspection
B. Heat treat lot number
C. Plating thickness
D. Plating baking per Federal Specification Q-Z-325
E. Gauging of threads
F. Material chemistry
G. Tensile strength, wedge angle
H. Surface/core hardness
I. Proof load (nuts)

All mechanical fasteners shall conform to ANSI standards, SAE standards, or ISO standards as appropriate. No mixture of metric and ANSI standard fasteners shall be permitted. All fasteners shall be stainless steel or chromium, galvanized or cadmium plated steel, depending on the specific application. Fasteners shall be of mechanical or threaded type, unless otherwise approved by the Administration. All threaded fasteners shall conform to ANSI Class 2 thread requirements, unless otherwise indicated. All threaded fasteners shall be self-locking or provided with locking devices. The use of self-tapping screws shall not be allowed unless approved by the Administration.

No protruding screws, mounting bolts or similar items shall be permitted either on the interior or exterior of the vehicle, other than those appointments which can be built into the structure in no other manner, as determined by the Administration. All exposed screws, bolts and nuts shall be stainless steel, unless otherwise specified, Phillips-head type, truss, or oval head. Self-locking nuts shall be ESNA elastic stop nuts or approved equivalent and shall be used throughout, where practical. When bolts are used to secure apparatus and the bolt head is inaccessible, a mechanical locking device shall be used to prevent the bolt head from turning when the nut is being removed. Undercar equipment shall not be supported by bolts in tension.

15.3.2 Threaded Fasteners

Steel bolts shall conform to the requirements of ASTM A-325, A-354, Grade BD, or A-490, as applicable. Nuts shall meet the requirements of ASTM A-194, A-325, or A-563, as applicable. Bolts and nuts shall be cut to ANSI threads with a class 2 fit, minimum. Bolts, unless otherwise specified, shall be furnished with high temperature elastic stop nuts or shall be drilled for and furnished with a cotter pin and nut suitable for use with the cotter pin. Hexagon nut and spring-lock washer combinations may be used with the Administration's approval. The peening of bolts shall not be allowed. Bolts used in structural applications shall not be smaller than 3/8-inch in diameter. Aluminum alloy bolts, nuts, and screws shall not be permitted. All steel screws, bolts and nuts shall be cadmium plated, or zinc plated with a chromate treatment, except for stainless-to-stainless joints where stainless steel bolts and nuts shall be used. All carbon steel bolts shall be SAE Grade 5 strength minimum. The number of different sizes of bolts shall be kept to a minimum. Lock bolts with swaged collars may be used. Cap screws and

bolts of lowest strength grade may be permitted in unit subassemblies upon Administration approval.

At least 1.5 screw threads shall be visible beyond all nuts. Screws shall not project more than 1.5 threads plus 0.25-inch on screws smaller than 0.25-inch diameter. Screws shall not project more than 8 threads on screws 0.25-inch or larger, unless elastic stop are used. For elastic stop nuts, screw thread shall in no case project more than 0.25-inch, regardless of screw size.

15.3.3 Metric Fasteners

Upon Administration approval, specific components, control groups, or individual units that are supplied by a supplier or sub supplier to the Contractor, may be supplied with metric fasteners to ANSI B1.13M (ISO-metric) Standards. All internal fasteners and threaded components of the approved assembly shall have ISO-metric threads. Internally, there shall be no mixing of metric and inch threaded fasteners. External mounting fasteners and threaded connecting components shall have ISO-inch threads to ANSI B1.1 Standards. Each unit, component, or group assembled with or containing ISO-metric threads shall be indelibly identified, in an approved manner and in a conspicuous approved location, to signify that the unit was assembled using metric threaded fasteners or components. All repair and maintenance manuals shall be conspicuously marked on each page where metric threaded fasteners were used within the unit. Replacement, repair, or maintenance parts supplied under this Specification shall contain all necessary replacement fasteners of the correct size and grade.

Metric fasteners shall be marked as required in "Metric Fastener Standards," Industrial Fasteners Institute, latest edition.

15.3.4 Decorative and Appearance Fasteners

All interior fasteners exposed to passengers shall be made of stainless steel. Slot-headed type shall not be used. Phillips-type may be used in specific areas with Administration approval. All fasteners not visible to the passengers on the interior of the vehicle shall be either stainless steel, zinc-plated steel or cadmium-plated steel, as appropriate to the materials being joined.

15.3.5 Torquing

All fasteners shall be properly torqued. The Contractor shall prepare procedures to ensure the proper torquing of all safety related fasteners, including underfloor, truck, and roof fasteners. The procedures shall include 1) the torque value, 2) torque patterns for multiple fastener locations, 3) lubrication condition required, and, 4) a quality control check off to assure that the work has been performed. All safety-related fasteners shall be "torqued striped" after torquing by paint or other means.

Where no fastener torque values are available from the OEM, the recommendation of the Industrial Fasteners Institute or approved equivalent shall be followed for torque-crucial fastener applications.

15.3.6 Washers and Lock Washers

Washers shall be used under the heads of all bolts and under all nuts. Where high strength fasteners are applied, washers shall be hardened and comply with IFI 1970 Fastener Standards.

Lock washers, when applied, shall conform to IFI 1970 Fastener Standards. Lock washers shall not be used for fatigue applications where the fastener must be torqued and marked. If applicable, prevailing torque nuts shall be used for these applications.

Other types of washers, including Belleville washers, may be used for special applications with the Administration's approval.

15.3.7 Rivets and Lock Pins

Rivets and lock pins exposed to passengers shall be austenitic stainless steel or aluminum, as appropriate to the materials being joined. Steel rivets shall conform with ASTM A 502, A-31, or A-131 as applicable. Aluminum alloy rivets shall conform to 6061-T6 or 6053-T61. Rivets driven cold shall be mechanically driven. Exposed heads shall be concentric with the shank and free from rings, fins, pits, and burrs.

15.3.8 Plating of Fasteners

All plated hardware in contact with heat producing apparatus shall be plated with zinc. Fasteners shall be plated in accordance with the following specification:

A. Cadmium plating per ASTM-A165-55, Type NS.
B. Chrome plating per ASTM-B456, Classification SC-3.
C. Galvanizing, hot dip with purest quality zinc, having minimum thickness of 0.001-inch.
D. Zinc plating shall conform to the latest revision of ASTM-B-633, Type II SC2, SC3 or SC4.

15.3.9 Rivet and Bolt Holes

Rivet and bolt holes shall be accurately located and aligned, and when necessary during assembly, holes shall be reamed round to specified size in position. Bolt hole clearances shall not exceed the Industrial Fasteners Institute's requirements. Any rivet which is removed shall be replaced with the next larger size rivet, after reaming the hole to the appropriate size.

15.3.10 Swage-Locking Fasteners

Swage-locking (Huckbolt-type) fasteners shall conform to Military Specification MIL-P-23469 and may be used in locations approved by the Administration. All rough surfaces of the collar end shall be machined or ground smooth where accessible to passengers, crew, or maintenance personnel performing routine maintenance functions. Fasteners shall be stainless steel unless otherwise approved by the Administration.

15.3.11 Locking Compounds and Sealants

Devices and components which rely on thread-locking and sealing compounds to make them function safely and reliably, or which require the use of such materials to make their assembly

and function possible shall not be provided. Exceptions may be made by the Administration upon the submission of sound technical grounds for their employment. Such materials may be used for applications that are a permanent part of the vehicle or component where no disassembly will be required for the service life of the vehicle or component.

The use of locking compounds or liquid thread sealants on any threaded fastener which must be disassembled more often than at the time of complete component overhaul is prohibited. The use of any such compound shall be submitted to the Administration for approval on a per item basis.

15.3.12 Locking Devices

Lock wire, if used, shall be stainless steel or monel.

Lock washers smaller than 3/4-inch size may be commercial standard, and those 3/4-inch size and larger shall conform to Military Standard Part MS35340.

15.3.13 Cleaning

Where metal is riveted or bolted to the vehicle structure, contact surfaces shall be free of dirt, grease, rust and scale and shall be coated with a suitable metal base primer which shall not interfere with the top coat application. Stainless steel parts shall not be coated.

15.4 STAINLESS STEEL

15.4.1 General

Permitted uses of structural stainless steels are specified throughout this Specification. Ferritic stainless steels shall be painted where exposed to passengers or the weather. Austenitic stainless steels may be unpainted. Unpainted stainless steels exposed to passengers shall be a single grade of austenitic stainless steel in which both the color and surface finish of abutting pieces shall match, except where the design specifically calls for contrasting appearance.

All materials used in the carbody shell shall be U.S. standard metal gauge thickness and tolerance. Metric gauge thickness, or rounding of dimensions to or from the metric system, shall not be permitted, except as approved by the Administration.

15.4.2 Austenitic Stainless Steel

Carbody shell components shall be constructed of weldable austenitic stainless steel of AISI types 201L, 301L and 304L with a maximum carbon content of 0.03 percent. Items other than the carbody shell shall be constructed of AISI 300 series austenitic stainless steels.

Stainless steel used in structural applications covered by this Specification shall also conform to APTA Standard SS-CRS-004-98, Standard for Austenitic Stainless Steel for Railroad Passenger Rail Equipment, and ASTM DS 67A, Handbook of Comparative World Steel Standards.

15.5 LOW ALLOY HIGH TENSILE STEEL

15.5.1 General

High-strength low-alloy (HSLA) or low-alloy high-tensile (LAHT) steel structural shapes, plates, and bars shall, as a minimum, conform to the requirements of ASTM A 588, where available. Plate steel may alternatively conform to ASTM A 710, Grade A, Class 1 or Grade C, Class 1.

Cold and hot rolled LAHT sheet and strip steel shall, as a minimum, conform to the requirements of ASTM A 606, Type 4. General requirements for delivery of these products shall be as required by ASTM A 568.

15.6 STEEL CASTINGS

15.6.1 General

All steel castings shall be manufactured in accordance with the latest revision of the Association of American Railroads Manual of Standards and Recommended Practices Specification M-201. Steel castings for use in couplers and draft gear shall meet the requirements of M-201 for grade C, normalized and tempered. Steel castings for use in truck bolsters and truck frames shall meet the requirements of M-201 for grade C, normalized and tempered, with the exception that carbon content be held to a maximum of 0.25 percent for weldability.

15.6.2 Miscellaneous Castings

Steel castings used in locations not referred to herein shall be selected for composition and characteristics best suited to the application, by the Manufacturer or Contractor concerned, but shall be subject to approval by the Administration.

15.6.3 Quality

Steel castings shall be sound throughout. The Manufacturer shall prove its manufacturing procedure by either destructive or nondestructive means. Castings shall conform to AAR M-201, ASTM E 446, severity level 3 or better, and ASTM E 125, Type II through IV discontinuities.

Following the establishment of a satisfactory procedure, quality control shall be maintained by testing one or more of each lot at a frequency to be determined by the Administration, the Contractor and the foundry, and this frequency shall be influenced by the critical requirements of the part. If castings are found to be porous or otherwise unsound, the material shall be destroyed at no expense to the Administration.

All castings shall have all sharp or rough edges removed that are a result of the casting operation. When grinding is used to dress surface defects or welds used to repair castings, care shall be exercised to insure that no abrupt sectional changes result.

15.7 ALUMINUM

15.7.1 General

Aluminum alloy mill products shall be identified by designations prescribed by The Aluminum Association and shall conform to specifications contained in the Association's publication "Aluminum Standards and Data." Aluminum alloy castings shall conform to ASTM B-26, B-85, or B-108 for, respectively, sand, die, or permanent mold castings. Aluminum alloy forgings shall conform to ASTM B-247.

15.7.2 Design Stresses

The Contractor shall be responsible for the design stresses in all structures, however, structures of aluminum shall be designed in accordance with the specification of the "Handbook of Design Stresses for Aluminum," published by the Aluminum Company of America, with appropriate revisions to factors of safety to properly accommodate the anticipated number and amplitude of load variations. Proper allowance shall be made for the effects of fatigue, and for column or plate stability effects. Aluminum alloys used for structural purposes shall be limited to the 5000 and 6000 series of alloys.

15.7.3 Fabrication and Fastening

The forming of aluminum parts; joining of parts by bolting, riveting, and welding; and the protection of contact surfaces shall, as a minimum, conform to the requirements of the Aluminum Company of America's Technical Report No. 524, "Specification Covering Use of Aluminum in Passenger Carrying Railway Vehicles," except as otherwise specified herein.

Fabrication techniques shall be such that the strength and corrosion resistance of the aluminum shall not be impaired or the surface finish permanently marred or discolored during construction.

15.7.4 Protection of Contact Surface

The specific measures to be taken by the Contractor to prevent the risk of direct metal-to-metal contact and resultant possible electrolytic corrosion shall be approved by the Administration and shall depend upon the determination of the most suitable method which can be adapted to the design involved. The following instructions are given for general guidance and shall not be construed to supersede conflicting recommendations by the aluminum manufacturer.

Aluminum alloy surfaces shall not be secured to or make direct metal-to-metal contact with the surfaces of copper, copper bearing aluminum alloy, brass, bronze, silver, nickel, nickel alloys, nickel plated parts, lead, tin, or wood.

The contact surfaces of aluminum alloy with aluminum alloy shall be painted with zinc chromate primer before securing.

The surfaces of aluminum alloy parts secured to steel parts shall be protected with a one-part polysulphide sealant, zinc chromate paste or silicone sealant used as a joint compound. Alternately, an insulating joint material which completely covers the faying surfaces may be used. The material shall be non-hygroscopic and, if fibrous, shall be impregnated with bitumen or an approved, non-corrosive, water and moisture-repellant substance. After driving, fasteners shall be primed and painted with red oxide or aluminum paint. Any dissimilar metal joints shall be completely water proofed with proper sealants and gaskets.

Some form of surface covering or insulation shall be provided to all bolts, rivets, securing clips and devices to prevent contact with the aluminum alloy, if the bolt or other device does not already consist of a compatible aluminum alloy. Stainless steel and carbon steel fasteners plated with cadmium or zinc shall be coated with zinc chromate paste before installation. Where possible, only the head and the shank of the bolt shall be in contact with the aluminum part when secured in place. Suitable bushings may be used in place of the zinc-chromate paste. Rivets driven hot may be considered to be covered by a protective oxide coating due to the heating; but the method of riveting shall, if possible, always be with the formed rivet head in contact with the aluminum alloy.

15.7.5 Interior Trim

Where unpainted aluminum is exposed to contact by passengers, it shall have a clear (natural) anodic coating with a thickness of 0.0008-inch and a minimum coating weight of 35 mg/sq inch, or an approved equivalent process.

15.8 ELASTOMERS

15.8.1 General

All elastomeric parts shall be of neoprene, or approved equivalent, unless otherwise specified. The elastomer shall be compounded and cured to perform satisfactorily in vehicle operation at any temperature between -5°F and +120°F. The elastomers shall have high resistance to ultraviolet radiation, weather, all Administration car washing fluids, and the longest possible life consistent with the other characteristics specified. All elastomeric parts shall be resistant to ozone, oxidation, heat, oil, grease, and acid.

All resilient mounts shall be of natural rubber where not exposed to oil, ozone or sunlight. Synthetic rubber compounds may be substituted for natural rubber only when approved by the Administration for a specific application.

15.8.2 Tests

Unless otherwise specifically stated herein, all tests shall be conducted according to the latest revisions of the indicated ASTM test procedures and demonstrate the minimum properties listed on the following table when tested in accordance with the indicated test methods:

15.8.3 Elastomeric Minimum Properties

Parts include door seals, glazing strips, truck bumpers and snubbers, structural and compressible gaskets, and mounting pads.

Physical Property	ASTM Test Method	Performance Requirement Value
Hardness, Durometer A	D2240	45 to 75
Tensile Strength	D412	2,000 lb/inch minimum
Ultimate Elongation	D412	250% minimum
Ozone Resistance	D1149	No cracks
Heat Aging Resistance	D573	
Oil Aging Resistance	D471	+80% Compression Set Maximum
Permanent Set	D395 (Method B)	25% Compression Set Maximum
Tear Resistance	D624	200 lb/inch minimum

15.8.4 Carbody Parts

Glazing strips shall be black neoprene. Door and window seals shall be of neoprene or approved material and shall be free of defects of material and workmanship. The durometer hardness measured with a Shore type "A" durometer at a temperature between 70°F and 90°F shall be 70 ±5.

The Contractor shall supply test equipment and test specimens and shall perform at their expense such tests as are specified. The test specimens shall be cut from the extruded material, and at least one tensile strength and elongation test and one accelerated aging test shall be made on the material used for each lot. If the compound or cure, or both, are changed during the production of material at least one test of each type shall be made for each different batch.

When testing the 6-inch by 1/2-inch ASTM dumbbell-type test specimen by the methods specified in ASTM Specification D15 and D412 for neoprene door edges, the tensile strength shall not be less than 1,500 lbs/square inches and elongation shall not be less than 275 percent.

The tensile strength of the neoprene shall not be reduced more than 25 percent when subjected to accelerated aging by the methods specified in ASTM Specification D573.

15.8.5 Metal Parts

Metal parts to which elastomeric material is vulcanized shall be made of SAE 1020 or 1045 hot-rolled steel or an approved equivalent.

15.8.6 Truck Parts

Truck bumpers and snubbers shall be made of natural rubber or approved equivalent. It shall be resistant to abrasion, oil, grease and acid. Exterior surfaces of air springs shall be natural rubber and abrasion resistant. Girdle rings shall be molded integral rubber for abrasion resistance.

15.8.7 Bonding

The joining of elastomeric pieces shall be conducted by the hot vulcanization process. Bonding of elastomers shall not be allowed unless the Contractor submits the application, bonding procedure and bonding agent technical data for approval prior to the purchase of any materials.

15.9 GLAZING MATERIALS

15.9.1 General

All exterior windows in the vehicle shall consist of safety glass and shall be certified as meeting the requirements of federal Regulation 49 CFR Part 223. The certifications shall indicate that all end facing windows meet the requirements of Type I testing in the Regulation, and that all side facing windows meet the requirement of Type II testing in the Regulation. All windows shall be leak-free in vehicle operation, and shall be capable of withstanding the external and internal pressure differentials caused by head-on pressures and passing trains. All Type I windows are to have spall shield coating on the interior.

15.9.2 Safety Glass

Safety glass, other than the windshield, shall consist of a minimum of two sheets of glass bonded with an approved plasticized polyvinyl butyral resin in the form of a membrane approximately 0.045-inch thick, which shall be resistant to degradation due to ultraviolet or visible light, or heat. Sheet overlap shall be 1/32-inch maximum. All edges shall be ground smooth. The windshield glazing shall be of similar construction and shall be a flat piece of nominal 0.560-inch thickness triple laminated high impact untinted glass. Safety glass shall comply with the requirements of ANSI Z26.1, latest revision and at a minimum, meet the following requirements.

15.9.2.1 Flat Test

When an individual light of glass is laid on a truly flat surface (surface plate), the glass shall not indicate a bow of more than 0.030-inch per linear foot.

15.9.2.2 Dimension Tolerance

The overall dimensions of individual lights as supplied shall be held within 0.030-inch of the dimensions ordered. The thickness of the plastic materials shall be within a tolerance of ±5% of the nominal thickness.

15.9.2.3 Color

There shall be no appreciable variation in color in the individual lights of laminated safety glass when examined over a white background. Safety glass materials shall have UV stabilizer additives to inhibit fading and loss of properties due to extended exposure to direct sunlight.

15.9.2.4 Haze

All lights of laminated safety glass shall be so nearly free from haze that the glass will have approximately the same clarity as a light of the same nominal thickness of plate glass when viewed against a North light.

15.9.2.5 Specks and Scratches

Occasional specks of foreign material or scratches are permissible, provided such specks do not exceed 0.020-inch in greatest dimensions or scratches do not exceed a total of 3 inches in length and neither are within the central three-quarters of the area of the light. The Administration reserves the right to determine which lights are to be rejected.

15.9.2.6 Marking

All safety glass shall be marked with proper identification in accordance with ANSI Z26.1. Each individual piece of window glass material shall also be permanently marked by the manufacturer prior to installation to indicate that the type of material was successfully tested as set forth in Appendix A, Title 49, Part 223 of the Code of Federal Regulations. The window light shall be installed so that the identification marking can be read from the inside lower right hand corner and shall be no closer than 3/4-inch to the edge. Each individual piece of glass shall contain the following permanent markings:

A. FRA Type I or II (material)
B. Manufacturer of the material
C. Type of material including thickness
D. Inside surface
E. mm\yy

15.10 WOOD AND PANELS

15.10.1 Lumber

Lumber shall be thoroughly air seasoned or kiln dried before using and shall be dressed on all surfaces to full dimensions. Lumber shall be straight-grained, free from dry rot, knots, checks, and other defects which may impair its strength and durability or mar its appearance.

15.10.2 Plymetal

The term "plymetal" as used in this Specification means metal-faced plywood. All plymetal panels shall conform to Military Specification MIL-P-8053, Sections 3.1.2 and 3.1.3 and the following requirements:

Mechanical Properties	Minimum Metal to Wood Average Shear Value or 80% Wood Failure
Dry shear	250 lbf/in^2
Boil shear, 3-hour boil, tested wet at room temperature	150 lbf/in^2
Soak shear, 48-hour soak wet at room temperature	150 lbf/in^2
Creep or cold flow, under static load for 48 hours, at room temperature	250 lbf/in^2

Plymetal panels shall be composed of exterior Grade B-B or better five-ply plywood, using resin glued hardwood or Douglas fir with solid and jointed cores and crossbands.

15.10.3 Plywood

All plywood shall be manufactured to conform with the requirements for Group 1, Exterior or Exposure 1 durability of U.S. Product standard PS1/ANSI A199.1 for construction and industrial plywood, and then stored under cover. All plywood panels shall be sealed with aluminum paint on all edges and cutouts as soon as possible after fabrication. All exposed edges of the panels, joints between panels, fastener heads, and openings of panels used in areas accessible to moisture shall be water-proofed and sealed with an approved coating prior to installation in the vehicle.

15.10.4 Honeycomb Panels

The term "honeycomb panels" as used in this Specification refers to an assembly of honeycomb material bonded to melamine-faced metal panels or to metal panels. Honeycomb material shall be commercial-grade aluminum honeycomb meeting the requirements of MIL-C-7438G. Bonding shall be sufficient to develop the full strength of the honeycomb material.

15.10.5 Panel Contour Tolerance

Surfaces exposed to passengers shall not deviate from the specified contour by more than 3/32-inch in any 36-inch distance. The slope of any such deviation shall not exceed 3/32-inch in 12 inches.

15.10.6 Melamine-Faced Aluminum

Melamine-faced aluminum panels shall be constructed by laminating melamine to aluminum sheets. The melamine-impregnated papers shall be directly molded to the aluminum sheets at temperatures of no less than 270°F and pressure no less than 1,000 psi. The surface characteristics, after manufacture, shall be no less than that required of type GP (General Purpose) in the NEMA Standards Publication No. LD-3, latest revision. The melamine and the required binder sheets shall be 0.020, ±0.005 inches thick. The aluminum sheets shall not be less than 0.025-inch (0.64-mm) in thickness when used as a facing on plywood. The aluminum sheets shall not be less than 0.081-inch (2.06 mm) in thickness when not laminated to a substrate such as plywood. Aluminum sheets shall be properly cleaned by etching, sanding, or other approved process to ensure full, permanent, adhesion.

The use of contact adhesives to bond the melamine sheets to the aluminum backing is not acceptable.

The bond between the melamine and aluminum sheets shall, as a minimum, meet the following requirements:

Internal bond (ASTM-D-952):	2,600 lbf/in^2 (17.9 MPa)
Flexural strength – (S) (ASTM-D-790) With grain: Crossgrain:	 26,500 lbf/in^2 (183 MPa) 25,300 lbf/in^2 (174 MPa)
Modulus of elasticity – (E) (ASTM-D-790) With grain Crossgrain	 3.8 x 10^6 llbf/in^2 (19.3 Gpa) 3.1 x 10^6 llbf/in^2 (21.4 Gpa)
Tensile strength (ASTM-D-638) With grain: Crossgrain:	 22,300 lbf/in^2 (154 MPa) 20,300 lbf/in^2 (140 MPa)

15.11 FIBERGLASS-REINFORCED PLASTIC

15.11.1 General

All fiberglass reinforced plastics (FRP) used on the vehicle shall be a polymeric-reinforced, laminated material consisting of a gel-coated surface, fiberglass reinforcement and a polyester resin. They shall be lightweight, high strength products with fire retardant and smoke properties meeting the requirements of this specification and shall be designed for the specific application on the vehicle. Colors used shall be approved by the Administration. All interior applications shall be designed such that the surfaces exposed to passenger view shall not crack, chip, peel, fade or otherwise be damaged from conditions encountered in service. FRP shall withstand without any physical deformation or structural damage from the environmental conditions specified in TS Section 0 and from acids, mild alkalis, and cleaning solutions.

15.11.2 Construction

Fiberglass reinforced plastic shall be manufactured by either open molding, hand layup, spray layup or by matched die molding. There shall be uniform distribution of the fiberglass reinforcement to avoid either resin-rich or resin-starved areas. All attachment points and edges shall be suitably increased in cross-section to provide proper reinforcement. Designs using wood reinforcement shall make proper allowance for its absorption of resin. Dies and molds shall be designed to take into account any "springback" of the part's shape, so as to achieve correct final dimensions. All corners and edges shall be rounded; there shall not be any sharp edges allowed on any parts.

15.11.2.1 Resin

The resin shall be a thermosetting polyester material of high quality selected to meet the intended requirements. All fillers and additives shall be added to resin mixes in accordance with the supplier's recommendations. Mineral filler shall not exceed 28% of finished weight for any part using preformed matched die molding.

15.11.2.2 Reinforcement

Finished fiberglass reinforced plastic items shall have a minimum fiberglass reinforcement content of 30% by weight. Reinforcement shall be either mat, fabric, woven roving, continuous roving, chopped spun roving, or swirl mat as required to meet the physical properties of this Specification and the molding process requirements.

The manufacturing process, glass content, resin system, and construction technique of the fiberglass parts shall reflect the highest level of strength and reinforcement for the parts designated purpose.

15.11.2.3 Gel Coat

The gel coat shall be resistant to scuffing, fire, weather, graffiti, perspiration, and cleaning agents. The gel coat shall be pigmented and have a minimum thickness of 0.020 ±0.005 inches. If the surface of the FRP panel is to be painted, a primer gel coat shall be used and the part shall be painted in accordance with this section. If the FRP panel does not receive paint, then the gel coat shall match the color scheme selected by the Administration.

15.11.2.4 Additives

Additives, fillers, monomers, catalysts, activators, pigments, fire retardants, and smoke inhibitors shall be added to the resin mixes to obtain finished products meeting the requirements of this section and the flammability requirements of TS Section 18.2.

15.11.2.5 Fastening

The fastening of fiberglass parts shall be by bolting through metal joints, strips or other approved inserts. Washers of similar inserts shall be bonded between fiberglass panels when joined.

15.11.3 Strength Requirements

Independent laboratory test certificates shall be provided stating that the reinforced plastic material complies with the requirements of the following standards. Test specimens shall be conditioned in accordance with ASTM D 618.

15.11.3.1 Matched Die Molded Parts

Physical Property	Test Method	Requirement
Tensile Strength	ASTM D-638	18,000 psi, minimum
Compressive Strength	ASTM D-695	24,000 psi, minimum
Flexural Strength	ASTM D-790	32,000 psi, minimum
Barcol Hardness	ASTM D-2583	45 minutes
Impact Strength	ASTM D-256	13 ft-lbs/inch of notch
Visual Defects	ASTM D-2563	Level II minimum

15.11.3.2 Open Molded Parts

Physical Property	Test Method	Requirement
Tensile Strength	ASTM D-638	14,000 psi, minimum
Compressive Strength	ASTM D-695	20,000 psi, minimum
Flexural Strength	ASTM D-790	23,000 psi, minimum
Barcol Hardness	ASTM D-2583	45 minutes
Impact Strength	ASTM D-256	10 ft-lbs/inch of notch
Visual Defects	ASTM D-2563	Level II minimum

Independent laboratory test certificates shall be provided to show evidence that the fiberglass reinforced plastic items used in the vehicle comply with the above requirements.

15.12 THERMOPLASTIC SHEET

15.12.1 General

Thermoplastic sheet used in the construction of this vehicle shall not contain PVC vinyl, and shall withstand without any physical deformation or structural damage, the environmental conditions described in TS Section 0, and shall be resistant to Administration cleaning solutions. Thermoplastic sheet shall be used as extruded or vacuum-formed.

Thermoplastic sheet shall be homogeneous and extruded from virgin stock which does not include any regrind of vacuum formed parts. Only UV stabilized pigments shall be used to create the specified color of the thermoplastic sheet. The color and surface finish of parts manufactured from this material shall be approved prior to the production run of any parts.

15.12.2 Quality

The finished parts shall be free of waves and quilting on both sides. Degraded polymer in the sheet shall not be allowed, and if present, shall be cause for rejection of the piece. Voids, lumps, and contamination shall also be cause for rejection of parts if the defects are larger than 0.010-inch, and the population of these defects is greater than one defect in four square feet.

15.12.3 Strength Requirements

Independent laboratory test certificates shall be provided stating that the thermoplastic sheet complies with the requirements of the following standards. Extruded sheet in the surface finish specified shall be used for testing.

Mechanical Properties	ASTM Method	Value
Specific Gravity	D-792	1.35 to 1.45
Tensile Strength	D-638	5,700 lbf/in^2 minimum
Elongation	D-638	50 percent
Flexural Strength	D-790	8,500 lbf/in^2) minimum
Flexural Modulus	D-790	3.0 x 10^5 lbf/in^2)
Hardness Rockwell "R" Scale	D-785	90 to 110
Heat Shrinkage 15 minutes at 350°F	–	10% maximum
Heat Deflection (annealed) @ 264 lbf/in^2	D 648	165°F minimum
Impact Strength Fabricated Parts Gardener Dart Drop 0.5-inch dia. ball at 73°F	D 3029	320 in-lb minimum
Impact Strength Fabricated Parts Gardener Dart Drop 0.5-inch dia. ball at -20°F	D 3029	80 in-lb minimum
Taber Abrasion, CS-10, 1,000 gm, 1,000 cycles	D 1044	0.05g maximum
Water Absorption	D 570	0.25% maximum

The Contractor shall identify each plastic compound utilizing the line call-out as specified by ASTM D 4000 ("Standard Classification System for Specifying Plastic Materials"). Line call-outs shall have suffix symbols to specify requirements for parameters and at a minimum shall identify color, fluid resistance, flammability test requirements, specific gravity, heat resistance, hardness, tensile strength, elongation at break, moisture resistance, impact resistance, compressive strength, oxidative stability, stiffness, and weather resistance.

15.13 PIPING AND TUBING

15.13.1 General

The Contractor shall duplicate the as-built condition of the vehicle when piping repairs are required. When design changes or modifications are required, they shall first be approved by the Administration before being implemented. Such changes shall follow the requirements listed in this section.

Following overhaul or upgrade, all piping systems shall be cleaned to remove dirt, metal chips, oily contamination, and moisture. After cleaning, all piping systems shall be pressure tested in accordance with the latest edition of the Code for Pressure Piping, ANSI B31.1. All leaks shall be repaired and the system recleaned and retested until leak-free. All piping and pipe subassemblies shall be deburred, cleaned, dried, and capped with tight fitting plastic caps, or approved equivalent on all openings after fabrication. Caps shall remain in place until immediately prior to incorporation into the final assembly.

All piping, valves, fittings, installation methods, and testing shall be in accordance with the Code for Pressure Piping, ANSI B31.1. All joints shall be easily accessible.

At all locations where pipe or tubing passes through holes in the floor, bulkheads, structure, or any fixed member, it shall be rigidly clamped to protect against possible damage or noise due to bearing, abrasion, or vehicle dynamics-induced rattling. Clamps shall not be welded, brazed or

otherwise permanently fastened to any pipe or tubing. Pipe and tubing interfaces with clamps shall be insulated with an elastomeric or woven non-asbestos mineral fabric tape material to protect and sound-insulate the pipe or tubing.

Wherever carbody piping interfaces with vibration-isolated rotating equipment such as the air compressor and air conditioning compressor-condenser unit, approved flexible vibration eliminators shall be used.

15.13.2 Brazing and Soldering of Piping, Tubing, and Fittings

All brazing and soldering shall comply with the applicable parts of TS Section 15.17, and the following requirements. All refrigerant piping and air system copper tubing shall be joined using silver solder conforming to Federal Specification QQ-B-654, Class 1 or 3. Refrigeration piping and tubing shall be internally swept with a continuous flow of a non-oxidizing gas such as dry nitrogen during brazing. Condensate drain tubing shall be joined using 95-5 percent solder or Silver Solder as above. Solder joints shall be wiped and have flux cleaned from tubing and fittings after soldering. After fabrication, the refrigeration and air systems shall each be cleared of all dirt and foreign matter, flushed with a degreasing agent and dried, all according to a written procedure prepared for each system by the Contractor and approved by the Administration.

15.14 PRESSURE VESSELS

All pressure vessels shall conform to the latest revision of Section VIII of the ASME Boiler and Pressure Vessel Code for Unfired Pressure Vessels. Test reports shall be furnished for each pressure vessel, and each pressure vessel shall be stamped to document the test.

15.15 WIRE AND CABLE

15.15.1 General

Throughout this section the term "wire" shall be interpreted to mean any insulated single conductor and the term "cable" shall be interpreted to mean any jacketed or bound together group of conductors except where otherwise described or defined within. The term "wiring" shall be interpreted to mean all wires and cables installed on the vehicle or its components. All new wiring shall be in compliance with APTA Standard RP-E-002-98 and RP-E-009-98 and Amtrak electrical standards which shall be provided by the Administration.

A minimum number of wire types and sizes shall be used in the vehicle. The selection of wire sizes and insulations shall be based on the current carrying capacity, voltage drop, mechanical strength, temperature and flexibility requirements in accordance with ICEA, ASTM, NEC, MIL or other approved equivalent specifications. Special attention shall be devoted to circuits where performance of the load is strongly affected by supply voltage, and wire sizing shall be carefully chosen to ensure that performance requirements are met.

Maximum wire ampacities shall conform to the requirement of Article 310 of the National Electrical Code (NFPA 70), Table 310-16, 90°C column for wires in raceways or conduits and Table 310-17 90°C for wires in free air. Maximum wire ampacities for conductors with an insulation rating from 125°C to 250°C shall conform to NEC Table 310-18 or 310-19 (latest

edition) as appropriate for the application. Where more than three conductors are routed in a raceway or cable, the ampacities shall be derated as detailed by Note 8 to tables 310-16 through 310-19.

In no case shall wire smaller than the following sizes be used:

A. Wire that is pulled through conduits or wireways - Number 12

B. Wire on electronic units, cards, and card racks - Number 22

C. All other wire, including that which is laid in, rather than pulled through, wireways - Number 18.

All shielded cables and cables with special insulation must be approved by the Administration.

The Contractor and subsystem supplier shall (through the Contractor) submit specifications and samples of each size and type of wire and cable proposed for use for approval by the Administration before proceeding with the work.

15.15.2 Conductors

Except as otherwise specified, conductors in all electrical wires and cables, including wire and cables in apparatus furnished by subcontractors shall be of stranded soft annealed tinned copper in accordance with ASTM-B33.

Stranding and conductor construction for all wires and cables larger than No. 18 AWG shall conform to AAR RP-585 (formerly S-501), or ICEA S-19-81 Table L/7, Class K, or Table L/8, Class M, as is appropriate for the application.

Stranding and conductor construction for wires and cables No. 18 AWG and smaller shall be in accordance with ICEA S-19-81 Table L/8, Class M, or shall be 19 strand construction as appropriate for the wire size.

The use of solid wire is not permitted except for approved wire wrap applications.

15.15.3 Insulation

For all general carbody wiring, the insulation shall be flame retardant, irradiated crosslinked polyolefin material rated at 2,000 VDC for wires carrying a nominal voltage greater than 50 VDC, and rated at 600 VDC for wires carrying a nominal voltage equal to 50 VDC or less.

For wire sizes No. 6 AWG and larger the material may be specially formulated for extra flexibility, however any proposed use of thin wall material per AAR 501, chart B must be justified as regards to its ability to withstand mechanical damage.

Insulation shall be in accordance with the Association of American Railroads Manual of Standards and Recommended Practices Standard S-501 and the following special requirements.

15.15.3.1 Insulation Properties

A. Smoke Density

National Bureau of Standards Smoke Chamber test using a 5.0 foot long piece of No. 12 AWG 2000 volt wire. Neither the maximum specific optical density (Dm) nor the specific optical density after 4 minutes (Ds-4 min.) shall exceed:

1.	On a flaming test	200
2.	On a non-flaming test	200

Capacitance Stability: Test method ICEA S-19-81, para. 6.9.2 at 90°C

Stability Factor	1.0 minimum
Alternate to stability factor-stability Factor difference, 1-14 days maximum	0.5
SIC (1 day) maximum	6.0

Ozone: (Test Method ICEA S-19-81 para 6.8)

After 24 hours exposure to an ozone concentration of 0.03% by volume at 90°C ± 2 degrees C, there shall be no insulation cracks.

Tension Set: (Test Method ICEA-S-66-524 para. 6.4.11.4)

As an alternative, Test Method ICEA S-19-81, paragraph 6.4.13.4, with the additional provision that the specimen shall be stretched until the gauge marks are 4 inches apart and that the average of three specimens not exceed a tension set of 30 percent, may be used.

Corrositivity: (Test Method - ASTM-D-2671-Copper Mirror)

After a test period of 16 hours at 175°C, ± 2 degrees C, the removal of more than 5 percent of the copper film constitutes failure.

B. Moisture Absorption

Gravimetric method at 70°C ± 2°C for 168 hours:

Maximum mg. per square inch	8

Electrical method (ICEA-S66-524)
Increase in capacitance, maximum percent:

1-14 days	3.0
7-14 days	1.5

C. High Temperature Applications

All wires for high-temperature applications such as those connecting to heaters and resistors shall be:

1. For wire sizes No. 16 AWG and larger, either abrasion resistant Teflon (polytetrafluoroethylene) (PTFE) meeting MIL-W-22759/6B, with a 1000-volt rating or silicone rubber insulated cable meeting AAR Standard S-503.

2. For wire sizes AWG 18 and smaller, abrasion resistant TFE Teflon meeting MIL-W-22759/6B. When used for interconnecting pieces of apparatus, this type wire must be in bundles with a protective covering.

Cables used for connections between carbody and ground brushes, and between carbody and current collectors shall be of the type designed specifically to a high degree of flexibility for connecting points having a large amount of relative motion.

Wiring within replaceable modular units and electronic apparatus such as cards and card racks shall be Kapton insulated per MIL-W-81381/22 (AS); ETFE (Ethylene-Tetrafluoroethylene) Tefzel per ASTM-D-3159 and insulation construction per MIL-W-22759/16 (AS); crosslinked polyolefin per TS Section 15.15.3 above, or PTFE (Polytetrafluorethylene) Teflon type EE per MIL-W-16878/5.

Wire for connections to the Operator's console, and also in any other locations where there are equally crowded concentrations of low-voltage control wiring, shall be insulated with ETFE Tefzel per ASTM-D-3159 and insulation construction per MIL-W-22759/16 (AS), except the wall thickness shall be 0.025 inches. When used for this application these type wires must be in bundles with a protective covering of crosslinked modified polyolefin or similar high temperature rated/low smoke generating insulation.

Multi-conductor cables, where approved, shall be constructed using wires as described in above. All multi-conductor cables shall have at least 10 percent spare conductors by design. For high temperature applications the cable shall conform to MIL-C-27072, latest revision, with type V conductors, style 4 sheaths, class D jackets (if needed), and shields (if needed). The following materials shall be used in the cable construction:

A. Fillers - Where required to obtain a circular cable cross section, fillers shall be made on non-hygroscopic materials compatible with the wire insulation and jacket and be of the same or of a higher temperature than the wire insulation.

B. Tape - A binder tape shall be employed over the assembly of conductors in multi-conductor cables if needed to assist in cable manufacturing, or if required to permit the cable to function as needed for its application. The binder tape shall be non-hygroscopic and shall be of the same or higher temperature class as the wire insulation and shall be of a compatible material.

C. Shield - Shields for use in cables, if required, shall consist of either copper braid or aluminum/polyester tape with a drain wire, as is appropriate for the application. Copper shields shall be made of either tinned copper strands which conform to ASTM B33 or silver-coated copper strands which conform to ASTM B298, as is appropriate for the wire insulation. Shield coverage shall not be less than 85 percent. Shield strand size and application shall be as recommended by the cable manufacturer for the particular application. Aluminum/polyester tape shields shall consist of a helical wrap of aluminum/polyester tape with a nominal thickness of 0.0004-inch aluminum on a backing of 0.001-inch polyester. The tape shall have a minimum overlap of 10 percent

of the tape width to ensure complete coverage. In contact with the aluminum side of the shielding tape shall be a number 22 AWG 7/30 tinned copper drain wire conforming to ASTM B 33 and B 174.

D. Jacket - The overall jacket of multi-conductor cables shall be cross-linked modified polyolefin (Low Smoke Jacket), ETFE Tefzel or TFE Teflon to match the wire insulation and application. It shall be extruded and vulcanized over the cabled conductors, and shall be well centered, with a smooth appearance without objectionable roughness or irregularities, consistent with good industry practice. The nominal jacket thickness shall be that shown below with the minimum wall not less than 80% of the nominal value.

Calculated Diameter Under Sheath Inch	Modified Polyolefin Inch	Teflon or Tefzel Inch
0.000-0.250	0.045	0.010
0.251-0.500	0.045	0.015
0.501-0.750	0.060	0.021
0.751-1.000	0.080	0.021
1.001-1.500	0.080	0.025
1.501-2.000	0.110	
2.001-2.500	0.125	
2.501-3.000	0.140	

Cables used to connect the coupler electric heads shall be specially constructed for the constant flexure of this service and shall have prior electric coupler service that has been satisfactory. This shall be verified by documentation to the satisfaction of the Administration.

15.16 WIRING

15.16.1 Application and Installation

All wiring shall be performed by qualified, experienced wiring personnel using appropriate tools for stripping insulation, cutting, soldering, and attaching crimp type terminals. The correct dies and tools as provided by the terminal manufacturer shall be used for all terminal applications. All new wiring shall be in compliance with APTA Standard RP-E-002-98 and RP-E-009-98, and Amtrak electrical standards.

When removing insulation from the conductor, wire strands shall not be nicked or damaged. Proper stripping tools shall be used to avoid such damage.

Vehicle wiring shall be in conformance with Chapter 3 of the National Fire Protection Association's publication (NFPA No. 70) Specification 70 (National Electrical Code) and the AAR Mechanical Division Manual of Standards, F-323, "Wiring Practice for Rolling Stock," except where otherwise specified, and except that all wire shall be as specified in TS Section 15.18. Circuit protection shall be in conformance with Chapter 2 of NFPA No. 70, Article 240. Parallel connection of connectors to achieve required ampacity is not permitted except under special circumstances as approved by the Administration.

Insofar as practicable, all wiring shall be fabricated into convenient units ("harnesses") on a bench and installed in standardized locations. Each branch of each circuit shall be easily separable from others for troubleshooting.

Conductors which operate at potentials differing by 50 volts or more shall not be cabled together and shall not be placed in the same conduit, junction box, or enclosure. Each area of a raceway, duct, junction box or enclosure divided into two or more distinct areas by metallic partitions may be considered separately in the application of this rule. Where it is impossible to avoid having wires at different voltages in the same equipment enclosure, the wires shall be physically separated and bundled separately.

All wiring connected to a piece of apparatus shall be insulated for the highest voltage connected. Wiring connected to transient-generating apparatus, such as unsurpassed contactor coils, shall not be run adjacent to wiring carrying signals to, from, or between semi-conductor circuits, logic circuits, cab signal/ATC circuits, or communications circuits. In cases where adequate physical separation is impossible, shielded wire of an approved design shall be used for all conductors involved. All cab signal/ATC wiring shall be run separately from other wiring to avoid inductive interference from the other wiring. All wires connected to a circuit breaker or any other protective apparatus shall be able to cause that apparatus to operate and remove power without suffering thermal damage to the wire.

A drip loop shall be provided in each wire or cable where water could otherwise run along the wire or cable to the point where it enters a box or enclosure.

All wire including that in ducts and conduit shall be handled to be free of kinks and insulation abrasions. Wire installation shall not be subject to accumulation of water, oil, or other foreign matter. All wire and cable shall be protected by grommets, insulated bushings or other protective material at ends of wire ducts or conduits and at other locations where cables enter or leave the ducts.

All wire and cable shall be fully protected against any contact with any surface other than that designed specifically to support or protect the wire. This applies to all current carrying wires or busses on the vehicle. Protective edging and similar material shall be applied wherever any possibility exists for a wire to contact a sharp edge for any reason.

Wire and cable dress shall allow sufficient slack for removal and reapplication of the wire terminations without excess tension for wire sizes as follows: 10 AWG and smaller – three reterminations; 8 AWG and larger – two reterminations.

Wire splices shall not be permitted, except with the expressed written approval of the Administration.

Wire and cable ties shall be snug but shall not be so tight as to cause indentation and cold flow damage to the insulation. Proper tools shall be used for this purpose. Adhesive installed mounting bases shall not be used for ties or cable support. Tie wrap application shall be reviewed on a case-by-case basis as part of the design review process.

The layout of wiring shall be designed in advance of its installation and in cooperation with those furnishing the related equipment. Ten percent spare wires shall be provided in all wire bundles, conduits and ducts.

All circuits and branches shall be separable by means of terminal boards to isolate portions

when troubleshooting. All circuits requiring, as part of regular maintenance, a high potential test shall be so arranged that they can be conveniently set up for the tests

All wire bundles and cables within an enclosure shall be supported by the use of tape rails and shall be free from the equipment box structure, metal edges, bolt heads, and other interference points, and shall have electrical clearance from the covers regardless of the insulation properties of the covers.

Wire bundles shall be located above or alongside the apparatus rather than at the bottom of the box wherever possible. In all cases, wire shall be a minimum of 1 inch above the bottom of the box. Wire entry into control or junction boxes shall not be permitted through the bottom of the box.

Wiring needed to calibrate and test vehicle functions shall be a part of the permanent vehicle wiring in order to enable the Administration to maintain the equipment. This wiring shall be properly identified and terminate in connectors in the respective control groups and cabinets.

15.16.2 Cable Connectors

All cable connectors with the exception of specific specialized applications approved by the Administration shall be of the environmental watertight variety with removable crimp contacts of the correct size for the wire being terminated. Connectors proposed for such specialized applications must meet the quality and life cycle criteria given below. Cable connectors shall be equipped with sealing gaskets on the front (so that the connector interface is sealed) and on the back where the cable enters. Extension bodies shall be used if necessary to insure that there is sufficient room to both terminate the cable wires and have the cable jacket extend within the body; be held by a clamp, and have a gasket seal the entrance. Unused connector pin positions shall be sealed with either connector contacts or sealing plugs designed for that purpose. Adjacent connectors shall either use different inserts or different insert orientations to prevent erroneous connections.

All cable connectors shall conform with MIL-C-5015, and be a positive locking, quarter turn bayonet coupling with metal shields, waterproof seals and crimp style gold or silver plated contacts. The coupling mechanism shall be spring loaded with stainless steel locking pins at the peak of the receptacle bayonet ramp to provide extended coupling life of a minimum of 2,000 operations. Audible, visual and tactile indications for full coupling shall be given, and lock wires shall not be required. Where necessary, EMI shielding shall be provided. All connectors shall be approved by the Administration.

15.16.3 Undercar Wiring

All undercar wiring shall be run in closed wire ducts, conduits, or open wireway and shall be securely clamped via a compression-type rubber sleeve in watertight strain relief bushings with insulated throat liners at entrance and exit points. Wire and cable shall be secured in the ducts to prevent chafing movement. The wire ducts and conduits shall be of drip-proof construction unless exposed to car wash spray due to their location. In such cases they must be watertight and of non-corrosive material.

Wire ducts shall be sized such that the sum of the cross-sectional areas of the conductors and their insulation does not exceed 50% of the inside cross sectional area at any point. In the case of wireways and ducts the actual lay of wires shall not go more than 90 percent of the way to the top of the vertical walls. Bends in the ducts shall be avoided; however, if they are required, protection shall be provided to avoid insulation chafing at the bends.

Cables shall be laid in place with sufficient slack at the bends so that cables will clear the inside bend surface of the duct, thereby preventing crushing of insulation.

Insulated wire of adequate physical strength (6 AWG or larger) may be cleated in place, using cleats as described in TS Section 15.16.4 at intervals of no more than 2 feet without conduit or raceways. Protective covers for the cleated cables to prevent damage from the roadbed or track debris shall be provided. Watertight strain relief bushings shall be used when entering equipment enclosures and shall have insulated throat liners and compression-type rubber sleeves inside the enclosures.

Only fully environment-proof electrical connectors as described in TS Section 15.16.2 shall be used underneath the vehicle.

All terminals shall conform to the requirements of TS Section 15.16.6.

All jumpers, jumper heads, and jumper receptacles shall be sealed in an approved manner to prevent the entry of water at any operating speed of the vehicle.

15.16.4 Cleating of Cables

All cable and wiring exiting raceways or cable which is not installed in conduit shall be cleated using split block cleats of molded neoprene rubber. The neoprene shall be a non-flammable, insulating type with a durometer value of 50 to 75. Each cleat shall have a stiffener of at least 10-gauge corrosion resistant material on the side away from the mounting bracket which shall act to spread the bolt clamping force over the entire length of the cleat. Bolts shall have lock nuts of approved design. Each wire in the cleat shall have its own cutout sized to the correct wire diameter. Cleat spacing shall be sufficient to prevent excessive wire sag. All cleated cables under the vehicle shall be protected with substantial metal shields to protect the cables from roadbed debris damage. All unused cleat spacing shall be filled with dummy plugs to prevent uneven distribution of clamping force.

Use of loop-type supports may be proposed to the Administration for use on an individual case-by-case basis provided that the clamp material is stainless steel, the cushion material is either ozone-resistant neoprene or silicone, and a chart is provided to identify the proper size clamp for use with each size cable and for each mounting location. This size information must also be identified in all parts listings. The variation in clamp sizes shall be kept to a minimum. The use of tape or other methods on cables to enable them to fit in an oversized clamp of any type is prohibited.

15.16.5 Installation of Wire in Conduit

Conduit shall be sized such that the sum of the cross-sectional areas of the conductors and their insulation does not exceed 40% of the inner cross sectional area of the conduit for three or more

conductors. For two conductors a limit of 31% shall be used while for a single conductor a limit of 53% shall be permitted. Where conduit nipples having lengths not exceeding 24 inches without bends of more than 15 degrees are used between enclosures, a maximum fill of 60% shall be permitted.

A run of conduit between junction boxes and/or pulling outlets shall not contain more than the equivalent of two quarter bends (180 degrees, total) including outlet fittings. Bend radii at the inner edge of the bend shall be no less than eight times the nominal, inside diameter of the conduit.

15.16.6 Terminals

Terminals, terminal blocks and connections used throughout the vehicle shall be the mechanical solderless type, made by an approved U.S. manufacturer with a comprehensive line of terminal blocks, accessories and application tools available. Terminal blocks shall be of the screw clamp type. The Contractor shall submit the proposed product lines to the Administration for approval. Terminals shall be attached to the wiring with the proper crimping tools and dies recommended by the manufacturer. Where possible, the terminal used shall be of the pre-insulated type which securely grips and holds the insulation. Wires connected to screw clamp terminal blocks shall be ferrruled as recommended by the subsystem manufacturer but as a minimum shall be applied to wires smaller than No. 14 AWG. Conductors which may be subjected to motion relative to the terminal shall be protected by suitable means to prevent breakage of the conductor at or near the terminal.

All screwless cage clamp terminal blocks shall be arranged so that the wiring is easily attached to the terminals. All terminal blocks shall be of the insulated type which securely grips with a constant restraining of the conductor under all temperature and vibration conditions specified with no loss of conductivity. The terminal blocks shall use copper conducting bars with stainless steel spring connections and shall have test plug adapters to allow troubleshooting without removal of wires from the blocks.

All solderless electrical terminal points and terminal boards shall have brass studs and connections which shall be locked using a single nut with brass flat washers and a plated spring type lock washer. Studs, nuts, and washers may also be made of corrosion resistant plated steel. Nylon-insert self-locking type nuts and other self locking fasteners shall not be used for electrical connections.

A minimum of 10% spare terminals shall be provided on each terminal assembly with at least one spare terminal being provided if there are nine or less active terminals. No. 6 and smaller screw type terminal boards and fast-on type terminations shall not be permitted without the written approval of the Administration. Terminal boards shall be in accordance with MIL-T-55164A matching the voltage range of the circuits involved may be proposed where physical conditions favor the use of such and where redesign of equipment would be otherwise required. "Faston" type terminations (using either beryllium copper or phosphor bronze) shall only permitted on a case-by-case basis by the Administration.

15.16.7 Ground Connections

15.16.7.1 Grounding

Grounding connections shall be made through copper pads of adequate area, silver soldered or brazed to a plate which is welded to the carbody structure. Grounding pads shall be tinned all over. Battery circuits shall be floated with neither the negative or positive side grounded. All equipment enclosures and shock-mounted equipment shall be grounded with flexible "strap" type grounding leads.

15.16.7.2 Bonding

All grounding and bonding jumpers and straps shall be sized to handle fault current and lightning discharge current, for which the voltage drop shall not exceed 25 volts. The bonding method employed shall not produce a DC resistance in excess of 0.0025 ohms, or more than 0.025 ohms at 150 kilohertz for any applied AC voltage.

15.16.8 Conduit

With the exception of truck areas, all conduits shall be of Aluminum Association's recommended aluminum alloy. Conduit couplings shall be an approved type. Threaded fittings shall be used. All conduit ends shall be deburred inside and out to remove sharp edges and all conduits blown out with compressed air to remove filings before installation. Conduits shall be securely clamped with all runs electrically grounded.

Any conduit on the trucks and in the areas near and over the trucks shall be heavy wall galvanized steel with threaded fittings. Fabricated conduits are not permitted under any circumstance.

All conduits shall be arranged to prevent moisture traps and shall be configured for proper drainage. The conduit arrangement and installation shall be subject to approval by the Administration.

A. Aluminum Conduit. Rigid aluminum conduit shall consist of seamless, rigid, aluminum alloy conforming to ANSI C-80.5 and to the requirements of Standard UL-6. All threads shall be covered with an oxidation-inhibiting compound. Aluminum fittings shall be used to assemble aluminum conduit and shall be made to the same grade and alloy as the conduit.

B. Steel Conduit. Rigid steel conduit shall be mild steel in standard lengths with threaded ends and hot-dipped zinc-coated exterior and interior surfaces. It shall be free of burrs and projections, circular in cross section, of uniform wall thickness, and shall conform to the requirements of ANSI C-80.1. The threads per inch and length shall conform to American Standard Pipe Threads B-2.1-1960. Steel fittings shall be used to assemble steel conduit. Elbows, nipples and couplings shall be made of the same grade of steel as that employed in the straight length of conduit. All fittings shall be treated, coated, and threaded according to the requirements for zinc-coated rigid steel conduit. All fittings shall conform to Standard UL-6.

15.16.9 Fittings and Junction Boxes

The fittings and junction boxes shall be as manufactured by the Contractor or by a supplier of a comprehensive line of parts. The Contractor shall submit the proposed product line to the Administration for approval. All covers shall be gasketed using approved materials. Screws and other hardware shall be stainless steel.

Undercar junction boxes shall be fabricated stainless steel. Covers shall be provided with gaskets permanently retained in channels. Adhesive fastened gaskets are not acceptable. Covers shall be retained by compressive spring-type latches and shall be completely removable.

All undercar junction boxes shall be weatherproof, shall have provisions for breathing, and shall be connected in such a way that drainage from other boxes shall not pass through the conduit into the junction boxes. Interiors of all junction boxes shall be protected with a white insulating paint or other approved process.

15.16.10 Wire Splicing

Splicing of conductors shall be avoided and will be permitted only with the expressed written approval of the Administration on a per item basis. Under no circumstances will splicing of conductors in conduit be permitted. In the event a splice is approved, it shall be in a junction box and the spliced joint shall be mechanically as strong and shall have the same conductivity as any other part of the conductor. The splice shall be an insulated permanent crimp splice in accordance with MIL-T-7928G, Type II, Class 1, insulated with heat-shrink wrap, and shall be installed with the crimping tool and die as specified by the splice manufacturer.

15.16.11 Marking

All wires and terminal studs shall be plainly and suitably identified with white or yellow permanent type markers with black printing and all terminal blocks or strips shall be identified, subject to the approval of the Administration, so that circuits may be easily identified. These identification markers shall resist abrasion. Each circuit shall be individually designated and each wire individually designated from point to point. Wiring connected to polarity-sensitive devices within any enclosure or assembly must be identified sufficiently to permit the device to be removed and be properly installed. Wires attached to terminal studs shall also have a marker indicating the terminal board and the individual terminal to which it is attached. Whether connected to male or female side, all wires connected to quick disconnects shall have identification markers affixed, shall be color coded or shall have their identity stamped on them at 3-inch intervals over the last 12 inches of the wire using the same methods are required above. A wire designation system and line of markers shall be submitted for approval which will coordinate all electrical circuits in the vehicle in a unified systems approach. Wire designations shall be the same as on the current MARC fleet for equivalent circuits unless otherwise specified. There shall be no common designation for return circuits incorporated in either power or control circuits. All male and female quick disconnects shall carry approved identification and shall be keyed wherever the design used offers this possibility so that improper connections cannot be made. In locations with six or more disconnects, a locator chart shall be provided to aid in location and reconnection.

15.16.12 Pulling Compound

Pulling compound, if used, shall be non-conductive, non-hygroscopic, non-odorous, and shall not attract vermin.

15.16.13 Solder

Solder shall be ASTM B 32, Grade 60B. A non-corrosive type flux shall be applied immediately before soldering. An automatic temperature controlled solder pot shall be used.

15.16.14 Tape

Electrical tape shall be polyvinyl chloride as specified in AAR Standard S-540.

15.16.15 Insulation Resistance

Insulation resistance to ground at 500 or 1,000 VDC, as applicable for each nominal voltage circuit group when measured with a high potential tester, shall give no more than the following leakages, on each vehicle with all circuit breakers closed, and all circuits complete under all humidity conditions:

Nominal Voltage	Maximum Leakage Resistance
Below 90 volts	2 megohm @ 500 VDC
90 volts to 600 volts	4 megohms @ 1,000 VDC

Inasmuch as the insulation resistance varies with season and humidity, the Contractor shall ensure that these requirements can be met under the most severe conditions.

15.16.16 Wireways

All new wireways, raceways, cable trays or cable ducts used in underfloor locations shall be constructed of either uncoated stainless steel or rigid carbon steel with a permanent low smoke elastomer coating to minimize the risk of oxidation and rust formation. The trays shall be adequately supported throughout their entire length in a manner approved by the Administration. There shall be absolutely no sharp edges. The trays shall be completely de-burred before installation on the vehicles. Grommet clamps shall be provided at all locations where cables or wires enter or leave the wireways. Under no circumstances shall wires or cables be dropped over the edge of the wireways, with or without wireway edge protection. All wire ways shall be routed such that they avoid sources of heat, wheel splash areas, and areas along the vehicle where the trays may be subject to foreign object damage.

15.16.17 Wire Tying Devices

Wire tying devices shall be of such material and construction that they will adequately retain the wires for the life of the wiring and shall be ozone and ultraviolet light proof. Those used within enclosures shall be designed for enhanced ozone resistance.

Where practicable, the wiring shall be pre-fabricated into standard harnesses, wrapped and tied with a high strength tie designed not to invade the wire insulation, and which shall include

spare wires within unit compartments. Generally, wires shall be installed and marked with the same arrangement and location with all identifications visible in each vehicle having similar apparatus. Spares shall be so marked on each end.

15.17 WELDING AND BRAZING

15.17.1 General

All welding practices not specifically covered in this Specification shall be in accordance with applicable requirements and recommendations of the American Welding Society (AWS), as contained in the "Structural Welding Code, Steel," AWS-Dl.l; "Structural Welding Code, Sheet Steel," AWS-Dl.3; "Structural Welding Code, Aluminum," AWS-Dl.2, and AWS Welding and Brazing handbook; and other applicable AWS Standards and Publications. Definitions, additional information on processes, or questions pertaining to welding shall be referred to AWS Welding Handbooks, latest edition. Requirements in addition to AWS requirements are specified in this section.

15.17.2 Welder Qualifications

Welders employed in the making of welds on structures or products built under this Specification shall make only those welds for which they have been qualified in accordance with the requirements of the AWS, ASME Section IX, or other equivalent qualifying procedure approved by the Administration. Records of welder qualifications tests shall be made available for review by the Administration prior to the start of welding and during manufacturing.

15.17.3 Test Welds

The Administration shall have the right to require the making of test welds by welder at the expense of the Contractor to determine that welder's ability to produce satisfactory welds of any given type. The Administration shall also have the right to require the making of test welds to settle any question which may arise as to the suitability of any welding method or procedure used during production. AWS requirements and recommendations shall be followed in conducting tests and the settlement issues related to welding practice.

15.17.4 Weld Preparation

Before welding of any type is started, parts to be joined shall be cleaned of coatings and films such as rust, oxide, millscale, oil, grease, corrosion products, paint, and other foreign material. Cleaning materials and processes shall be in accordance with applicable parts of Section 2, MIL-HDBK-132, "Protective Finishes." All parts which are to be joined by welding shall be adequately supported and held in their proper position by appropriate tables, jigs, or fixtures.

15.17.5 Weld Penetration

Full penetration welds (and partial penetration welds, where permitted) shall be in accordance with the requirements of AWS Standard D1.1-82.

15.17.6 Welding Process

Current, voltage, distance, flame and other variables shall be controlled to give a smooth weld, free of gas pockets, oxide inclusions, and minimum variations in the width and thickness of the weld as well as wandering and spattering. Full penetration welds (and partial penetration welds, where permitted) shall be in accordance with the requirements of AWS D1.1. The method of depositing weld metal shall be chosen to minimize warpage. Flanges may be stabilized during weld fabrication with bars temporarily tack-welded in place, if this and subsequent removal of the temporary bars does not impair the strength of the weld-fabricated assembly, as determined by the Administration.

15.17.7 Heat Treatment

Where appropriate for the material and welding methods used, for parts rotating at high speed, or for parts subjected to shock and/or vibration and other critically-stressed parts, shall be heat-treated after welding for stress relief and/or strength attainment only as approved by the Administration.

Stress relief shall be done in accordance with AWS Dl.l, the applicable ASTM specification for the material, or the recommendations of the supplier of the material.

15.17.8 Inspection

The Contractor shall inspect all structural welds and shall submit the proposed method of inspection as part of the Inspection Test Plan. The Contractor's lead welding inspector shall be an AWS-CWI or equivalent. In addition to visual inspection requirements specified by AWS welding code, non-destructive surface inspection (dye penetrant or magnetic particle methods, as appropriate) shall be used to inspect all first production welds (to be included with the Inspection and Test Plan). The Contractor shall specify additional non-destructive inspection requirements for subsequent welds. If the Contractor elects to inspect less than 100 percent, then the Contractor shall submit a random sampling inspection plan for approval by the Administration. In no case shall the length of (weld non-destructively inspected) be less than one percent of the total weld length for each weld.

Non-destructive surface inspection shall be performed to ASTM E 709 for magnetic particle inspection or ASTM E 165 for dye penetrant inspection. Non-destructive subsurface inspection shall be performed to AWS Dl.1, Section 6, Part B for radiographic inspection or Part C for ultrasonic inspection. Personnel performing these tests shall be qualified to MIL-STD-410, or approved equivalent.

15.17.9 Contractor Documentation

Before any structural welding takes place, the Contractor shall submit to the Engineer written welding procedures, including welding parameters for each production weld and all quality assurance measures including inspection, welder certification and defect repair procedures.

15.17.10 Welding Rod or Wire

Welding rod, wire, electrodes or filler metal shall meet AWS specifications. These materials shall be purchased in packages of a size determined by production requirements, and marked with the Manufacturer's name and the specification, diameter, and net weight of the material.

The material shall be stored in accordance with recommendations of the AWS "Structural Welding Code" so as to protect it from damage, and so that it can be easily identified. Material shall be issued and handled in such a way as to prevent it from being mixed with that of another specification.

In case a question shall arise regarding the suitability of welding rod, wire, electrodes or filler metal, provisions of the AWS Welding Handbook shall govern. Where special materials are required that are not covered by these or other applicable AWS welding material specifications, the Contractor shall submit the purchase specifications to the Administration for approval.

15.17.11 Special Welding

Procedures for structural welding of stainless steel to LAHT, or other combinations of metals or conditions not covered by AWS specifications or codes, shall be as submitted by the Contractor and approved by the Administration.

Austenitic stainless steel electrodes or wire shall be used to join carbon or LAHT steels to stainless steels.

15.17.12 Resistance Welding

Resistance welding shall be in accordance with MIL-W-6858, Class B for structural applications and Class C for non-structural applications. The Contractor shall control current, time, electrode size and shape, and tip force, to produce uniform welds of specified strength which are not subject to inter-granular stress corrosion cracking. For each type of metal joint or built-up assembly to be resistance welded, a prior sample of the joint shall first be welded with the prescribed settings of current, time and tip pressure, and then either static tested for shear strength or tested to destruction by tearing to ensure that a weld nugget is pulled out of one of the plates. Sample welds shall be subject to approval by the Administration and shall be made and tested by either the shear-strength or the tear-test method daily and whenever there is a change in welder, material, material assembly thickness, electrodes or welding machine settings. Complete records of the set-up and test results shall be maintained by the Contractor.

The Contractor or Manufacturer shall treat surface marks resulting from welding to eliminate any visible defects and discoloration in the finish surface. All external spot welding shall be held in alignment in an approved manner.

15.17.13 Brazing and Soldering

All brazing (conducted above 840°F) and soldering (conducted below 840°F) shall be in accordance with the requirements of the AWS. Brazed or soldered joints shall present a first-class appearance in accordance with AWS quality standards. All pipe or tubing connections

shall be leak free. The inner surfaces of the air conditioning tubing and piping shall be protected from oxidizing contaminants during and after brazing or soldering operations have been completed. Any soldering of stainless steel lap joints on the carbody shell shall have a smooth, uniform appearance and shall be leak-free.

15.18 COATINGS AND APPLICATION

15.18.1 Materials and General Requirements

All weldments of those portions of the vehicle not constructed of stainless steel, after completed and properly cooled, shall be cleaned in an approved manner to ensure removal of all welding flux. Sand or grit blasting is preferred provided damage will not result to surrounding apparatus. Immediately following inspection of the clean weldment to ensure integrity of the weld a coat of primer will be applied to prevent oxidation of the bare metal.

Prior to the application of any coating materials, all surfaces shall be completely free of grease, oil, welding flux, mill scale and other contaminants that would preclude proper adhesion. After cleaning of all metal surfaces a coat of primer shall be applied in a manner recommended by the primer Manufacturer. All primers shall be compatible with any finish and/or intermediate coatings that are to be applied thereafter. Each layer of coating materials - whether primer or intermediate and finish coats - shall be free of runs, sags, or other application defects. All intermediate and/or finish coatings shall be applied in a manner recommended by the manufacturer. Spray application being used as much as possible.

All painted surfaces which are scratched or damaged during shipment, storage, handling, or installation shall receive touch-up paint as required to present a satisfactory appearance.

Touch-up paint shall be identical in all respects to original paint.

The inner surfaces of subfloor sheets shall be coated with an approved compatible acoustical insulating material in a manner recommended by the Manufacturer. The underside of the end platforms shall be insulated with insulating material to a 3/16-inch wet film thickness. Insulation materials shall be fire retardant.

15.18.2 Painting

All areas requiring paint shall be thoroughly cleaned, given one coat of primer and one coat of finish paint. The paint and color scheme shall be approved by the Administration. Equipment outside of the vehicle end, including end sills, shall be coated with materials that match the exterior appearance of the carbody. All underfloor equipment except stainless steel shall be coated black. All previously painted surfaces shall be renewed. All exterior steel surfaces except stainless steel shall have an approved coating system applied. Underfloor equipment boxes that have components removed and replaced shall be cleaned and have applied a minimum of two coats of an approved non-conductive white paint or other approved material. The inside surfaces of all other underfloor equipment boxes shall be touched up as required with the same approved paint or material. Any equipment or parts of equipment which would be damaged or suffer impaired operation from painting shall not be painted and shall be corrosion-resistant.

15.18.3 Corrosion Protection

All surfaces shall be completely free of rust, scale, grease and other foreign matter immediately preceding the application of the primer. All joints shall be properly sealed with an approved water-proofing compound that will be compatible with coatings applied. Spot welding connections shall be thoroughly coated with an approved spot weld sealer.

All surfaces that are concealed after assembly shall be properly cleaned and coated with an approved preservative coating in a manner recommended by the coating manufacturer, especially inside surfaces of fabricated items. Where possible, dip coating of sections is preferred.

All aluminum surfaces, where required, shall be properly cleaned and shall be given a coating of an approved zinc chromate material. All joints between aluminum and other metals shall be suitably water-proofed and insulated with an approved compound which shall cover the entire area of each contact surface.

Any arc welding performed on stainless steel shall be thoroughly cleaned and if necessary coated with an approved stainless steel coating material.

15.18.4 Trucks

The Contractor shall apply one coat of an approved primer on all exposed surfaces of the truck immediately after final cleaning, repairs and inspection. Before installation under the vehicle the Contractor shall clean off all accumulated dust, dirt or other foreign matter by means appropriate to the purpose and then coat the truck with a light bodied approved truck paint, of a type that will not conceal any cracks that may develop in service, and allow the paint to air dry. Wheels, axles and exposed neoprene or other elastomeric parts shall not be coated.

15.18.5 Acoustical Insulation

If required, acoustical insulating materials shall be applied to properly cleaned underframe, sides, ends, roof and floor sheets, to the supplier's recommendations. The materials shall be resistant to dilute acids, alcohols, grease, gasolines, aliphatic oils, and vermin. The material shall be unaffected by sunlight and ozone and shall not become brittle with age. It shall be J. W. Mortell Company's No. 2039 sound deadening compound, Aquaplast No. DL-10, or Administration-approved equivalent.

15.19 LETTERING, SIGNS AND NUMBERS

15.19.1 Lettering and Signs

Lettering and signs shall be applied to each vehicle as recommended and approved by the Administration, and shall be a decalcomania of approved type and color. All damaged or missing decals shall be renewed. All lettering, size, style and spacing applied to vehivles should be the same as on the present MARC fleet unless otherwise specified. The decalcomania may be edge sealed, per OEM instructions.

15.19.2 Lettering and Numbering

Location of lettering and numbering shall be applied to the interior and exterior of the vehicle as approved by the Administration.

Interior lettering shall include equipment location signs or symbols, safety signs on door, etc., and signs giving necessary information.

15.19.3 Decals

Marking film decals and adhesives shall conform to requirements of MIL-M-43719, Type II. Application techniques shall be in accordance with manufacturer's recommendations.

15.20 FLAMMABILITY, SMOKE EMISSION AND TOXICITY

All combustible material used in the construction of the vehicle shall satisfy the flammability, smoke emission, and toxicity requirements cited in TS Section 18.2.

15.20.1 Electrical Fire Safety

Electrical equipment shall conform to NFPA 130, 2010 Edition Section 8.6 (or the latest issue of that document at the time of proposal submission), except where more restrictive requirements are imposed by this Specification.

15.21 ELECTRICAL STANDARDS

This section describes the standards to be used when overhauling, repairing, or renewing components. In addition to the following standards, the Contractor shall comply with the Amtrak electrical standards.

15.21.1 Electronic Practices

All electrical and electronic control systems and components shall be selected using the "Reliability Design Handbook" Number RDH376 as a guide. All devices shall be derated to operate within the "Acceptable" region for electrical stress versus temperature for "Airborne Application," at ground mobile severity. If there is a conflict between guidelines given in these Specifications elsewhere and the "Reliability Design Handbook," the more restrictive condition shall govern.

15.21.2 Electronic Criteria

Hardware including the case, heat sinks, mounting brackets, etc., shall be protected against moisture, oxidation, and common air-borne contaminants. Hinges and latches shall be of metal not subject to corrosion.

Separate circuit breakers shall be provided for major assemblies or functions. Hermetically sealed, dry tantalum capacitors, in metal cases, shall be used in place of aluminum electrolytics, except for very high values which are not practical or commercially available, in which case long life grade aluminum electrolytics shall be used, except in the case of commutating

capacitors which shall incorporate a nontoxic impregnant and shall be chosen to give a service life of at least 20 years. Filter capacitors shall have high ripple current ratings for long life.

Except for accelerating and braking power resistance, all resistors shall be derated 50 percent for power dissipation.

Capacitors shall be derated 20 percent for voltage based on the nominal supply voltage and maximum case temperature. If filter capacitors are exposed to low ripple voltages, lesser values of derating may be accepted if it can be shown that reduced operating temperatures can be achieved due to lower dissipation, however, the sum of the DC and AC ripple voltage shall always be less than the capacitor's voltage rating at its maximum case temperature, normally 85°C (185°F).

Transformers and inductors shall be derated 10 percent for current.

Germanium semi-conductors shall not be used.

All semi-conductor junction temperatures shall be limited to 150°C (or to the maximum rated temperature for the device if its rating is less than 150°C) or less, at maximum ambient temperature and at maximum rated output power.

The need for adjustments shall be avoided wherever possible by the use of appropriate circuitry, stable components, and high tolerance circuits.

All printed circuit board shall be interchangeable between equipment groups without additional adjustment.

All return circuits for any one system shall return to a single terminal point, without any connections to returns from other systems, and then have a single connection to the vehicle return circuit (B- for control voltage circuits, carbody for high-voltage circuits, etc.).

15.21.3 Vacuum-Pressure Impregnation

Major electrical components as well as other smaller devices, as specified in their respective Sections, shall be Vacuum-Pressure Impregnated as a part of the overhaul if reused.

The process shall utilize a solventless polyester varnish (GE 702 or approved equivalent) in accordance with the Manufacturer's application instructions. The following procedure shall be implemented after all cleaning and repairs of the devices have been completed:

A. Perform a high voltage DC leakage test per TS Section 15.24(6).

B. Preheat the device and assure its uniform temperature between 45°C and 60°C.

C. Place the device in a vacuum tank and draw a vacuum of at least 2500 microns.

D. While holding the 2500 micron vacuum, admit the varnish to the tank to cover the device. Then reduce the vacuum by 1/3 (to 500 mm Hg) and hold for 30 minutes or until localized bubbling ceases.

E. Slowly break the vacuum with an inert gas until atmospheric pressure is attained.

F. Pressurize the tank with an inert gas to 70 to 90 psi, and hold for 30 minutes.

G. Return the excess varnish to the storage tank, release the pressure and allow the device to drain for 15 minutes.

H. Cure the device for 6 to 10 hours between 175°C and 185°C.

15.21.4 Dip and Bake

Small electrical devices shall have their insulating properties restored by the "Dip and Bake" process. The following small motors are in this category, other devices are specified in their respective sections:

Exhaust Fan Motors
Evaporator Blower Motors
Condenser Fan Motors
Cab Heater Motors

The process shall utilize a solventless polyester varnish (GE702 or approved equivalent) in accordance with the Manufacturer's application instructions and the following procedure after all cleaning, repair and initial tests of the devices have been completed and leakage current does not exceed limits in relations to its working voltage.

Preheat the device to assure its uniform temperature between 45°C and 60°C.

Dip the device into the hot varnish and allow to soak for a period of time to assure maximum penetration of the varnish into the windings.

Remove the device from the varnish tank and allow to drain excess varnish.

Place the device in an oven preheated to at least 160°C and maintain that temperature to cure the varnish for a time proportional to the size of the device but not less than 4 hours.

15.21.5 Semiconductor Standards

The Contractor shall be responsible for insuring that all electrical and electronic circuitry renewed, upgraded, or overhauled shall meet, as a minimum, the criteria listed in this Section with regard to the use of semiconductors.

Semiconductors for electronic circuits shall be adequate in current and PIV rating and performance characteristics for the application intended.

Discrete semiconductors shall have the following minimum voltage breakdown rating, depending on the use.

Transistors and thyristors operated from the nominal battery supply, or those connected to trainlines shall have minimum breakdown ratings of four times the maximum circuit voltage.

Suppression devices shall be provided as necessary to protect the devices and limit the circuit voltage.

Diodes operated from the nominal battery supply, or those connected to trainlines shall have a minimum breakdown rating (PIV) of 1,000 volts.

Diodes on circuit boards, and connected to battery supply shall have minimum breakdown voltage of 800V and transient suppression circuits.

All discrete semiconductors operated from inverters or other isolating devices shall have minimum breakdown ratings of 2 times the maximum circuit voltage (except where specifically detailed otherwise). Suppression devices shall be provided as necessary to protect the devices and limit the circuit voltage.

All semiconductors other than high power devices shall be operated at less than 50 percent of the maximum continuous current rating or 50 percent of the maximum continuous power rating, with the more restrictive rating being the controlling value.

Circuits shall be designed to limit excessive current to semiconductors, to prevent damage from high discharges (spikes) and to limit excessive temperature through properly designed heat sinks, where required.

Semiconductors shall be placed in a clean and ventilated environment which shall favor easy replacement.

Integrated circuits operated from the battery supply through inverters or other isolating devices shall be operated within the voltage and current ratings specified by the manufacturer, derated to less than 50 percent of the maximum stress level at the maximum operating temperature of the device as specified by the manufacturer. Where the supply to integrated circuits is regulated and surge protected, the voltage rating shall be 15 percent below the Manufacturer's recommended maximum. In addition, the maximum power shall be limited to 50 percent of the Manufacturer's specified maximum at the maximum operating temperature.

All semiconductors shall be hermetically sealed and rated for operation over the temperature range of -40°C to +85°C.

All thyristors, transistors, and diodes shall be JEDEC registered and numbered, and must be available from at least two different U.S. manufacturers. However, non-JEDEC-registered devices which carry more than 10 amps may be used provided that the Contractor obtains prior approval based on submission of complete procurement specifications defining each such device and evidence of availability from two or more manufactures based on those specifications.

All integrated devices shall be standard devices available from at least two (2) different suppliers. Exceptions shall be submitted to the Administration for approval.
All electronic circuit boards shall be burned in for 100 hours at 50°C. The methods used must be submitted to the Administration for approval.

15.21.6 Hi-Pot

An insulation resistance test shall be performed on all electrical components using a DC leakage tester. Each nominal voltage circuit shall be subjected to the voltage indicated below and shall

conform to the respective test level shown under all climatic conditions. All electronic devices and components shall be disconnected or removed from circuits while conducting these tests.

Nominal Circuit Voltage	High Voltage DC Leakage Test-Voltage
74-volt circuits	500 volts
230/115-volt circuits	1,000 volts
480-volt circuits	2,500 volts

15.22 ELECTRICAL DEVICES AND HARDWARE

15.22.1 General

The following sections describe the requirements for replacing electrical devices and hardware and the requirements to overhaul as deemed appropriate. All new hardware and devices shall be subject to approval by the Administration. All contactors, starters and relays shall be a minimum NEMA size 1.

15.22.2 Contactors

Contactors shall be defined as those devices that switch a minimum of five kilowatts of electrical energy through their main contact tips. All contactors used shall meet or exceed the requirements of MIL-R-6106 or an approved equivalent.

All contactors shall be constructed and utilized in a fail-safe manner; that is, all failures shall be in a direction such that neither the ridership, the crew, nor the equipment is placed in jeopardy.

All contactors shall be installed such that they are fully accessible for inspection, repair-in-place, or removal and replacement.

There shall be a maximum of two wire terminations on any one contact of the device.

The coil of all contactors shall be suppressed with a solid state device to protect against transients generated on the low-voltage network.

Under no circumstances shall either the main or auxiliary contact tips of contactors be placed in parallel for the purpose of carrying a current load at or above the manufacturer's tip rating.

Bifurcated wiping contacts shall be used in low-voltage applications wherever necessary due to "dry circuit" switching requirements.

Device installation shall be such that the arc spray is directed by an arc chute away from ground and any other electrical devices proximate to the contactor.

The contactor shall be constructed in a very heavy-duty fashion suitable for use in transit service. The Administration reserves the right to review and approve the design and selection of all contactors.

All contactors shall be constructed such that the main tips make and break with a motion that prevents deposits and/or pitting.

All contactors shall be readily identifiable by means of a permanent, durable marking strip giving the device circuit designation.

15.22.3 Relays

Relays shall be defined as those devices which switch less than five kilowatts of electrical energy through their contacts.

All relays used which switch ten amps or less through their contacts shall meet or exceed the requirements of MIL-R-5757, or approved equivalent, and shall have proven railroad application. All relays and applications shall be approved by the Administration.

All relays shall be constructed and utilized in a fail-safe manner; that is, all failure shall be in a direction such that neither the ridership, the crew, nor the equipment is placed in jeopardy.

There shall be a maximum of two wires connected to each terminal of the device.

The coil of all relays shall be suppressed with a solid-state device to protect against transients generated along the low-voltage network.

Under no circumstances shall the contact tips of relays be placed in parallel for the purpose of carrying a current load at our above the manufacturer's contact tip rating.

Bifurcated contacts shall be used in low-voltage applications whenever necessary due to dry circuit switching requirements.

All relays shall be constructed in a heavy-duty fashion suitable for use in transit service. Vapor Corporation style relays, 365XXXX-XX (75 VDC)/375XXXX-XX (120 VAC) relays, or approved equivalent, are defined as meeting the requirements of this section. The Administration reserves the right to review and approve the selection of all relays.

All relays shall be installed such that they are fully accessible for inspection, repair-in-place, or removal and replacement.

15.22.4 Switches

Switches shall be provided with a "keying" feature so that after installation, the body of the switch is constrained from mechanical rotation.

All switches provided shall be of the highest quality procurable and shall be fully suitable for the rigors of the Administration's service environment. All control switches which are subject to water splash, which is defined to mean any switches mounted near windows or doors, or mounted on the Train Operator's control console, shall be environmentally sealed. Toggle and push-button switches shall be suitable for railway application and shall be approved by the Administration. All safety-critical switches, such as those that can cause door openings, shall be designed to withstand a high potential test of 1,500 volts for one second, in a clean, dry condition, without false conduction. The design and selection of all switches shall be subject to review and approval.

There shall be a maximum of two wires connected to each terminal of the device.

Switches shall be individually replaceable without disconnecting or removing anything other than the mounting fasteners and electrical connections of the switch to be replaced.

15.22.5 Circuit Breakers

15.22.5.1 General

All circuit breakers shall be extremely rugged and fully suitable for the service intended. They shall be of the highest quality procurable. Selection of all circuit breakers shall be subject to review and approval by the Administration.

The ON, and OFF positions of all circuit breakers shall be permanently marked on the handle, or on the case of the circuit breaker.

All input power circuits shall be individually protected by circuit breakers. No circuit breaker shall protect more than one circuit.

Circuit breaker terminals shall not be used as junction points.

All circuit breakers shall be sized by current rating, interrupting capacity, and tripping time to protect both the associated equipment and the minimum size wire used for power distribution within the protected circuit.

Each circuit breaker pole shall be equipped with adequate means of arc extinction to prevent flashover.

The continuous current rating of thermal-magnetic trip circuit breakers shall be selected in accordance with ANSI C37.16 for the load and type of service specified.

All thermal-magnetic trip circuit breakers shall conform to the requirements of ANSI C37.13 and ANSI C37.15.

Circuit breaker current rating shall be clearly and permanently visible after installation.

Electrically operated circuit breakers shall be arranged for operation from the low-voltage DC/AC supply.

15.22.5.2 High-Voltage Circuit Breakers

High-voltage circuit breakers shall be used to accommodate the primary and auxiliary circuits, and must show tripped position.

The trip elements shall be thermal magnetic connected in series.

The circuit breaker handle shall protrude from the circuit breaker panel cover sufficiently to be operational in all positions. Circuit breakers must show a tripped position.

15.22.5.3 Low-Voltage Circuit Breakers

Low-voltage circuit breakers shall be either one-or two-pole devices depending on intended function, and shall show tripped position. Circuit breakers must show a tripped position.

Trip elements shall be thermal-magnetic, or magnetic, as is appropriate for the application.

15.22.5.4 Circuit Breaker Panel

Circuit breaker panels shall be of an approved safety type, and shall conform to the latest and best practices. The number of branch circuits and the capacities thereof for each panel shall conform to the requirements specified herein.

The circuit breaker panel shall conform to the applicable portions of the APTA Recommended Practices and Standards.

All live portions of the protected circuitry shall be completely concealed so that no danger of electrocution exists from the accidental touching of the panel or any appurtenances or devices mounted thereto.

There shall be provided a wiring gutter or tie bar along the top, sides and bottom, for the routing of high-voltage leads to their designated circuit breakers.

The panel shall be configured for easy removal so that maintenance and repair action is not impeded.

15.22.5.5 Fuses

All fuses shall be permanently identified and readily accessible.

The circuit protection function performed by fuses shall normally be performed by use of appropriately rated circuit breakers. Fuses shall only be used where specifically called for in the specification or where use of circuit breakers is not technically feasible. Fuses shall be used in these areas only with Administration approval.

The fuse holder shall contain fuse retention devices at both ends.

Except as otherwise approved by the Administration or specified herein, all fuses shall be of current-limiting, arc-confining type, providing a clear visible indication of a blown condition.

Unless explicitly noted otherwise in this specification, all fuse compartments are to have a fuse of identical size and rating as the "in-circuit" fuse mounted in a convenient location for use as a spare.

The rating of each fuse is to be clearly and permanently marked on the fuse itself.

15.22.5.6 Bus Bars

Bus bars shall be fabricated from hard drawn copper. As a minimum, the connection points

shall be placed to improve and maintain good conductivity throughout the lifetime of the equipment.

The bus bar conductivity shall be 98 percent of the "Annealed Copper Standard" for a straight bar of rectangular cross section.

The current density shall not exceed 1,000 amperes per square inch in cross section.

A higher current density may be employed where the design either limits the maximum bus bar operating temperature to 90°C or less or incorporates plating of the bus bar to prevent oxidation of the (plated) bus bar surface at the maximum bus bar operating temperature.

15.23 OVERHAUL OF CONTACTORS, RELAYS, AND RESISTORS

Contactors, relays, resistors and their enclosures shall be overhauled in accordance with the following procedures:

A. Remove and overhaul all inspection covers.

B. Thoroughly clean all components.

C. Renew all wiring with overheated, cracked or chafed insulation. Overheated terminals shall be renewed. New wiring shall be marked in accordance with the same format as the original wiring. Reroute or secure wiring to eliminate chafing or fouling.

D. Terminals and mounting hardware shall be tight.

E. DC leakage current of the wiring and components shall not exceed the appropriate values in TS Section 15.23.6.

F. All contactors and relays shall be overhauled to the following minimum standards using the following steps where applicable. Whatever procedure is used, bench or on vehicle, the result shall be a component that is "functionally like new."

    1. (Bench overhaul only) Remove, completely disassemble and clean all components. With the exception of this step "on car" overhauled components shall meet the same requirements as a bench overhaul.

    2. Arc Chutes:
        a) All broken, or worn components renewed.
        b) Side and/or end shields that are burnt more than 50% thru shall be renewed.

    3. Metal arc horns or contact supports that have been burnt to the extent that a surface area is reduced by 20% or more shall be renewed or repaired by brazing and filing to the original configuration.

    4. Blow out coils shall be reinsulated by the application of two coats of G.E. A15B17A or approved equivalent insulating varnish.

5. Operating, trip and reset coils that do not meet resistance values of the appropriate OEM requirements shall be renewed. All coils shall meet the minimum leakage current standards of the operating voltage. Renew coils with damaged or deteriorated leads or wire terminations. Cracked encapsulated coils shall be renewed.

6. Armature stop clearances shall be set in accordance with the appropriate OEM requirements.

7. Braided shunts that are burnt, frayed or broken so that their current capacity is reduced by 20% or more shall be renewed.

8. Failed resistors, capacitors or suppression devices shall be renewed.

9. Renew all springs. Also renew adjusting springs and related equipment if their failure causes the component to fail adjustment or calibration.

10. Renew bent, broken, burnt or worn interlocks.

    a) Interlocks shall be cleaned by use of rubber oxide stones only. Cleaned interlocks shall have the same profile as a new interlock.
    b) All interlocks shall be adjusted for proper wipe and shall have "line" contact.

11. Renew encapsulated relays or components that are cracked or burnt.

12. Renew all contactor main contacts. Test and adjust contacts, in accordance with the OEM requirements.

13. Pivot points shall operate freely and have proper clearances. Renew worn or deteriorated parts that allow excessive movement or contact misalignment. Armature air gaps shall be within OEM-specified tolerances.

14. All pick-ups and drop-outs shall be within OEM-specified tolerances.

15. Leakage current to ground of current carrying parts shall not exceed those specified in 15.24.6 for the appropriate working voltages.

16. Diaphragms and needle valves utilized by the time delay relays shall be renewed, unless the relay is renewed with another or similar type device.

17. All coils shall be transient voltage protected by application of an MOV, or approved equivalent.

18. Tests and adjustments shall be in accordance with the appropriate OEM requirements.

19. When applied, the component's mounting hardware and electrical connections shall be clean and tight.
20. Renew or replace contactors and relays if overhaul will not result in a "functionally like new" component.

21. Renew any damaged or overheated insulators, standoffs or resistor tubes. All mounting hardware shall be tight and in good mechanical condition. Renew any damaged or overheated wiring and terminations. Clean the resistor assemblies and enclosures and remove any foreign material. Verify the resistance values of each resistor against the values listed in the appropriate schematic. Renew as required.

15.24 LUBRICATION

All lubrications shall be performed in accordance with the appropriate OEM Maintenance Manual. Lubricants shall be clearly identified and shall be stored and handled in a manner which assures segregation of each type to prevent improper selection or intermixing of different types. Both bulk containers and small shop containers and applicators shall be protected from contamination. Small containers and applicators used in the shop shall be marked for exclusive use with a particular lubricant and shall not be used for other materials unless thoroughly cleaned and relabeled.

Grease applicators used for bearings shall be of a type which can apply a measured quantity of grease in accordance with OEM instructions.

Prior to opening oil fill plugs or uncovering grease fittings, the area around the opening or fitting shall be wiped clean to prevent contamination. If grease fitting caps are missing, particular care shall be required to clean the opening prior to adding grease. When grease is applied the fitting shall be ensured to be taking the grease. Defective fittings shall be renewed. All grease fittings shall be capped to exclude dirt.

15.25 PRINTED CIRCUIT BOARD STANDARDS

15.25.1 General

Printed circuit boards shall be designed, constructed and inspected to ANSI/IPC-D-275, latest revision, except where more stringent requirements are noted here. Within ANSI/IPC-D-275, printed circuit board classes are designated. Printed circuit boards supplied under this Specification shall be Class 2, minimum, with the exception of wayside computers that are not utilized in vehicle operation. Class 3 requirements shall apply to all vital equipment.

Circuit board material shall be per NEMA Standard LI 1, Type FR-4 (MIL-P-13949, Type GF), for boards which have no components whose power dissipation is greater than two watts and when said board is not mounted adjacent to components dissipating greater than two watts. Otherwise, circuit board material shall be per NEMA Standard LI 1, Type FR-5 (MIL-P-13949, Type GH).

Printed circuit boards shall have a minimum thickness of 1/16 inch (1.6 mm) base material. The copper laminate shall be firmly attached to the board and shall be resistant to blistering and peeling when heated with a soldering iron.

Traces shall be made as wide as practical, with the minimum width being based on a 10°C temperature rise.

Components with pins shall be mounted only on one side. Connections shall be made to the other side or internal layers via plated through holes. Surface Mount Technology (SMT) devices may be mounted on both sides if part of an approved existing design.

All circuit boards shall be inherently stiff or shall be reinforced to prevent damage due to vibration or handling. Circuit boards larger than 100 in^2 (65,000 mm^2) shall be centrally stiffened unless otherwise approved.

All printed circuit boards with the same function shall be interchangeable between equipment groups without additional adjustment.

All printed circuit boards shall be of the "plug-in" type, with positive support against vibration, except where approved otherwise.

15.25.2 Marking

All circuit boards shall be labeled with a part number, serial number, revision level, and descriptive nomenclature.

All components shall be labeled on the board with component drawing references and such other information as may be required to repair and troubleshoot the board. The component and wiring sides of the board shall each be marked to indicate capacitor and diode polarity, and at least two leads or one lead and a graphic symbol indicating orientation of all transistors and thyristors.

Integrated circuits and other multi-terminal devices shall have an index mark on the component side of the board, visible with the component inserted, to indicate proper keying and insertion; the first pin on all IC packages shall be identified on the wiring side of the board.

For boards whose component density is greater than 2.25 components per square inch, the Contractor may submit an alternate marking plan for possible approval. Such a plan should include board marking, augmented by layout drawings.

15.25.3 Component Mounting

Components shall be fastened to the board in such a manner as to withstand repeated exposure to shock and vibration. Large components shall be supported in addition to the solder connections. Power resistors shall be mounted on standoffs so that the resistor bodies do not contact the board, spaced far enough away from the board so that resistor-produced heat will not discolor or damage the board.

15.25.4 IC and Device Sockets

IC and device sockets are prohibited except for components that must be removed for reprogramming or initial calibration procedures or devices that are available only in mounting in sockets. All socket applications are subject to Administration approval. All other components shall be soldered in place.

Where approved, IC sockets shall comply with MIL-S-83502 and MIL-S-83734, as is applicable

for the device, and shall be made of the following materials:

A. The bodies shall be molded from diallyl phthalate, PTFE Teflon, or approved equivalent.

B. The contacts shall be fabricated from beryllium copper and shall be plated with a minimum of 0.000030-inch (0.76 micrometer) of gold over a minimum of 0.000050-inch (1.27 micrometer) of low stress nickel in the area of contact with IC pins.

15.25.5 Conformal Coating

Both sides of the assembled printed circuit boards shall be coated with a clear insulating and protective coating material conforming to MIL-I-46058 latest revision, or approved equivalent.

The coating shall be easily removed with a brush-applied solvent or penetrated by a hot soldering iron when a component must be unsoldered. The coating solvent shall not adversely affect board-mounted components.

All IC sockets, connectors, and test points shall be masked when the coating is applied.

15.25.6 Keying

All printed-circuit boards shall be "keyed" to prevent insertion into the wrong socket. Further, circuit boards in safety-related control systems, such as friction brakes, cab signal, ATC, ATS, and systems which can cause damage or unsafe train operation if the vehicle is operated with a card removed, shall be connected through a safety circuit to disable the vehicle if a circuit board is removed.

15.25.7 Circuit Board Connectors

Printed circuit board connectors shall be heavy duty, high reliability, two-part type with a history of successful service in rail applications and shall be approved by the Administration prior to commencing design.

Connectors which comply with MIL-C-55302, latest revision, and which have plated contacts as described below, are considered to comply with the requirements of this section.

The connector contact area shall be plated with a minimum of 0.000030-inch (0.76 micrometer) of gold over a minimum of 0.000050-inch (1.27 micrometer) of low stress nickel.
Card edge connectors are prohibited.

All connectors within one panel assembly shall be keyed to prevent damage or malfunction due to incorrect insertion.

15.25.8 Testing

Sufficient clearance shall be provided between components to allow testing, removal, and replacement without difficulty due to lack of space.

Test points shall be provided in appropriate locations on modules and printed circuit boards. A negative return test point shall also be provided. The test points shall either accept and hold a standard 0.080 inch (2 mm) diameter tip plug or shall be a turret lug similar to Cambion No. 160-1026-01-05, or approved equivalent, with sufficient clearance to permit it to accept a standard oscilloscope probe clip, and shall be identified by appropriate markings.

15.25.9 Plated-Through Holes

In addition to the general guidelines of the Institute of Printed Circuits (IPC), the following requirements shall be met:

A. Plating Holes - Copper plate shall be a minimum of 0.001 inch (25 micrometer) minimum average thickness, and 0.003 inch (76 micrometer) maximum average thickness. Solder plates shall be 0.0003 inch (7.6 micrometer) minimum average thickness and 0.0015 inch (38 micrometer) maximum average thickness.

B. Plated Hole Defects - A maximum of three voids per hole shall be acceptable. Total area of the voids shall not exceed 10% of the total wall area. The largest void dimension shall not exceed 25% of the core diameter or the board thickness, whichever is smaller. There shall be no pits, voids, or cracks at the junction of the hole wall and terminal area to a depth of 1.5 times the total copper thickness on the surface.

15.25.10 Enclosures

All circuit boards that are rack-mounted shall plug into racks containing the mating half of the circuit board connector. The circuit board rack shall mount in an enclosure conforming to requirements in this document. The rack, circuit board, and circuit board hardware shall be designed as an integrated system.

The rack and enclosure shall provide environmental and EMI shielding as required to meet the requirements of this document.

Printed circuit boards shall be positively retained by means of keeper bars or other approved method. The enclosure or rack cover shall not be used to retain the circuit boards.

Each circuit board shall be fitted with an ejector or hand grip to assist in board removal. The rack and the edge of each board, or the card ejector, shall be labeled with corresponding numbers to identify board location within the enclosure.

15.25.11 Extenders

Printed circuit board extenders (two sets of each type) shall be provided by the Contractor for test purposes. At least two extenders of each type shall be available for use and evaluation throughout the design conformance and acceptance test programs.

15.26 BATTERY BACKUP CIRCUITS

15.26.1 General

Where individual electronic circuits require their own battery, the following conditions apply:

A. The batteries shall be rechargeable nickel-cadmium with a built-in charger or non-rechargeable lithium, unless otherwise approved by the Administration.

B. If a nickel-cadmium battery is used, the charge time vs. discharge time must be approved, for the specific application. In no case shall the battery life-span be less than four years.

C. If a lithium battery is used, the calculated life-span and the assumptions for that calculation must be approved for the specific application. In no case shall the life-span be less than three years.

In order to properly assess the impact of distributed battery backup systems, the Contractor shall provide a complete list of battery locations, battery type, estimated lifespan, discharge time, and the impact of battery discharge failure.

SECTION 16
QUALITY ASSURANCE

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SECTION 16
QUALITY ASSURANCE

16.1 GENERAL SYSTEM DESCRIPTION

The Contractor's Quality System efforts shall be in compliance with the requirements of ANSI/ASQ Q9001-1994. Where it differs from the terms of the Contract, the more stringent requirement shall take precedent. The Contractor need not be certified under ANSI/ASQ Q9001-1994.

The Contractor shall establish, implement and execute a comprehensive system to assure that all aspects of the work are in conformance with the Administration's contract. The Quality System shall include the Contractor's Quality System Manual, Quality Plan, and all implementing manuals, processes, and procedures. The Quality System Manual shall state the Quality Policy, definition of responsibilities, and authority of personnel who manage and perform work affecting quality. It shall include all procedures for implementing the required ANSI/ASQ Q9001-1994 standard.

The Administration reserves the right to perform required and/or continuous quality inspections at the Administration's discretion during the Contractor's execution of the Contract to ensure that the Contractor is meeting all of its Quality System requirements. The inspections will be performed independent of and in addition to the Contractor's quality assurance (QA) functions. These monitoring functions will confirm that Deliverables and Submittals under the Contract conform to the Specification as well as Administration-approved Contractor drawings and documentation. The Administration's quality control activities will in no way waive, abrogate, replace, negate, override, or lessen the Contractor's quality and other obligations under the Contract.

The Contractor's Quality System shall be subject to Administration verification at any time. Administration Inspectors shall have free access to the Contractor's/Subcontractor's facilities during all normal business hours and when work is in progress.

The Quality System shall be consistent with documents, including sample Quality System Manuals and Quality Plans, submitted by the Contractor and approved by the Administration

16.2 SOFTWARE QUALITY ASSURANCE

The requirements of this section shall apply to those new subsystems that utilize proprietary computer software to control their function. The Contractor shall submit, for approval, a Software Quality Assurance Plan in accordance with IEEE/ANSI Standard 730. ***(CDRL 1601)*** The plan shall include the submittal and approval of the documents listed below:

A. System Functional Description
B. Software Requirements Specification
C. Software Design Description
D. Software Verification and Validation Plan
E. Software Verification and Validation Report

F. User Documentation

The Software Design Description (SDD) shall be in accordance with ANSI/IEEE Standard 1016. The final Software Design Description shall include details required by ATA Specification No. 102, through all levels to level 6. Level 4 shall be interpreted to mean all source code, including operating systems. The levels defined in ATA No. 102 are summarized below only for information:

Level 1: Computer description and operation
Level 2: Software architecture, basic program and functions
Level 3: Detailed flow information
Level 4: Annotated compiler/assembly listing
Level 5: Detailed memory map and listing
Level 6: User documentation

After original approval, changes to the software shall be formally submitted for approval by the Administration, prior to implementation. The software documentation shall be revised concurrently with software changes.

16.3 QUALITY SYSTEM MANUAL

The Contractor shall establish and maintain a written Quality System Manual and procedures defining its Quality System. The procedures shall include, but not be limited to, the control of subcontractors, receiving inspection, discrepancy control, design control, production and process control, configuration control, software configuration control, functional test, drawing control, calibration/certification program, shipping inspection, QA/QC records, Contractor activity at the acceptance site or on the Administration's property, and any other quality provisions needed to meet the requirements of the Contract.

16.4 QUALITY PLAN

16.4.1 Submittal

Within 15 calendar days after Notice to Proceed, the Contractor shall develop and submit to the Administration for approval, a Quality Plan that defines the system elements required to regulate methods, procedures, and processes to ensure compliance with all Contract requirements. ***(CDRL 1602)*** If deficiencies are found during the assessment of the Quality Plan, corrective action shall be implemented and documented by the Contractor as a condition of having the Plan approved.

16.4.2 General Requirements

The Quality Plan shall illustrate how the Contractor intends to meet the Quality System requirements of the Specification and shall include as a minimum:

A. An organizational chart, including definition of the responsibilities of the Contractor's key management, project and line personnel. Also to be included are organizational charts for major subsystem suppliers.

B. Flow charts of paperwork for documenting the acceptance or rejection of material and the disposition of unacceptable material, for defining accountability for material found defective or malfunctioning during production conformance testing, and for configuration verification for items to be included in the Vehicle Overhaul History Books.

C. A Material Review Board (MRB) or approved equivalent.

D. The methods and procedures used to control daily manufacturing processes and material quality.

E. Forms used to convey, track, and account for design changes implemented in the vehicles regardless of their state of completion, and any other forms necessary for the Quality Plan. Each form shall be provided with a serial number.

F. Flow charts that show paperwork flow which documents the approval of new or upgraded component design.

G. The Plan shall include a manufacturing schedule indicating the Contractor's plant location, and the work to be performed for its own operations and those of major subcontractors. When work is scheduled to be accomplished at different locations, the Contractor's manufacturing schedule shall clearly identify each location and the work to be accomplished therein. All work shall follow the Contractor's manufacturing schedule and shall not be moved from one plant to another without the Administration's written approval. All systems completed at a given site shall be demonstrated to be functionally operational before shipment to another site.

16.4.3 Audits

The Administration-approved Quality Plan and all implementing manuals, processes, and procedures will be subject to periodic audits by the Administration. The Administration reserves the right to visit the Contractor's facility, prior to approval of the Plan, to perform an audit of the effectiveness of the submitted Quality Plan.

16.4.4 Inspection and Test Schedule

The Inspection and Test Schedule shall show major manufacturing, inspection, and test milestones on a schedule that includes planned dates for submittals. The Inspection and Test Schedule shall identify all inspection or test witness and hold-points in accordance with TS Section 16.5. The Inspection and Test Schedule will be used by the Administration to ensure the Contractor's commitment to product quality and compliance with all Contract requirements. The Inspection and Test Schedule shall include a rectifying feedback system to the Contractor's engineering and production groups. The Quality Plan shall include a schedule/matrix of testing and inspection keyed to the Special Provisions and Technical Specification of the Contract and covering each item of the work in accordance with the Specification requirements.

16.5 QUALITY PLAN – DETAILED REQUIREMENTS

16.5.1 Management Responsibility

The Quality System organization structure of the Contractor, Subcontractors, and Suppliers shall be clearly defined and independent from the manufacturing unit. The management responsibility for the QA function shall be set forth in the Contractor's policy and organization chart. The QA manager shall have sufficient authority and organizational freedom to insure that a non-conforming or discrepant product will not be delivered to the Administration. The Contractor shall ensure that the Quality System is understood, implemented, and maintained at all levels of the organization. The responsibility for the QA function shall be so placed within the Contractor's own organization such that the quality of products delivered under the terms of this Contract shall not be compromised in order to meet schedule and cost projections. Any conflicts that arise as a result of this provision shall be brought to the Administration's attention by the Contractor's QA Manager and shall be resolved to the Administration's satisfaction prior to shipment of affected items.

The Contractor's executive management shall review the Quality System at defined intervals using the ASQ/ISO 9000 series Standards and the Contractor's stated quality policy and objectives to ensure the continued suitability and effectiveness of the Quality System.

16.5.2 Contract Review and Change Control

The Contractor shall establish procedures to review and amend the Contract via a change control system.

16.5.3 Design Control

Written procedures shall be implemented by the Contractor for control of the entire design process including design validation and changes. These procedures shall ensure that Specification design requirements are correctly translated into drawings and specifications used for procurement, manufacture, and test. The Contractor shall implement procedures for transmission of design and quality requirements and standards to subcontractors and suppliers to assure compliance with Contract requirements.

The Contractor shall establish and maintain objective evidence of compliance with all of the requirements of the procurement specifications and design control procedures.

The Contractor shall provide procedures for the evaluation of proposed changes to design drawings and Specifications, ensuring that there is complete compliance with Contract requirements for proposal, approval, and implementation of engineering changes. The Contractor shall be responsible for all drawings and engineering changes presented by subcontractors and suppliers.

The Contractor shall implement a Configuration Management Plan that maintains and assures the latest drawing configuration. The Contractor shall ensure that requirements for the effectivity point of changes are met and that obsolete contract drawings and requirements are promptly removed from the system. Means of tracking the effectivity points for design change,

retrofits, upgrades and field modifications shall be employed and made available to the Administration to verify latest vehicle configuration.

16.5.4 Document and Data Control

The Contractor shall establish and maintain procedures to control all documents and data related to this Contract. The Contractor shall also be responsible for all documents and data generated by suppliers and subcontractors related to the Contract. There shall be procedures by which the documents and data will be reviewed and approved. A document control list shall be maintained providing current status of design documents and drawings. All revisions or changes to documents and data shall be reviewed and approved by the same individual or group that performed the original review.

16.5.5 Purchasing

The Contractor shall outline the methods to be used for selection and control of subcontractors and suppliers. The Contractor shall be responsible for ensuring that all supplies and services procured conform to Contract requirements. The effectiveness and integrity of quality control by the subcontractors shall be reviewed and assessed by the Contractor at intervals consistent with the product complexity and quality.

The Administration reserves the right to inspect, at the source, any supplies furnished or services rendered under the Contract. The Contractor shall support and facilitate the Administration's efforts to contact manufacturers, subcontractors, or suppliers for the purpose of discussing, among other things, schedule, design, or quality issues. When the Administration elects to inspect at a subcontractor's facility, such inspection shall not be used by the Contractor as evidence of effective quality control of the subcontractor.

It is the Contractor's responsibility to ensure that the subcontractor's product meets all the requirements of this Specification. The Contractor shall ensure that the subcontractors and suppliers are cognizant of all pertinent Specification requirements. Purchase order requirements shall ensure that the subcontractor must notify and obtain approval for design changes from the Contractor and for requests for certificates of compliance (where applicable) prior to implementation.

16.5.6 Control of Administration-Supplied Product

The Contractor shall establish and maintain documented procedures for the control of verification, storage, and maintenance of Administration-supplied product, if any.

The Contractor shall also establish procedures to ensure that Administration-supplied material and equipment is handled, secured, and incorporated into the vehicle in accordance with the terms of the Contract. These procedures shall include receipt inspection; and retention of material certifications.

The Contractor shall document accountability for receipt, consumption or return of parts supplied by the Administration.

16.5.7 Product Identification and Traceability

The Contractor shall establish and maintain procedures for identification and control of product. Product shall include batch, materials, subassemblies, and components. The procedures shall be used to prevent the use of incorrect or defective items, ensure that only correct and acceptable items are used or installed, and that current configuration is maintained. Manufacturing history of items shall be documented on paper forms or in on-line electronic files, such that the manufacturing status of parts and assemblies can readily be determined as they are processed. Any document or data files which trace items throughout receipt, storage, fabrication, repair, and shipment shall be retained and shall be subject to inspection by the Administration.

16.5.8 Process Control

The Contractor, subcontractors, and suppliers shall provide control of manufacturing and production processes that directly affect quality and product configuration through the use of a formal manufacturing schedule. This schedule shall be compatible with the approved inspection schedule and will show each significant operation and the related control/hold points for inspections, examinations and tests.

Hold-points shall be established by manufacturing such that in no case will work be hidden from inspection or test by subsequent assembly. All corrections shall require re-inspection and appropriate testing prior to advancement of work.

Manufacturing and production processes shall be performed and controlled using qualified personnel and procedures in accordance with industry codes and standards and Specification requirements. These processes shall include, but are not limited to, welding, heat treating, and non-destructive testing.

Manufacturing and production conditions that adversely affect product quality shall be identified, and eliminated. Evidence of corrective actions to prevent recurrence of such conditions shall be verified and documented.

The manufacturing schedule shall also identify activities that control or verify the qualification of personnel during all stages of design, procurement, manufacturing, fabrication, and testing.

16.5.9 Inspection

The Contractor shall establish formal inspection procedures. Inspection procedures shall be submitted to the Administration for approval prior to implementation. All inspections shall be performed to demonstrate compliance with Specification requirements, identify deficiencies and confirm the elimination of deficiencies.

The procedures shall provide detailed instructions for the performance of inspections, documentation of results, acceptance criteria and disposition and treatment of non-conforming items. Instructions for publication and retention of the results and final report shall also be defined.

If the Contractor employs the services of outside inspection facilities, it shall assure that outside services contractors demonstrate compliance to the appropriate industry standards and the Specification requirements. Outside services contractors' certification of compliance with industry standards and Specification requirements shall be submitted to the Administration for approval, prior to acceptance of services performed.

16.5.10 Inspection, Measuring, and Test Equipment

The Contractor shall ensure that inspection, measuring, and test equipment is identified, controlled, calibrated, and maintained in order to demonstrate the conformance of work to Specification requirements.

The Contractor, subcontractors, and suppliers shall demonstrate an effective time- or usage-cycled calibration/certification program. Validity of measurements shall be ensured through the use of suitable inspection, measurement, and test equipment of the range and type necessary to determine conformance of items with Contract requirements. Tooling and fixtures used as a medium of inspection or manufacture shall be included in this program. At intervals established to ensure continued validity, measuring devices shall be verified or calibrated against certified standards traceable to the National Institute of Standards and Technology or approved equivalent. Every device verified shall bear an indication showing current status and date for re-calibration. All calibration certifications shall be recorded and become part of the QA/QC records. In no case shall the Contractor use test or measuring equipment that bears an expired calibration stamp.

16.5.11 Inspection and Test Status

The Contractor shall provide the means to identify the inspection and test status of work during production and installation. The system shall be capable of identifying the progressive inspection status of components or materials as to their acceptance, rejection, or non-inspection status. This system shall ensure that only work that has passed the required inspections and tests is accepted. Non-conforming items shall be identified by physical segregation and status indicators such as markings, serialization, tags, stamps, and inspection records.

16.5.12 Non-Conforming Material

The Contractor shall establish and maintain an effective system for controlling non-conforming material, including procedures for its identification, segregation and disposition. Dispositions to use "as-is" or repair of non-conforming material shall require the Administration's approval. All non-conforming material shall be positively identified to prevent unauthorized use, shipment, or intermingling with conforming material. Holding areas and procedures, mutually agreeable to the Contractor and the Administration, shall be established by the Contractor.

Product that does not conform to the specified requirements shall not be incorporated into the work without the express written approval of the Administration. Each such request for approval must be submitted in a formal proposal signed by the Contractor's program manager, project engineer, and quality representative.

The Contractor shall establish a Material Review Board (MRB), or equivalent review procedures, for non-conforming material that will identify the causes of defects, disposition of defective material, and recommend corrective actions to prevent recurrence, including verification of the effectivity of the corrective actions. The MRB shall include one Administration representative. The procedures shall identify all Contractor representatives and/or departments responsible for this review. The MRB shall have sufficient authority to make disposition of non-conforming product without interference or reprisal from its own management. A summary report on non-conforming material shall be issued on a monthly basis.

16.5.13 Correction and Preventive Action

The Contractor shall establish and maintain procedures for implementing corrective and preventive action. The Contractor shall implement and record any changes to the documented procedures resulting from corrective and preventive action.

Corrective action and related information shall be documented and made available to the Administration upon request. Corrective action shall extend to all subcontractors and suppliers and include, at a minimum:

A. Analysis of data and examination of discrepant products to determine extent and causes

B. Introduction of required improvements and corrections, initial review of the adequacy of such measures, and monitoring of the effectiveness of corrective action taken

C. Analysis of trends in processes or performance of work to prevent non-conforming products.

16.5.14 Handling, Storage, Packaging, Preservation, and Delivery

Written procedures shall be established to assure that items are handled, stored, and shipped in such a manner to prevent damage and loss. There shall be instructions for identification markings, precautionary signs, protection against weathering and corrosion, drying agents, moisture barriers, electro-static discharge, and control of shelf life.

16.5.15 Records

The Contractor shall establish procedures to maintain and control records required to furnish evidence of activities affecting quality. These procedures shall include a QA/QC records list that will define which records will be kept. The procedures will also identify responsibility for production, collection, indexing, filing, storage, maintenance, and disposition of quality records.

Adequate records shall be kept to provide evidence of quality and accountability. These records shall include results of examinations, inspections, tests, process controls, certification of processes and personnel, non-conformance (including disposition), calibrations, corrective action, audits and any other quality requirements defined in the Contract. The records shall be complete and available for review by the Administration as provided under the Contract.

Exceptions taken to the quality of workmanship on the vehicle, inclusive of all subsystems, components, and materials by both the Contractor's and Administration's inspection representatives shall be posted in a manner convenient to review at or on the affected vehicle. The rejection/approval status of each exception shall be readily determined throughout the vehicle's manufacturing cycle and shall be kept current by the Contractor's inspection force on a routine, daily basis. This exceptions document shall be included in the QA/QC record list.

The Contractor shall retain copies of all records and make them available to the Administration for a period of a minimum of seven (7) years after expiration of all warranty periods, unless otherwise specified.

16.5.16 Quality Audits

The Contractor shall submit a comprehensive system of planned and periodic audits. The audits shall be carried out by the Contractor to verify compliance with and effectiveness of all aspects of the Quality System. The audits shall be performed at predetermined periods by qualified personnel not having direct responsibilities in the areas audited. The documented audit results shall be reviewed by the Contractor's management personnel having responsibility in the area audited. Follow-up action, including re-audit of deficient areas, shall be as determined by the Contractor and reported to the Administration. Audit reports and follow-up action reports shall be available to the Administration for review and approval no later than 10 calendar days after each audit.

Audits of subcontractors and suppliers shall be made by the Contractor and may be witnessed by the Administration at the following times during the execution of the Contract work:

A. As a condition of the subcontract or purchase order, prior to the start of any work.

B. Within a 30 calendar-day period prior to formal acceptance by the Contractor of the first article inspection or services being supplied by the subcontractor or supplier.

C. When the supplier or supplier facility manufacturing the product has changed.

D. When re-certification is warranted due to unacceptable performance, such as product non-conformance, schedule impact, or cost overruns are encountered.

Non-conformance with any part of the approved Quality Plan will be cause for rejection of the Contract work. Any schedule delays caused by non-conformance with the approved Quality Plan, whether by the Contractor, its manufacturers, subcontractors or suppliers, will not serve as a basis for an extension of time under the Contract.

The Administration reserves the right to conduct independent audits of the Contractor's Quality System for its effectiveness at any time. This audit shall include the Contractor, subcontractors, and suppliers. The Contractor shall take prompt action to resolve problems and obtain approval by the Administration. At a minimum, QA audits of the Contractor will be made at the following times during the course of the Contract at the Administration's option:

A. Prior to the start of production of the first vehicle.

B. Within a 30 calendar day period prior to formal acceptance of the first vehicle.

C. When the supplier or supplier facility manufacturing the product has changed.

D. When re-certification is warranted due to unacceptable performance, such as product non-conformance, schedule impact, or cost overruns are encountered.

All QA audits shall judge and report on the degree of compliance with approved procedures prepared by the Contractor. Audit reports shall be prepared and submitted within 10 days following any audits conducted by the Administration. The audit report will describe the scope of the audit; the procedures used; a statement of all deficiencies found, keyed to the approved Quality Plan; the corrective action required for each deficiency found; and the date by which corrective action will be completed. The Contractor shall prepare a report in a similar manner for each audit conducted by it and shall submit a copy to the Administration and to the audited organization.

Each audit shall require a formal written response by the Contractor within 10 days of receipt of the initiating Administration audit report. Responses shall fully describe the methods and timetable by which compliance will be achieved and demonstrated. Contractor audit responses will be subject to the Administration approval.

16.5.17 Personnel Qualifications and Certifications

Contractor personnel performing inspections and tests shall be qualified for such work by virtue of prior experience and training, and verified by testing where applicable. Manufacturing personnel performing processes such as welding and brazing shall be currently certified for such work. Manufacturing personnel performing all other work shall be experienced for the task being performed. Records of personnel certification and qualifications shall be maintained and available for the Administration's review.

16.5.18 Statistical Techniques

The Contractor shall identify the need for statistical techniques that will be used for the Contract requirements. Sampling plans used by the Contractor shall be fully documented and based on generally recognized and accepted practices. Statistical quality control applications used in acceptance of parts, materials, and/or processes by the Contractor shall be submitted to the Administration for approval.

The Contractor may use certificates of compliance, with a certified copy of test results, for materials and products in lieu of specified sampling and testing procedures, as approved by the Administration. All evidence of compliance shall be preserved and shall be available to the Administration upon request. All certificates of compliance shall identify, at a minimum, the part number, serial number, and batch or heat number. The certificate shall be signed by an

authorized representative of the Contractor or subcontractor, stating that the equipment or material complies in all respects with Contract requirements and industry standards.

16.6 QUALITY SYSTEM PROCEDURES

The Contractor shall develop procedures to assure effective implementation of the QA/QC activities for this Contract. At a minimum, the following procedures shall be included in the Contractor's Quality System Manual for use in the Quality Plan:

A. Design control, including control of all technical documentation

B. Transmission of all QA/QC requirements to procurement sources

C. Surveillance of subcontractors and suppliers for conformance with all Specification requirements

D. Receiving inspection, in-process inspection, and final inspection

E. Production and process control

F. Operator certifications and qualifications

G. Functional testing

H. Discrepancy control

I. Discrepant Material Disposition

J. Corrective action

K. Measuring and test equipment calibration and certification

L. Drawing control

M. QA/QC records and record retention

N. Shipping inspection

O. Selection of qualified procurement sources

P. Evaluation and assessment of subcontractor's Quality System

Q. Monitoring of subcontractor QA/QC performance

R. Evaluation of procured articles against purchase order requirements

S. Feedback of problems and their resolutions to the Contractor's engineering and production departments

T. Material Equipment Certification and Test Reports

U. Mill and laboratory testing and reporting.

16.7 INSPECTION REQUIREMENTS

During vehicle overhaul, the Contractor shall provide inspection points at all critical stages manufacturing operations, and test to monitor production progress and adherence to Contract requirements. There shall be sufficient inspection points to ensure that non-conforming material or product does not enter or remain in the production process.

The Contractor shall inspect and physically or functionally test all items to be delivered under the terms of this Contract. Inspection shall occur at appropriate points in the manufacturing sequence to ensure compliance with drawings, process and test specifications, quality procedures and standards. Non-conformance shall be documented and corrected according to TS Section 16.5.12. Discrepant material review results and recommendations shall be documented and corrective action taken according to TS Section 16.5.13.

The Contractor shall ensure that inspections are performed on the latest approved design. When modifications, overhauls, or replacements are required, there shall be a reinspection of the affected items. All inspection procedures shall provide for reporting deficiencies or questionable conditions to the Administration.

Typical inspection points are identified in the sections that follow. The Administration's participation in or witness to any or all of these inspections shall be at the Administration's discretion and shall in no way alleviate the Contractor's responsibilities for such inspections.

16.7.1 First Article Inspections

First Article Inspections (FAI) shall be required for selected overhauled equipment, and all new and upgraded systems, assemblies, and subassemblies, which are furnished by the Contractor and subcontractors.

At a minimum, the following shall be subject to a formal FAI:

A. Trucks
B. Wheel/Axle assembly
C. Battery Charger

Within 30 days after NTP, the Contractor shall provide to the Administration a list of items subject to FAI ***(CDRL 1603)*** and based on the approved overhaul schedule. The list shall provide notification of no less than 15 days in the U.S. and 30 days outside the U.S. for any scheduled event. The list shall be updated and issued monthly.

The Contractor shall conduct the FAI at the point of manufacture on the first piece, component, assembly, or system constructed using production tooling and conditionally approved or approved design drawings. A procedure shall be submitted by the Contractor and approved by the Administration prior to conducting the FAI.

The FAI shall establish the quality of workmanship for the balance of like components and evaluate component and system maintainability where possible. Photographs shall be taken to document the results of the FAI. Three sets of photographs shall be forwarded to the Administration, with a minimum of one set to be retained by the Contractor. Any subjective characteristics noted during the FAI shall be evaluated and criteria for inspection shall be agreed to, jointly, by the Administration and the Contractor. Whenever possible, the Contractor will retain at least two sets of samples to inspect subjective characteristics, such as color, finish, or texture. The approval status of samples shall be clearly visible and easily authenticated. Samples are to be retained in a secure place. At a minimum, the following shall be required to perform an FAI:

A. A complete set of drawings approved or conditionally approved by the Administration.

B. Material certifications.

C. Vendor certifications, as required.

D. Inspection forms that control in-process work.

E. Proof that all required testing has been performed in accordance with the Approved Inspection and Test Plan and the results satisfy specification requirements.

F. A Contractor pre-FAI final inspection report to assure readiness of the first article.

G. Tools and labor required to perform inspection and test.

H. Tools and labor for required disassembly and removal of covers, etc.

I. Equipment and labor required to perform functional test, if required.

J. The inspection article shall be displayed in an accessible, well-lit space to allow ease of inspection.

K. FAI procedure submitted to the Administration for approval 30 days in advance of the first FAI.

The Contractor shall not be permitted to schedule more than one (1) FAI per day without the prior written approval of the Administration.

16.7.2 Receiving Inspection

Receiving inspection activity shall provide for the inspection of all incoming material. Written procedures shall be implemented to assure items are inspected upon receipt to verify conformance to acceptance criteria of specifications, drawings, and purchase orders. All material certifications and test reports used as the basis for acceptance by the Contractor shall be preserved. A material identification system shall be used to preclude the use of incorrect or noncompliant materials during manufacture.

16.7.3 In-Process Inspection

The Contractor's Quality System shall ensure that all production operations, together with all processing and fabrication of any type, shall be performed under controlled conditions. Controlled conditions shall include documented work instructions, adequate production equipment, and any special working environment. The Quality System shall effectively monitor the issuance of and compliance with all of these work instructions. Inspection procedures shall be used where applicable. Inspection shall be accomplished in a systematic manner selected by the Contractor, subject to audit and surveillance by the Administration.

16.7.4 Hold-Point Inspection

The Contractor shall establish hold points in the teardown and production process to provide the most critical form of inspection. Hold points shall be utilized to inspect completed operations or installations. Hold points shall also be used to inspect items that are about to be covered by succeeding assembly operations. A list of hold-point inspections shall be submitted to the Administration for approval. Non-conforming products shall not be released from a hold point area until all discrepancies have been corrected. The Contractor shall use inspection forms to document all discrepancies found. The inspection forms shall be posted at or near the point of inspection for each vehicle and included with the Vehicle Overhaul History Book when all discrepancies have been eliminated. The Contractor shall submit a list of hold-point inspections to the Administration for review and approval.

The Contractor shall submit a list of hold point inspections to the Administration for review and approval. ***(CDRL 1604)*** The list of hold points shall include both surveillance and mandatory hold points that will be enforced by the Contractor staff. The Administration reserves the right to jointly witness any and all hold point inspections. In addition, the Administration retains the right to add up to five additional hold points, at its discretion, any time during the Contract. The additional hold points that may be required by the Administration, may be added or removed at the Contractor or its subcontractor facility, and shall be at the Administration's sole discretion.

16.7.5 Pre-Shipment Final Inspection

After factory testing and prior to shipment, the Contractor shall present each vehicle to the Administration for inspection. Before the Administration's final inspection, the vehicle shall be completed, final inspected, and accepted by the Contractor's QA/QC Department. All

workmanship items covered by prior inspection reports shall be corrected and all production and functional testing completed before final inspection begins. During the final inspection, all Contractor and subcontractor personnel shall vacate the vehicle, except as provided below. All Contractor inspection reports shall be made available to the Administration's inspectors at the time of final inspection.

The Contractor shall provide a qualified individual to accompany the Administration representative during final inspection. The Contractor's representative shall have the authority to assure that proper corrective action is taken. The Contractor shall provide labor and tools to remove or open and re-apply covers and doors. During final inspection, all systems shall be operational, with the use of approved types of special equipment or power supplies, where necessary.

16.7.6 Shipping Inspection

The Contractor's Quality System shall provide for the proper inspection of product to ensure completion of manufacture prior to shipment. Written procedures shall be prepared to ensure that all shipments shall be adequately prepared to preclude damage during shipment. These procedures shall include vehicle shipping preparation instructions and inspection procedures for vehicles scheduled for shipment to the acceptance site.

16.7.7 Outbound and Inbound Inspection

A joint outbound inspection shall be conducted by both the Contractor and the Administration to document the condition of each vehicle as it leaves the Administration's property. The Contractor shall conduct an inbound inspection with the Administration's resident inspector present at the Contractor's facility to confirm the results of the outbound inspection. Both the Contractor and Administration representatives shall sign off on the results of each inspection. The Contractor shall be responsible for preparing the inspection form for both the outbound and inbound inspection and shall submit it to the Administration for approval. Any equipment or items that are found to be missing after the completion of the outbound inspection will be the responsibility of the Contractor.

16.7.8 Post-Shipment Inspection

The Contractor shall conduct a receiving inspection on each vehicle upon arrival of the vehicle on Administration property. At its sole discretion, the Administration may choose to accompany the Contractor's inspector during this inspection. The results of the inspection shall be documented and included in the Vehicle Overhaul History Book. All discrepancies identified as having occurred during the shipping process shall be corrected according to TS Section 16.5.13.

16.7.9 Pre-Acceptance Final Inspection

After all post-shipment testing has been completed, the Administration shall conduct a final inspection.

16.8 MODIFICATION/RETROFIT PROGRAM

The Contractor shall develop a Modification Schedule to effect and inspect retrofits or modifications made to vehicle at the Contractor's site and on the Administration's property. When a retrofit or modification is made by the Contractor, it shall be to the entire fleet in kind, or, if approved by the Administration, on an effective vehicle basis. The Contractor's Quality Control shall verify and document the completion status of all current modifications at the time of final inspection. The Modification Schedule shall detail how activities will be coordinated among the various responsible parties to ensure that all required activities are accomplished. The Contractor shall also develop a matrix of all modifications performed and to be performed. The Modification Schedule matrix shall be updated and submitted to the Administration monthly.

16.9 SUBCONTRACTOR INSPECTION

Inspection of subcontractor products and materials shall be conducted at the subcontractor's facility.

The Contractor shall provide to the Administration a list of vendor items subject to FAI. This list shall include the projected schedule dates for each event. FAIs shall be performed in accordance with requirements in TS Section 16.7.1.

Once a product has been approved at FAI, the subcontractor may begin shipment of product to the Contractor's facility. Subcontractor pre-shipment inspections shall be scheduled prior to each shipment. The Contractor shall notify the Administration at least 30 days in advance of any shipment to allow the Administration to make travel arrangements. The subcontractor shall be required to provide similar inspection elements as defined for FAIs in TS Section 16.7.1, the only exception is that the pre-FAI inspection report identified in TS Section 16.7.1 shall be replaced with a production final inspection report.

Changed designs or poor manufacturing performance of the subcontractor may, at the sole discretion of the Administration, require a repeat of the FAI.

16.10 REQUIRED CDRLS

1601 Software Quality Assurance Plan (16.2) [Only Required for New Systems]

1602 Quality Plan (16.4.1)

1603 List of Items Subject to FAI (16.7.1)

1604 Hold-Point Inspection List (16.7.4)

SECTION 17
MANAGEMENT AND SUPPORT SYSTEMS

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SECTION 17
MANAGEMENT AND SUPPORT SYSTEMS

17.1 GENERAL SYSTEM DESCRIPTION

This section defines the management program required to provide a process of planning, scheduling, design review, controlling, and reporting. This section also defines reliability, maintainability, manuals, and training.

17.2 CONTRACT MANAGEMENT

The Contractor shall propose the designated Project Manager to the Administration for approval. The Contractor's management structure shall enable the Project Manager to manage the Work effectively. Formal communication shall be between the Project Manager and the Administration. All communication, written and verbal, and all documentation for the Contract shall be in English (U.S. terminology). All weights, dimensions, and measurements shall be stated in English units.

The Project Manager, once approved, shall be the primary contact between the Contractor and the Administration.

17.2.1 Management Plan

The Contractor shall submit a Management Plan to the Administration for review and approval. ***(CDRL 1701)*** The Management Plan shall be explicit in the areas of organization, controls, planning, and schedules. The Management Plan shall be consistent with the Contractor's Quality Assurance Program Plan and Quality Assurance Manual, as defined in TS Section 16 Quality Assurance. The Management Plan shall include the following specific information, including references to other plans as indicated:

A. **An Organization Chart(s) –** Identify participants responsible for each major function to be performed in designing, engineering, overhauling, and managing the overhaul program. The narrative section accompanying the organization chart(s) shall address the following:

   1. The executive structure for each phase of the Project including any external management committee for the Project. How executive decisions will be made, communicated and implemented within the Contractor's organization.

   2. The Project Manager, Lead Electrical Engineer, Lead Mechanical Engineer, and Project Scheduler.

   3. The chart(s) shall show the functional structure of the organization down to the task leader level, and where possible, shall identify lead individuals by name. All major participants shall be identified in the chart(s). A list shall be included with their mailing address, phone number, and email address.

4. If significant changes to the Contractor's organization are planned for different phases of the Project, then separate charts shall be provided for each phase.

5. The proposed interfaces and relationships with the Administration for critical issues such as project management, quality assurance, system safety, and systems integration.

6. The address and telephone number of the major office(s) or facilities of each firm in the Contractor's organization and the number of Project staff assigned to those locations.

7. The management systems to be used for configuration management, financial and schedule management, and MBE/DBE reporting; and the frequency of periodic and status reports to be provided to the Administration during the Project.

B. **Project Control Methodology –** Describe in detail the following:

1. Work Breakdown Structure – Explain the proposed Work Breakdown Structure system and how it will be used to manage the project work.

2. Construction and Production Schedule Management – Describe the process for developing and updating the Project Schedule and for monitoring the progress of critical path activities. Describe the process to be used to resolve scheduling conflicts. Describe the method for reporting scheduling conflicts or issues that may require the Administration's participation in resolution activities.

3. Cash Flow – Describe how progress will be recorded and invoices produced and supported, including integration of change orders.

C. **A Project Plan that is compatible with the Quality Assurance section and Testing section requirements** – The Project Plan document shall represent the Contractor's actual plan that shall be specifically developed for this project; and shall define how the overhaul process will occur, and how overhaul procedures will be developed; and shall include the following:

1. Overhaul process workflow in block diagram format, showing Contractor and subcontractor operations.

2. Designated hold point and production inspection points for the production process specific to this overhaul project.

3. Description of the activities at each station along the production line.

4. Corrective action procedures to prevent recurrences of nonconforming conditions or events.

5. Instructions and procedures for control and revision of work and for the timely release to the production floor of the latest released revision of the work instructions, drawings, and procedures.

D. A master program schedule, emphasizing key milestones and events

E. A flow chart of project task scheduling that depicts interaction of vehicle components and equipment overhauled and/or procured from suppliers. The flow chart shall be categorized by each overhauled system in the vehicle.

F. A schedule for the items of design and manufacture that require approval

G. Configuration and Data Management – Provide the configuration management plan for managing and tracking the project submittals and subsequent revisions. The plan should describe the system for controlling and retaining the revision status of documentation and approving changes to approved baseline documents and equipment configurations. Provide a description of the proposed change control process, a detailed task flow diagram, and an organization chart. Describe how the Administration will be involved in the process and how information regarding configuration changes will be provided.

H. Shipping Plan – Describe the planned methodology for transporting the vehicle from the Administration to the Contractor's facility; and vice versa. Indicate the carriers by name, the insurance carriers, the methods of shipment, the estimated duration of each transit, and pick-up and arrival dates at the Administration's facilities.

17.2.2 Progress Reviews and Reports

Progress reviews shall be held on a monthly basis. The reviews shall be held at either the Contractor's or the Administration's facilities, as directed by the Administration.

For the duration of the Contract, commencing from the calendar month subsequent to the NTP date, the Contractor shall submit formal Monthly Progress Reports (MPR), every month on a recurring basis no later than the 10th day of the month. ***(CDRL 1702)*** It is noted that the Contractor's progress payment invoice will not be processed if the previous monthly progress report is not submitted.

At a minimum, the following information shall be included in the MPR:

A. Reporting on actual progress against planned progress.

1. Information provided shall include progress of scheduled activities of major procurements, subcontracts, submittals, design releases and review, Administration review and approval items, and other activities which may offer a potential impact to maintaining the approved schedule.

2. Problem areas and plans for the forthcoming period shall also be included.

B. Monthly progress schedule updates, in accordance TS Section 17.2.3.4.

C. Subcontractor/Supplier progress reports, which shall include a matrix delineating information related to all major equipment suppliers and overhaul subcontractors, who will support the Contractor's engineering and overhaul processes. This shall include subcontractors who may provide engineering and/or overhaul support on-site at the Contractor's facility.

   1. The matrix shall identify the vendor name, equipment supplied and/or overhauled, status of their contract with the Contractor (PO number, date, or estimated date for hiring the supplier into the overhaul program, etc.).

   2. The matrix shall also include information related to material shortages and or material lead time issues, as related to each vendor.

D. Non-Conformance Report. The list of NCRs including disposition.

E. Tracking list delineating salvage equipment and material returned to Administration, updated to reflect past month activities.

F. Tracking list delineating float equipment and material, updated to reflect past month activities.

In addition to the requirements specified in this section, the Administration, at its discretion, may request special reports and/or topical reviews to be held, in order to address problem areas.

17.2.3 Schedules and Project Controls

The Schedule submitted shall be a detailing of the schedule submitted under the Contractor's Proposal.

17.2.3.1 General

Full compliance with the following schedule submission requirements is essential to ensure the timely processing of progress payments. The Administration intends to utilize the Contractor's project schedule to monitor the progress of the contract; and therefore, it is imperative that the Contractor's project team includes scheduling staff with adequate experience in performing CPM analysis and in developing (and maintaining) a fully resource loaded schedule, as related to major vehicle overhaul programs. As specified in Special Provisions Section H–Measurement and Payment, the Administration has designated certain recurring milestone payments to ensure that the project schedule is developed and maintained in accordance with the Administration's requirements.

The Contractor shall prepare and maintain a detailed progress schedule in accordance with this Section. This schedule shall be the Contractor's intended working schedule and shall be used to plan, organize, and execute the work; record and report actual performance and progress; and forecast remaining work. Work shall be scheduled such that the specified intermediate milestone dates and completion dates are met as specified in the Special Provisions. The initial

baseline schedule submittal shall reflect zero status, addressing the contract work as viewed from Notice to Proceed looking forward in time.

17.2.3.2 Progress Schedule

A Progress Schedule defining the Contractor's production and delivery schedule shall be prepared and submitted in accordance with the requirements specified in this Section. The Progress Schedule shall be submitted to the Administration for approval within 45 days after Notice to Proceed. ***(CDRL 1703)***

The Progress Schedule shall address contract, production, and overhauled vehicle delivery activities for the period from Notice to Proceed to delivery of the last overhauled vehicle. The Project Schedule shall be a time-scaled bar chart derived from the Contractor's formal Project Scheduling software. The Contractor shall provide supplementary written information sufficient to describe the methods to be used and the resource restraints in order to enable the Administration to evaluate the Project Schedule for its usefulness as a valid and workable management tool.

The Progress Schedule shall provide sufficient detail and clarity of form and technique so that the Contractor can properly control the Contract work and the Administration can readily monitor and follow progress of the Contract work. The schedule shall reflect on-time completion of all contractually-specified intermediate milestone(s) and completion dates. The degree of detail shall be to the satisfaction of the Administration. The Progress schedule shall indicate, but is not limited to, the following:

A. Key planning activities

B. Key system/equipment procurement activities performed by Contractor

C. Key system/equipment procurement activities performed by Subcontractor(s)

D. Key design and engineering activities performed by Contractor

E. CDR, delineated by each system

F. PDR, delineated by each system

G. FDR, delineated by each system

H. Key design and engineering activities performed by Subcontractor

I. Submittal of System Work Plans

J. Progress Meetings

K. Vehicle outbound inspection at MTA's facility

L. Vehicle receiving inspection at Contractor's facility

M. Preliminary production activities including steam cleaning and equipment disassembly.

N. For systems/equipment that are disassembled from the vehicle by the Contractor and shipped to a subcontractor for overhaul; provide scheduled dates for receiving the material at the Subcontractor facilities

O. Key vehicle manufacturing activities at the Contractor's facility

P. For systems/equipment that are of new design supplied by a vendor, and/or overhauled by a subcontractor; provide scheduled dates for receiving the material at the Contractor's facility

Q. Key vehicle manufacturing activities at subcontractor facilities

R. Contractor's QA/QC activities, including but not limited to:

1. Production QA activities at each manufacturing station
2. Contractor QA hold point inspections
3. Administration hold point inspections
4. FAIs scheduled at the Contractor's facility
5. FAIs scheduled at the subcontractor facilities
6. Sourcing inspection for subcontractor work

S. Contractor's testing activities, including but not limited to:

1. Production test activities at the Contractor's facility
2. Production test activities at subcontractor facilities
3. System qualification tests at the Contractor's facility
4. System qualification tests at subcontractor facilities
5. System functional and acceptance tests at the Contractor's facility
6. For all overhauled vehicles, milestones for static and dynamic acceptance testing to be completed at the Administration.

T. Overhauled vehicle ready for shipment from Contractor's facility

U. Overhauled vehicle delivered at the Administration's facility

V. Training program activities

1. Commencement of training
2. Completion of training

W. Warranty program activities.

17.2.3.3 Administration Review and Approval

The Contractor shall participate in a conference with the Administration to appraise and evaluate the proposed baseline project schedule. The Contractor shall make any revisions

necessary as a result of this review and resubmit the applicable items within 15 days after the conference.

When the baseline schedule and supporting analysis documentation, or revisions thereto, satisfy the Specification requirements and completion dates, the Administration will approve the Contractor's submittal.

17.2.3.4 Monthly Project Schedule Updates

At the request of the Administration, the Contractor shall participate in a pre-update conference to verify progress prior to the formal monthly submittal.

The Contractor shall submit three (3) copies of the following to the Administration for review and approval: ***(CDRL 1704)***

A. Updated Progress Schedule. If the submitted update of the Progress Schedule is larger than 11 x 17 inches in size, submit also a reproducible copy.

B. Narrative, covering as a minimum:

1. A description of physical progress during the report period.
2. Problem areas, current and anticipated.
3. Delays incurred during the report period and explanation of same.
4. Delaying factors, their impact and an explanation of corrective actions taken or proposed to mitigate those delays.
5. Changes in activity duration including an explanation.
6. Changes in activity sequence including an explanation.
7. Listing with explanation of added activities.
8. Listing with explanation of deleted activities.
9. Listing with explanation of changes in interdependencies.
10. Plans for forthcoming report period.

The Contractor shall submit a revised Progress Schedule and Narrative documentation when one or more of the following conditions occur: ***(CDRL 1705)***

A. When a change or delay significantly affects any specified intermediate milestone date, the completion date or the sequence of activities.

B. When the Contractor elects to change a sequence of activities affecting any critical path or to significantly change the previously approved schedule submittal.

C. When, in the opinion of the Administration, the status of work is such that the Progress Schedule and Narrative documentation is no longer representative for planning, executing and evaluating the work.

The monthly invoice will not be processed before the Administration approves the monthly progress status update prior to submittal of the monthly progress status update in accordance with the requirements of this Section.

17.2.3.5 Change Orders, Delays, and Time Extensions

The General Provisions shall be augmented by the following requirements.

A. When proposed change orders are initiated or delays are experienced the Contractor shall submit to the Administration in writing: ***(CDRL 1706)***

   1. A Time Impact Analysis illustrating the influence of each change or delay on any specified intermediate milestone date or completion date. The Time Impact Analysis is to include, as a minimum, what critical path activities are affected on what specific workdays and why for each activity for each workday. Also, if the claim is for more than one contract milestone, the Time Impact Analysis is to address each contract milestone individually.

   2. A proposal demonstrating how the Contractor plans to incorporate the change or delay into the current Progress Schedule with minimal impact to milestone completion dates. Justification of the plan shall be based on revised activity logic and/or durations in addition to such other supporting evidence as the Administration deems necessary.

   3. Submit 3 copies of each Time Impact Analysis and Schedule Revision Proposal within 30 days after a delay occurs or notice of direction is given to the Contractor.

B. The Administration will, within a reasonable time after receipt of the Contractor's Time Impact Analysis and Schedule Revision Proposal, review the submittal and advise the Contractor in writing thereof. Upon agreement by both parties the appropriate revisions shall be incorporated into the Progress Schedule at the next monthly update.

C. It is understood and agreed that schedule float time is not for the exclusive use of either the Administration or the Contractor. Extensions of time for performance under any and all of the provisions of this Contract will be granted only to the extent the equitable time adjustment for activities affected exceed the total float along the paths involved.

Where the Administration has not yet made a final determination, or the parties are unable to agree on the schedule revisions or time extensions, if any, the Contractor shall incorporate such revision as the Administration may determine to be appropriate for such interim purposes. It is understood and agreed that any such interim determination for the purpose of this paragraph shall not be binding on either party for any other purpose, and that after the Administration has made a final determination the Contractor shall revise the Progress Schedule in accordance with the final decision.

17.3 INITIAL ACTIVITIES MEETING

This meeting shall take place no later than 20 days after NTP at the Administration's facilities for the purpose of introducing the Administration's personnel to the Contractor's management team. Formal channels of communication shall be established and procedures for letter and meeting numbering, etc., agreed upon. Also during these meetings, the Contractor shall present the project control methodology and convey the plans for the initial activities prior to formal progress reporting. ***(CDRL 1707)*** Meeting minutes reflecting agreements, plans, and open items will be distributed by the Administration.

17.4 DESIGN AND CONFIGURATION CONTROL

The Contractor's program for design and configuration control shall meet the following requirements:

A. Topical reviews to address key issues shall be held as needed.

B. Sample materials shall be submitted for approval during the design process, as required.

17.4.1 System Overhaul Process Reviews

For all overhauled equipment, the Contractor shall conduct a formal System Work Plan review. The review may be conducted during monthly progress meetings; and the intent of the review shall be to "walk-through" the proposed equipment overhaul process for each system. The Contractor's System Work Plans shall be utilized in conducting the reviews.

17.4.2 Design Reviews

The Contractor shall conduct the design reviews for all new and upgraded equipment as described below. There will be three formal design reviews:

A. Conceptual Design Review (CDR)
B. Preliminary Design Review (PDR)
C. Final Design Review (FDR)

Design reviews shall be conducted to evaluate the progress and technical adequacy of the design and compatibility with the performance requirements of the Contract. Two (2) weeks prior to each review, a design review package shall be submitted that includes the information described in TS Section 17.4.5 through 17.4.7. ***(CDRL 1708)*** Minutes of review meetings will be distributed by the Administration.

The design review schedule shall be included in the Program Schedule specified in TS Section 17.2.3.

17.4.3 Design Baseline

For the purposes of change control, the design baseline shall be established at the FDR. Changes beyond FDR that affect the design characteristics agreed to, or presented at the FDR, shall be submitted for approval. ***(CDRL 1709)***

17.4.4 Production Baseline

The production baseline shall be established at First Article Inspection (FAI). Changes beyond FAI shall be documented in the form of change requests and submitted for approval. ***(CDRL 1710)***

17.4.5 Conceptual Design Review

At a minimum, the CDR shall:

A. Confirm the Contractor's management team and the scope of supply of sub suppliers.

B. Provide narrative descriptions of the new and upgraded subsystems proposed by the Contractor and sub suppliers.

C. Provide a dynamic outline for the cars including worst-case conditions of wear and failures for new equipment, if required.

D. Identify all interfaces between new and upgraded subsystems and the overhauled vehicle. Identify responsibilities between the Contractor and suppliers and provide a schedule for completion of detailed definition of the interfaces.

E. Confirm that the Contractor is familiar with the intended operations and maintenance environment of the Administration.

F. Identify information needs and decisions required from the Administration.

The primary objectives of the CDR shall be to acquaint the Administration with the Contractor's intended design and procurement activities, to resolve external interfaces, and to provide the basis for proceeding to PDR. The CDR shall be held at the Contractor's facility. In addition to the Contractor's lead engineers, appropriate lead engineering staff, from the respective supplier or subcontractor, shall also participate in the CDR.

17.4.6 Preliminary Design Review

The PDR shall be conducted to review the progress and adequacy of the selected design approach and to evaluate specification compliance. The PDR shall be held at the Contractor's facility. The PDR shall represent approximately 50 percent completion of the total design engineering effort for the new and upgraded subsystems.

In addition to the Contractor's lead engineers, appropriate lead engineering staff, from the respective supplier or subcontractor, shall also participate in the PDR.

At a minimum, the PDR shall include:

A. Final list of all new interior components and materials for approval by the Administration

B. Detailed functional descriptions of the new and upgraded subsystems and major components

C. Detailed interface descriptions including:

    1. Mounting arrangements and installation methods
    2. Definition of all electrical connections with voltage, current waveform, and impedance levels

D. Single-line power diagrams, control schematics and functional block diagrams for each new or upgraded subsystem

E. Software design descriptions (first level of software documentation) for microprocessor-based or other programmable equipment, as appropriate.

F. List of trainlines

G. Engineering calculations, computer printouts, and other relevant data that verify that the new and upgraded systems and equipment meets the specified performance

H. List of diagnostic and test equipment for each subsystem.

I. List of special tools for each subsystem.

The Contractor is encouraged to submit PDR information incrementally in order to reduce the duration and impact of the formal PDR meeting. Ideally, the formal PDR meeting should be limited to confirmation of previously reviewed, commented and approved-in-principle submittals, and resolution of open items that require a meeting environment. The PDR shall be held at the Contractor's facility.

17.4.7 Final Design Review

The FDR shall be conducted incrementally when detailed design of a subsystem is complete and the production drawings are ready for release. The FDR shall determine that detailed design of the equipment under review will satisfy the design requirements established in the contract documents and shall confirm the exact interface relationships between the equipment and the overhauled vehicle and any other items that are Administration furnished. The reviews shall be held on mutually agreeable dates at the Contractor's or sub supplier's facilities.

Data submitted for the PDR shall be updated to a level of detail consistent with completed design and submitted for the FDR.

In addition to the Contractor's lead engineers, appropriate lead engineering staff, from the respective supplier or subcontractor, shall also participate in the FDR.

At a minimum, the FDR shall include:

A. Latest revisions of the drawings and documentation submitted for the PDR.

B. Assembly drawings

C. Software documentation, as appropriate, at the second level, consisting of structured data flow diagrams to the lowest level of decomposition with software module descriptions (or elemental process descriptions) in structured narrative format. The second level of software documentation is one level above source code.

In general, the Administration shall have on-site access to drawings and other design and manufacturing information related to manufacturing release of the vehicle, including microprocessor source code, if appropriate and other proprietary technical data. On-site access shall be provided at the Contractor's and each sub supplier's facility. The Contractor may establish suitable confidentiality agreements.

17.4.8 Drawing Requirements

Drawings shall be dimensioned in U.S. units (feet, inches) or both U.S. and metric units. Electrical schematic drawings shall be drawn in accordance with IEEE standards, using symbols approved by the Administration. All drawings shall be drawn using CAD, as approved by the Administration. As-built drawings shall be supplied in AutoCAD 2000 electronic format and three (3) sets of reproducible copies. ***(CDRL 1711)***

The Contractor shall submit a drawing tree and list. The list shall provide space for tracking the submittal status of each drawing ***(CDRL 1712)***

As part of the drawing tree submittal, the Contractor shall include the primary drawing numbering system, including the significance of characters. Nameplates on major equipment items shall provide space for Administration numbers to be added by the Contractor.

The review of drawings shall neither be construed as permitting any departure from the Contract, nor as relieving the Contractor of the responsibility for any error, including details, dimensions, and materials.

The Contractor shall submit drawings for review by the Administration. These shall include, but not limited to, the following:

A. Static and Dynamic outline of the overhauled vehicle

B. Top-level drawings, assembly and major subassembly drawings, installation and arrangement drawings for new and upgraded subsystems

C. Single-line, control schematic, and functional block diagram drawings for each new subsystem

D. Electrical wiring diagram and schematic drawings for each modified electrical circuit

E. Interface control drawings

F. Outline drawings of new and upgraded equipment components showing:

1. Overall dimension, orientation, center of gravity, points of normal support, and method of support during mounting and removal.

2. Location of access doors and covers.

3. Required drawout space and area required to open access doors.

4. Location and space requirements for cable and pipe entrances.

17.4.9 Specifications for Final Record

The Contractor shall provide three (3) paper copies and one (1) electronic copy on CDROM of the conformed specifications. ***(CDRL 1713)*** The conformed specifications shall be the final record of technical specifications and shall have the Contractor's engineering, manufacturing, and installation changes incorporated during the time-period from NTP through final acceptance of the last overhauled vehicle.

17.5 CONFIGURATION VERIFICATION AND DOCUMENTATION

The Contractor shall submit for Administration approval, a plan detailing the process to be used for drawing verification, revision, scanning, and conversion, which shall meet the requirements of this section. ***(CDRL 1714)***

17.5.1 Equipment Configuration Verification

It is the Administration's intent to have the Contractor audit and verify the existing equipment configuration to latest OEM configuration. It is the Contractor's responsibility to obtain the latest OEM configuration for all overhauled subsystems, including vendor developed overhaul procedures, component design modifications, manufacturing procedures, etc. The Contractor's objective in meeting the requirements of this section shall be to ensure the following:

A. To ensure that the equipment on each overhauled car matches the latest OEM configuration, unless noted otherwise for the particular equipment

B. To identify equipment changes made in the field to the as-built vehicle

C. To ensure that the design and installation of all field modifications meet the quality and workmanship standards of the specification.

The Contractor shall audit all overhauled subsystems on each vehicle as part of the verification process. Equipment/components that are not compliant with the latest OEM configuration shall be modified as necessary or otherwise made compliant by the Contractor, and the scope of work shall be considered to be part of the Contractor's overhaul work.

The Administration and/or its operating railroad contractors may have performed in-house field modifications (equipment modifications and/or configuration changes) to the as-built vehicle. Documentation may not available for modifications made in the field. Elsewhere in the specification, the Administration has detailed the work scope for all known field modifications. However, during the audit, if equipment is found to have undergone any in-house modifications and/or field changes that are not specified elsewhere in the specification, the Contractor shall notify the Administration to determine disposition prior to making any equipment/configuration modifications. The Administration may have the Contractor complete the work in accordance with Special Provisions Section F-Legal Requirements.

During the audit, should the Contractor find a field modified equipment configuration, which is not detailed elsewhere in the specification and has a conflict with the latest OEM configuration, the Contractor shall notify the Administration for disposition. Unless instructed otherwise by the Administration, the Contractor shall make all necessary modifications to the equipment to bring it in compliance with the latest OEM configuration.

The Contractor is also responsible for updating and revising the appropriate existing as-built documentation to reflect the correct equipment configuration as determined from the audit. As-built documentation includes engineering drawings, parts catalog(s), and maintenance manual(s).

17.6 RELIABILITY

The objective of the Reliability Program shall be to deliver an overhauled vehicle that has equipment reliability and operational availability equivalent to the best vehicle fleets.

17.6.1 Reliability Estimate

The Contractor shall submit a reliability estimate for new and upgraded equipment. The reliability estimate shall provide estimates for each major subsystem. Estimates shall be based on actual revenue service results for identical equipment operating under service conditions and duty cycles equivalent to the MARC operating environment. Reasonable extrapolations may be made for non-identical but similar equipment. For equipment that is a new design, or significant evolution or upgrade of existing equipment, the prediction shall be based upon the methodology of MIL-HBK-217. Estimates shall also be given by failure type, as specified in TS Section 17.6.2. The reliability estimate shall be submitted for approval. ***(CDRL 1715)***

17.6.2 Failure Classifications

Failures that occur in revenue operations and require subsequent maintenance action shall be classified into one of four categories:

> Type 1: Failures that can be reset or bypassed from the Cab and result in no loss of performance or other penalty. A maximum fault isolation and correction time of 2 minutes is allowed.
>
> Type 2: Failures that require the Engineer to leave the cab to reset, bypass, or otherwise correct the failure, or that result in a minor loss of performance such as door cut-out. A maximum fault isolation and correction time of 4 minutes is allowed.

Type 3: Failures that result in major performance reduction requiring removal of the vehicle from revenue service prior to scheduled removal. Type 1 and Type 2 failures that cannot be isolated and corrected within 2 or 4 minutes respectively, using the fault annunciations and facilities provided, shall be classified as Type 3 failures.

Type 4: Failures that are not detected in operation, failures that occur while not operating and all other failures that are not classified as Type 1, 2 or 3.

17.6.3 Reliability Requirements

The mean time between failures for the major new and upgraded subsystems shall be quantified by the Contractor while the overhauled vehicle(s) are operated in service on the Administration's property. The achieved reliability shall be submitted in a Reliability Report to demonstrate compliance with the fleet defect requirement of the Special Provisions. The Reliability Report shall be updated monthly and resubmitted throughout the general and extended warranty periods, or until fleet defects are satisfactorily corrected. ***(CDRL 1716)***

17.7 MAINTAINABILITY

Maximum consideration to maintenance, troubleshooting, component removal, repair, and inspection shall be given in the design of new and upgraded subsystems and components. The objective of maintainability is to minimize maintenance labor and materials costs, vehicle downtime, and the need for specially trained or highly skilled repair persons.

17.7.1 Modular Design

Modular design principals shall be employed to the greatest extent practical on new and upgraded subsystems. Components shall be packaged together in replaceable subassemblies according to the logical function that they perform, and using standardized dimensions and components to achieve flexibility in use. Components or subassemblies requiring occasional removal shall preferably be plug-in units. Plug-in units shall be adequately identified, secured and keyed to prevent misapplication.

17.7.2 Adjustments

The need for adjustments shall be avoided. Where adjustment points cannot be avoided, they shall be readily accessible, adequately identified and self-locking to prevent inadvertent adjustment or drift.

17.7.3 Accessibility

All new and upgraded systems and components serviced as a part of periodic preventative maintenance shall be readily accessible for service and inspection. Removal or physical movement of components unrelated to the specific maintenance and/or overhaul tasks involved shall be unnecessary. Relative accessibility of components, measured in time needed to gain access, shall be inversely proportional to frequency of maintenance and overhaul of the components.

17.7.4 Interchangeability

Assemblies or components that are functionally interchangeable shall be physically interchangeable. Assemblies or components that are not functionally interchangeable shall not be physically interchangeable.

17.7.5 Maintainability Design Checklist

The following list shall be included in the design for maximum maintainability:

A. Systematic fault isolation procedures shall be developed for inclusion in the maintenance manuals.

B. Built-in test points shall be provided and marked.

C. Failure indicators shall be provided and identified.

D. All test points, fault indicators, modules, wire junctions, pipes, tubes, wires, etc., must be identified by name plates, color coding, number coding, or other means to assist the maintenance personnel.

E. The placement of components in equipment cabinets, enclosures, or confined places shall give the most accessible positions to those items requiring the most frequent maintenance or adjustment.

F. Standard, commercially available industrial components and hardware shall be used wherever possible.

G. Access to structural components shall be provided to the greatest extent practicable to allow inspection for cracks and corrosion.

H. Major components shall be designed for ease of removal.

I. Means shall be provided to verify the operability of redundant or parallel hardware components, and associated switching devices, during maintenance, troubleshooting, and testing.

17.8 SYSTEM SUPPORT PLAN

The Contractor shall submit a System Support Plan that outlines procedures for meeting system support requirements. ***(CDRL 1717)*** System support elements include:

A. Technical support
B. Manuals
C. Microprocessor based products
D. Training
E. Diagnostic and test equipment
F. Special Tools
G. Spare parts

The Contractor shall, during the design review stage, review all configuration changes from the as-built configuration of the vehicle for potential impact to each of the above system support elements.

17.9 TECHNICAL ON-SITE SUPPORT

Technical support in the form of personnel on Administration property shall be available from the time the first vehicle is delivered to Administration through the end of the base warranty period.

The Contractor shall provide adequate staff and resources on-site as required. On-site personnel qualified to maintain the vehicles shall assist with testing and with resolving operation and maintenance problems. The personnel shall be thoroughly familiar with the vehicles. The personnel shall provide support during the warranty period by isolating failures, providing replacement parts and responding to any warranty claims, including initiation and follow-up or remedial actions. On-site personnel shall include field service engineers, technicians and repair personnel as required and shall be available within 48 hours after the Administration's request.

17.10 MANUALS

Upon request from the Contractor, the Administration shall provide one (1) complete set of Vehicle Maintenance Manuals and Parts Catalogs. At the end of the Contract, the Contractor shall return the complete set of Maintenance Manuals and Parts Catalogs to the Administration. ***(CDRL 1718)***

The Contractor shall supply "change pages" to the existing manuals for all configuration changes from the as-built condition. New binders are not required. The contractor shall include three (3) copies in PDF format on CD-ROM disk.

Revisions to the OEM manuals supplied shall be recorded on a control list in the front of each manual affected. All updates to the manuals and integrated parts catalog shall follow the existing format which will be made available to the Contractor, and shall comply with requirements of 49 CFR 238.

Updating of lists and manuals shall be performed on a quarterly basis throughout the warranty period. ***(CDRL 1719)***

Draft change pages shall be supplied prior to delivery of the third vehicle. ***(CDRL 1720)*** Change page quality shall be equivalent to the OEM paper quality and shall be appropriately sized for the manuals in which they will be inserted.

17.10.1 Manual Submissions

Manuals incorporating change pages shall be developed and submitted. ***(CDRL 1721)*** Information gathered during proof-of-design and acceptance testing and during the warranty shall be incorporated into the manuals for the final submittal.

17.10.2 Revisions

Revisions to the draft and approved manuals shall be recorded on a control list in the front of each manual. The list shall be issued with each revision and shall show the date of each revision and the page reference. Updated lists and revisions shall be maintained in the manuals by the Contractor until the warranty period expires. Revisions to the manuals shall be issued by manual number. Revisions shall be prepared before the arrival of altered components and as soon as possible after procedures are changed or errors are found.

17.11 TRAINING

This section describes the type of training required from the Contractor on new and upgraded systems.

17.11.1 General

The Contractor shall provide a program to educate, train and teach personnel in all details of the new and upgraded equipment, as required, to enable the Administration to satisfactorily operate, service and maintain the vehicles. The training program would be required for a total of approximately 40 people. It is expected that 10 people would attend each training session. The program shall include 75 hours of classroom and operator/supervisor training. The training shall be provided to the board and component levels.

One objective of the program shall be to develop within the Administration the capability to perform similar training under its own training program subsequent to the Contractor's involvement. The training shall be designed to be delivered by an instructor in the classroom and, when appropriate, in the field or shop when actual equipment is used. The Administration shall have the right to videotape any classroom training sessions.

17.11.2 Training on Administration Property

Unless noted otherwise, the Administration will furnish equipment for training as described below.

17.11.2.1 Classroom and Practical Training Space

Space for classroom lectures and practical training on equipment will be furnished at Administration facilities. The location and class times shall be at the convenience of the Administration. Training equipment such as a DVD player shall be provided by the Contractor, as needed.

17.11.2.2 Use of Actual Equipment as Training Aids

The Contractor may use actual equipment or spare parts furnished under the Contract for use as training aids in lieu of mock-ups, and for demonstration of, and practical exercises in, adjusting, testing, disassembly and assembly equipment. However, the Contractor shall be responsible that such parts are not damaged or modified in any way. In addition, these parts must pass re-inspection and acceptance tests after return to the Administration.

17.11.2.3 Shop Space

The Administration will make available, upon proper notice, vehicles and trains for instructional purposes and will also arrange for road operations including furnishing power, dispatching and operational supervisors as necessary.

17.11.3 Training Program Plan

The Contractor shall submit a Training Program Plan in accordance with the following. ***(CDRL 1722)***

17.11.3.1 Description

A narrative description that documents the design for training Administration personnel, including supervisors, operators and maintenance and repair personnel shall be developed as appropriate. The description for each training program shall include:

A. Performance objectives that state the expected behavior, the conditions under which performance will occur and the measures and standards to be applied.

B. The sequence of learning activities.

C. An outline of the content.

D. Learning strategies to be used (e.g., classroom presentation, hands-on practice, paper and pencil exercises, etc.)

E. Methods and criteria for evaluating performance, including an objective grading system to report progress of trainees during the training.

F. Resources required, such as equipment, shop space, VCRs, etc.

G. Approximate times required for training.

17.11.3.2 Training Delivery Schedule

The Contractor shall submit the training schedule for review and approval by the Administration. ***(CDRL 1723)*** It shall include the title of the program, general description of the program, intended audience (i.e., supervisors, operators, maintenance and/or repair personnel), size of audience, Administration facilities required (e.g., classroom size, shop/field requirements), sequence of classroom and shop/field instruction and estimated hours for both, number of sessions, and any other information that will facilitate planning for, and delivery of, the training programs. The training schedule shall be in accordance with TS Section 17.2.3 of this specification.

17.11.3.3 Train-the-Trainer

A plan for training Administration trainers to deliver the training subsequent to the Contractor's involvement shall be included. It shall describe the Contractor's approach,

resources, and hours required and any training aids that might be included (e.g., videocassettes, etc.)

17.11.3.4 Training Materials

The Contractor shall provide materials to support each course in the training program, including: instructor guides, training aids, student workbooks, and operator and maintenance manuals. All training materials shall become the property of the Administration. The instructor guides and student workbooks shall be submitted as camera-ready copy in form that allows easy reproduction: that is, loose-leaf bound, black ink on 8-1/2 by 11-inch white paper, printed on both sides, and numbered sequentially within units of training.

Any view graphs used in training will be supplied along with camera-ready, paper copy. Master copies of slides and other audiovisual material shall also be provided to allow for reproduction as necessary.

17.11.3.5 Training Aids

The Contractor shall provide training aids, such as mock-ups, scale models, overhead transparencies, videotaped demonstrations, diagnostic testing equipment, and any special tool required. Spare parts used during the training sessions must be in good working condition and approved by supervisors before and after use in the classroom.

17.12 SPARE PARTS, SPECIAL TOOLS, AND TEST EQUIPMENT

Spare parts shall be interchangeable with their corresponding part. All spare parts shall be reconfigured to the latest revision during the warranty period.

17.12.1 Packaging

Packaging shall consider the reliability of the parts and the requirements for inspection and inventory (e.g., the packaging selected for highly reliable part shall be such that the parts can be identified, inspected, stored for long periods, and endure multiple inventories).

17.12.2 Spare Parts

The Contractor shall provide all spare parts (mandatory) as specified in the various sections of this specification, and listed in the CDRL list. The provision of mandatory spare parts is considered to be part of the Contractor's Bid Price.

The Contractor shall submit a recommended spare parts list for new and upgraded equipment that details those parts required to support the vehicle fleet. ***(CDRL 1724)*** The submission shall include the part number, description of each part, subsystem it belongs to, pricing, estimated delivery, and recommended quantities for each part. The list shall be sorted alphabetically and by system.

17.12.3 Special Tools and Diagnostic and Test Equipment

Within 180 days from NTP for new and upgraded equipment, the Contractor shall provide a

listing of all OEM-recommended special tools, and diagnostic and test equipment that would be required for performing scheduled and on-going maintenance activities. ***(CDRL 1725)***

Within 360 days from NTP, the special tools, and diagnostic and test equipment shall be delivered to the Administration. ***(CDRL 1726)*** The provision of all OEM-recommended special tools, and diagnostic and test equipment is considered to be part of the Contractor's Proposal Price.

17.13 REQUIRED CDRLS

1701 Management Plan (17.2.1)

1702 Monthly Progress Reports (17.2.2)

1703 Progress Schedule (17.2.3.2)

1704 Monthly Updated Progress Schedule (17.2.3.4)

1705 Revised Progress Schedule and Narrative Documentation Data (17.2.3.4)

1706 Change Orders, Delays, and Time Extensions (17.2.3.5)

1707 Initial Activities Meeting (17.3)

1708 Design Review Package (17.4.2)

1709 Changes Beyond FDR Affecting Design Characteristics (17.4.3)

1710 Production Baseline Changes Beyond FAI (17.4.4)

1711 Three Sets of Electrical Schematic Drawings (17.4.8)

1712 Drawing Tree and List (17.4.8)

1713 Conformed Specifications (17.4.9)

1714 Drawing Verification, Revision, Scanning, and Conversion Plan (17.5)

1715 Reliability Estimate (17.6.1)

1716 Reliability Report (17.6.3)

1717 System Support Plan (17.8)

1718 Return of Complete Set of Maintenance Manuals and Parts Catalogs at End of Contract (17.10)

1719 Updating of Lists and Manuals (17.10)

1720 Draft Change Pages for Manuals (17.10)

1721 Manuals Incorporating Change Pages (17.10.1)

1722 Training Program Plan (17.11.3)

1723 Training Schedule (17.11.3.2)

1724 Recommended Spare Parts List (17.12.2)

1725 Listing of All OEM-Recommended Special Tools Required (17.12.3)

1726 Delivery of All Special Tools (17.12.3)

SECTION 18

SAFETY AND SECURITY CERTIFICATION

SECTION 18
SAFETY AND SECURITY CERTIFICATION

MARC III PASSENGER RAILCAR
MINOR OVERHAUL

18.1 GENERAL SYSTEM DESCRIPTION

The MARC III Passenger Railcar (MARC III) Minor Overhaul Safety and Security Certification Program shall be conducted in accordance with the Federal Transit Administration (FTA) Handbook for Transit Safety and Security Certification. As defined by the FTA, safety and security certification is the series of processes that collectively verify the safety and security of a project for use by passengers, employees, emergency responders, and the general public. The MTA will develop an MARC III Passenger Safety and Security Certification Plan (SSCP) in accordance with FTA guidelines to describe how certification activities will be carried out for the project. The MTA will provide the MARC III SSCP to the Contractor no later than 60 days after NTP. The Contractor shall comply with the requirements of the MARC III SSCP in addition to the requirements of this section.

The Contractor shall designate a member of its staff to serve as Safety and Security Certification Manager (SSCM). The SSCM shall serve as the primary point-of-contact to the MTA for safety and security certification related matters. The SSCM shall participate on the MARC III Safety and Security Certification Committee (SSCC) established by the MTA to carry out safety and security certification activities.

The following CDRLs shall be submitted to the MTA in support of safety and security certification:

A. **CDRL 1801 – System Safety Program Plan (SSPP) –** Describes the tasks and activities used by the Contractor to identify, evaluate, and eliminate/control hazards, or reduce the associated risk to an acceptable level.

B. **CDRL 1802 – Preliminary Hazard Analysis (PHA) –** Initial risk assessment performed by the Contractor to identify, assess, and make recommendations on the resolution of potential hazards. This PHA will form the basis for the Hazard Tracking Log (HTL).

C. **CDRL 1803 – Hazard Tracking Log (HTL) –** Developed from the inputs of the PHA, this document shall serve as the primary tool used by the Contractor and SSCC to track identified safety hazards to closure.

D. **CDRL 1804 – Open Items Log –** The document established as the primary tool used by the Contractor and the SSCC to log and track hazards unable to be closed prior to the railcars entering revenue service.

E. **CDRL 1805 – Failure Modes, Effects, and Criticality Analysis (FMECA) –** Performed by the Contractor to identify potential system and subsystem failure modes and their subsequent effects on the entire system.

F. **CDRL 1806 – Operating and Support Hazard Analysis (O&SHA) –** Performed by the Contractor to evaluate activities for hazards or risks introduced into the system by operational and support procedures and to evaluate their adequacy.

G. **CDLR 1807 – Fault Tree Analysis –** Performed qualitatively or quantitatively by the Contractor to assess undesired top-level events by systematically analyzing the order of faults for the event to occur.

H. **CDRL 1808 – Safety and Security Certification Conformance Checklists –** Checklists completed and signed by the Contractor upon verification that each safety and security certifiable element has been design, constructed, assembled, and tested in accordance with the technical specifications and contract requirements.

I. **CDRL 1809 – Flammability and Smoke Emission Test Procedures and Reports –** Documentation provided by the Contractor as evidence that materials installed on the railcars meet the flammability and smoke emission performance criteria requirements of this contract.

J. **CDRL 1810 – Toxicity Test Procedures and Reports –** Documentation provided by the Contractor as evidence that materials installed on the railcars meet the toxicity performance requirements of this contract.

K. **CDRL 1811 – Flammability, Smoke Emission, and Toxicity (FST) Matrix –** Verifies that materials required for testing meet the flammability and smoke emission performance criteria of 49 CFR Part 238 and NFPA 130 – Standard for Fixed Guideway Transit and Passenger Rail Systems, and the toxicity performance criteria of this specification.

In addition to the CDRLs above, the Contractor shall submit supporting documentation as evidence that the safety and security certifiable elements of the railcars have been designed, constructed, assembled, and tested in accordance with contract technical specification and requirements. Supporting documentation for safety and security certification may take the form of other CDRLs, inspection reports, and test procedures and reports submitted to the MTA for review and approval.

18.2 SAFETY AND SECURITY CERTIFIABLE ELEMENTS

A preliminary list of safety and security certifiable elements is provided in Exhibit 1-1. The safety and security certifiable element list will be further developed by the SSCC during the design phase of the project. The MTA or a member of the SSCC may request additional elements be added to the list during the life of the project. The MTA retains final approval authority for the safety and security certifiable element list.

Exhibit 1–1. Preliminary Safety and Security Certifiable Elements List

1.0 Carbody
2.0 Trucks
3.0 Coupler
4.0 Air Brake
5.0 Electrical System
6.0 Interior Furnishings
7.0 Toilet Room
8.0 Water & Water Retention
9.0 Door System
10.0 HVAC
11. 0 Lighting
12.0 Communications
13.0 Cab Equipment
14.0 Testing
15.0 Materials, Workmanship, and Standards
16.0 Quality Assurance
17.0 Management & Support Systems
18.0 Safety & Security Certification

18.3 REQUEST FOR VARIANCE

The Contractor may submit a variance request for documentation it elects to submit in lieu of the documentation required in this section. The request for variance must be submitted to the MTA for review and approval. At a minimum, the request for variance shall be submitted in writing and include the following:

- Specify the requirement from which relief is being sought

- Purpose for the request and an explicit justification for how the contract requirement is being met with the documentation provided
- Description of all differences between the configuration and system/subsystem design of the MARC III railcars if the documentation being submitted was performed for past railcar programs
- All information (analyses, drawings, references, calculations, change analysis or impact, etc.) necessary for the MTA to make an informed decision
- Statement by the Contractor certifying that the documentation submitted meets or exceeds the contract requirements.

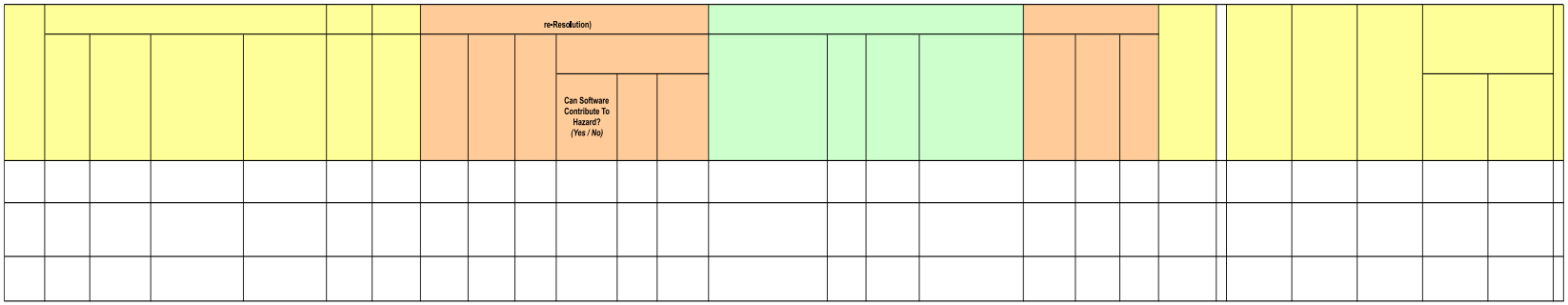
18.4 SYSTEM SAFETY PROGRAM PLAN

The Contractor shall develop a System Safety Program Plan (SSPP) that defines the activities, management controls, and monitoring processes used to ensure safety hazards are identified, analyzed, and eliminated or controlled to an acceptable level of risk. ***(CDRL 1801)*** The Contractor SSPP shall be developed in accordance with the requirements contained in MIL-STD 882.

18.5 PRELIMINARY HAZARD ANALYSIS/HAZARD TRACKING LOG

The Contractor shall prepare and submit a comprehensive PHA to the MTA for review and approval. ***(CDRL 1802)*** The PHA shall identify hazards associated with new systems, subsystems, and equipment installed on the railcars. The PHA shall also identify potential hazards resulting from the overhaul and/or modification of existing systems, subsystems, and equipment. The PHA shall consider the impacts of the overhaul to the safety of passengers, personnel, equipment, the environment, and general public. The PHA shall cover each safety and security certifiable element of the railcar. The Contractor shall use a PHA worksheet similar to the example shown in Exhibit 1-2 or an equivalent subject to MTA review and approval. The PHA shall form the bases for the Hazard Tracking Log (HTL). ***(CDRL 1803)*** The Contractor shall use the HTL to track all identified hazards and vulnerabilities to closure throughout the entire project life cycle. The Contractor shall submit the HTL to the MTA for review and approval upon closure of all identified hazards. The Contractor shall produce the latest revision of the HTL for review during SSCC meetings. The SSCC may request the Contractor to submit the latest revision of the HTL to the MTA at any time during the project.

Exhibit 1–2. Preliminary Hazard Analysis/Hazard Tracking Log Worksheet



Hazard Risk Index 1 (Pre-Resolution Hazard Rating/Prior to Elimination or Mitigation of Hazard)Hazard Risk Index 2 (Post-Resolution Hazard Rating/Post Elimination or Mitigation of Hazard)

18.6 OPEN ITEMS LOG

The Contractor shall develop an Open Items Log from the HTL, capturing those hazards or vulnerabilities that are unable to be resolved prior to the railcars entering revenue service. ***(CDRL 1804)*** Typically, such documentation is associated with maintenance and training manuals. Hazards that remain open must not result in unacceptable risk levels.

18.7 FAILURE MODES, EFFECTS AND CRITICALITY ANALYSIS

The Contractor shall submit FMECAs for new systems, subsystems, and equipment to the MTA for review and approval. ***(CDRL 1805)*** FMECAs may be required for overhauled and/or modified systems, subsystems, and equipment based on the results of the PHA. The FMECA shall be conducted in accordance with the FTA Hazard Analysis Guidelines for Transit Projects. The FMECA shall assess the failure modes of the major systems and subsystems that may contribute to Severity Category 1 or 2 Hazards. The FMECAs shall consider:

A. Equipment failure modes
B. Software errors
C. Component failures
D. Systematic component failures
E. Interface issues.

18.8 OPERATING AND SUPPORT HAZARD ANALYSIS

The Contractor shall submit an O&SHA for new systems, subsystems, and equipment to the MTA for review and approval. ***(CDRL 1806)*** O&SHAs may be required for overhauled and/or modified systems, subsystems, and equipment based on the results of the PHA. The O&SHA shall include operating and maintenance procedures for railcar subsystems found by the PHA to have a Hazard Risk Index of 1 or 2. After final design, the Contractor may track O&SHA items as part of the HTL.

18.9 FAULT TREE ANALYSES

The MTA may request the Contractor to submit Fault Tree Analyses to the MTA for review and approval. ***(CDRL 1807)*** A request for the Contractor to submit a Fault Tree Analyses shall be contingent upon the results of the PHA and other safety and security analyses performed by the Contractor.

18.10 GENERAL SAFETY DESIGN CRITERIA

Criteria for system design, for all equipment with safety-critical characteristics, and for operational procedures shall assure that system safety objectives are implemented throughout design development, testing, delivery, operations, and maintenance.

The following criteria shall be incorporated as a minimum:

A. No single-point failure shall result in a hazard with a Hazard Risk Index of 1 or 2. Multiple, latent, undetected failure modes shall be considered as a single-point failure.

B. Railcar design shall include component interlocks wherever an out-of-sequence operation can result in a hazard with a Hazard Risk Index of 1 or 2.

C. Emergency equipment for public use shall be clearly identified and accessible.

18.11 SAFETY AND SECURITY CERTIFICATION CONFORMANCE CHECKLISTS

The Contractor shall perform design criteria and construction specification conformance in accordance with guidelines set forth in the latest revision of the FTA Handbook for Transit Safety and Security Certification. The checklists shall ensure safety and security-related technical specification requirements have been incorporated into the as-built MARC III railcars. The Contractor shall complete Safety and Security Certification Conformance Checklists for all safety and security certifiable elements. ***(CDRL 1808)*** The Contractor shall use the Conformance Checklist template provided in Exhibit 1-3 or an equivalent approved by the MTA.

Exhibit 1-3. Safety and Security Certification Conformance Checklist

MTA Maryland

MARC III MINOR OVERHAUL
SAFETY AND SECURITY CERTIFICATION
DESIGN AND CONSTRUCTION CONFORMANCE CHECKLIST

MARC

Contract Name: _____
Contractor: _____
Contract No: _____
Certifiable Element: _____
Sub-Element: _____

Status	Means of Verification - Design	Means of Verification - Construction
C = Compliance	DS = Design Submittal	CS = Construction Submittal
NC = Noncompliance	CO = Change Order	TS = Test Submittal
PC = Partial Compliance	CA = Calculations	M = Measurement
	O = Other	VI = Visual Inspection
		O = Other

Item No.	Specification Ref.	Description/Requirement	Source / Std.	Design Criteria Ref.	Design Verification				Construction Verification			
					Status	Initials	Date	Means of Verification	Status	Initials	Date	Means of Verification

Notes and Restrictions

Contractor Design Verification

Name _____ Signature _____
Title _____ Organization _____
Date _____

Contractor Construction Verification

Name _____ Signature _____
Title _____ Organization _____
Date _____

FOR MTA USE ONLY

SSCC Acceptance - Design

Yes___ No___
Name _____ Signature _____
Title _____ Organization _____
Date _____

SSCC Acceptance - Construction

Yes___ No___
Name _____ Signature _____
Title _____ Organization _____
Date _____

18.12 FLAMMABILITY, SMOKE EMISSION, AND TOXICITY TESTING REQUIREMENTS

18.12.1 Flammability and Smoke Emission Test Procedures and Performance Criteria

The Contractor shall submit flammability and smoke emission test procedures and reports for new and/or modified materials. ***(CDRL 1809)*** The Contractor shall follow the test procedures and meet the performance criteria for flammability and smoke emission testing found in the latest revisions and editions of 49 CFR Part 238 and NFPA 130. Whenever a conflict arises between these requirements, the more restrictive shall apply.

18.12.2 Toxicity Test Procedures and Performance Criteria

The Contractor shall submit toxicity test procedures and reports for new and/or modified materials. ***(CDRL 1810)*** Materials and products that have highly toxic products of combustion shall not be used. Combustible materials, except those identified as exempt in this section, shall be tested for toxicity using Boeing Specification Support Standard BSS-7239. Materials shall meet the following maximum toxic gas release limits (ppm) given in Exhibit 1-4 as determined per BSS-7239.

Exhibit 1-4. Toxicity Test Procedures and Performance Criteria for Passenger Railcar Material Fire Risk Assessment

Toxic Gas	Test Procedure	Release Limit (ppm)
Carbon Monoxide (CO)	BSS-7239	2,500
Hydrogen Fluoride (HF)	BSS-7239	150
Nitrogen Dioxide (NO_2)	BSS-7239	100
Hydrogen Chloride (HCL)	BSS-7239	300
Hydrogen Cyanide (HCN)	BSS-7239	100
Sulfur Dioxide (SO_2)	BSS-7239	100

The tests shall be run in the flaming mode after 240 seconds using the NBS Smoke Density Chamber for sample combustion. The gas sampling may be conducted during the smoke

density test. The test report shall indicate the maximum concentration (ppm) for each of the above gases at the specified sampling time.

18.12.3 Material Compliance Matrix

The Contractor shall submit a Flammability, Smoke Emission, and Toxicity (FST) Matrix for all new or modified materials. ***(CDRL 1811)*** The FST Matrix shall identify the following:

A. FST Index Number

B. Material Name

C. Supplier

D. Function of Material

E. Combustible Material Weight

F. Location of Material

G. Heating Value (BTU/lb and BTU/hr)

H. Peak Heat Release Rate (kW/m^2)

I. Correspondence Letter Number for Submission of Test Results

J. Date of Test

K. Test Procedure

L. Test Facility

M. Test Facility Report Number

N. Test Result Values

O. Pass/Fail Summary

P. Waiver/Deviation Requested (must be accompanied by a formal Waiver/Deviation Request)

Q. Additional Comments

18.12.4 Materials Exempt from Testing Requirements

Materials used to fabricate miscellaneous, discontinuous small parts that will not contribute materially to fire growth in end use configuration shall be exempt from flammability, smoke

emission, and toxicity testing requirements. Exempt parts must be less than 16 inches^2 in end use configuration and may include, but are not limited to, the following:

A. Knobs

B. Rollers

C. Fasteners

D. Clips

E. Grommets

F. Small electrical parts

18.12.5 Materials Requested for Waiver or Deviation

The Contractor may request for a waiver from material testing requirements or a deviation from the technical specification for materials and/or parts that do not meet the exemption criteria. The Contractor shall provide any previous FST test reports available for the material. The Contractor's request for waiver shall be submitted in writing and include the following:

A. FST Index Number

B. Material Supplier

C. Material Description (trade name and specific formulation)

D. Location

E. Material Weight in Location (less any noncombustible material)

F. Reason for Waiver/Deviation Request

G. Contractor's Justification for Waiver/Deviation

Materials requested for waiver must not contribute to an unacceptable hazard, otherwise the Contractor shall make the necessary modifications to eliminate or reduce the hazard to an acceptable level.

18.12.6 Electrical Fire Safety

Except when otherwise approved or where more restrictive requirements are imposed by this Specification, electrical equipment shall conform to the electrical fire safety for railcars section of NFPA 130.

18.13 REFERENCED CDRLS

1801	System Safety Program Plan
1802	Preliminary Hazard Analysis
1803	Hazard Tracking Log
1804	Open Items Log
1805	Failure Modes, Effects, and Criticality Analysis
1806	Operating and Support Hazard Analysis
1807	Fault Tree Analysis
1808	Safety and Security Certification Conformance Checklists
1809	Flammability and Smoke Emission Test Procedures and Reports
1810	Toxicity Test Procedures and Reports
1811	Flammability, Smoke Emission, and Toxicity Matrix

18.14 REFERENCED STANDARDS AND GUIDELINES

- FTA Handbook for Transit Safety and Security Certification, Final Report, Latest Revision
- FTA Hazard Analysis Guidelines, Final Report, Latest Revision
- Department of Defense MIL-STD 882, System Safety Program Requirements, Latest Revision
- NFPA 130, Standard for Fixed Guideway Transit and Passenger Rail Systems, Latest Revision