

SOLICITATION NO. CA-90-X120-R

SPECIFICATIONS FOR

30 METHANOL 40-FOOT TRANSIT COACHES  
120 DIESEL 40-FOOT TRANSIT COACHES

KEY BID DATES

ISSUED:	May 16, 1986
ADVERTISED:	May 16, 1986
PRE-BID:	June 25, 1986
SUBMITTALS DUE:	10:00 a.m. August 6, 1986

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT  
124 W. 4th Street  
Los Angeles, California 90013

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NOTICE INVITING BIDS

Sealed bids will be received by the Southern California Rapid Transit District (hereinafter called District) at its offices at 124 West 4th Street, Los Angeles, California 90013 until 10:00 a.m. on August 6, 1986 for 30 Methanol and 120 Diesel 40-Foot Heavy Duty Advance Design Transit Coaches and additional spares and equipment. At that time, the Life Cycle Costing Technical Proposal portion of the bid for the 120 buses only will be opened. The Pricing portion of the bid will be held and opened at a later date as defined under Section 1.4 Bid Requirements. Bids received after the date/time specified above for bid opening shall be considered late bids and therefore, shall not be opened and/or considered for award.

This bid includes provisions for a multi year agreement for the purchase of additional buses for five consecutive years subject to availability of funding.

Solicitation documents and further information may be obtained from the District's Director of Purchasing at 124 West 4th Street, Los Angeles, California 90013.

All bidders must certify that they are not on the Comptroller General's list of ineligible contractors.

The award to be let under this solicitation is subject to a financial assistance contract between the District and the U. S. Department of Transportation, Urban Mass Transportation Administration (UMTA).

Successful bidder will be required to comply with all applicable Equal Employment Opportunity laws and regulations.



Maynard Z. Walters  
Director  
Office of Contracts,  
Procurement & Materiel

Southern California  
Rapid Transit District

Date: May 16, 1986

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PART I: SOLICITATION, OFFER AND AWARD

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1.0 SOLICITATION



1.0 SOLICITATION

1.1 DEMONSTRATION BUSES

The apparent low bidder will be required to provide at no charge to the District a demonstrator bus. Demonstrator bus shall be in general compliance in structural design with District specification requirements. The purpose of the demonstrator bus is to verify compliance with District specification requirements in areas of structural design such as, but not limited to: width of the bus; height; door opening; floor height; approach, departure and brake-over angles; step height; power train installation; accessibility to sub-assemblies and components; removal and replacement of components as well as accessibility to tuning the engine.

District forces will conduct the compliance inspection. The Contractor's representative may observe the compliance inspection. In the area of verifying access to removal of or replacement of power train components, the bidders representative may offer guidance in the proper procedure which should be outlined in the maintenance repair manual for the demonstrator bus.

Bidders who are not in substantial compliance to the District specification regarding structural design and power train installation will not be considered a responsive bidder in this procurement.

The demonstrator bus shall be made available at the District within 7 days after notification that vendor is the apparent low bidder. Bidders who are interested in participating in this procurement must sign the attached demonstration bus agreement form.

1.2 SCOPE

INVITATION FOR BID (IFB) NO. CA-90-X120-R

DATE: May 16, 1986

The contract awarded hereunder shall be for the manufacture and delivery of 2 or 3 axle transit coaches/spare parts in accordance with the terms and conditions set forth below. The contract shall be a firm-fixed price contract.

This invitation for bids includes a life-cycle cost procurement evaluation as provided for in Public Law 97-102.

1.3 CONTRACT DOCUMENTS

Any contract resulting from this solicitation shall include the following, which are incorporated herein:

40-Foot Heavy Duty Transit Coaches Specifications including addenda.

Copies of Federal and applicable state grant contracts, Federal excise tax exemption certificate and certificates for all other tax exemptions.

Resolution from the District's governing board approving the contract and certifying availability of local funds.

1.4 DEFINITIONS

The following are definitions of special terms used in this document.

- (1) **PROCURING AGENCY.** The Southern California Rapid Transit District (District).
- (2) **CONTRACTING OFFICER.** The person who is executing this contract on behalf of the Procuring Agency and who has complete and final authority except as limited herein.
- (3) **CONTRACTOR.** The successful bidder who is awarded a contract for providing all coaches and equipment described in the contract documents.
- (4) **AUTHORIZED SIGNEE.** The person who is executing this contract on behalf of the Bidder/Contractor and who is authorized to bind the Bidder/Contractor.
- (5) **SUPPLIER.** Any manufacturer, company, or agency, providing units, components, or subassemblies for inclusion in the coach. Supplier items shall require qualification by type and acceptance tests in accordance with requirements defined in Part III, Quality Assurance Provisions.
- (6) **WORK.** Any and all labor, supervision, services, materials, machinery, equipment, tools, supplies, and facilities called for by the contract and necessary to the completion thereof.
- (7) **DEFECT.** Patent or latent malfunction or failure in the design, material or workmanship of any components or subsystem that causes a coach to cease operating or causes it to operate in a degraded mode.
- (8) **RELATED DEFECT.** Damage inflicted on any component or subsystem as a direct result of a defect.
- (9) **SERVICE LIFE.** The coach shall be designed to operate in transit service for at least 12 years or 600,000 miles. It shall be capable of operating at least 50,000 miles per year including the twelfth year.
- (10) **MEAN MILEAGE BETWEEN FAILURES.** The following are design goals for mean mileage between failures by failure class, provided that all specified preventive maintenance procedures are followed.
  - (a) **Class 1: Physical Safety.** Mean mileage shall be greater than 1,000,000 miles. A failure that could lead directly to passenger or driver injury and represents a severe crash situation.

- (b) Class 2: Road Call/Coach Change. Mean mileage shall be greater than 10,000 miles. A failure resulting in an enroute interruption of revenue service or removal of coach from service during its assignment. Service is discontinued until the coach is replaced or repaired at the point of failure.
  - (c) Class 3: Coach change. Mean mileage shall be greater than 8,000 miles.
  - (d) Class 4: Bad Order. Mean mileage shall be greater than 8,000 miles. The failure shall be reported by driver, inspector, or service personnel.
- (11) PREVENTIVE MAINTENANCE PROGRAM. The preventive maintenance program is referenced throughout this specification by use of the abbreviation "PMP".
- (12) MAINTENANCE AND INSPECTION. Scheduled maintenance or inspection required by the Contractor shall require a skill level of Class B Mechanic or less. Scheduled maintenance tasks shall be related and shall be grouped in maximum mileage intervals. Routine scheduled maintenance actions, such as filter replacement and adjustments, shall not be required at intervals of less than 6,000 miles, except for routine daily service performed during the fueling operations. Higher level of scheduled maintenance tasks shall occur at even multiples of mileage for lower level tasks. Complete scheduled maintenance cycle shall be repeated at 18,000 mile interval, or less.
- (13) The District's current straight time wage scale for a mechanic Class "A" is \$15.54 plus 80% fringe benefits and overhead for a total per hour of \$27.97.
- (a) Failures requiring an in-service coach change cost the District \$150.00 per event.
  - (b) Failures requiring shop repair, other than PMP are at \$27.97 straight wage rate including fringe benefit and overhead.
- (14) LIFE-CYCLE COSTING (LCC) - A procurement process that takes into consideration the initial cost and other costs of ownership over the life of the bus, as a basis for making the award.

#### 1.5 BID REQUIREMENTS

Sealed bid packages will be received at 124 W. 4th Street, Los Angeles, California 90013, Purchasing Department until 10:00 a.m., August 6, 1986 for the provision of 30 Methanol and 120 Diesel powered 40-foot heavy duty transit coaches. The bid package shall consist of two envelopes, one labeled "Pricing"

and one labeled "Life Cycle Costing Technical Submittal." Each envelope shall contain one original and five copies of the appropriate bid documents. The "LCC Technical Submittal" for the 120 diesel buses only shall be publicly opened immediately after 10:00 a.m. on August 6, 1986. The sealed priced bid shall be publicly opened at 10:00 a.m., on August 15, 1986

All equipment, labor, and materials shall be furnished in strict accordance with the delivery schedule and conditions of the specifications. The coaches shall fulfill all of the requirements defined in Part II; Technical Specifications, including addenda thereto. Compliance with these requirements shall be in accordance with the procedures defined in Part III: Quality Assurance Provisions. The Contractor shall accept the Warranty Provisions covering the coaches as defined in Part IV.

The LCC provisions require each bidder to provide the District with a LCC calculation worksheet and technical proposal. (See Part 1 Attachment 1)

#### 1.6 PRICING SCHEDULE

The bidder shall complete and execute the pricing schedule. The successful bidder shall be liable for payment of local sales taxes applicable to the complete coach as delivered and should add these amounts to the bid price. Local sales tax is 6.5%. The District shall be liable for any taxes applicable to the complete coach as delivered that are promulgated and become effective between the date of bid opening and the delivery date. The District is exempt from Federal Excise tax and Transportation tax. Certification of this will be provided to the successful bidder. At the option of the contractor, the District shall make arrangements to make direct payment of applicable taxes to the California State Franchise Tax Board.

California sales tax law excludes equipment modified for the benefit of the physically handicapped from sales taxes. Bidders shall, therefore, indicate on the pricing sheet the cost of those features added to provide accessible service. Part I, Attachment 6 provides a listing of equipment to be considered in this regard. Other materials or items not identified but which are required in the manufacture of the coach in order for it to provide access to the physically handicapped shall also be exempt from sales tax.

#### 1.7 DELIVERY PROCEDURE

Delivery shall be determined by signed receipt of the District's designated agent(s) at the point of delivery, and may be preceded by a cursory inspection of the coach.

Delivery of the coaches shall be F.O.B. point of delivery by Common Carrier Driveaway. Deliveries shall be made to the District's Division 4 facility which, is located at 7878 Telegraph Road, Downey, California.

#### 1.8 DELIVERY SCHEDULE

Delivery of all 150 coaches shall be completed within 52 weeks after delivery of the executed contract documents.

The coaches shall be delivered at a rate not to exceed 8 coaches per day Monday through Friday. No deliveries shall be made on Saturdays, Sundays, or holidays. Deliveries shall be at least 5 per week. Hours of delivery shall be 8:00 a.m. through 3:00 p.m.

1.9 SERVICE AND PARTS

The bidder shall submit with the priced bid a list containing the name, address, and telephone number of the representatives responsible for assisting the District, as well as the location of the nearest distributions center which can furnish a complete supply of parts and components for the repair and maintenance of the coaches to be supplied. All parts shipped to the District shall be freight pre-paid to the District's delivery point.

1.10 PAYMENT SCHEDULE

The District shall pay for coaches within 30 days after final acceptance of each coach.

Contractor's invoices for coaches, spare parts, and/or equipment shall be submitted to the District 30 calendar days prior to each delivery. A proforma invoice is acceptable.

The Contractor shall invoice in lots of five coaches. Each invoice shall include:

- Contract number
- Line item number invoiced
- Number of spare parts/equipment involved, if applicable
- Model and serial number of coach invoiced, if applicable
- Unit or total prices by line item number
- Total invoice amount.

1.11 AWARD BASIS

The award shall be made to the bidder whose adjusted price offer for the total 150 coaches reflects the lowest cost of ownership, including delivery charges, as described on the pricing schedule in the specification provided the bid is responsive in all respects to these procurement requirements. The lowest adjusted price is determined by the completion of the LOC Evaluation Worksheets, for the 120 diesel buses and have bid price for the 30 methonal buses Part I, Attachment I. The bidder must be a person, firm, or corporation which:

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.

Has adequate engineering and service personnel, or has the capacity to have such personnel, to satisfy any engineering or service problems that may arise during the warranty period.

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 a required time.

Further, the bidder shall be qualified in accordance with Part III: Quality Assurance Provisions.

The District has the right to conduct a pre-award survey of each bidder.

#### 1.12 PRE-BID CONFERENCE

A pre-bid conference will be held in the District's Board Room, 2nd Floor, 425 South Main, Los Angeles, at 10:00 a.m. on June 25, 1986. Those desiring to attend must advise the Office of Contracts, Procurement and Materiel prior to that date.

All questions pertaining to and requests for clarification of these specifications shall be submitted in writing. Written questions should be submitted to the office of Contracts, Procurement and Materiel 5 working days prior to the date of the pre-bid conference.

Copies of written responses to all questions or requests will be forwarded to all attendees who sign the roster at the pre-bid conference, and to all firms which have requested a copy of these specifications.

A separate form shall be used for each question or request. The District will issue the response to all questions no later than fifteen (20) calendar days prior to LCC submittal date. Bidder's questionnaire package should include an original plus five (5) copies.

#### 1.13 BIDDER REVIEW PROCEDURES

A bidder may seek UMTA review of the District's determination on issues other than LCC procedures and determinations. The District shall be responsible for final review of all LCC determinations. Protests or appeals of District decisions regarding any other issue relative to this procurement shall be filed in writing not less than 14 calendar days prior to the scheduled bid opening date. The District shall have no obligation to consider pre-award protests or appeals received less than 14 calendar days prior to the date of bid opening.

The date of submission shall be the date of receipt of a letter of protest by the District.

Protests or appeals shall be addressed and delivered to the Office of Contracts, Procurement and Materiel.

The bidder may withdraw its protest or appeal at any time before the District issues a final decision.

Should the District postpone the date of bid opening owing to an appeal, the District shall notify all parties who are on record as having obtained a copy of the solicitation documents that an appeal has been filed, and that the date of

bid opening shall be postponed until the District has issued its final decision. The District shall issue appropriate amendments postponing and rescheduling the date of bid opening.

All decisions of the District under these procedures are final and not subject to appeal. Following issuance of its final decision, the District has no obligation to provide the bidder any further review of that decision.

A letter of protest must set forth the grounds for protest and shall be fully supported with technical data, test results, or other pertinent information related to the subject being protested.

The District shall respond in writing to a letter of protest not less than 7 days prior to the date of bid opening.

Any complaint to the Urban Mass Transportation Administration shall be made not less than 4 days prior to the opening of the bids.

#### 1.14 BID PREPARATION

Each offer shall be made only on the bid form which shall be enclosed in a sealed envelope with the name and address of the bidder clearly stated, and 150 each 40-FOOT HEAVY DUTY TRANSIT COACH OFFER marked on the outside. This envelope shall contain two envelopes: one for LCC data and one for pricing offer. All blank spaces in the offer must be filled in and no changes shall be made in the wording.

In preparing the LCC technical proposal, the bidder must respond to each of the items in this specification. (See Part I, Attachment I.)

Data submitted as part of the LCC technical proposal shall include:

1. Technical Submission, Part II, Section 3.10
2. Passenger Seating and Standee Diagram
3. Data required under Part I, Section 1.8
4. Data necessary to compute LCC factor calculations
5. LCC Calculation Worksheet, Part I, Attachment I

#### 1.15 BID POSTPONEMENT AND AMENDMENT

The District reserves the right to revise or amend the specifications up to the time set for receiving the bids. Such revisions and amendments, if any, shall be announced by addenda to this solicitation. Copies of such addenda shall be furnished to all prospective bidders. If the amendments require changes in quantities or price bid, or both, the date set for receiving bids may be postponed by such number of days as in the opinion of the District shall enable bidder to revise their bids. In any case, the bid receiving period shall be at least 5 working days after the last amendment, and the amendments shall include an announcement of the new date, if applicable, for opening bids.

1.16 BID REJECTION

The District reserves the right to waive any minor bid informalities or irregularities received which do not go to the heart of the bid or prejudice other bidders, or to reject any and all bids submitted. Conditional bids, or those which take exception to the specifications, will be considered nonresponsive and will be rejected. Failure on the part of a bidder to respond to one or more of the cost factors included in the LCC procedure shall cause the bid to be rejected.

1.17 SINGLE BID RESPONSE

If only one bid is received in response to the invitation for bids, a detailed cost proposal may be requested of the single bidder. A cost/price analysis and evaluation and/or audit may be performed of the cost proposal in order to determine if the price is fair and reasonable. As an alternative a comparative price analysis of recently bid competitive tenders for similar buses will be acceptable.

1.18 BID WITHDRAWAL

After the bids are opened, bids may not be withdrawn for 90 calendar days after the date of the opening of the "Pricing Proposal" portion of the bid. Prior to the date and time set for bid opening, however, bids may be modified or withdrawn by the bidder's authorized representative by written or telegraphic notice. Written or telegraphic notices must be received in the District's Purchasing Agents office no later than the exact date and time for bid opening. A telegraphic modification or withdrawal received in the designated office by telephone from the receiving telegraph office no later than the date and time set for bid opening shall be considered, if such message is confirmed by a copy of the telegram.

1.19 ROLLING STOCK REQUIREMENTS

The District will review LCC data supplied by bidders to determine that:

1. Data provided by the bidder in support of its estimate impact are in fact valid data which are based upon objective conclusions drawn from valid testing, engineering analysis, etc.
2. Where clarification, verification, and/or support of technical data submitted by the bidder is needed for evaluation purposes, the District shall require that such data be furnished by the bidder within three calendar days.



1.20 AWARD PROCEDURE

District agrees to deliver an executed contract or purchase order to successful bidder within 60 days after pricing proposal bid opening.

1.21 BID BOND

A bid guarantee from each bidder equivalent to ten percent of the bid price shall accompany the sealed priced bid. The "bid guarantee" shall consist of a firm commitment such as a bid bond, certified check, Irrevocable Letter of Credit, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of his bid or proposal execute such contractual documents as may be required within the time specified. The contracting officer shall be the sole judge of the acceptability of the bidder's guarantee.

Bidders may use their own "Bid Bond" form or the attached form designated as Part I Attachment 8 - Bid Bond.

1.22 PERFORMANCE BOND

A performance bond on the part of the Contractor for 20 percent of the contract price shall be required and must be submitted within 8 working days after award of contract. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the Contractor's obligations under such contract. Successful bidder may use their own form or the attached form designated as Part I Attachment 9 - "Faithful Performance Bond".

**S.C.R.T.D. LIBRARY**

SOLICITATION, OFFER & AWARD

1.23.1 OFFER

ADDENDA

The undersigned acknowledges receipt of the following addenda to the documents:

Addendum No. \_\_\_\_\_, dated \_\_\_\_\_

Addendum No. \_\_\_\_\_, dated \_\_\_\_\_

Addendum No. \_\_\_\_\_, dated \_\_\_\_\_

Failure to acknowledge receipt of all addenda may cause the bid to be considered nonresponsive to the solicitation. Acknowledged receipt of each addendum must be clearly established and included with the offer.

1.23.2 OFFER

BIDDER'S CERTIFICATION  
REGARDING  
INELIGIBLE CONTRACTORS

The \_\_\_\_\_ hereby certifies that it IS NOT included on the U.S. Comptroller General's Consolidated List of persons or firms currently debarred for violations of various public contracts incorporating Labor Standard Provisions.

By: \_\_\_\_\_

By: \_\_\_\_\_

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

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

1.23.3 OFFER  
BIDDER'S CERTIFICATION  
REGARDING  
BUY AMERICA REQUIREMENTS

The bidder hereby certifies that it will comply with the requirements of Section 165a of the Surface Transportation Assistance Act of 1982 and the regulations in 49 CFR 661.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Title \_\_\_\_\_

or

The bidder hereby certifies that it cannot comply with the requirements of Section 165a of the Surface Transportation Act of 1982, but it may qualify for an exception to the requirement pursuant to Section 165b of the Surface Transportation Assistance Act and regulations at 49CFR 661.7.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Title \_\_\_\_\_

SIGN AND RETURN COPY WITH YOUR BID

120 DIESEL 40-FOOT HEAVY DUTY TRANSIT COACH

SOLICITATION, OFFER & AWARD

1.23.4 OFFER

By execution below bidder hereby offers to furnish equipment and services as indicated herein:

PRICING

ITEM	ITEM DESCRIPTION	NO. OF UNITS	UNIT PRICE	TOTAL
1	120 40-Foot Heavy Duty Transit Buses.	120	\$ _____	\$ _____
	Delivery Charge			\$ _____
	Import Duties			\$ _____
	Ocean Freight			\$ _____
	6-1/2% State Sales Tax*			\$ _____

Total 120 Diesel Buses

A \$   
To Be Used In  
Life Cycle Costing.

\* Bidder shall indicate below the cost of equipment per bus which is exempt from sales tax under California law regarding equipment modified for the benefit of the physically handicapped, Part I, Attachment 6. State sales tax amount entered above shall be computed considering the exemption on accessibility equipment.

Cost of Equipment per bus  
Modified for Benefit of  
Physically Handicapped

120 DIESEL 40-FOOT HEAVY DUTY TRANSIT COACH

SOLICITATION, OFFER & AWARD

1.23.4 OFFER (Con't.)

ITEM	ITEM DESCRIPTION	NO. OF UNITS	UNIT PRICE	TOTAL
1	Power/Plant Assemblies with all accessories mounted on a cradle ready for installation*.	2	\$ _____	\$ _____
2	Transmission ready for installation.	2	\$ _____	\$ _____
3	Freon compressors and compressor drive components.	2	\$ _____	\$ _____
	Sub Total Spare Parts and Equipment			\$ _____
	6-1/2% Sales Tax			\$ _____
	Delivery Charges			\$ _____
	Import Duties			\$ _____
	Ocean Freight			\$ _____

Total Spare Parts - Items 1, 2, 3  
for 120 Diesel Buses

B \$   
To Be Used In Life  
Cycle Costing

\* See Part I Attachment 7 for the minimum components to be included under this item.

30 METHANOL 40-FOOT HEAVY DUTY TRANSIT COACHES

SOLICITATION, OFFER & AWARD

1.23.5 OFFER

By execution below bidder hereby offers to furnish equipment and services as indicated herein:

PRICING

ITEM	ITEM DESCRIPTION	NO. OF UNITS	UNIT PRICE	TOTAL
1	40-Foot Heavy Duty Transit Buses	30	\$ _____	\$ _____
	Import Duties			\$ _____
	Ocean Freight			\$ _____
	Delivery Charges			\$ _____
	6-1/2% State Sales Tax*			\$ _____
	Total 30 Methanol Buses		\$ _____	

TO BE ADDED TO LCC  
ADJUSTED PRICE FOR  
120 DIESEL BUSES

\* Bidder shall indicate below the cost of equipment per bus which is exempt from sales tax under California law regarding equipment modified for the benefit of the physically handicapped, Part I, Attachment 6. State sales tax amount entered above shall be computed considering the exemption on accessibility equipment.

\_\_\_\_\_  
Cost of Equipment  
Modified for Benefit of  
Physically Handicapped

METHANOL 40-FOOT HEAVY DUTY TRANSIT COACHES

SOLICITATION, OFFER & AWARD

1.23.5 OFFER (Con't.)

PRICING

ITEM	ITEM DESCRIPTION	NO. OF UNITS	UNIT PRICE	TOTAL
1	Power/Plant Assemblies with all accessories mounted on a cradle ready for installation*	2	\$ _____	\$ _____
2	Transmission ready for installation	2	\$ _____	\$ _____
3	Freon compressors and compressor drive components	2	\$ _____	\$ _____
	Sub Total Spare Parts and Equipment			\$ _____
	6-1/2% State Sales Tax*			\$ _____
	Delivery Charges			\$ _____
	Import Duties			\$ _____
	Ocean Freight			\$ _____
	Total Spare Parts. Item 1, 2, & 3 for 30 Methanol Buses		\$ _____	
				<u>TO BE ADDED TO LCC ADJUSTED PRICE FOR 120 DIESEL BUSES.</u>

\* See Part I, Attachment 7 for the minimum components to be included under this item.



SOLICITATION OFFER & AWARD

OPTION PRICING

1.23.6

OPTION A - BRAKE RETARDER SYSTEM

Bidders shall quote pricing to provide an electric or hydraulic retarder system for the 150 buses. Bidder shall provide with his Technical Submittal, information for the retarder proposed. Also, include the percentage of brake lining life increase over a bus without the retarder.

Option A - Retarder System \$ \_\_\_\_\_ per bus for 150 buses  
% \_\_\_\_\_

OPTION B - AIR STARTERS

Twenty-five coaches of the diesel powered buses shall be equipped with air starters and supporting system. Ingersoll-rand, Start Master, or equal are approved. Contractor shall provide information pertaining to the starter system proposed.

Option B - Air Starters \$ \_\_\_\_\_ per bus

OPTION C - SEATING ARRANGEMENT

The bidder shall quote pricing for 120 buses with the following seating arrangement which increases standee free floor space in the aisle:

Curbside of the bus - single passenger (single row) seating in lieu of standard double arrangement. Streetside of the bus - standard double (two passenger) seating.

Option C - Special Seating Arrangement \$ \_\_\_\_\_ per bus

OPTION D - ADDITIONAL BUSES

Bidder shall state price to furnish 1 to 125 additional diesel buses at a unit price to be extended for the number of optional buses purchased. The quantity of buses shall be determined at the time the District exercises the option.

Bidder's pricing for the optional quantity shall be firm for 120 days from the date of award by the District Board of Directors of the base contract. The District reserves the right to exercise this option in its own best interest at any time during the 120 day period.

SOLICITATION OFFER & AWARD

OPTION PRICING CON'T  
1.23.6

Delivery for any option quantity shall be the same as that offered under the base contract. This delivery period shall begin on the date the District exercises this option. This option will not be used in evaluating the base bid.

	1-25	26-75	76-125
Unit Price	\$ _____	\$ _____	\$ _____
Delivery Charges	\$ _____	\$ _____	\$ _____
Import Duties	\$ _____	\$ _____	\$ _____
Ocean Freight	\$ _____	\$ _____	\$ _____
6-1/2% Sales Tax	\$ _____	\$ _____	\$ _____
TOTAL	\$ _____	\$ _____	\$ _____

NOT TO BE CONSIDERED IN CONTRACT AWARD.

OPTION E - LONG TERM PURCHASE OF ADDITIONAL BUSES

At the election of the District and subject to availability of funds, District will purchase additional buses in increments of 25 units from a minimum of 75 to a maximum of 225 per year for a five year period commencing in 1987.

The contract price for the additional units will be based on the following multi-year procurement plan:

- (1) The adjusted LCC award price.
- (2) Adjustment of award price based on Producer Price Index Commodity Code 14-11-01. The calculation for determining the cost of buses would be as per the following example:
  - a. June 1986 Producer Price Index as covered under Commodity Code 14-11-01, Finished Goods Section, motor vehicle including coaches.

Unadjusted	348.2
------------	-------

- b. Index at time of calculation based on averaging the final published index from the preceding year and all months preceding the actual award date.

1987	NOV	(FINAL)	356.2	
1987	DEC		356.1	
1988	JAN		356.4	
1988	FEB		356.6	
1988	MAR		<u>356.5</u>	
		AVERAGE	356.4	356.4

- c. Percentage increase/decrease to Base Price. (+) 1.024
- d. LCC Adjusted Price bid on 120 buses. \$165,000.00
- e. Adjusted price for 150 buses ordered in April, 1988. \$168,960.00

By execution below bidder agrees to furnish buses and spare parts similar to the 120 Diesel buses required under specification CA-90-X120-R in accordance with the multi-year procurement plan specified herein.

\_\_\_\_\_  
 NAME OF COMPANY

\_\_\_\_\_  
 BY (PRINT YOUR NAME)

\_\_\_\_\_  
 SIGNATURE BY AUTHORIZED INDIVIDUAL

DEMONSTRATOR BUS AGREEMENT

1.23.7

By execution of this form, bidder agrees to provide at no charge to the District a demonstrator bus to be delivered to the District within 7 calendar days after notification that they are the apparent low bidder.

The purpose of the demonstrator bus is to verify compliance with District specifications requirements.

Bidder understands that if the demonstrator bus is not in substantial compliance to the District specifications the bidder's offer will be rejected and bidder will not be eligible for award.

---

COMPANY NAME

---

SIGNATURE OF AUTHORIZED INDIVIDUAL

SOLICITATION, OFFER & AWARD

1.23.8 OFFER

BIDDER'S STATEMENT

BIDDER: OUR OFFER IS AFFIRMED HERETO. It is understood that the SCRID's specifications and conditions set forth form part of our offer.

We specifically agree to keep this offer open for sixty days.

\_\_\_\_\_  
(COMPANY NAME)

\_\_\_\_\_  
(FULL MAILING ADDRESS)

\_\_\_\_\_  
(TELEPHONE)

\_\_\_\_\_  
(LEGAL NATURE OF BUSINESS ENTITY)

BY:

\_\_\_\_\_  
(TYPE NAME OF AUTHORIZED INDIVIDUAL)

\_\_\_\_\_  
(TITLE)

\_\_\_\_\_  
(SIGNATURE OF AUTHORIZED INDIVIDUAL)

DATE: \_\_\_\_\_

2.0 GENERAL TERMS AND CONDITIONS

The following terms and conditions shall become part of the contract between the District and the successful bidder.

2.1 INTEREST OF MEMBERS OF, OR DELEGATES TO, CONGRESS

No member, officer, or employee of the District 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.

2.2 PROHIBITED INTEREST

No member, officer, or employee of the District 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.

2.3 EQUAL EMPLOYMENT OPPORTUNITY

In connection with the execution of this contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex 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, color, sex, 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.

2.4 MOTOR VEHICLE POLLUTION REQUIREMENTS

When new motor vehicles are purchased with project funds, the Contractor must furnish to the Procuring Agency a certification in writing that:

- Engines shall meet federal pollution standards only.
- The horsepower of the vehicle is adequate for the speed, range, and terrain in which it will be required to operate and also to meet the demands of all auxilliary power equipment.
- All gases and vapors emanating from the crankcase of a spark-ignition engine are controlled to minimize their escape into the atmosphere.
- Visible emission from the exhaust will not exceed No. 1 on the Ringleman Sacle when measured six inches from the tail pipe with the vehicle in steady operation.
- When the vehicle has been idled for three minutes and then accelerated to 80 percent of rated speed under load, the opacity of the exhaust will not exceed No. 2 on the Ringleman Scale for more than five seconds, and not more than No. 1 on the Ringleman Sacle thereafter.

## 2.5 DISADVANTAGED AND WOMAN-OWNED BUSINESS ENTERPRISES

Pursuant to Title 49, Code of Federal Regulations, part 23.67, a bidder, as a condition of being authorized to bid this procurement, must certify by completing Part 1, Attachment 3, that it has on file with the Urban Mass Transportation Administration (UMTA) an approved or not disapproved annual Disadvantaged Business Enterprise Subcontracting Goal's plan.

In connection with the performance of the contract, the contractor will cooperate with the District in meeting its commitments and goals with regard to the maximum utilization of Disadvantaged and Women - Owned Business Enterprises, and will use its best efforts to insure that such businesses shall have the maximum practicable opportunity to compete for subcontracts under this contract.

## 2.6 CARGO PREFERENCE

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 for United States flag commercial vessels.

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 the paragraph above to the UMTA Administrator and the District (through the prime contractor in the case of sub-contractor bills-of lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, D.C. 20230.

Contractor agrees to insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract.

## 2.7 IDEMNIFICATION

The Contractor shall indemnify, keep, and save harmless the District, their agents, officials, and employees against all injuries, deaths, losses, damages, claims, suits, liabilities, judgments, costs, and expenses, which may accrue against the District arising out of, or resulting from the Contractor's acts or omissions, including acts or omissions of its employees, servants, and agents.

## 2.8 PATENT INFRINGEMENT

The District will advise the Contractor of any impending patent suit and provide all information available. The Contractor shall defend any suit or proceeding brought against the District based on a claim that any equipment, or any part thereof, furnished under this contract constitutes an infringement of any patent, and the Contractor shall pay all damages and costs awarded therein,



including incidental and consequential damages, against the District. In case said equipment, or any part thereof, is in such suit held to constitute infringement and use of said equipment or parts is enjoined, the Contractor shall, at its own expense and at its option, either procure for the District the right to continue using said equipment or part, or replace same with non-infringing equipment, or modify it so it becomes non-infringing.

#### 2.9 OMISSIONS FROM SPECIFICATIONS

Notwithstanding the provision of drawings, technical specifications, or other data by the District, the Contractor shall have the responsibility of supplying all parts and details required to make the coach complete and ready for service even though such details may not be specifically mentioned in the drawings and specifications. Fareboxes, radios, and other items that are installed by the District shall not be the responsibility of the Contractor unless they are included in this contract.

#### 2.10 PRIORITY

In the event of any deviation between the description of the coaches in Part II: Technical Specifications and other parts of this document, the technical specifications shall govern.

#### 2.11 WRITTEN MODIFICATIONS TO CONTRACT

Oral change orders are not permitted. No change in this contract shall be made unless the District gives prior written approval. The Contractor shall be liable for all costs resulting from, and for satisfactorily correcting, any specification change not properly ordered by written modification to the contract and signed by the District.

#### 2.12 CHANGE ORDER PROCEDURE

Within 30 calendar days after receipt of a written change order to modify the contract, the Contractor shall submit to the District a detailed price and schedule proposal for the work to be performed. This proposal shall be accepted or modified by negotiation between the Contractor and the District. At that time, a detailed modification shall be executed in writing by both parties. Disagreements that cannot be resolved within negotiations shall be resolved in accordance with the contract disputes clause. Regardless of any disputes, the Contractor shall proceed with the work ordered. The District reserves the right to require a cost price analysis, evaluation, and audit of change order pricing in order to determine if the price is fair and reasonable.

#### 2.13 PRICE ADJUSTMENT FOR REGULATORY CHANGES

If price adjustment is indicated, either upward or downward, it shall be negotiated between the District and the Contractor for changes that are mandatory as a result of legislation or regulations that are promulgated and become effective between the date of bid opening and the date of manufacture. Such price adjustment may be audited, where required.

#### 2.14 INTERCHANGEABILITY

All units and components procured under this contract, whether provided by suppliers or manufactured by the Contractor, shall be duplicates in design, manufacture, and installation to assure interchangeability among coaches in this procurement. This interchangeability shall extend to the individual components as well as to their locations in the coaches.

#### 2.15 MATERIALS/ACCESSORIES RESPONSIBILITY

The Contractor shall be responsible for all materials and workmanship in the construction of the coach and accessories used, whether the same are manufactured by the Contractor or purchased from supplier. This provision excludes fare boxes, radios, and equipment leased or supplied by the District, except insofar as such equipment is damaged by the failure of a part or component for which the Contractor is responsible, or except insofar as the damage to such equipment is caused by the contractor during the manufacture of the coaches.

#### 2.16 INSTRUCTORS

The Contractor shall have one or more qualified instructors who shall be available at the District's property for 160 Instructor hours between the hours of 8:00 and 5:00 p.m. during the period immediately after acceptance of the first coach. Instructor(s) shall conduct schools and advise the personnel of the District on the proper operation and maintenance of the equipment. The Contractor shall also provide visual and other teaching aid for use by the District's own training staff. The District shall approve the subjects and scheduling of the classes conducted by the Contractor.

#### 2.17 ENGINEERS

The Contractor shall, at its own expense, have a competent engineer available on request to assist the District's staff in the solution of engineering or design problems within the scope of the specifications that may arise during the warranty period. This does not relieve the Contractor of responsibilities under Part IV: Warranty Provisions.

#### 2.18 MAINTENANCE, PARTS AND OPERATOR'S MANUALS

The Contractor shall provide for the diesel buses 200 current maintenance manuals, 25 current parts manuals, and 200 standard operator's manuals to the District as listed below, as part of this contract. For the Methonal buses 50 current maintenance manuals, 15 parts manuals and 100 operator manuals. The Contractor shall keep parts books up-to-date for a period of 12 years. Maintenance and parts manuals must be delivered on or before the first bus arrives.

The supplied maintenance and operator's manuals shall incorporate all equipment ordered on the coaches covered by this procurement.

## 2.19 SPARE PARTS

The Contractor shall guarantee the availability of replacement parts for these coaches for at least a 12-year period after the date of acceptance. Spare parts shall be interchangeable with the original equipment and shall be manufactured in accordance with the quality assurance provisions of this contract.

The Contractor shall provide a list of recommended spare parts for the coaches ordered. The spare parts list shall be delivered to the District within 60 days after execution of the Contract. Parts must be delivered within 30 days of the order.

## 2.20 UNAVOIDABLE DELAYS

If the delivery of completed coaches under this contract should be avoidably delayed, the District shall extend the time for completion of the contract for the determined number of days of excusable delay. A delay is unavoidable only if the delay was not reasonably expected to occur in connection with or during the Contractor's performance, and was not caused directly or substantially by acts, omissions, negligence, or mistakes of the Contractor, the Contractor's suppliers, or their agents, and was substantial and in fact caused the Contractor to miss delivery dates, and could not adequately have been guarded against by contractual or legal means.

## 2.21 NOTIFICATION OF UNAVOIDABLE DELAY

The Contractor shall notify the District as soon as the Contractor has knowledge that an event has occurred which will or may delay deliveries. Within 5 days, the Contractor shall confirm such notice in writing furnishing as much detail as is available.

## 2.22 REQUEST FOR EXTENSION IN EVENT OF UNAVOIDABLE DELAY

The Contractor agrees to supply, as soon as such data are available, any reasonable proofs that are required by the District to make a decision on any request for extension. The District shall examine the request and any documents supplied by the Contractor and shall determine if the Contractor is entitled to an extension and the duration of such extension. The District shall notify the Contractor of its decision in writing.

The Contractor shall not be entitled to damages or compensation, and shall not be reimbursed for losses, on account of unavoidable delays.

## 2.23 PRE-DELIVERY TESTS AND INSPECTION

The pre-delivery tests and inspections shall be performed at or near the Contractor's plant; they shall be performed in accordance with the procedures defined in Part III: Quality Assurance Provisions, and they may be witnessed by the Resident Inspector. When the coach passes these tests and inspections, the Resident Inspector shall authorize release of the coach for shipment to Los Angeles.

2.24 ASSUMPTION OF RISK OF LOSS

The District shall assume risk of loss of the coach on delivery, as defined in Section 1.6, if delivered by common carrier driveaway. Prior to this delivery, the Contractor shall have risk of loss of the coach, including any damages sustained during the common carrier driveaway operation. Drivers shall keep a maintenance log enroute and it shall be delivered to the District with the coach.

2.25 ACCEPTANCE OF COACH

Within 15 calendar days after arrival at the designated point of delivery, the coach shall undergo the District tests defined in Part III: Quality Assurance Provisions. If the coach passes these tests, acceptance of the coach by the District occurs on the fifteenth day after delivery. Acceptance may occur earlier if the District notifies the Contractor of early acceptance or places the coach in revenue service. If the coach fails these tests, it shall not be accepted until the repair procedures defined in Section Part I 2.26 have been carried out and the coach is retested until it passes.

2.26 REPAIRS AFTER NONACCEPTANCE

The District may require the Contractor, or its designated representative, to perform the repairs after nonacceptance, or the work may be done by the District's personnel with reimbursement by the Contractor.

2.27 REPAIRS BY CONTRACTOR

If the District requires the Contractor to perform repairs after nonacceptance of the coach, The Contractor's representative must begin work within 5 working days after receiving notification from the District of failure of acceptance tests. The District shall make the coach available to complete repairs within the Contractor repair schedule.

The Contractor shall provide, at its own expense, all spare parts, tools, and space required to complete the repairs. District may require Contractor to remove the coach from the District's property while repairs are being effected. If the coach is removed from the District's property, repair procedures must be diligently pursued by the Contractor's representatives, and the Contractor shall assume risk of loss while the coach is under its control.

The District requires the presence of a manufacturer's representative on the District's property, within five days of notification, to address necessary repairs.

2.28 REPAIRS BY DISTRICT

(1) Parts Used. If the District elects to perform the repairs after nonacceptance of the coach, it shall correct or repair the defect and any related defects using Contractor specified parts available from its own stock or those supplied by the Contractor specifically for this repair. Monthly, or at a period

to be mutually agreed upon, reports of all repairs covered by this procedure shall be submitted by the District to the Contractor for reimbursement or replacement of parts.

(2) Contractor Supplied Parts. If the Contractor supplies parts for repairs being performed by the District after nonacceptable of the coach, these parts shall be shipped prepaid to the District from any source selected by the Contractor within 10 working days after receipt of the request for said parts.

(3) Return of Defective Components. The Contractor may request that parts covered by this provision be returned to the manufacturing plant. The total cost for this action shall be paid by the Contractor.

(4) Reimbursement for Labor. Contractor shall reimburse District for labor. The amount shall be determined by multiplying the number of man-hours actually required to correct the defect by a per hours, first class mechanic, straight wage rate, plus 80% overhead and fringe benefits, plus the cost of towing the coach if such action was necessary. These wage and fringe benefit rates shall not exceed the rates in effect in the District's service garage at the time the defect correction is made.

(5) Reimbursement for Parts. Contractor shall reimburse District for defective parts that must be replaced to correct the defect. The reimbursement shall be completed using the parts costs provided in the contractors parts' catalogue effective at the date of the claim and shall include taxes where applicable and 25% handling costs.

## 2.29 TITLE

Adequate documents for securing title to the coaches in the District's jurisdiction shall be provided to the District at least 10 calendar days before each coach is released to the common carrier driveaway or to the District's drivers. Following acceptance of each coach, the Contractor warrants that the title shall pass to the District free and clear of all liens, mortgages and encumbrances, financing statements, security agreements, claims, and demands of any character.

## 2.30 LIQUIDATED DAMAGES

TIME IS OF THE ESSENCE IN THIS CONTRACT. "In case all the coaches called for under the contract are not delivered before or upon the time limit as set forth in the specifications, damage will be sustained by the District. It is, and will be, impracticable to determine the actual damage which the District will sustain in the event of and by the reason of such delays; and it is therefore agreed that pursuant to Government Code Section 53069.85 the Contractor will pay the District the sum of \$100.00 for each coach every calendar day that the coaches are delayed beyond the delivery time stipulated, subject to extensions granted thereto in writing. The Contractor agrees to pay such liquidated damages herein provided and, in case the same are not paid, agrees that the District shall deduct the amount thereof from any money due or to become due the Contractor under the contract.

The Contractor will be granted an extension of time and will not be assessed with liquidated damages or the cost of engineering and inspection for any portion of the delay in completion of the work beyond the time named in these specifications caused by acts of God, or of the public enemy, fire, floods, epidemics, strikes, labor disputes, and freight embargoes, or other causes beyond his reasonable control, provided that the Contractor shall notify the District in writing of the causes of delay within 15 days from the beginning of any such delay. The District's Contract Administrator shall ascertain the facts and extent of the delay, and his findings thereon shall be final and conclusive. Contractor has the burden of proof that the delay was beyond his control.

#### 2.31 AUDIT AND INSPECTION OF RECORDS

The Contractor shall permit the authorized representative of the U.S. Department of Transportation and of the Comptroller General of the United States to inspect and audit all data and records of the Contractor relating to its performance and its subcontracts under this contract with which Federal funds are used from the date of the contract through until the expiration of three years after completion of the contract. This section excluded the inspection data and records required in Part III: Quality Assurance Provisions. The inspection and audit provided in this section does not include an audit of the manufacturer's cost and/or profit, with the exception of single bid or sole source situations.

#### 2.32 TERMINATION FOR CONVENIENCE

This contract may be terminated by the District in whole, or in part, whenever the District shall determine that such termination is in the best interest of the District. Any such termination shall be effected by delivery to the Contractor of a notice of termination specifying the extent to which performance of work under the contract is terminated, and the date upon which such termination becomes effective.

Any receipt of a notice of termination, and except as otherwise directed by the District, the Contractor shall: stop work under the contract on the date and to the extent specified in the notice of termination: place no further orders or subcontracts for materials, services, or facilities, except as may be necessary for completion of such portion of the work under the contract as is not terminated; terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the notice of termination; assign to the District in the manner, at the times, and to the extent directed by the District, all of the right, title, and interest of the Contractor under the orders and subcontracts so terminated, in which case the District shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts; settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification of the District, to the extent he may require, which approval or ratification shall be final for all the purposes of this clause; transfer title to the District and deliver in the manner, at the times, and to the extent, if any, directed by District the fabricated or unfabricated parts, work in process, completed work, supplies, and other materials produced as a part of, or acquired

in connection with their performance of, the work terminated, and the completed or partially completed plans, drawings, information and other property which, if the contract had been completed, would have been required to be furnished to the District; use its best efforts to sell, in the manner, at the times, to the extend, and at the price(s) directed or authorized by the District, any property of the types referred to above, provided, however, that the Contractor shall not be required to extend credit to any purchaser, and may acquire any such property under the conditions prescribed by and at a price(s) approved by the District, and provided further, that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the District to the Contractor under this contract or shall otherwise be credited to the price or cost of the work covered by this contract or paid in such other manner as the District may direct; complete performance of such part of the work as shall not have been terminated by the notice of termination; and take such action as may be necessary, or as the District may direct, for the protection or preservation of the property related to this contract which is in the possession of the Contractor and in which the District has or may acquire an interest.

Settlement of claims by the Contractor under this termination for convenience clause shall be in accordance with the provisions set forth in Federal Procurement Regulations (FPR) 1-8.701 (c), (d), (e), (f), (g), (i), (j) and (k) except that wherever the work "Government" appears it shall be deleted and the word "District" shall be substituted in lieu thereof.

#### 2.33 TERMINATION FOR DEFAULT

The District may, by written notice of default to the Contractor, terminate the whole or any part of this contract if the Contractor fails to make delivery within the time specified herein or any extension thereof; fails to perform any of the other provisions of the contract, or so fails to make progress as to endanger performance 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 District may authorize in writing) after receipt of notice from the District specifying such failure.

If the contract is terminated in whole or in part for default, the District may procure, upon such terms and in such manner as the District may deem appropriate, equipment similar to those which were to be supplied. The Contractor shall be liable to the District for any excess costs for such similar supplies or services, and shall continue the performance of this contract to the extent not terminated under the provisions of this clause.

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. If the failure to perform is caused by the default of a subcontractor, and if such default arises out of causes beyond the control of both the Contractor and subcontractor, and without the fault or negligence of either of them, the Contractor shall not be liable for any excess costs for failure to perform, unless the equipment or services to be furnished by the subcontractor were obtainable from other sources insufficient time to permit the Contractor to meet the required delivery schedule.

Payment for completed equipment delivered to and accepted by the District shall be at the contract price. The District may withhold from amounts otherwise due the Contractor for such completed supplies such sum as the District determines to be necessary to protect the District against loss because of outstanding liens or claims of former lien holders.

If, after notice of termination of this contract under the provisions of this clause, the rights and obligations of the parties shall be the same as if the notice of the District.

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

#### 2.34 DISPUTES

Except as otherwise provided in this contract, any dispute concerning a question of fact arising under this contract which is not disposed of by agreement shall be decided by the District's Director of Purchasing, who shall reduce his decision to writing and mail or otherwise furnish a copy thereof to the Contractor. The decision of the District shall be final and conclusive. In connection with any appeal proceeding under this clause, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of its appeal. Pending final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the contract and in accordance with the District's Director of Purchasing's decision.

The Director of Purchasing may also consider and decide questions of law if it is necessary to do so in order to decide a question of fact.

#### 2.35 COMMUNICATIONS

Communications in connection with this contract shall be in writing and shall be delivered personally; or by telex, telegram, twx; or by regular, registered, or certified mail addressed to the officer(s) or employee(s) of the District and of the Contractor designated to receive such communications. Telephone calls may be used to expedite communications but shall not be official communication unless confirmed in writing.

#### 2.36 OFFICIAL RECEIPT

Communications shall be considered received at the time actually received by the addressee or designated agent.



2.37 FEDERAL FUNDING

The contract to be awarded will be subject to a financial assistance agreement between the District and the U. S. Department of Transportation.

2.38 NONRESTRICTIVE CLAUSES

Wherever brand, manufacturer or product names are indicated in these specifications, they are included for the purposes of establishing identification and a general description of the item. Wherever such names appear, the term "OR APPROVED EQUAL" is considered to follow. The decision on the approved equal will be rendered by the District.

It should be understood that specifying a brand name, components and/or equipment in this specification shall not relieve the supplier from his responsibility to produce the product in accordance with the performance warranty and contractual requirements. The supplier is responsible for notifying the District of any inappropriate brand name, component and/or equipment that may be called for in the specifications, and to propose a suitable substitute for consideration.

2.39 INELIGIBLE CONTRACTORS

A contract cannot be awarded to any vendor that is on the United States Comptroller General's list of ineligible contractors. Fill in the appropriate section in the Bid Form if your firm IS NOT on the ineligible list.

2.40 COMPLIANCE WITH COPELAND REGULATIONS (29 CFR PART 3)

No contractor-employee, or other person, shall require or induce a person employed on a project subject to Federal wage standard statute, to give up or return any part of such employee's compensation to which he or she is entitled as provided in the Copeland "Anti-Kickback Act, 41 U.S.C. 51-54. (All violations will be reported to UMTA by the District).

2.41 BUY AMERICA

All steel, cement and manufactured products must be of domestic manufacture or origin. There are four exceptions to this otherwise universal mandate:

1. Non-availability in domestic market;
2. Waivers granted by the Secretary of Transportation for reasons of public interest;
3. With respect to rolling stock only, but including train control, communications and transit power equipment, fifty percent may be of non-domestic manufacture, but final assembly of such products must take place in the United States;

4. If the price of comparable domestic products is twenty-five percent greater for general procurements, and ten percent greater for rolling stock.

All Bidders are to complete the appropriate section in the Bid Form, "Buy America" certification.

#### 2.42 COVENANT AGAINST CONTINGENT FEES

The contractor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement to understanding for a commission, percentage, brokerage or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or violation of this warranty the District shall have the right to annul this contract without liability, or at its discretion, to deduct from the contract price of consideration, or otherwise recover, the full amount of such commission, percentage, brokerage or contingent fee.

#### 2.43 COVENANT AGAINST GRATUITIES

The contractor warrants that no official or employee of the District has been offered or been given gratuities (in the form of entertainment, gifts or otherwise) for the intent or purpose of securing favorable treatment in the award, amending, or evaluation performance of the contract.

#### 2.44 FLEET DEFECTS

"In the event of a breach of the warranty requirements set forth in Section IV, 1.6, et seq. (fleet defects) causing coaches to be out of service for repairs, the contractor, in addition to all warranty services, and costs thereof, shall pay to the District as liquidated damages \$100.00/per day/per coach for the period that the coach is out of service, or, as an alternate, shall provide a substitute coach in good working condition, suitable for rapid transit service, for every day that the defective coach is out of service. If monies are still due and owing, or shall become due and owing from the District to the contractor, the damages provided for hereunder shall be deducted therefrom."

#### 2.45 LIFE CYCLE COST

In order to minimize the chance of extended protests or more serious legal action, the District's LCC cost factors are objective, measurable, and repeatable. To further safeguard the process, the District's specifications require bidders to itemize their concerns with the LCC system in advance of the bid opening. Only after the District has responded to all LCC questions and concerns will the bid opening occur.

Part I - Attachment 1

120 EA. DIESEL POWERED BUSES - 40 -FOOT HEAVY DUTY TRANSIT COACH

LCC Calculation Worksheet  
(To Be Completed By Bidder)

A. Base Price Life Cycle Cost Factor #1 (LCCF)

Part A will be completed by the District after opening the price proposal.

Indicate the prices A & B entered in Part I, Section 1.2 Offer on page 14 and 15.

A \_\_\_\_\_ + B \_\_\_\_\_ LCCF#1 \_\_\_\_\_

B. Life Cycle Cost Factor #2

Amounts Added for Life Cycle Costing Based on Fleet Standardization

B.1 District records for parts inventory, warehousing and mechanic training indicate that new buses which are not substantially similar to those already in the fleet, result in an incremental cost increase of \$3445 each over their service life. Accordingly, this extra cost associated with dissimilar buses and their subcomponents is added to the vehicle purchase price for purposes of Life Cycle Costings.

B.2 Bidder shall indicate which of the following systems descriptions are common to the bus bid on and other buses currently in the District's fleet. The District reserves the right to concur in or reject all such determinations. See Part I, Attachment 5 for a listing of systems or system components already in the District's fleet.

B.3 Add on Price for each Bus type with no common components: \$3445

- Deduct for similar engine \$1233 \_\_\_\_\_
- Deduct for similar transmission \$923 \_\_\_\_\_
- Deduct for similar axle and brakes \$615 \_\_\_\_\_
- Deduct for similar body components \$308 \_\_\_\_\_

- Deduct for similar A/C components \$246  
(i.e. Compressor and Condenser if used) \_\_\_\_\_
- Deduct for similar main AC alternator \$123 \_\_\_\_\_
- Other\* \_\_\_\_\_
- Sub-total deducts \_\_\_\_\_
- Remaining Price Add On \_\_\_\_\_

B.4 Calculate LCC standardization factor:

$$\frac{\text{Price Add On Per Bus for Standardization}}{\text{Price Add On Per Bus for Standardization}} \times 120 \text{ buses} = \text{LCCF \#2}$$

\* Bidder shall make claim for any additional add on price reduction in writing at pre-bid conference. The District will advise all pre-bid conference attendees of any further add on price reduction items prior to bid opening date.

C. Life Cycle Cost Factor #3 - Passenger Capacity

40-foot buses typically provide 66 seated and standee positions per vehicle. Therefore, the 120 buses will accommodate up to 8,880 passengers.

Bidders shall state the number of their vehicles required to provide 8,880 passenger positions. Any number of more or fewer buses, or percent thereof rounded to the nearest tenth of a bus, different than the base of 120 buses shall be multiplied by the bidders per vehicle cost, including sales tax, import duties, ocean freight, and delivery charges. This cost adjustment factor shall be added to the base bid price. Standee positions shall be defined as a clear floor space of 1.0' x 1.5'. Standee space shall not overlap floor space required for foot space by seated passengers. Total passenger capacity shall not cause vehicle to exceed GVWR. Bidders shall submit, with their LCC technical submission, a drawing illustrating seating positions including foot space and standee locations so defined above.

- a. Number of Buses to Equal 8,880 positions \_\_\_\_\_ = X
- b. 120 Buses - X = Difference in Buses \_\_\_\_\_ = Y
- c.  $Y \times \$ \frac{\text{bid cost per bus}}{\text{bid cost per bus}} = \text{LCCF \#3}$  \_\_\_\_\_

## D. Life Cycle Cost Factor #4 - Fuel Economy

The LCC fuel economy price adjustment shall be determined based on data to be provided by prospective bidders. The data source shall be bus manufacturer's documentation based on computer simulations or SAE Type II test using the duty cycle defined in Part I, Attachment 2.

Data provided to the bidder by the engine manufacturer for use on the computer model shall also be included with the technical submission.

The District may select at random three coaches from the first 15 coaches manufactured as a "typical sample" for fuel consumption verification testing. The coaches selected will be tested by a third party, independent testing agency in compliance with the SAE Type II test sequence to validate the data presented to the District by the manufacturer in (Z) \_\_\_\_\_ MPG. Should test data reveal the typical coach MPG is less than Z \_\_\_\_\_ MPG minus .2 MPG, the manufacturer will be responsible for the difference \_\_\_\_\_ MPG X 120 buses X 300,000 miles X \$1.00 per gallon \_\_\_\_\_ plus all costs incurred to test the coaches. Should the tests validate the Z \_\_\_\_\_ MPG minus .2 MPG, the District will be responsible for all testing costs.

LCC fuel economy will be based on 300,000 service life divided by manufacturer's estimated MPG = life time fuel use.

The base price will be increased by the life cycle fuel cost for bid evaluation purposes.

Service Life = 300,000 miles  
Z = \_\_\_\_\_ MPG

$\frac{300,000 \text{ miles}}{Z} = \text{Lifetime Fuel Use One Bus}$

Lifetime Fuel Use x \$1.00 per gallon x 120 buses = LCCF #4 \_\_\_\_\_

## E. Life Cycle cost Factor #5 - Preventive Maintenance Program (PMP)

Regular preventive maintenance is necessary to prolong a vehicle's useful life. However, it also results in a considerable portion of total maintenance costs. Therefore it is the District's objective to purchase a vehicle designed to require the least costly preventive maintenance program over its useful life.

E.1 PMP activities are to be performed at 6,000 mile intervals.

(a) Specified PMP: 6,000 miles

$$\frac{\text{Labor}}{\text{Hrs}} \times \$28.00 = \frac{\text{Labor}}{\text{Rate}} = \frac{\text{Labor}}{\text{Cost}} + \frac{\text{Materials}}{\text{Cost}} = \frac{\text{Cost}}{\text{Per PMP}} \times \frac{100}{\# \text{ PMP For Bus Life}} = \frac{\text{PMP}}{\text{Total For Bus Life}}$$

PMP Cost One Bus x 120 Buses = LCCF #5 \_\_\_\_\_

E.2 Bidder shall provide, with the technical submission, copies of previously published maintenance manuals indicating PMP requirements. Technical submission shall also include itemized labor time required to complete each PMP task and related material cost.

F. Life Cycle Cost Factor #6 - Removal and Rebuild Costs (RRC)

It is necessary to remove and rebuild the engine, engine subassembly and components to achieve the specified life of the vehicle. This results in a considerable portion of the total life cycle costs. Therefore, it is the District's objective to purchase a vehicle designed to require the least costly maintenance over its useful life. To make this determination, the bidder shall provide: 1) Labor hours required to remove and replace the engine, engine subassembly or components, 2) Labor hours required to rebuild these units, 3) Parts required to recondition these units. These costs must be multiplied by the number of cycles required for rebuilding the components to achieve the 600,000 specified miles.

RRC cost one bus x 120 buses = LCCF #6 \_\_\_\_\_

Replace and Rebuild Costs (RRC)

	<u>Labor Hours</u>			<u>Labor Rate</u>	<u>Total</u>	<u>Parts Required Cost</u>	<u>Total</u>	<u>Life Cycle Frequency</u>
	<u>R&amp;R Labor</u>	<u>Rebuild Labor</u>	<u>Total Labor Hours</u>			<u>Rebuild Parts Cost</u>		
Engine Tune Up	_____ hrs.		= _____ hrs.	x \$28.00 hr.	= \$ _____	+ \$ _____	= \$ _____	$\frac{X12}{50K} = \$$ _____
Engine	_____ hrs.	+ _____ hrs.	= _____ hrs.	x \$28.00 hr.	= \$ _____	+ \$ _____	= \$ _____	$\frac{X2}{250K} = \$$ _____
All Cylinder Head(s) 1 or 3	_____ hrs.	+ _____ hrs.	= _____ hrs.	x \$28.00 hr.	= \$ _____	+ \$ _____	= \$ _____	$\frac{X2}{250K} = \$$ _____
Injectors	_____ hrs.	+ _____ hrs.	= _____ hrs.	x \$28.00 hr.	= \$ _____	+ \$ _____	= \$ _____	$\frac{X2}{250K} = \$$ _____
Fuel Pump	_____ hrs.	+ _____ hrs.	= _____ hrs.	x \$28.00 hr.	= \$ _____	+ \$ _____	= \$ _____	$\frac{X2}{250K} = \$$ _____
Transmission	_____ hrs.	+ _____ hrs.	= _____ hrs.	x \$28.00 hr.	= \$ _____	+ \$ _____	= \$ _____	$\frac{X2}{250K} = \$$ _____
Main Alternator	_____ hrs.	+ _____ hrs.	= _____ hrs.	x \$28.00 hr.	= \$ _____	+ \$ _____	= \$ _____	$\frac{X2}{250K} = \$$ _____
Radiator	_____ hrs.	+ _____ hrs.	= _____ hrs.	x \$28.00 hr.	= \$ _____	+ \$ _____	= \$ _____	$\frac{X2}{250K} = \$$ _____
A/C Compressor	_____ hrs.	+ _____ hrs.	= _____ hrs.	x \$28.00 hr.	= \$ _____	+ \$ _____	= \$ _____	$\frac{X2}{250K} = \$$ _____
A/C Condensor Motor	_____ hrs.	+ _____ hrs.	= _____ hrs.	x \$28.00 hr.	= \$ _____	+ \$ _____	= \$ _____	$\frac{X2}{250K} = \$$ _____

x 120 Coaches  
Total MRRRC = \$ \_\_\_\_\_

G. Summary of LCC Factors

To determine the lowest bidder based on the LCC factors, the base bid shall be adjusted by LCCF #2 through #6. Bidders shall enter LCCF #2 through #6 below.

- 1. LCCF #1 = \$ Base Bid Price (To be Inserted By District) \$ \_\_\_\_\_
- 2. LCCF #2 = Standardization Price Adjustment \$ \_\_\_\_\_
- 3. LCCF #3 = Passenger Capacity Price Adjustment \$ \_\_\_\_\_
- 4. LCCF #4 = Fuel Economy Price Adjustment \$ \_\_\_\_\_
- 5. LCCF #5 = PMP Price Adjustment \$ \_\_\_\_\_
- 6. LCCF #6 = PMP Price Adjustment \$ \_\_\_\_\_

H. Factor Weights (LCC Price Adjusted)

The five LCC factors from item G above, excluding item 1, shall be entered below for weighing purposes in order to more accurately reflect their importance to the District. The factor weights used are based on the present cost of money, the relative impact of the factor on future operating costs, and the relative accuracy in quantifying each (see Part I, Attachment 4).

Bidders shall complete Factors 2 to 6 of the following calculation. The District will complete Factor 1, after the price proposal opening date, to determine the adjusted LCC bid price which shall be used for bid evaluation purposes.

LCCF #1	_____	x	50%	=	_____
LCCF #2	_____	x	4%	=	_____
LCCF #3	_____	x	5%	=	_____
LCCF #4	_____	x	30%	=	_____
LCCF #5	_____	x	7%	=	_____
LCCF #6	_____	x	4%	=	_____

---

Total Adjusted LCC Price 100% = \_\_\_\_\_ \*

for 120 Buses (To Be Computed by District)



Part I - Attachment 2

Operating Duty Cycle:

Design Operating Profile. The operating profile for design purposes shall consist of simulated transit type service. The duty cycle is described in Figures 1 and 2. The duty cycle consists of three phases to be repeated in sequence: a central business district (CBD) phase of 2 miles with 7 stops per mile and a top speed of 20 mph, an arterial route phase of 2 miles with 2 stops per mile and a top speed of 40 mph, and a commuter phase of 4 miles with 1 stop and a maximum speed of 55 mph.

The coach shall be loaded to full capacity of 66 passengers and shall average approximately 18 mph while operating on this duty cycle. Operation shall continue regardless of the ambient temperature or weather conditions. The passenger doors shall be opened and closed at each stop, and the coach shall be knelt at each stop during the CBD phase. The braking profile shall be:

16 percent of the stops at	3 fpsps
50 percent of the stops at	6 fpsps
26 percent of the stops at	9 fpsps
8 percent of the stops at	12 fpsps

These percentages of stops shall be evenly distributed over the three phases of the duty cycle. For scheduling purposes, the average deceleration rate is assumed.

Phase	Stops/ Miles	Top Speed (mph)	Miles	Accel. Distance (ft)	Accel. Time (sec)	Cruise Distance (ft)	Cruise Time (sec)	Decel. Rate (fpsps)	Decel. Distance (ft)	Decel. Time (sec)	Dwell Time (sec)	Cycle Time (min- sec)	Total Stops
CBD	7	20	2	155	10	540	18.5	6.78	60	4.5	7	9.20	14
Idle												5.0	-
Arterial	2	40	2	1035	29	1350	22.5	6.78	255	9	7	4.30	4
CBD	7	20	2	155	10	510	18.5	6.78	60	4.5	7	9.20	14
Arterial	2	40	2	1035	35	1350	22.5	6.78	255	9	7	4.30	4
CBD	7	20	2	155	10	510	18.5	6.78	60	4.5	7	9.20	14
Commuter	1 stop for phase	Maxi- mum or 55	4	5500	90	2 mile + 4580 ft	188	6.78	480	12	20	5.10	1
<b>Total</b>			<b>14</b>									<b>47.10</b>	<b>51</b>

Average Speed - 17.8 mph

Figure I - TRANSIT COACH DESIGN OPERATING DUTY CYCLE

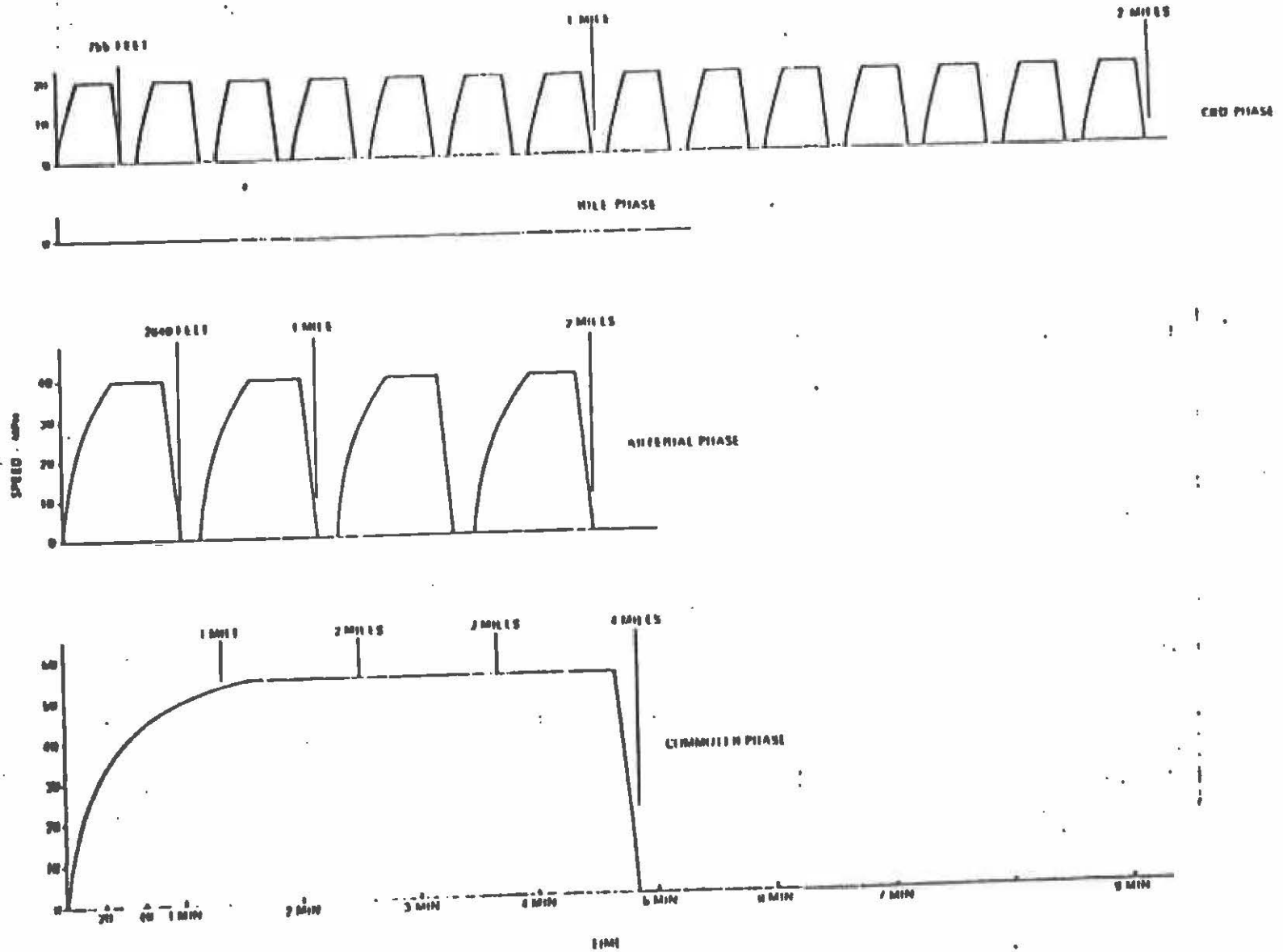


FIGURE 2 TRANSIT COACH DESIGN OPERATING PROFILE DUTY CYCLE

PART 1 - ATTACHMENT 3

Disadvantage Business Enterprise Certification.

The bidder hereby certifies that it has complied with requirements of Title 49, Code of Federal Regulations, part 23.67, by submitting an annual Disadvantaged Business Enterprise Goal's Plan to the Urban Mass Transportation Administration for approval.

\_\_\_\_\_  
(NAME OF FIRM)

Further, the bidder certifies that its annual Disadvantaged Business Enterprise Goals Plan has either been approved, or not disapproved by the Urban Mass Transportation Administration.

NAME \_\_\_\_\_

SIGNATURE \_\_\_\_\_

TITLE \_\_\_\_\_

DATE \_\_\_\_\_

## Rationale for Life Cycle Costing Factor Weights

## 40-Foot Bus Procurement

Six factors in Life Cycle Costing have been identified, isolated, and weighted according to their impact on the total lifetime costs of owning and operating 40-foot buses. These factors are base bid price, mean mileage between road failures, standardization, passenger capacity, fuel economy, and preventive maintenance price adjustment.

1. Base Bid Price - (50% of total)

This is the most important single item in computing the total cost of operating a bus over its lifetime. The weight given this factor is justified by the large initial outlay involved in buying a bus. Further the bus purchase price is given added significance in that it is also the most precisely quantifiable element of the LCC process.

2. Standardization - (4% of total)

This factor is also experiential, based on the actual costs incurred by the District for parts inventory, warehousing, and mechanic training whenever new buses are procured. Unfortunately, these costs vary according to the extent to which new equipment is substantially similar to that already in service. Thus, these cost differences must be built into the bid process in order for the District to assess fairly the actual costs of operating new equipment over its design life.

The District has determined that the introduction of new buses into the fleet has a parts inventory impact of \$2756 per bus. This cost has been distributed over six major vehicle sub-systems on a relative cost basis. Accordingly, a bidder can determine which of their current components are common to those buses already in the fleet or offer substitute components in order to maximize the standardization price adjustment. (See Attachment 5 for a listing of those components present in the District fleet.)

3. Passenger Capacity - (5% of total)

This factor is designed to take into account the ability of a bus to carry extra passengers over and above the required minimum specified. The ability to carry extra passengers is especially vital during peak hours. Our experience with 40-foot buses indicates that a few extra seats could easily produce revenue of 8% of the initial purchase price of a bus over its design life. This amounts to 4% of a total which includes the initial purchase price.

4. Fuel Economy - (30% of total)

Fuel is the largest single factor contributing to the actual cost of running a bus for its design life. Based on our experience, about the

equivalent of 75% of the initial purchase cost of a bus will be expended over its 600,000 mile design life to fuel it. The potential for differences in fuel mileage between vehicles is significant. A difference of 4 miles per gallon, at current fuel prices, could mean a difference in operating costs of 50% of the initial purchase price, or 25% of a total which includes the initial purchase cost.

5. Preventive Maintenance Price Adjustment - (7% of total)

This factor includes the costs of material and labor to execute preventive maintenance on a bus as called for by the bus manufacturer. Our experience indicates that the equivalent of 18% of the initial purchase price of a bus will be expended on preventive maintenance over its design life. This amounts to 9% of a total which includes the initial purchase price.

6. Removal and Rebuild Costs (RRC) - (4% of total)

This factor includes the cost to remove and rebuild the engine, engine subassembly and components to achieve the specified life of the vehicle. Such costs become a considerable portion of the total life cycle costs. It is the District's objective to purchase a vehicle designed to require the least costly maintenance over its useful life.

The factors listed above are those which are significant, verifiable, and quantifiable. We think their inclusion as life cycle cost drivers is justified logically and based on the District's experience with diverse kinds of equipment, including small buses.

Part I, Attachment 5

LIST OF SYSTEM COMPONENTS ALREADY IN DISTRICT'S FLEET

ENGINE

6V71 DDA  
8V71 DDA  
6V92 DDA  
903 Cummins  
3208 Caterpillar

TRANSMISSION

(ALLISON)

HV730D  
HT740D  
VS2  
MT643

AXLE

Rockwell  
Eaton

"S" Cam  
Wedge Brake

BODY

GMC RTS II	Carpenter CBW-300
GFC 870	Neoplan AN-44DA
GMC 5307A	
Flxible III-CC	
AMG B	

AIR CONDITIONING COMPRESSOR

Trane  
Thermo King  
Carrier

ELECTRICAL (RELAYS, CIRCUIT BREAKERS)

Delco Remy  
Bosch  
Cutler-Hammer  
Cole  
Essex  
Ohio Electric  
Autolite

Part I, Attachment 6

RECOVERY OF CALIFORNIA SALES TAX  
ON BUS MODIFICATIONS FOR HANDICAPPED

Wheelchair System

- Wheelchair lift and and lift control panel.
- o Brake-accelerator-wheelchair lift interlock.
- Rear door wheelchair lift; a key switch at driver's position disarming the wheelchair lift system.
- Lights above wheelchair boarding position (floodlight).
- o External/internal public address system.
- Fold-up seats.
- Seat belts for wheelchair patron.
- o Wheelchair securement devices.
- Wheelchair securement straps

Kneeling System

- Kneeling mechanism.
- o Brake-throttle-kneeling interlock.
- Illuminated indicator on driver's panel.
- o Control switch on driver's panel.
- Warning system (lights and audible alarm).

Miscellaneous

- o Modifications to doorways, loading area, aisleway, and passenger's assist design.
- o Signs and Decals
- o Non-Skid Flooring



Part I, Attachment 7

DEFINITION OF POWER PLANT ASSEMBLY

The power plant assembly shall include but not be limited to the following:

1. Engine cradle
2. Engine
3. Transmission
4. Turbocharger
5. Radiator
6. Alternator
7. A/C Compressor
8. Starter
9. Heat Exchanger (transmission and engine)
10. Oil filter (bypass filter if used)
11. Muffler

Any component such as belts, hoses, brackets, etc. not mentioned above but used in propulsion systems operation shall be included.

PART I, ATTACHMENT 8

This form must be completed and attached to Bid unless a certified check is attached.

150 40-FOOT HEAVY DUTY TRANSIT COACHES

FOR THE SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

BID BOND

KNOW ALL PEOPLE BY THESE PRESENTS, that we \_\_\_\_\_ as Principal, hereinafter called the Principal, and \_\_\_\_\_ a corporation duly organized under the laws of the State of \_\_\_\_\_ as Surety, hereinafter called the Surety, are held and firmly bound unto the SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT, as Obligee, hereinafter called the Obligee, in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for \_\_\_\_\_

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

SIGNED AND SEALED THIS \_\_\_\_\_ DAY OF \_\_\_\_\_ 19 \_\_\_\_\_

\_\_\_\_\_  
(Witness)  
\_\_\_\_\_  
(Title)

(  
(Principal) (Seal)  
(  
(Title)

\_\_\_\_\_  
(Witness)  
\_\_\_\_\_  
(Title)

(  
(Surety) (Seal)  
(  
(Title)

PART I, ATTACHMENT 9

150 40-FOOT HEAVY DUTY TRANSIT COACHES

FAITHFUL PERFORMANCE BOND

KNOW ALL PEOPLE BY THESE PRESENTS:

That \_\_\_\_\_, as Principal, and

\_\_\_\_\_, as Surety, are held and firmly bound unto  
the SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT, as Obligee, in the just and full  
amount \_\_\_\_\_ for the

(words and figures)

payment whereby bind ourselves, our heirs, executors, administrators and assigns,  
jointly and severally, firmly by these presents.

Given under our hands and sealed with our seals this \_\_\_\_\_ day of  
\_\_\_\_\_, 19\_\_\_\_.

The condition of the foregoing obligation is such that, WHEREAS, the  
above-named Principal is about to enter into a contract with the Southern  
California Rapid Transit District whereby said Principal agrees to \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

as provided in said contract, which said contract is hereby referred to and made a  
part hereof to the same extent as if the same were herein specifically set forth;

NOW THEREFORE, if the said Principal shall well and truly do and perform  
all things agreed by it/him in said contract to be done and performed, then this  
obligation is to be void; otherwise to remain in full force and effect;

120 DIESEL 40-FOOT TRANSIT COACHES

PART II: A TECHNICAL SPECIFICATIONS

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1.0 BASIC PROVISIONS

## 1.1 WARRANTY REQUIREMENTS

Warranties in this document are in addition to any statutory remedies or warranties imposed on the Contractor. Consistent with this requirement the Contractor warrants and guarantees to the original District each complete coach, and specific subsystems and components as follows:

### 1.1.1 COMPLETE COACH

The coach is warranted and guaranteed to be free from defects\* and related defects\* for one year or 50,000 whichever comes first, beginning on the date of acceptance of each coach. \*\* Brake drums shall be warranted for 50,000 miles. During this warranty period, the coach shall maintain its structural and functional integrity. The warranty is based on regular operation of the coach under the operating conditions prevailing in the in District service. Brake lining material shall be warranted for 15,000 miles.

### 1.1.2 SUBSYSTEMS AND COMPONENTS

Specific subsystems and components are warranted and guaranteed to be free from defects and related defects for the times and/or mileages given in Figure IV-1.

ITEM	WHICHEVER OCCURS FIRST	
	YEARS	MILEAGE
Engine	2	200,000
Transmission	2	100,000
Drive axle	2	100,000
Brakes (Excluding Lining and drums wear)	2	50,000
Air conditioning system	2	n/a
Basic body structure	3	150,000

FIGURE IV-1. SUBSYSTEM AND COMPONENT WARRANTY

\* For definitions, see Part I: Solicitation, Offer and Award/Contractual Provisions.

\*\* For acceptance requirements, see Part I: Solicitation, Offer and Award/Contractual Provisions.

## 1.2 VOIDING OF WARRANTY

The warranty shall not apply to any part or component of the coach that has been subject to misuse, negligence, accident, or that has been repaired or altered in any way so as to affect adversely its performance or reliability, except insofar as such repairs were in accordance with the Contractor's maintenance manuals and the workmanship was in accordance with recognized standards of the industry. The warranty shall also be void if the District fails to conduct normal inspections and scheduled preventive maintenance procedures as recommended in the Contractor's maintenance manuals.

## 1.2 EXCEPTIONS TO WARRANTY

The warranty shall not apply to scheduled maintenance items, and items such as tires and tubes, nor to items furnished by the District such as radios, fare boxes, and other auxiliary equipment, except insofar as such equipment may be damaged by the failure of a part of component for which the Contractor is responsible.

## 1.4 DETECTION OF DEFECTS

If the District detects a defect within the warranty periods defined in Section 1.1, it shall promptly notify the Contractor's representative. Within 5 working days after receipt of notification, the Contractor's representative shall either agree that the defect is in fact covered by warranty, or reserve judgment until the subsystem or component is inspected by the Contractor's representative or is removed and examined at the District's property or at the Contractor's plant. At that time the status of warranty coverage on the subsystem or component shall be mutually resolved between the District and the Contractor. Work necessary to effect the repairs defined in Section 2.2 shall commence within 10 working days after receipt of notification by the Contractor.

## 1.5 SCOPE OF WARRANTY REPAIRS

When warranty repairs are required, the District and the Contractor's representative shall agree within 5 days after notification on the most appropriate course for the repairs and the exact scope of the repairs to be performed under the warranty. If no agreement is obtained within the 5-day period, the District reserves the right to commence the repairs in accordance with Section 2.3.

## 1.6 FLEET DEFECTS

A fleet defect is defined as the failure of identical items covered by the warranty and occurring in 20% of the coaches in this contract during the warranty period.

### 1.6.1 SCOPE OF WARRANTY PROVISIONS

The Contractor shall correct a fleet defect under the warranty provisions defined in Section 2 of Part IV: Warranty Provisions. After correcting the defect, the Contractor shall promptly undertake and complete a work program reasonably designed to prevent the occurrence of the same defect in all other coaches purchased under this contract. The work program shall include inspection and/or correction of the potential or defective parts in all of the coaches.

The warranty on items determined to be fleet defects shall be extended for the time and/or miles of the original warranty. This extended warranty shall begin on the date a fleet defect was determined to exist, or on the repair/replacement date for corrected items.

### 1.6.2 VOIDING OF WARRANTY PROVISIONS

The fleet defect provisions shall not apply to coach defects caused by non-compliance with the Contractor's recommended normal maintenance practices and procedures.

### 1.6.3 EXCEPTIONS TO WARRANTY PROVISIONS

Fleet defect warranty provisions shall not apply to damage that is a result of normal wear and tear in service to such items as seats, floor covering, windows, interior trim, and paint. The provisions shall not apply to District supplied items such as fareboxes and radios.

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PART II: TECHNICAL SPECIFICATIONS

1.0 GENERAL

## 1.1 SCOPE

Part II: Technical Specifications cover requirements for a 2 or 3 axle wheelchair accessible 40-foot diesel powered transit coach. It is intended for the widest possible spectrum of passengers, including children, adults, the elderly, and the handicapped.

## 1.2 DEFINITIONS

The following are definitions of special terms used in Part II.

- (1) dBA. Decibels reference to 0.0002 microbar as measured on the "A" scale.
- (2) Audible Discrete Frequency. An Audible Discrete Frequency is determined to exist if the sound power level in any 1/3-octave band exceeds the average of the sound power levels of the two adjacent 1/3-octave bands by 4 decibels (dB) or more.
- (3) Standee Line. A line marked across the coach aisle in line with the driver's barrier to designate the forward area which passengers may not occupy when the coach is moving.
- (4) Free Floor Space. Floor area available to standees, excluding ingress/egress areas, area under seats, area occupied by feet of seated passengers, and the vestibule area.
- (5) Curb Weight. Weight of vehicle, including maximum fuel, oil, and coolant; and all equipment required for operation and required by this Specification, but without passengers or driver.
- (6) Seated Load. One hundred fifty pounds for every designed passenger seating position and for the driver.
- (7) Gross Load. One hundred fifty pounds for every designed passenger seating position, for the driver, and for each 1.5 square feet of free floor space.
- (8) SLW (Seated Load Weight). Curb weight plus seated load.
- (9) GVWR (Gross Vehicle Weight Rated). Curb weight plus gross load.
- (10) Driver's Eye Range. The 95th-percentile eyellipse defined in SAE Recommended Practice J941, except that the height of the eyellipse shall be determined from the seat at its reference height.
- (11) Fireproof. Materials that will not burn or melt at temperatures less than 2,000 degrees Fahrenheit.
- (12) Fire-Resistant. Materials that have a flame spread index less

than 150 as measured in a radiant panel flame test per ASTM-E 162-75.

- (13) Human Dimensions. The human dimensions used in Part II: Technical Specifications are defined in SAE Recommended Practice J833.
- (14) HIC (Head Injury Criteria). The following equation presents the definition of head injury criteria:

$$\left[ \frac{1}{t_1 - t_2} \int_{t_1}^{t_2} (a) dt \right]^{2.5} (t_2 - t_1)$$

where

a = the resultant acceleration at the center of gravity of the head form expressed as a multiple of g, the acceleration of gravity. t1 and t2 = any two points in time during the impact.

- (15) Classes of Failures. Classes of failures are described below.
  - (a) Class 1: Physical Safety. A failure that could lead directly to injury of passenger, driver or other, and represents a severe crash situation.
  - (b) Class 2: Road Call. A failure resulting in an enroute interruption of revenue service. Service is discontinued until the coach is replaced or repaired at the point of failure.
  - (c) Class 3: Coach Change. A failure that requires removal of the coach from service during its assignments. The coach is operable to a rendezvous point with a replacement coach.
  - (d) Class 4: Bad Order. A failure that does not require removal of the coach from service during its assignments but does degrade coach operation. The failure shall be reported by driver, inspector, or hostler.
- (16) Maintenance Personnel Skill Levels. Defined below are maintenance personnel skill levels used in Part II: Technical Specifications.
  - (a) 5M: Specialist Mechanic or Class A Mechanic Leader.
  - (b) 4M: Journeyman or Class A Mechanic.
  - (c) 3M: Service Mechanic or Class B Serviceman.
  - (d) 2M: Mechanic Helper or Coach Serviceman.
  - (e) 1M: Cleaner, Fueller, Oiler, Hostler, or Shifter.
- (17) Standards: Standards referenced in Part II: Technical Specifications are the latest revisions unless otherwise stated.

### 1.3 ABBREVIATIONS

The following is a list of abbreviations used in Part II: Technical Specifications and Part III: Quality Assurance.

- (1) ASTM: American Society for Testing and Materials.
- (2) SAE: Society of Automotive Engineers
- (3) ANSI: American National Standards Institute
- (4) ASHRAE: American Society of Heating, Refrigerating, and Air Conditioning Engineers
- (5) SPI: Society of the Plastics Industry
- (6) USDHEW: United States Department of Health, Education, and Welfare
- (7) UL: Underwriter's Laboratory
- (8) BMCS: Bureau of Motor Carrier Safety
- (9) FMVSS: Federal Motor Vehicle Safety Standards
- (10) AWS: American Welding Society

## 1.4 LEGAL REQUIREMENTS

The coach shall meet all applicable FMVSS and all applicable BMCS regulations in effect at the date of manufacture.

The Contractor shall comply with all applicable Federal, State, and local regulations. Local regulations are defined as those below the state level. In the event of any conflict between the requirements of this Specification and any applicable legal requirement, then the legal requirement shall prevail.

Provide General Model TCP-5J, Amerex Model 425 or approved equal, 5-pound multi-purpose fire extinguisher, complete with mounting bracket.

Provide emergency reflector kit, Cat's Eye 7500, KD 610-4645 or approved equal.

Both the fire extinguisher and reflector kit shall be mounted in a position that is convenient and accessible to the operator and out of the reach of passengers, subject to District approval.

## 1.5 OVERALL REQUIREMENTS

### 1.5.1 AS-BUILT DRAWING

The Contractor shall, prior to commencing production, supply an "as-built" 3/16" = 1 ft. scale drawings photographically reproduced on stable base matte finish Mylar film. This drawing shall have sufficient detail and data to describe all interior and exterior technical body features of the buses to be furnished. Drawings shall minimally include passenger assist layouts, seat placement and dimensions, passenger door and window dimensions. Format of drawing shall be approved by the District.

#### 1.5.1.1 Physical Size

With the exception of exterior mirrors, marker, and signal lights, flexible portions of the bumpers, radio antenna, roof mounted escape hatches, fender skirts, and rubrail, the coach shall have the following overall dimensions. Roof mounted escape hatches shall not be more than two inches higher than roofline in the closed position.

- (1) Length: 40 feet, 0 inches (+0, -1 inch)
- (2) Width: 8 feet, 6 inches (+0, -1 inch)
- (3) Height: 10 feet, maximum.
- (4) Step Height from Street Level



	to 1st Step - Front	14.5 In. Max.
(5)	Step Height from Street Level to 1st Step - Rear	16 In. Max.
(6)	Step Riser Height - Front - Rear	10.25 In. Max. 10.75 In. Max.
(7)	Head Room Over Aisle	78 In. Min.
(8)	Floor Height At Front Entrance At Rear Exit	34 In. Max. 36 In. Max.
(9)	Front door opening, clear between hardware and assists Rear door opening, clear between hardware and assists	30 In. Min. 25 In. Min.
(10)	Passenger seating capacity	43 Seat Min.
(11)	Seat Width (Two Positions)  Seat Back Height	35 In. Min.  36 In.
(12)	Body Turning Radius Right Left	44 Ft. Max. 44 Ft. Max.

#### 1.5.1.2 Underbody Clearance

The coach shall maintain the minimum clearance dimensions as shown in Figure II-3 and defined in SAE Standard J689, regardless of load up to the gross vehicle weight rating.

- (1) Ramp Clearances. Approach angle shall be no less than 10 degrees. Breakover angle shall be no less than 10 degrees. Departure angle shall be no less than 9 degrees.
- (2) Ground Clearance. Ground clearance shall be no less than 10 inches except within the axle zone, and wheel area.
- (3) Axle Clearance. Axle zone clearance which is the projected area between tires and wheels on the same axial centerline, shall be no less than 6 1/2 inches.
- (4) Wheel Area Clearance. Wheel area clearance shall be no less than 8 inches for parts fixed to the coach body and 6-1/2 inches for parts that move vertically with the axles.

II-7

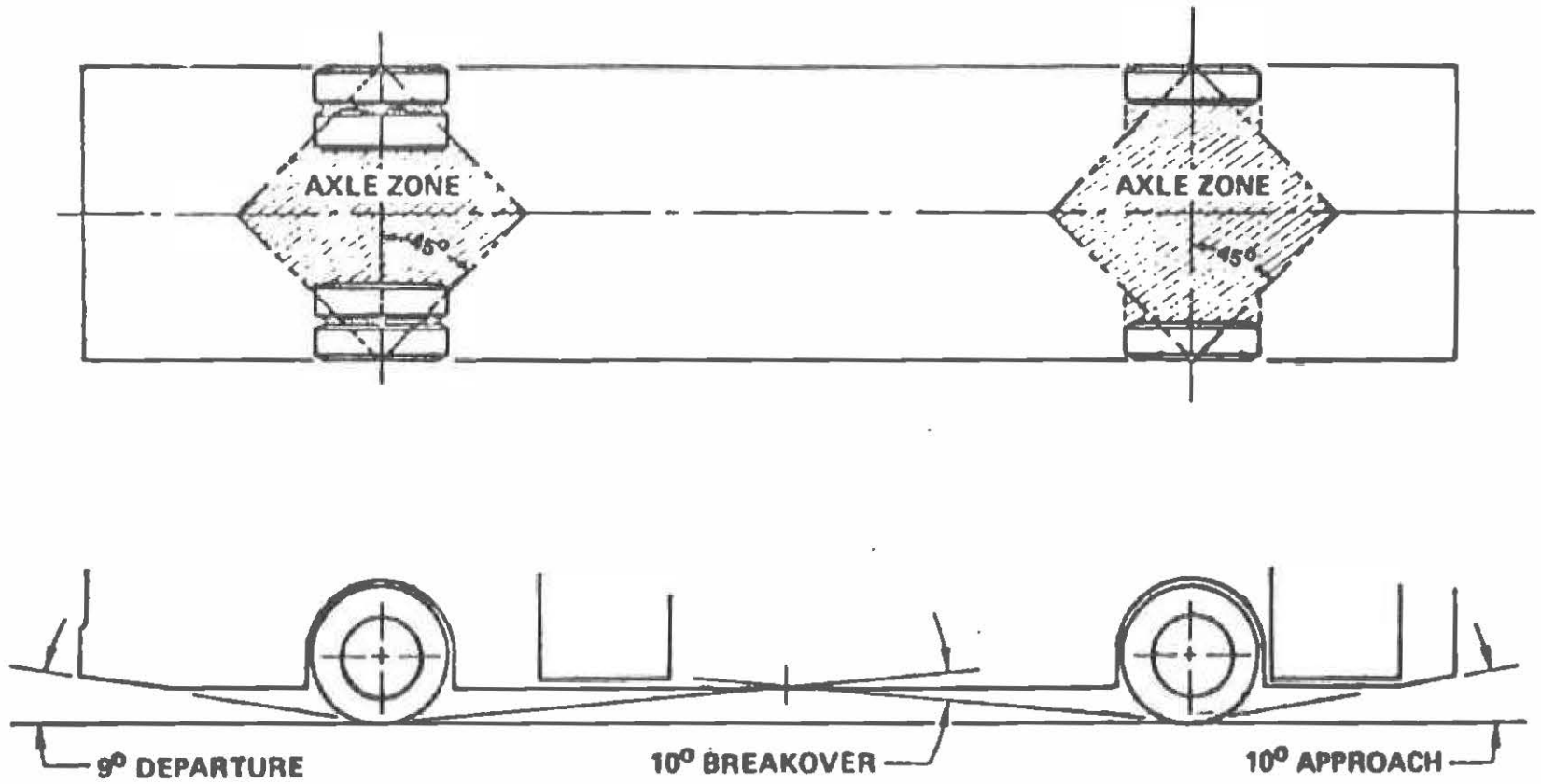


FIGURE II-3. TRANSIT COACH MINIMUM ROAD CLEARANCE

## 1.5.2 WEIGHT

### 1.5.2.1 Gross Vehicle Weight

Gross vehicle weight shall not exceed 20,500 pounds for each axle. Weight shall include a full complement of fuel, oil, water, seated and standee passengers including driver. Any weight in excess of the above maximum shall carry a penalty of five dollars (\$5.00) per pound, which shall be deducted from the Contractor's invoice by the District.

The Contractor shall submit a certified weight slip for the curb weight of each axle and a certified weight slip for the total curb weight of each bus upon delivery.

## 1.5.3 CAPACITY

Rated capacity of the standard configuration coach shall be no less than 43 seated passengers with the specified seating arrangement, subject to the terms of the Life Cycle Costing factor. A \$600 per seat incentive shall be paid to the contractor's invoice price for each seat provided over the 43 specified.

## 1.5.4 SERVICE LIFE AND MAINTENANCE

### 1.5.4.1 Service Life

The coach shall be designed to operate in District revenue service for a minimum of 50,000 miles per year or 600,000 miles.

### 1.5.4.2 Maintenance and Inspection

Scheduled maintenance or inspection tasks as specified by the Contractor shall require a skill level of 3M or less. Scheduled maintenance tasks shall be related and shall be grouped in maximum mileage intervals. Routine scheduled maintenance actions, such as filter replacement and adjustments on all coach components, including the wheelchair lift system, shall not be required at intervals of less than 6,000 miles, except for routine daily service performed during the fueling operations. Higher levels of scheduled maintenance tasks shall occur at even multiples of mileages for lower level tasks.

### 1.5.4.3 Mean Mileage Between Failures

The following are design goals for mean mileage between failures by failure class, provided that all specified preventive maintenance procedures are followed.

- (1) Class 1: Physical Safety. Mean mileage shall be greater than 1,000,000 miles.
- (2) Class 2: Road Call. Mean mileage shall be greater than 10,000 miles.
- (3) Class 3: Coach Change. Mean mileage shall be greater than

8,000 miles.

- (4) Class 4: Bad Order. Mean mileage shall be greater than 6,000 miles.

#### 1.5.4.4 Mean Time to Repair

Repair time and skill levels required for various repairs to coach components shall be stated by the Contractor which will be used for Life Cycle Costing purposes in determining the contract award. The District may require a demonstration of actual time requirements.

#### 1.5.4.5 Accessibility

All systems or components serviced as part of periodic maintenance or whose failure may result in Class 1 or Class 2 failures shall be readily accessible for service and inspection. To the extent practicable, removal or physical movement of components unrelated to the specific maintenance and/or repair tasks involved shall be unnecessary.

Relative accessibility of components, measured in time required to gain access, shall be inversely proportional to frequency of maintenance and repair of the components.

Due to the need to check Transmission fluid levels on a daily basis, an access door shall be provided which permits both the inspection and filling of the fluid from outside the rear of the bus with the engine compartment door closed.

#### 1.5.4.6 Interchangeability

Components with identical functions shall be interchangeable. These components shall include, but not be limited to passenger window hardware, interior trim, lamps, lamp lenses, and seat assemblies. Components with nonidentical functions shall not be, or appear to be interchangeable.

#### 1.5.5 OPERATING ENVIRONMENT

The coach shall achieve normal operation in the environmental conditions normally occurring in the District's service area. Temperature ranges of 20 degrees Fahrenheit to 115 degrees Fahrenheit, at relative humidities between 5 percent and 100 percent, and at altitudes up to 3,000 feet above sea level. Degradation of performance due to atmospheric conditions shall be minimized at temperatures above 115 degrees Fahrenheit, or at altitudes above 3,000 feet. Special equipment or procedures may be employed to start the coach after a 12 hour or more exposure to temperatures below 30 degrees Fahrenheit without the engine in operation. Speed, gradability, and acceleration performance requirements shall be met at, or corrected to, 85 degrees Fahrenheit, 29.00 inches Hg. dry air with all accessories on including A/C. Performance degradation at conditions other than the test standard shall not exceed 1 percent for each 3 degrees Fahrenheit and 4 percent for each 1,000 feet of altitude above the standard. The interior climate control system shall perform in accordance

with Section 3.7.1.

2.0 BODY

## 2.1 SHELL

### 2.1.1 GENERAL

#### 2.1.1.1 Design

The coach shall have a clean, smooth, simple design, primarily derived from coach performance requirements and passenger service criteria established by Part II: Technical Specifications. The exterior and body features, including grilles and louvers, shall be shaped to allow complete and easy cleaning by automatic bus washers without snagging washer brushes. Water and dirt shall not be retained in or on any body feature to freeze or bleed out onto the coach after leaving the washer. Body, windows and doors shall be sealed to prevent leaking of air, dust, or water under normal operating conditions and during cleaning in automatic bus washers for the service life of the coach. Accumulation on any window of the coach of spray and splash generated by the coach's wheels on a wet road shall be minimized.

#### 2.1.1.2 Materials

Body materials shall be selected and the body fabricated to reduce maintenance, extend durability, and provide consistency of appearance throughout the life of the coach. Detailing shall be kept simple; add-on devices and trim shall be minimized and, where necessary, integrated into the basic design.

#### 2.1.1.3 Finish and Color

All exterior surfaces shall be smooth and free of visible fasteners, wrinkles, and dents. Exterior surfaces to be painted shall be properly cleaned and primed as appropriate for the paint used, prior to application of paint to assure a proper bond between the basic surface and successive coats of original paint for the service life of the coach. Paint shall be applied smoothly and evenly with the finished surface free of dirt, runs, orange peel, and other imperfections. All exterior finished surfaces shall be impervious to diesel fuel, gasoline, and commercial cleaning agents. Finished surfaces including striping shall not be damaged by controlled applications of commonly used graffiti-removing chemicals. Exterior painted surfaces shall have minimum of .5 mil thick primer coat and minimum 2.5 mil thick finish coat of Koppers or approved polyurethane paint. Colors and paint schemes shall be in accordance with plan detailed in Special Requirements - Part II, Attachment A, Technical Specification. Contractor shall provide color rendering of proposed color scheme depicting Contractor's bus and RTD color requirements for use by the District in approving the color scheme.

#### 2.1.1.4 Numbering and Signs

Monograms, numbers, and other special signing specified by the District shall be applied to the inside and outside of the coach as required. Signs shall be durable and fade-, chip-, and peel-resistant; they may be decals, or pressure-sensitive appliques. All decals shall be sealed with clear, waterproof sealant around the edges and on all exposed

surfaces. At least one sign shall be provided on each side of the coach interior to indicate that seats at the front are priority seats for elderly and handicapped passengers. The exact wording, size, color, and location for these signs shall be subject to District approval. A listing of all decal requirements is provided in Special Requirements - Part II, Attachment B.

#### 2.1.1.5 Pedestrian Safety

Exterior protrusions greater than 1/2 inch and within 80 inches of the ground shall have a radius no less than the amount of the protrusion. The left side rearview mirror and required lights and reflectors are exempt from the protrusion requirement. Advertising frames shall protrude no more than 7/8 inch from the body surface and shall have the exposed edges and corners radiused to the extent practicable. Grilles, doors, bumpers and other features on the sides and rear of the coach shall be designed to minimize the ability of unauthorized riders to secure toeholds or handholds.

#### 2.1.1.6 Passenger Windows

A minimum of 12,000 square inches of window area, including door windows, shall be required on each side of the standard configuration coach. Section 2.4.2 describes the specific requirements for passenger windows.

#### 2.1.1.7 Passenger Doors

Two doors shall be provided in the right side of the coach for passenger ingress and egress. The front door shall be forward of the front wheels and located so that the driver is able to collect or monitor the collection of fares. The rear door centerline shall be rearward of the point midway between the front door centerline and the rearmost seat back. Specific requirements for doors are in Section 2.1.8. Requirements for operation of doors are in Section 2.2.1.

#### 2.1.1.8 Advertising

Provisions shall be made to integrate advertising, which is specified by the District, into the exterior design of the coach. Advertising media, frames, or supporting structures shall not detract from the readability of destination signs and signal lights, and shall not compromise passenger visibility. Advertising provisions shall not cause pedestrian hazards or foul automatic bus washing equipment, and shall not cover or interfere with doors, air passages, vehicle fittings, or in any other manner restrict the operation or serviceability of the coach. All frames and hardware will be painted as per Specification, Section 2.1.1.3, Special Requirements - Part II, Attachment A.

Ad frames shall be provided on the exterior of both sides and rear of the coach to display and securely retain flat or molded advertising media. Ad frame supports shall locate the signs above the rubrail and shall retain flat signs within 1/2 inch of the coach body. The sign supports shall be installed to reduce the possibility of them being used as



handholds. Frames on both sides of bus shall be 30" by 144" and ad frame on rear of bus shall be 21" by 72". Supports for rear ad frames are subject to District approval.

## 2.1.2 STRUCTURE

### 2.1.2.1 Strength and Fatigue Life

Under conditions of transit service throughout the service life of the coach, the basic structure shall withstand fatigue damage that is sufficient to cause injury to passenger, driver or others.

### 2.1.2.2 Distortion

The coach, at GVWR and under static conditions, shall not exhibit deformation or deflection that impairs operation of doors, windows, or other mechanical elements. Static conditions include the vehicle at rest with any one wheel or dual set of wheels on a 6-inch curb or in a 6-inch deep hole.

### 2.1.2.3 Resonance

All structure, body, and panel-bending mode frequencies, including vertical, lateral, and torsional modes, shall be sufficiently removed from all primary excitation frequencies to minimize audible, visible, or sensible resonant vibrations during service.

### 2.1.2.4 Material

Reinforced fiberglass and plastic materials shall be excluded from the basic body construction, except for replaceable panels or doors.

### 2.1.2.5 Corrosion

The coach shall resist corrosion from atmospheric conditions and road salts. The understructure and exterior shall maintain structural integrity and nearly maintain original appearance throughout its service life, provided it is maintained in accordance with the procedures specified in the service manual by the Contractor. Materials exposed to the elements and all joints and connections of dissimilar metals shall be corrosion-resistant and shall be protected from galvanic corrosion. Representative samples shall withstand a 2-week salt spray test in accordance with ASTM Procedure B-117 with no visual or structural detrimental effects to normally visible surfaces, and no significant structural degradation or weight loss of over 1 percent for other members or components.

### 2.1.2.6 Towing

Towing devices shall be provided on each end of the coach. The front towing device when used with a load equalizing sling shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the coach within 20 degrees of the longitudinal axis of the coach. The rear towing device(s) shall not provide a toehold for

unauthorized riders. The front towing devices shall allow attachment of a rigid tow bar and shall permit safe lifting of the coach, at curb weight, by the towing devices and the tow bar until the wheels are clear of the ground. The method of attaching the tow bar shall require the specific approval of the District. The front towing devices shall accommodate a crane hook with a 1-inch throat. The successful bidder shall provide a written procedure for lift towing the coach from the rear in case of an emergency.

#### 2.1.2.7 Jacking

It shall be possible to safely jack up the coach, at curb weight, with a common 10-inch-high hand jack or a 10-ton floor jack, at the discretion of the District, when a tire or dual set is completely flat and the coach is on a level, hard surface, without crawling under any portion of the coach. Jacking from a single point shall permit raising the coach sufficiently high to remove and reinstall a wheel and tire assembly. Jacking pads located on the axle or suspension near the wheels shall permit easy and safe jacking with the flat tire or dual set on a 6-inch-high run-up block not wider than a single tire. Jacking and changing any one tire shall be completed by a 2M serviceman in less than 30 minutes from the time the coach is approached. The coach shall withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage.

#### 2.1.2.8 Hoisting

The coach axles or jacking plates shall accommodate the lifting pads of a 2-post hoist system. Jacking plates, if used as hoisting pads, shall be approximately 5 inches square, with a turned-down flange not less than 1 inch deep on each side to prevent the coach from falling off the hoist. Other pads on the coach structure shall support the coach on jack stands independent of the hoist.

#### 2.1.2.9 Fire Protection

The passenger and engine compartments shall be separated by a barrier(s) which shall, by incorporation of fireproof materials in its construction, be a firewall. This firewall shall preclude or retard propagation of an engine compartment fire into the passenger compartment. Only necessary openings shall be allowed in the firewall, and these shall be fireproofed. Any passageways for the climate control system air shall be separated from the engine compartment by fireproof material. Piping through the bulkhead shall have copper, brass, or fireproof fittings sealed at the firewall with copper or steel piping on the forward side. Wiring may pass through the bulkhead only if connectors or other means are provided to prevent or retard fire propagation through the firewall. The conduit and bulkhead connectors shall be sealed with fire proof material at the firewall. Engine access panels in the firewall shall be fabricated of fireproof material and secured with fireproof fasteners. These panels, their fasteners, and the firewall shall be constructed and reinforced to minimize warping of the panels during a fire that will compromise the integrity of the firewall.

#### 2.1.2.10 Crashworthiness

The coach body and roof structure shall withstand a static load equal to 150 percent of the curb weight evenly distributed on the roof with no more than a 6-inch reduction in any interior dimension. Windows shall remain in place and shall not open under such a load.

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

Exterior panels below the rubrail and their supporting structural members shall withstand a static load of 2,000 pounds applied perpendicular to the coach anywhere below the rubrail by a pad no larger than 5 inches square. This load shall not result in deformation that prevents installation of new exterior panels to restore the original appearance of the coach.

#### 2.1.3 EXTERIOR AND APPLIED PANELS

##### 2.1.3.1 Strength and Installation

Only exterior panels that are above the rubrail may be structural components. Exterior surface panels shall not be installed or retained with visible rivets or fasteners.

##### 2.1.3.2 Repair and Replacement

Exterior panels below the rubrail shall be divided into sections that are repairable or replaceable by a 3M mechanic in less than 30 minutes for a section up to 5 feet long (excludes painting).

Exterior side panels above the rubrail and below the lower daylight opening shall be repairable or replaced by a 3M mechanic in less than 1-1/2 hours for a section up to 5 feet long (excludes painting).

##### 2.1.3.3 Rain Gutters

Gutters shall be provided to prevent water flowing from the roof onto the side windows and passenger doors. When the coach is decelerated, the gutters shall not drain onto the windshield, or driver's side window, or into the door boarding area.

##### 2.1.3.4 License Plates

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

#### 2.1.3.5 Rubrails

Rubrails composed of flexible, resilient material shall be provided to protect both sides of the coach body from damage caused by minor sideswipe accidents with automobiles. Rubrails shall have vertical dimensions of no less than 2 1/2 inches with the centerline no higher than 33 inches above the ground. The rubrails shall be capable of withstanding impacts of 200 foot-pounds of energy from a steel-faced spherical missile no less than 9 inches in diameter and of a 500-pound load applied anywhere along their length by a rigid plate 1 foot in length, wider than the rubrail and with 1/4-inch end radii with no visible damage to the rubrail, retainer, or supporting structure. The rubrail may be discontinued at doorways. A damaged portion of the rubrail shall be replaceable without requiring removal or replacement of the entire rubrail.

#### 2.1.4 INTERIOR

##### 2.1.4.1 Headroom

Headroom above the aisle and at the centerline of the aisle seats shall be no less than 78 inches. At the centerline of the window seats, headroom shall be no lower than the required top of the side window. Headroom at the back of the rear bench seat may be reduced to a minimum of 56 inches, but it shall increase to the normal ceiling height at the front of the seat cushion. In any area of the coach directly over the head of a seated passenger and positioned where a passenger entering or leaving the seat is prone to strike his head, padding shall be provided on the overhead paneling.

##### 2.1.4.2 Driver's Barrier

A barrier or bulkhead between the driver and the left front passenger seat shall be provided. The barrier shall eliminate glare and reflections in the windshield directly in front of the barrier from interior lighting during night operation. The barrier shall extend from below the level of the passenger or driver's seat cushion, whichever is lower, to within 1 inch of the ceiling and side wall and shall fit the coach side windows and wall to prevent passengers from reaching the driver or his personal effects. Specified trim panel materials are District standard. Driver's barrier shall be of 1/4 inch thick polycarbonate material of similar color but darker than the passenger side windows. Driver's barrier shall follow the contour of the bus side wall and ceiling. A portion of the driver's barrier along the aisle side shall be cut out to provide a passenger assist. A driver's coat hook and strap shall be installed at a point near where the driver's barrier meets the side wall, subject to District approval. A 1-1/2" knuckle clearance shall be provided between the driver's barrier and any support thereof which may be used as a passenger assist.

##### 2.1.4.3 Modesty Panels

Sturdy divider panels constructed of solid durable, unpainted, corrosion-resistant material complementing the interior trim shall be provided at the rear of both stepwells. Modesty panels may be installed at

the sides of longitudinal seats when the required armrests are integral. These dividers shall be mounted on the side wall and shall project toward the aisle no further than passenger knee projection in longitudinal seats or the aisle side of the transverse seats. Modesty panels shall extend no higher than the lower daylight opening of the side windows and those forward of transverse seats shall be mounted a nominal 1-1/4 inches of the floor. Panels forward of longitudinal seats shall extend to below the level of the seat cushion. Dividers positioned at the doorways shall provide no less than a 2 1/4 inch clearance between the modesty panel and the opened door to protect passengers from being pinched. The modesty panel and its mounting shall withstand normal kicking, pushing, and pulling loads of 200-pound passengers without permanent visible deformation.

#### 2.1.4.4 Rear Bulkhead

The rear bulkhead paneling shall be contoured to fit the ceiling, side walls, and seat backs so that any litter, such as a cigarette package or newspaper, will tend to fall to the floor or seating surface when the coach is on a level surface. Any air vents in this area shall be louvered to reduce air flow noise and to reduce the probability of trash or litter being thrown or drawn through the grille. The panel, or sections thereof, shall be easily and quickly removable to service components located behind the rear bulkhead.

#### 2.1.4.5 Construction

Interior panels may be integral with, or applied to, the basic coach structure. They shall be decorated in accordance with the interior specified. Use of moldings and small pieces of trim shall be minimized, and all parts shall be functional.

#### 2.1.4.6 Fastening

Interior panels shall be attached so that there are no exposed edges or rough surfaces. Panels and fasteners shall not be easily removable by passengers. Interior trim fasteners, where required, shall be rivets or cross-recessed head screws.

### 2.1.5 FLOOR

#### 2.1.5.1 Height

Height of the floor above the street shall be no more than 34 inches, measured at the centerline of the front door. The floor may be inclined only along the longitudinal axis of the coach, and the incline shall be less than 1 1/2 degrees of the horizontal. All floor measurements shall be with the coach at the design height and on a level surface.

#### 2.1.5.2 Strength

The floor deck may be integral with the basic structure or mounted on the structure securely to prevent chafing or horizontal movement. Sheet metal screws shall not be used to retain the floor and all floor fasteners shall be serviceable from one side only. Tapping plates used for the floor

fasteners shall be no less than the same thickness as a standard nut for that fastener, and all floor fasteners shall be secured and protected from corrosion for the service life of the coach. The floor deck shall be reinforced as needed to support passenger loads. At GVWR, the floor shall have an elastic deflection of no more than 0.60 inches from the normal plane. The floor shall withstand the application of 2.5 times gross load weight without permanent detrimental deformation. Floor and step treads, with coverings applied, shall withstand a static load of at least 150 pounds applied through the flat end of a 1/2-inch diameter rod, with 1/32-inch radius, without permanent visible deformation.

#### 2.1.5.3 Edges

The floor shall be essentially a continuous flat plane, except at the stepwells and wheel housings. Where the floor meets the walls of the coach, the surface edges shall be blended with a circular section of radius not less than 1 inch, and a molding or cove shall prevent debris accumulation between the floor and wheel housings.

#### 2.1.5.4 Floor Protection

The floor, as assembled, including the sealer, attachments, and covering, shall be waterproof, nonhygroscopic, resistant to wet and dry rot, resistant to mold growth, and impervious to insects. Plywood shall be no less than 3/4 inch thick, 7 ply, American Plywood Association, Marine grade, A-C, and shall be installed with the A side up and with all edges sealed.

### 2.1.6 STEPS AND STEPWELLS

#### 2.1.6.1 Steps

A maximum of three steps shall be required for passenger ingress and egress. The steps in each doorway shall be in a fixed location relative to the floor of the coach. At the front door, the first step up from street level shall not exceed 14.5 inches with the coach at the design height, and all step riser heights to coach floor level shall be the same height which shall be no more than 10.25 inches. At the rear door, the interior steps down from floor level shall not exceed 10 3/4 inches, and the final step to street level shall not exceed 16 inches with the coach at the design height. Risers shall be continuous, flat, planes across the entire width of the stepwell except for notches which may be required at either end to accommodate the opened doors. These notches shall not exceed 1 1/2 inches in depth and 3 inches in length. Step risers may be inclined, not to exceed 10 degrees from the vertical with only the lower edge inward. All corners shall have radii no less than 1/2-inch to facilitate cleaning.

All step treads shall be of uniform depth which shall be no less than 11 inches and the plane of the step treads shall be parallel to the plane of the floor. Treads shall be covered with 5/16-inch, nonskid, ribbed composition rubber material that shall remain effective in all weather conditions. Tread covering shall be black to match the vestibule flooring. The edge of the vestibule floor shall have no overhang at the step riser. The edge of the vestibule floor and the end of the step tread

shall have a bright, contrasting yellow band no less than 2 inches wide on the full width of the step. The color shall be permanently blended into the tread covering material. The color bands on the edges of the steps shall be a bright yellow.

#### 2.1.6.2 Stepwell Structure

Stepwells shall be corrosion-resistant throughout the life of the coach. Stepwells shall be replaceable as units if they are constructed of nonmetallic material. The steps shall simultaneously support 300-pound loads on a six inch wide section at the center of each step tread without permanent deformation and with elastic deflection of no more than 0.125 inches. Each step tread shall support a load of 500-pounds evenly distributed over the center half of the tread without permanent deformation. The steps shall be sloped only sufficient to preclude water accumulation in the stepwells. All corners in the stepwell shall have radii no less than 1/2-inch.

#### 2.1.7 WHEEL HOUSING

##### 2.1.7.1 Construction

Wheel housings shall be constructed of corrosion-resistant, fire-resistant material. Wheel housings, as installed and trimmed, shall withstand impacts of a tire tread dislodging from the tire at 55 mph without penetration.

##### 2.1.7.2 Clearance

Sufficient clearance and air circulation shall be provided around the tires, wheels, and brakes to preclude overheating when the coach is operating in District revenue service. Tire chain clearance shall be provided on all driven wheels in accordance with SAE information Report J683.

Interference between the tires and any portion of the coach shall not be possible in maneuvers up to the limit of tire adhesion with weights from curb weight to GVWR.

##### 2.1.7.3 Fender Skirts

Features to minimize water spray from the coach in wet conditions shall be included in wheel housing design. Any fender skirts shall be unbreakable and easily replaceable. They shall be flexible if they extend beyond the allowable body width. Wheels and tires shall be removable without disturbing the fender skirts.

##### 2.1.7.4 Splash Aprons

Splash aprons, composed of 1/4-inch-minimum composition or rubberized fabric, shall be installed behind each wheel and shall extend downward to within 4 inches of the road surface. Apron widths shall be no less than tire widths, except for the front apron which shall extend across the width of the coach. Splash aprons shall be bolted to the coach

understructure. Splash aprons and their attachments shall be inherently weaker than the structure to which they are attached. Splash aprons and their attachments shall not be included in the road clearance measurements. Other splash aprons shall be installed where necessary to protect coach equipment.

#### 2.1.8 PASSENGER DOORS

##### 2.1.8.1 Materials

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

##### 2.1.8.2 Dimensions

When open, the doors shall leave an opening no less than 84 inches in height. Front door opening width shall be no less than 34.5 inches with the doors fully opened. Rear door opening width shall be no less than 30 inches with the doors fully opened. Door opening widths may be reduced 3 inches on the sides of the extreme top and extreme bottom of each door opening. This 3-inch projection shall be reduced to 0 inches within 26 inches of the bottom and within 18 inches of the top. Allowable projection into the door opening is shown on Figure 11-4. Projections shall not form a hazard to passengers. The clear door opening widths, including door-mounted passenger assists or touch bars, shall be no less than 30 inches for the front door and 25 inches for the rear door.



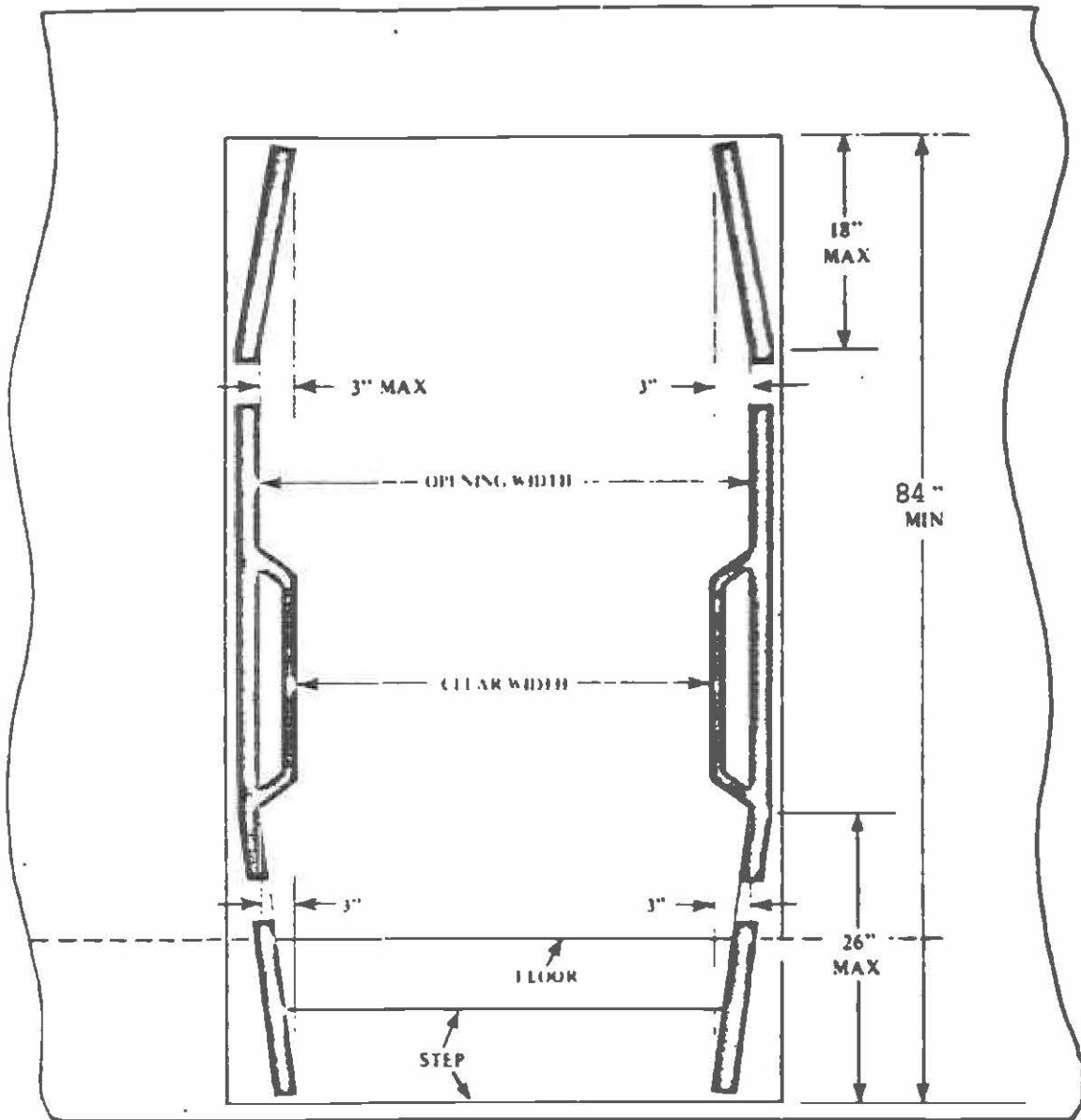


FIGURE II-4. TRANSIT COACH MINIMUM DOOR OPENING

#### 2.1.8.3 Door Glazing

The upper section (1/2 door height) of both front and rear doors shall be glazed for no less than 45 percent of the respective door opening area of each section. The lower section of the front door shall be glazed for no less than 25 percent of the door opening area of the section. The edge of a 6-inch high curb shall be visible to the seated driver through the closed front door when the coach is no more than 12 inches from the curb.

#### 2.1.8.4 Door Projection

Exterior projection of the doors shall be minimized and shall not exceed 13 inches during the opening or closing cycles or when doors are fully opened. Projection inside the coach shall not exceed 20 inches. The closing edge of each door panel shall have no less than 2 inches of soft weather stripping. The doors, when closed, shall be effectively sealed and the hard surfaces of the doors shall be at least 4 inches apart.

#### 2.1.8.5 Door Height Above Pavement

It shall be possible to open and close either passenger door when the coach loaded to GVWR is not kneeled and parked with the tires touching an 8-inch high curb on a street sloping toward the curb so that the left side wheels are 5 inches higher than the right side wheels. The bottom edge of the doors shall be a minimum of 14-1/2 inches above the pavement in an opened or closed position.

### 2.1.9 SERVICE COMPARTMENTS AND ACCESS DOORS

#### 2.1.9.1 Interior

Access for maintenance and replacement of equipment shall be provided by panels and doors that appear to be an integral part of the interior. Removal of fixtures or equipment unrelated to the repair task to gain access shall be minimized. Access doors shall be hinged with positively retained props, as necessary, to hold the doors out of the mechanic's way. Retention of all interior access panels, except on the door actuator compartments shall be with cross-recessed head screws. Panel fasteners shall be standardized so that only one tool is required to service all special fasteners within the coach. Access doors for the door actuator compartments shall be secured with hand screws or latches and shall prevent entry of mechanism lubricant into the coach interior. All fasteners that retain access panels shall be captive in the cover.

Access openings in the floor shall be sealed to prevent entry of fumes and water into the coach interior. Floor access openings shall be flush with the floor and shall be edge bound with stainless steel or black anodized aluminum to prevent the edges from coming loose. Access openings shall be nonsymmetrical so that the ribs of reinstalled flooring shall be properly aligned. Fasteners shall tighten flush with the floor.

#### 2.1.9.2 Exterior

Conventional or pantograph hinged doors shall be used for the engine compartment and for all auxiliary equipment compartments including separate access doors for checking the quantity and adding to the engine coolant, engine lubricant, transmission fluid and the windshield washer reservoir. Access to these compartments shall be from outside the coach.

Access openings shall be sized for easy performance of tasks within the compartment including tool operating space. Access doors shall be of rugged construction and shall be capable of withstanding severe abuse throughout the life of the coach. They shall close flush with the surface. All doors shall be hinged at the top or on the forward edge and shall be prevented from coming loose or opening during transit service or in coach washing operations. Doors with top hinges shall have safety props stored behind the door or on the door frame. All access doors shall be retained in the open position by props or counterbalancing with overcenter or gas-filled springs. Springs and hinges shall be corrosion-resistant and shall last for the coach's service life. Latch handles shall be flush with, or recessed behind the body contour and shall be sized to provide an adequate grip for opening. Engine door shall be equipped with flush mounted T-handle type latches.

Large access doors shall hinge up and out of the way or fold flat against the coach body and shall be easily openable by one person. These doors, when opened, shall not restrict access for servicing other components or systems. Major access doors, except engine doors, shall be equipped with locks requiring a nominal 5/16-inch, square end tool to open. The locks shall be standardized so that only one tool is required to open all major access doors on the coach. A counter-balance or spring system should operate large doors but, if not practicable, a powered assist device may be used, provided it is equipped with an emergency system to open the doors manually in less than 30 seconds. The emergency system shall be easily accessible and quickly operable by one person in the event of a power or air system failure or engine compartment fire.

The battery compartment shall prevent accumulation of debris on top of the batteries and shall be vented and self-draining. It shall be accessible only from outside the coach. The battery compartment and battery support hardware shall be stainless steel. The inside surface of the battery compartment's access door shall be electrically insulated, as required, to prevent the battery terminals short circuiting on the door if the door is damaged in an accident or if a battery comes loose.

## 2.2 OPERATING COMPONENTS

### 2.2.1 DOORS

#### 2.2.1.1 Control

Operation of, and power to, the passenger doors shall be completely controlled by the driver. Doors shall open or close completely in 1 to 1.5 seconds from the time of touch bar actuation and shall be subject to adjustment requirements of Section 2.2.1.3. A control or valve in the driver's compartment shall shut off the power to, and/or dump the power from, the front door mechanism to permit manual operation of the front door with the coach shut down. A master door switch, which is not within reach of the seated driver, shall when set in the "Off" position close and lock the rear doors, deactivate the rear door control system, release the interlocks and permit normal operation of the front doors. In the event of a front door electrical circuitry failure, the door must remain open or go to the open position. Pantographic type passenger doors are unacceptable.

To preclude movement of the coach, an accelerator interlock shall lock the accelerator in the closed position and a brake interlock shall engage a portion of the service brake system when the rear door control is activated. The braking effort shall be adjustable with hand tools only, from zero effort to the maximum capability of the brake system. The adjustment device shall be enclosed in a tamperproof housing, if located inside the coach.

Passenger-Controlled Rear Door. The rear door control shall be limited to unlocking and enabling the opening mechanism, which shall be signaled by illumination of a green light near the door. The door is actually opened by touching either of the rear door vertical passenger assists with a force of 5 to 10 pounds. The touch bars shall meet the general requirements for passenger assist size, strength and knuckle clearance defined in Section 2.6.3.1 and shall not self-activate if the coach is stopped with the left side 10 inches higher than the right side. The touch bar assists shall be located near the opened edge of the door panels and extend from 36 inches above the floor to within 36 inches of the street surface. The doors shall close when the touch bar is released.

If the doors are power-assist type, the doors shall close within 1 to 1.5 seconds from the fully opened position. If power operated, the doors shall close in 2.5 seconds. A separate switch, convenient to the driver, shall convert the rear door to a power door with both opening and closing controlled by the driver. If the door controls fail, the front doors must remain in an open position. The front doors shall remain open if the bus engine is shut off. Closed rear doors shall be locked by means of a positive mechanical device.

#### 2.2.1.2 Closing Force

No more than a 10 pound force shall be imposed on a 1-square inch area of any passenger struck by a closing rear door. A maximum force of 35 pounds shall be required for a passenger to free himself after having either door close upon him, even if the sensitive edge or safety device on the rear door is inoperative.

#### 2.2.1.3 Door Speed Control

Door opening and closing speeds shall be independently controlled by a pre-set orifice. Power assisted doors shall open and close in 1-1/2 seconds after actuation. Power operated doors shall open in 2 seconds and close in 2-1/2 seconds after actuation. Door mechanism shall be concealed from passengers but shall be easily accessible for servicing. All elements of the door and actuator system shall operate without a Class 3 failure for 50,000 miles in District revenue service. Door activator systems are subject to District approval.

#### 2.2.1.4 Emergency Operation

In the event of an emergency, it shall be possible to open the doors manually from inside the coach using a force of no more than 25 pounds after actuating an unlocking device at each door. The unlocking devices shall be clearly marked as an emergency only device and shall require two distinct actions to actuate. The door emergency unlocking device shall be accessible from the stepwell areas. When this emergency device is actuated the door interlock brake system shall apply to stop the coach.

Locked doors shall require a force of more than 100 pounds to open manually. When the locked doors are manually forced to open, damage shall be limited to the bending of minor door linkage with no resulting damage to the doors, engines, and complex mechanism.

#### 2.2.1.5 Roof Ventilators

The coach shall be designed to accommodate the installation of roof ventilators. Two ventilators shall be provided in the roof of the coach approximately over each axle. These ventilators shall be easily opened and closed manually by one person. When open with the coach in motion, these ventilators shall provide fresh air inside the coach. Each ventilator shall cover an opening area no less than 425 square inches and shall be capable of being positioned as a scoop with either the leading or trailing edge open no less than 4 inches, or with all four edges raised simultaneously to a height no less than 3 1/2 inches. An escape hatch shall be incorporated into the rear roof ventilator. When opened the escape hatch shall not become detached from the coach.

## 2.2.2 WINDSHIELD WIPERS AND WASHERS

### 2.2.2.1 Windshield Wipers

The coach shall be equipped with a variable speed windshield wiper for each half of the windshield with separate controls for each side. Exhaust from the wiper motors powered by compressed air, shall be muffled or piped under the floor of the coach. No part of the windshield wiper mechanism shall be damaged by manual manipulation of the arms. At 60 mph, no more than 10 percent of the wiped area shall be lost due to windshield wiper lift. Both wipers shall park along the edges of the windshield glass. Windshield wiper motors and mechanisms shall be easily accessible for repairs or service from inside or outside the coach and shall be removable as complete units.

### 2.2.2.2 Windshield Washers

The windshield washer system shall deposit washing fluid on the windshield and, when used with the wipers, shall evenly and completely wet the entire wiped area. Compressed air shall purge all fluid from the lines after each use of the washers.

The windshield washer system shall have a minimum 2-gallon reservoir, located for easy refilling from outside of the coach. Reservoir pumps, lines and fittings shall be corrosion-resistant, and the reservoir itself shall be translucent for easy determination of fluid level if visible, or a fluid level indicator shall be provided.

## 2.2.3 LIGHTING, CONTROLS, INSTRUMENTS

### 2.2.3.1 Exterior Lighting

All exterior lights shall be sealed to prevent entry and accumulation of moisture or dust, and each lamp shall be replaceable in less than 5 minutes by a 2M mechanic. Lights mounted on the engine compartment doors shall be protected from the impact shock of door opening and closing. Lamps, lenses and fixtures shall be interchangeable to the extent practicable. Lamps at the rear of the coach shall be visible from behind when the engine service doors are opened.

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

Lamps at the front and rear doors shall activate only when the doors open and shall illuminate the street surface to a level of no less than 1 foot-candle for a distance of 3 feet square outward from the lowest step tread edge. The lights may be positioned above or below the lower daylight opening of the windows and shall be shielded to protect passengers' eyes from glare.

Turn signal lights shall be provided at front, rear and sides of bus. Front side turn signal lights shall be located in standard position near front wheel housing.

Clearance lamps shall be provided at each bus corner to delineate bus height in accordance with Title 13 of the California Administrative Code Section 641. These four corner lamps shall be equipped with dual-filament bulbs. The three candlepower filament shall be lighted when the bus headlights are lit. The thirty-two candlepower filament shall be connected through a silent type electronic flasher unit to a switch located on the left side of the operator's control panel. This crime alarm lighting system is authorized under Section 25275.5 of the California Vehicle Code and an agreement with the District's operator's union. Exact switch location and type shall be subject to District approval.

Micro switch, Part No. 4TL 1-3 is a District standard for the silent alarm system switch. The crime alarm activation switch shall be mounted on control panel located to left of seated driver. Switch shall be protected with black, spring loaded cover. Mounting of the SAS switch is subject to District approval.

#### 2.2.3.2 Service Area Lighting

Lights shall be provided in the engine compartment to generally illuminate the area for night emergency repairs or adjustments. The lights shall be controlled by a switch located near the rear start controls in the engine compartment. Necessary lights, located in other service compartments, shall be provided with momentary contact switches on the light fixture or convenient to the light.

#### 2.2.3.3 Passenger Interior Lighting

An overhead fluorescent lighting system shall provide general illumination in the passenger compartment and shall be controlled independent of the master run switch. The system shall provide no less than 15 foot-candles of illumination on a 1-square foot plane at an angle of 45 degrees centered 33 inches above the floor and 24 inches in front of the seat back at each seating position except at the rear cross seat where the illumination may be decreased to 7 foot candles.

Floor surface in the aisle shall be illuminated at no less than 10 foot candles. The floor surface in the vestibule shall be illuminated to no less than 4 foot candles with the front door open and to no less than 2 foot candles when the front door is closed. Fluorescent light fixtures shall be located above the side windows at or near the juncture of the coach ceiling and the side wall and may be provided over the rear door. Fluorescent lighting shall not be installed above the driver's side window and the front door. Lamp fixtures and lenses shall be fire-resistant and shall not drip flaming material onto seats or interior trim if burned.

Advertising media located in this area shall be illuminated by direct lighting. Interior lighting requirements shall be attained with advertising media installed. The fixtures shall be sealed to prevent accumulation of dust and insects but shall be easily openable on hinges for cleaning and service. The lenses shall be retained in a closed position and if threaded fasteners are used, they must be captive in the lens with cross-recessed type heads. Power supplies shall be enclosed with fire-proof material and shall be located at the individual light fixtures. Power supplies shall be inaudible with an operating frequency above 18,000 Hz. Interchangeability of fluorescent lamps, lenses, fixtures, and power supplies shall be maximized.

In addition to the features specified in this section, the District further requires that the contractor modify the master run switch and the interior passenger lighting control switch to achieve the following:

1. All interior passenger lights are on when the master run switch is in the "Nite/Run" position.
2. Only the curb side interior passenger lights are on when the master run switch is in the "CL/ID" position.

A stepwell lighting system shall be illuminated when the master run switch is in "RUN" and "NITE/RUN", except the front stepwell lamps which shall be extinguished when the front doors are closed. The system shall provide no less than 2 foot candles of illumination on the entry and exit step treads with the doors open. These lights shall be shielded to protect passengers' eyes from glare. Light fixtures shall be totally enclosed, splashproof, designed to provide ease of cleaning as well as lamp and housing removal, and shall not be easily removable by passengers. Stepwell lights shall be protected from damage caused by passengers kicking lenses or fixtures and shall not be a hazard to passengers.

#### 2.2.3.4 Driver's Lighting

The driver's area shall have a light to provide general illumination and it shall illuminate the half of the steering wheel nearest the driver to a level of 10 to 15 foot candles. This light shall be controlled by a switch that is convenient to the driver.

#### 2.2.3.5 Driver Controls

All switches and controls necessary for the operation of the coach shall be conveniently located in the driver's area and shall provide for ease of operation. Switches and controls shall be essentially within the hand reach envelope described in SAE Recommended Practice, J287, Driver Hand Control Reach. Controls shall be located so that boarding passengers may not easily tamper with control settings.



Accelerator and brake pedals shall be designed for ankle motion, subject to District approval. Foot surfaces of the pedals shall be faced with wear-resistant, nonskid, replaceable material. Pedal travel shall be limited by stops under the pedals.

Controls for engine operation shall be closely grouped within the driver's compartment. These controls include separate master run switch and start switch or button. The master run switch shall be a four position rotary switch with the following functions:

OFF-All electrical systems off, except power available for the passenger interior lighting, turn lights, hazard lights, silent alarm, horn and fare box.

CL/ID-All electrical systems off, except those listed in OFF and power to radio and marker lights.

RUN-All electrical systems and engine on, except the headlights, parking lights, and marker lights.

NITE/RUN-All electrical systems and engine on.

The door control, kneel control, windshield wiper/washer controls, and run switch shall be in the most convenient driver locations. They shall be identifiable by shape, touch, and markings. Doors shall be operated by a single control, conveniently located and operable in a horizontal plane by the driver's left hand. The setting of this control shall be easily determined by position and touch. Turn signal controls shall be floor-mounted, left foot-controlled, waterproof, heavy-duty, momentary contact switches.

All switches and controls shall be marked with easily read identifiers. All panel-mounted switches and controls shall be replaceable, and the wiring at these controls shall be serviceable from the vestibule or the driver's seat. Switches, controls, and instruments shall be dust and water-resistant consistent with the coach washing practice described in Section 2.3.1.

#### 2.2.3.6 Instrumentation

The speedometer, air pressure gauge(s), and certain indicator lights shall be located on the front cowl immediately ahead of the steering wheel. The steering wheel spokes or rim shall not obstruct the driver's vision of the instruments when the steering wheel is in the straight-ahead position. Illumination of the instruments shall be simultaneous with the marker lamps. Glare or reflection in the windshield, side window, or front door windows from the instruments, indicators, or other controls shall be minimized. Instruments and indicators shall be easily readable in direct sunlight. Driver control area shall include the following identified switches and lights which are readily and visibly accessible:

## SWITCHES

- Master run switch
- Start button or switch
- Kneel switch
- Turn signal switch(es)
- Interior lighting switch
- Instrument panel lighting intensity control
- Passenger chime switch
- Driver's area light switch
- Hazard warning switch
- Horn button in steering wheel hub, protected to preclude accumulation debris such as transfer punches in steering wheel hub (no identifier required)
- Foot-controlled headlight dimmer switch, waterproof (no identifier required)
- Fast idle switch
- Diagnostic light panel test switch(es)
- Emergency stop switch (guarded)
- Motor guard
- Wheelchair lift switches as required

## CONTROLS AND INDICATORS

- Accelerator pedal
- Brake pedal
- Door control
- Master Door Switch
- Windshield wipers
- Windshield washers
- Interior climate control
- Defroster control
- Driver's heater control
- Parking emergency brake control (actuation of brake, not control, shall be indicated to the driver)
- Front door dump valve
- Transmission control
- Public address system controls
- Destination sign controls
- Indicator Lights (Diagnostics)
- High headlamp beam
- Right turn
- Left turn
- Hazard warning (may be common with turn signal indicators)
- Exit door open or unlocked
- Parking brake applied
- Service brakes applied (may be common with parking brake indicator)
- Engine Protection System (Low coolant, lubricant, excessive temperature)

Transmission Protection System (Low lubricant)  
Low Fuel Indicator  
Stop Request

The instrument panel shall include a speedometer indicating up to 80 mph and calibrated in maximum increments of 5 mph. The speedometer shall be a rotating pointer type, with a dial deflection of 220 degrees to 270 degrees and 40 mph near the top of the dial. It shall be equipped with an odometer with a capacity reading no less than 999,999 miles. The speedometer shall be sized and accurate in accordance with SAE Recommended Practice J678. The instrument panel shall also include air brake reservoir pressure gauge(s) with indicators for primary and secondary air tanks. Also included on the instrument panel shall be a dial type fuel level gauge indicating fuel level with minimum 1/4 tank increments from fuel to empty. This gauge shall be calibrated to show empty with approximately 15 gallons of usable fuel remaining. The instrument panel and wiring shall be easily accessible for service from the driver's seat or top of the panel. Wiring shall have sufficient length and be routed to permit service without stretching or chafing the wires.

2.2.3.7 Onboard Diagnostics

Critical systems or components shall be monitored with a built-in diagnostic system. This diagnostic system shall have visual and audible indicators. The diagnostic indicator lamp panel shall be located in clear sight of the driver but need not be immediately in front of him. The intensity of indicator lamps shall permit easy determination of on/off status in bright sunlight but shall not cause a distraction or visibility problem at night. All indicators shall have a method of momentarily testing the operation of the lamp. Wherever possible, sensors shall be of the closed circuit type, so that failure of the circuit and/or sensor shall activate the malfunction indicator. An audible alarm shall be loud enough for the driver to be aware of its operation and to be inclined to discontinue operation of the coach. Malfunction and other indicators listed in Figure II-6 shall be supplied on all coaches.

Space shall be provided on the panel for future additions of no less than 5 indicators as the capability of onboard diagnostic systems improves.

VISIBLE INDICATOR	AUDIBLE ALARM	FUNCTION
Low oil pressure	Yes	Engine oil pressure low
Hot engine*	Yes	Engine coolant temperature high
Low air	Yes	Air system pressure low in primary or secondary reservoirs
Low coolant*	Yes	Radiator water level low
Charging System(s) stop	No	Alternator not charging
Kneel	No	Kneeling system activated
Low engine oil level	Yes	Engine oil level low failure (if applicable)
A/C stop	No	Compressor off at high/low switch (if applicable)
Fire	Yes [This alarm shall be a bell, separate from the other audible alarm(s)]	Overtemperature in engine compartment (Section 3.6.5.4.)
Low fuel	No	Indicates low fuel condition
Engine emergency stop	Yes	Engine protection system
Low transmission oil level	Yes	

\*Indicators may be common. However, both functions shall be provided.

Figure II-6 Onboard Diagnostic Indicators

## 2.3 INTERIOR TRIM

### 2.3.1 GENERAL REQUIREMENTS

The interior shall be generally pleasing - simple, modern and free from superficial design motifs. It shall have no sharp depressions or inaccessible areas and shall be easy to clean and maintain. To the extent practicable, all interior surfaces more than 10 inches below the lower edge of the side windows or windshield shall be shaped so that objects placed on them fall to the floor when the coach is parked on a level surface. The entire interior shall be cleanable with a hose, using a liquid soap attachment. Water and soap should not normally be sprayed directly on the instrument and switch panels. Handrails, lights, air vents, armrests, and other interior fittings shall appear to be integral with the coach interior. There shall be no sharp, abrasive edges and surfaces and no unnecessary hazardous protuberances. All plastic and synthetic materials used inside the coach shall be fire resistant except vinyl seat coverings which shall meet the requirements of Federal Specification CCC-A 680a Class 2(a)1 and seating upholstery textiles which shall meet the requirements for textiles in Federal Aviation Regulations 25.853(b), as tested in accordance with Appendix F of that part.

Materials shall be selected on the basis of maintenance, durability, appearance, safety, flammability, and tactile qualities. Trim and attachment details shall be kept simple and unobtrusive. Materials shall be strong enough to resist everyday abuse and vandalism; they shall be resistant to scratches and markings. Interior trim shall be secured to avoid resonant vibrations under normal operational conditions.

#### 2.3.1.1 Trim Panels

Interior side trim panels shall be textured stainless steel, anodized aluminum, or plastic melamine type material. It shall permit easy removal of paint, greasy fingerprints, and ink from felt tip pens. Panels shall be easily replaceable and tamper-resistant. They shall be reinforced, as necessary, to resist vandalism and other rigors. Interior mullion trim, moldings, and trim strips shall be plastic, textured stainless steel, or anodized aluminum. Individual trim panels and parts shall be interchangeable to the extent practicable.

Side panels and modesty panels below bus windows shall be of laminated plastic Formica Bookmatched 232(-64) or Consoweld Dura Beauty, Select Walnut W-46-T or approved equal.

#### 2.3.1.2 Headlining

Headlining shall be of a laminated plastic such as Formica Gemina, White 749(-30) or Consoweld Dura Beauty Antique White Cantina C-25T or approved equal. Headlining shall be supported to prevent buckling, drumming, or flexing and shall be secured without loose edges. Headlining

materials shall be treated or insulated to prevent marks due to condensation where panels are in contact with metal members. Moldings and trim strips, as required to make the edges tamperproof, shall be stainless steel, aluminum, or plastic, colored to complement the ceiling material. Headlining panels covering operational equipment that is mounted above the ceiling shall be on hinges for ease of service but retained to prevent inadvertent opening.

#### 2.3.1.3 Front End

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

#### 2.3.1.4 Rear End

Rear bulkhead and rear interior surfaces shall be paneled with the same material or approved equal as used in the trim panels.

#### 2.3.1.5 Passenger Information and Advertising

An aluminum frame, provided by the contractor, to retain information sized 15-3/4 inches wide, 13 inches high posted by the District, such as routes and schedules shall be mounted to the rear of the driver's barrier, subject to District approval. Finish to be bronze anodized.

Advertising media 11 inches high and 0.09 inches thick shall be retained near the juncture of the coach ceiling and side wall. The retainers may be concave and shall support the media without adhesives. The media shall be illuminated by the interior fluorescent lighting system.

### 2.3.2 PASSENGER SEATS

#### 2.3.2.1. Arrangements

Passenger seats forward of the exit door shall be arranged in a transverse, forward facing configuration, except at the wheel housings where seats may be arranged as appropriate with due regard for passenger access and comfort. Perimeter seating shall be provided rearward of the exit door.

Seating capacity with this arrangement shall be no less than 46. Hip-to-knee room, measured from the front of one transverse, seat back

cushion horizontally across the highest part of the transverse seat or panel immediately in front, shall be no less than 27.5 inches. Foot room, measured at the floor forward from a point vertically below the front of the seat cushion, shall be no less than 14 inches. Seats immediately behind the wheel housings may have foot room reduced, provided the wheel house is shaped so that it may be used as a footrest.

Each transverse, forward facing seat, except the rear seats, shall accommodate two adult passengers. Thickness of the transverse seat backs shall be minimized to increase passenger knee room and coach capacity. The area between the longitudinal seat backs and the attachment to the coach side walls shall be enclosed to prevent debris accumulation.

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

#### 2.3.2.2 Structure and Design

The passenger seat frame and its supporting structure shall be constructed and mounted so that space under the seat is maximized to increase wheelchair maneuvering room and is completely free of obstructions. The structure may be pedestal mount or fully cantilevered from the side wall with sufficient strength for the intended service. The lowest part of the seat assembly that is within 12 inches of the aisle shall be at least 10 inches above the floor. The underside of the seat and the side wall shall be configured to prevent debris accumulation and the transition from the seat underside to the coach side wall to the floor cove radius shall be smooth. All transverse objects, including seat backs, modesty panels, and longitudinal seats, in front of forward facing seats shall not impart a compressive load in excess of 1,000 pounds onto the femur of passengers ranging in size from a 5th-percentile female of a 95th-percentile male during a 10g deceleration of the coach. This deceleration shall peak at .05 + .015 seconds from initiation. Permanent deformation of the seat resulting from two 95th-percentile males striking the seat back during this 10g deceleration shall not exceed 2 inches, measured at the aisle side of the seat. Structural failure of any part of the seat or side wall shall not introduce a laceration hazard.

The back of each transverse seat shall incorporate a handhold no less than 7/8 inches in diameter for standees and seat access/egress. The handhold shall not be a safety hazard during severe decelerations. The handhold shall extend above the seat back near the aisle so that standees shall have a convenient vertical assist, no less than 4 inches long that may be grasped with the full hand. This handhold shall not cause a standee using this assist to interfere with a seated 50th-percentile male passenger. The handhold shall also be usable by a 5th-percentile female, as well as by larger passengers, to assist with seat access/egress for either transverse seating position. The seat back handhold may be deleted from seats that do not have another transverse seat directly behind and where a vertical assist is provided in accordance with Section 2.6.3. Armrests shall not be included in the design of transverse seats.

absorbing materials to provide passenger head protection. Protection shall be afforded to passengers ranging in size from a 6-year old child to a 95th-percentile male to prevent head injury of more than 400 HIC during the 10g deceleration of Section 2.3.2.2. The minimum radius of equipment in any portion of the head or chest impact zone shall be a nominal 1/4-inch. Armrests shall be padded with material that is the same as, or similar to, the seat back padding and handholds. Color of the padding shall complement the other interior materials. Seats, back cushions, and other pads shall be securely attached and shall be detachable by means of a simple release mechanism employing a special tool so that they are easily removable by the maintenance staff but not by the passengers. To the extent practicable, seat cushions and pads shall be interchangeable throughout the coach and the pad coloring shall be consistent throughout the materials. All material and workmanship shall conform to SPI standards and specifications in tests for plastic foam. The material shall have high resistance to tearing, flexing, and wetting.

Crash requirement shall be met without the use of readily vandalized material or pads on the back portion of the seat.

Seat cushion and backs shall be individual and easily removed for maintenance.

Cushioned seats shall be upholstered as follows:

Seats shall be covered with woven fabric and shall have a 6" wide vinyl panel at the top of the seat back and at the front of the seat cushion. The vinyl trim shall be Uniroyal Naugahyde Ebony Brown, DOE grain RTD-3978 or approved equal.

Fabric panels shall be Craftex pattern K8758N/69411 or approved equal.

Neoprene foam cushions and backs shall be provided. Specified seat covering materials and neoprene foam cushions are District standard.

Non-padded seat colors shall be coordinated with cushioned seat fabric colors, subject to District approval.

<u>Manufacturer</u>	<u>Location</u>	<u>Seat Type</u>	<u>Model No.</u>
1. American Seating	a.	Forward Facing (cushion)	6466
	b.	Standard Seat	6468
2. Coach and Car	a.	Forward Facing (cushion)	298 Alt. 2
	b.	Standard Seat	300

### 2.3.3 DRIVER'S SEAT

#### 2.3.3.1 Dimensions

Driver's seat shall be latest model National air-ride, low back type with heavy duty shock absorbers.



Longitudinal seats shall be the same general design as transverse seats but without seat back handholds. Longitudinal seats may be mounted on the wheelhouses. Armrests shall be included on the ends of each set of longitudinal seats except on the forward end of a seat set that is immediately to the rear of a transverse seat, the driver's barrier or a modesty panel and these fixtures perform the function of restraining passengers from sliding forward off the seat. Armrests are not required on longitudinal seats located in the wheelchair parking area that fold up when the armrest on the adjacent fixed longitudinal seat is within 1 1/2 to 3 1/2 inches of the end of the seat cushion. Armrests shall be located from 7 to 9 inches above the seat cushion surface. The area between the armrest and the seat cushion shall be closed by a barrier or panel and shall be constructed and trimmed to complement the modesty panels. The top and sides of the armrests shall have a minimum width of 2 inches and shall be free from sharp protrusions that form a safety hazard. Soft padded arm rests shall not be utilized.

Seat back handholds and armrests shall withstand static horizontal and vertical forces of 250 pounds applied anywhere along their length with less than 3/4-inch permanent deformation. Seat back handholds and armrests shall withstand 25,000 impacts in each direction of a horizontal force of 125 pounds with less than 1/4-inch permanent deformation and without visible deterioration.

#### 2.3.2.3 Construction and Materials

Seats installed rearward of the exit door shall be non-padded fiberglass, polycarbonate, or nylon and shall be attached to the frame with tamperproof fasteners. Coloring shall be consistent throughout the seat material, with no visually exposed portion painted. All visually exposed metal of the standard seat structure including mounting brackets and other components shall be stainless steel. The seats shall be contoured for individuality, lateral support, and maximum comfort and shall fit the framework to reduce exposed edges. The seat back thickness shall not exceed 1/4-inch in the knee room area. The seat forward of a seated passenger shall absorb energy in a severe crash by allowing the passenger's knees to deform the seat back in accordance with the requirements of Section 2.3.2.2. Complete seat assemblies shall be interchangeable to the extent practicable.

Cushioned seats shall be installed from the exit door area forward. Seating and interior trim shall have features to maximize safety, comfort, and capacity. At other seating positions hip-to-knee room shall be no less than 27.5 inches. The seat bottom cushion shall be supported by springs. The seat cushion and back shall be padded with neoprene foam, or material with equal properties subject to District approval, no less than 2 inches thick in areas contacted and loaded by passengers in the normal seated position and shall be upholstered with vinyl and fabric materials. Springs and cushions shall be shaped for individuality, lateral support, and comfort.

The upper rear portion of the seat back, the seat back handhold, and the upper rear surface of the modesty panels located immediately forward of transverse seats shall be padded and/or constructed of energy

Seat shall be comfortable and adjustable so that persons ranging in size from the 95th-percentile male to the 5th-percentile female may operate the coach. The driver's seat cushion shall have a minimum width of 18 inches, a length of 16 to 18 inches, and rearward slope of 5 degrees. The driver's seat back height, measured from the point of intersection of the uncompressed seat cushion to the top of the seat back, shall be  $20 + 2$  inches. The angle formed between the seat back and the seat cushion shall be adjustable in the range of 95 to 110 degrees. Height of the seat shall be adjustable so that the distance between the top of the uncompressed seat cushion and the floor may vary between 17 and 21 inches with the seat in the forward position, the distance from the center of the steering wheel to the seat back shall be no less than 23 inches. The seat shall be adjustable for a minimum travel of 6 inches. While seated, the driver shall be able to make all of these adjustments by hand without complexity, excessive effort, or being pinched. Adjustment mechanisms shall hold the adjustments and shall not be subject to inadvertent changes.

#### 2.3.3.2 Structure and Materials

The driver's seat shall be contoured to provide maximum comfort for extended period of time. Cushions shall be fully padded with at least 3 inches of neoprene foam, or material with equal properties subject to District approval, in the seating areas at the bottom and back. Upholstery shall be ventilated. All visually exposed metal on the driver's seat, including the pedestal, shall be unpainted stainless steel. Required seat belts shall be fastened to the seat so that the seat may be adjusted by the driver without resetting the seat belt. Seat belts shall be stored in automatic retractors. The driver's seat shall be cushioned supplementally by an air cylinder or air diaphragm. These devices may also provide the seat height adjustments. Damping shall be provided as required. Driver's seat shall be upholstered in same vinyl material as used on passenger seats.

#### 2.3.4 FLOOR COVERING

##### 2.3.4.1 Vestibule

The floor in the vestibule shall be covered with 5/16-inch, nonskid, ribbed black, rubber composition material that remains effective in all weather conditions. The floor covering, as well as transitions of flooring material to the main floor and to the stepwell area shall be smooth and present no tripping hazards. Floor covering ribs shall run transversely in line with the entrance, longitudinally in line with the aisle, and shall be joined smoothly and matched in 45 degrees mitered joints. The integrally molded yellow standee line shall be at least 2 inches wide and shall extend across the coach aisle in line with the driver's barrier. Color shall be consistent throughout the floor covering.

##### 2.3.4.2 Driver's Compartment

The floor in the driver's compartment shall be easily cleaned and shall be arranged to prevent debris accumulation. Any floor coverings shall be 3/16-inch thick, ribbed surface, heavy-duty, rubber composition material. Color of the driver's floor covering shall be the same as the

vestibule.

#### 2.3.4.3 Passenger Area

The floor in the passenger area shall be covered with black nonskid rubber composition material that remains effective in all weather conditions. A one-piece center strip shall extend from the rear seat between the aisle sides of transverse seats to the standee line. The covering between the center strip and the wheel housings may be separate pieces. The material shall be 3/16-inch thick in the aisle section and longitudinally-ribbed. At the rear door, however, a separate transversely-ribbed strip as wide as the door shall extend from the center strip to the top step.

The floor under the seats shall be covered with 1/8-inch thick, smooth surface flooring material. The floor covering shall closely fit the sidewall cove or extend to the top of the cove. Color of the floor covering in the passenger compartment shall be the same as that in the vestibule.

#### 2.3.4.4 Wheelchair Parking Space Flooring

The wheelchair parking area floor shall be covered with 3/16-inch thick, longitudinally-ribbed rubber flooring material. The rubber flooring shall be applied to the wheelchair parking spaces so that the ribs run perpendicularly to the center isle.

## 2.4 WINDOWS

### 2.4.1 DRIVER'S WINDOWS

#### 2.4.1.1 Windshield

The windshield shall permit a driver's field of view as referenced in SAE Recommended Practice J1050. The vertically upward view shall be a minimum of 15 degrees, measured above the horizontal and excluding any shaded band. The vertically downward view shall permit detection of an object 3 1/2 feet high no more than 2 feet in front of the coach. The peripheral view shall be a minimum of 90 degrees about the line of sight. Any binocular obscuration due to a center divider may be ignored when determining the 90 degree requirement provided that the divider does not exceed a 3 degree angle in the driver's field of view. Windshield pillars shall not exceed 10 degrees of binocular obscuration. The windshield shall be designed and installed to minimize external glare as well as reflections from inside the coach. When the coach is operated at night with the passenger interior lighting on, essentially no reflections shall be visible in the windshield immediately forward of the driver's barrier. Reflections in the remainder of the windshield shall be minimized, and no reflection of any part of the coach interior behind the driver's barrier shall be visible in the windshield. Windshield glare shall be subject to the approval of the California Highway Patrol.

The windshield shall be easily replaceable by removing zip-locks from the windshield retaining moldings. Bonded-in-place windshields shall not be used. The glazing material shall have single density tint. The upper portion of the windshield above the driver's field of view shall have a dark, shaded band with a minimum luminous transmittance of 6 percent when tested in accordance to ASTM D-1003.

#### 2.4.1.2 Driver's Side Window

The driver's side window shall open sufficiently to permit the seated driver to easily adjust the left outside rearview mirror. This window section shall slide rearward a nominal 5 inches full height in tracks or channels designed to last the service life of the coach full height. The driver's side window shall not be bonded in place and shall be easily replaceable. The glazing material shall have a single density tint.

Any driver's side window glass area above the sunvisor in the lowered position shall be tinted to the same degree as the shaded band on the windshield.

### 2.4.2 SIDE WINDOWS

#### 2.4.2.1 Dimensions

Side windows shall extend from the shoulder height of a 5th-percentile, seated, female passenger to the eye level of a 95th-percentile, standing male passenger. Vertical mullions between windows including the trim shall not exceed 7 inches in width. All side windows shall be easily replaceable without disturbing adjacent windows and

shall be mounted so that flexing or vibration from engine operation or normal road excitation is not apparent.

The side windows shall open in sections sliding forward and rearward. The sliding portion of the window shall open no more than a nominal six inches. The windows shall be retained in the closed or stationary position by an anodized aluminum latch.

Slide open windows shall provide a minimum clear opening of three square feet at the rear of the coach to provide air flow for the cyclone cleaning process.

#### 2.4.2.2 Materials

Side window plastic glazing material shall have a 1/2-inch nominal thickness. The material shall conform with the requirements of ANSI Z26.1-1977 Standard for Type AS-5 Safety Glazing Materials except for Test Number 17 which shall subject the specimens to 1000 cycles and the arithmetic mean of the percentages of light scattered shall not exceed 5 percent. Windows on the coach sides and in the rear door shall be tinted a neutral color, complementary to the coach exterior, subject to District approval. The maximum solar energy transmittance shall not exceed 37 percent, as measured by ASTM E-424, and the luminous transmittance shall be no less than 16 percent as measured by ASTM D-1003. Plastic glazing is exempt from the interior trim flammability requirement of Section 2.3.1.

The glazing material for the front and side destination sign shall be clear safety glass.

### 2.5 INSULATION

#### 2.5.1 MATERIAL

##### 2.5.1.1 Properties

Any insulation material used between the inner and outer panels shall be fire-resistant and sealed to minimize entry of moisture and to prevent its retention in sufficient quantities to impair insulation properties. Insulation properties shall be unimpaired by vibration compacting or settling during the life of the coach. The insulation material shall be nonhygroscopic and resistant to fungus and breeding of insects. Any insulation material used inside the engine compartment shall be fire-resistant and shall not absorb or retain oil or water.

## 2.5.2 PERFORMANCE

### 2.5.2.1 Thermal Insulation

The combination of inner and outer panels on the sides, roof, and ends of the coach, and any material used between these panels shall provide a thermal insulation sufficient to meet the interior temperature requirements of Part II: Technical Specifications. The coach body shall be thoroughly sealed so that drafts cannot be felt by the driver or passengers during normal operations with the passenger doors closed.

### 2.5.2.2 Sound Insulation

The combination of inner and outer panels and any material used between them shall provide sufficient sound insulation so that a sound source with a level of 80 dBA measured at the outside skin of the coach shall have a sound level of 65 dBA or less at any point inside the coach. These conditions shall prevail with all openings, including doors and windows, closed and with the engine and accessories switched off.

The coach-generated noise level experienced by a passenger at any seat location in the coach shall not exceed 83 dBA and the driver shall not experience a noise level of more than 75 dBA under the following test conditions. The coach shall be empty except for test personnel, not to exceed 4 persons, and the test equipment. All openings shall be closed and all accessories shall be operating during the test. The coach shall accelerate at full throttle from a standstill to 60 mph on level commercial asphalt or concrete pavement in an area free of large reflecting surfaces within 50 feet of the coach path. During the test, the ambient noise level in the test area shall be at least 10 dBA lower than the coach under test. Instrumentation and other general requirements shall conform to SAE Standard J366. If the noise contains an audible discrete frequency, a penalty of 5 dBA shall be added to the sound level measured.

## 2.6 ANCILLARY FEATURES

### 2.6.1 DRIVER'S AREA

#### 2.6.1.1 Dash Panels

To the extent practicable, areas that are visible from outside the coach in the vicinity of the dash panel and cowl shall be configured to preclude use for storage of items.

#### 2.6.1.2 Visors

Adjustable sun visors shall be provided for concurrent use on both the driver's side of the windshield and the driver's side window. Visors shall be shaped to minimize light leakage between the visor and windshield pillars. Visors shall store out of the way and shall not obstruct air flow from the climate control system or interfere in the operation of other equipment such as the radio handset or the destination control, etc. Deployment of the visors shall not restrict vision of the rearview mirrors.

Visor adjustments shall be made easily by hand with positive locking and releasing devices and shall not be subject to damage by overtightening. Sun visor construction and materials shall be strong enough to resist breakage during adjustments. Visors shall not be transparent. Visors, when deployed, shall be effective in the driver's field of view simultaneously at all angles more than 5 degrees above the horizontal.

#### 2.6.1.3 Exit Signal

A passenger chime signal audible to the driver and to passengers anywhere inside the coach shall be provided. The chime shall have pull cords that are convenient to seated passengers, standees, and passengers standing at the rear door. Standees shall be able to easily reach the chime signal located near the passenger interior lighting fixtures. Push buttons may be provided on all vertical window mullions for the convenience of seated passengers and passengers at the rear door. A driver-controlled switch shall deactivate the chime system. A vertical pull cord shall be provided adjacent to each wheelchair riding position, subject to District approval.

Contractor shall supply a "Stop Requested" sign which shall be illuminated when the passenger chime exit signal is activated. Sign shall remain illuminated until one or both passenger doors are opened. The sign shall normally appear white when illuminated, the sign letters shall be white on a red background. The passenger chime shall sound only when the sign is first illuminated. The sign shall be mounted on the extreme front center of the ceiling panel in a position visible to the seated driver and seated passengers. An indicator light on the dash panel shall be provided and activated when the stop request sign illuminated.

#### 2.6.2 MIRRORS

##### 2.6.2.1 Outside Mirrors

The coach shall be equipped with a corrosion-resistant, outside rearview mirror with 1/4" plate glass mirror and metal mounting stud on each side of the coach subject to District approval. Mirrors shall permit the driver to view the highway along both sides of the coach, including the rear wheels. Mirrors shall be firmly attached to coach to prevent vibration and loss of adjustment, but not so firmly attached that the coach or its structure is damaged when the mirror is struck in an accident. The right side rearview mirror shall be mounted so that its lower edge is no less than 80 inches above the street surface. Mirrors shall retract or fold sufficiently to allow coach washing operations. The right side mirror shall be mounted on the front windshield/front door area structure and not on the front passenger door. It shall provide visibility of the mirror through the right side of the windshield.

##### 2.6.2.2 Inside Mirrors

Mirrors shall be provided for the driver to observe passengers throughout the coach without leaving his seat and without shoulder movement. A mirror above the front stepwell, for use by the operator in determining that the front door is clear of passengers, shall be provided.

With a full standee load, including standees in the vestibule, he shall be able to observe passengers in the front and rear stepwells, anywhere in the aisle, and in the rear seats. Inside mirrors shall not be in the line of sight to the right outside mirror.

#### Approved Mirrors

Exterior: Rosco - No. 8805 TQ (right and left side)  
Interior: Rosco - No. 416 Driver's Mirror  
Acme  
Speciality - No. 1653  
Exit Door: Rosco - No. 2066-380 12" Mirror  
No. 2159-608 6" Mirror

### 2.6.3 PASSENGER ASSISTS

#### 2.6.3.1 General Requirements

Passenger assists in the form of full grip, vertical stanchions or handholds shall be provided for the safety of standees and for ingress/egress. Passenger assists shall be convenient in location, shape, and size for both the 95th-percentile male and the 5th-percentile female standee. Starting from the entrance door and moving anywhere in the coach and out the exit door, a vertical assist shall be provided either as the vertical portion of seat back assist (see Section 2.3.2.3) or as a separate item so that a 5th-percentile female passenger may easily move from one assist to another using one hand and the other without losing support. Excluding those mounted on the seats and doors, the assists shall be between 1 1/4 and 1 1/2-inches in diameter or width with radii no less than 1/2 inch. All passenger assists shall permit a full hand grip with no less than 1 1/2-inches of knuckle clearance around the assist, except the assists mounted on the door panels which shall have no less than 1 inch of knuckle clearance. A crash resulting in a 1-foot intrusion shall not produce sharp edges, loose rails, or other potentially dangerous conditions associated with a lack of structural integrity of the assist. Any joints in the assist structure shall be underneath supporting brackets and securely clamped to prevent passengers from moving or twisting the assists. Assists shall withstand a force of 300 pounds applied over a 12-inch linear dimension in any direction normal to the assist without permanent visible deformation. Brackets, clamps, screw heads, and other fasteners used on the passenger assists shall be flush with the surface and free of sharp edges. Assists that are handled by passengers including functional components used as passenger assists, shall be of stainless steel or PVC over metal base. All assists located forward of the seated operator shall be black PVC coated. PVC coating shall be black and 3 mil minimum. PVC covering is available from "Tube Craft, Inc.", 1311 West 80th Street, Cleveland, Ohio.

#### 2.6.3.2 Front Doorway

Front doors, or the entry area, shall be fitted with assists no less than 3/4-inch in width. Assists shall be as far outward as practicable, but shall be no further than 6-inches from the outside edge of lower step tread and shall be easily grasped by a 5th-percentile female



boarding from street level. Door assists shall be functionally continuous with the horizontal front passenger assist and the vertical assist on the front modesty panel.

#### 2.6.3.3 Vestibule

The aisle side of the driver's barrier and the modesty panels shall be fitted with vertical passenger assists that are functionally continuous with the overhead assist and that extend to within 36-inches of the floor. These assists shall have sufficient clearance from the barrier to prevent inadvertent wedging of a passenger's arm. A horizontal passenger assist shall be located across the front of the coach and shall prevent passengers from sustaining injuries on the fare collection device or windshield in the event of a sudden deceleration. Without restricting the vestibule space, the assist shall provide support for a boarding passenger from the front door through the fare collection procedure. Passengers shall be able to lean against the assist for security while paying fares. The assist shall be no less than 36 inches above the floor or the average step tread surface. The assists at the front of the coach shall be arranged to permit a 5th-percentile female passenger to easily reach from the door assist, to the front assist, to vertical assists on the driver's barrier or front modesty panel. The front assist shall not impede the boarding of wheelchairs, if applicable, and should provide space to mount and vault a Cubic Western Data electronic farebox.

#### 2.6.3.4 Overhead

Except forward of the standee line and at the rear door, a continuous, full grip, overhead assist shall be provided. This assist shall be convenient to standees anywhere in the coach and shall be located over the center of the aisle seating position of the transverse seats. The assist shall be no less than 70 inches above the floor. Overhead assists shall simultaneously support 150 pounds on any 12-inch length. No more than 5 percent of the full grip feature shall be lost due to assist supports.

#### 2.6.3.5 Longitudinal Seats

Longitudinal seats shall have vertical assists located between every other designated seating position, except for fold-up seats. Assists shall extend from near the leading edge of the seat and shall be functionally continuous with the overhead assist. Assists shall be staggered across the aisle from each other where practicable and shall be no more than 52 inches apart.

#### 2.6.3.6 Rear Doorway

Vertical assists that are functionally continuous with the overhead assist shall be provided at the aisle side of the transverse seat immediately forward of the rear door and on the aisle side of the rear door modesty panel. Rear doors, or the exit area, shall be fitted with assists no less than 3/4 inch in width and shall provide at least 1 1/2 inches of knuckle clearance between the assists and their mounting. A 5th-percentile

female shall be provided assists that are functionally continuous during the entire exiting process, and the assists shall be no more than 6 inches from the outside edge of the lower step tread.

#### 2.6.4 EXTERIOR ROUTE DISPLAYS

##### 2.6.4.1 Electronic Destination Signs

The Contractor shall equip all buses with Transign System BVK 9004, Electronic Destination Sign System. Both front and side signs shall display identical message. Both signs shall display destination messages only when the coach engine is running. When the master run switch is in the "Off" position the signs shall appear blank (all blank).

Bidder shall supply and install an electronic destination sign system that is equivalent in performance and memory capacity as the Transign BK9004 system. Programming of signing system provided shall be compatible with that used for the Transign BVK 9004 system.

Destination sign controls shall not utilize membrane type switches due to their reliability problems in a transit bus environment. Thumbwheel type switches shall be used to change destination codes. The exterior viewing window on both front and side destination signs shall be double strength clear glass.

Any sign system proposed as equal to the Transign DVS 10000-8 system shall include the following features:

1. Front sign.
2. Side sign.
3. Control Console (Route Number Option).
4. 2,000 lines of memory.
5. Zero insertion force EPROM sockets.
6. Complete maintenance documentation for both field and depot level repair. Depot level documentation shall provide fault isolation and repair procedures for all circuit components of all modules and circuit boards used in the sign system.
7. Engineering drawings and circuit schematics.
8. Complete installation.
9. Emergency alarm feature must function with the District's standard emergency alarm system.

##### 2.6.4.2 Run Numbers

All three character spaces shall have the capability to display 0,1,2,3,4,5,6,7,8,9,0 and X readings.

Run number sign shall be Transign model D15005 or approved equal. This model sign has been approved for use in transit buses by the California Highway Patrol.

#### 2.6.5 FARE COLLECTION

Space, as far forward as practicable, and structural provisions shall be made for installation of a Cubic Western Data electronic farebox. Location of the farebox shall not restrict traffic in the vestibule, including wheelchairs if a front door loading device is used, and shall allow the driver to easily reach the coin drop levers and to view the change platform. The farebox mounting location shall not restrict access to the driver's area and shall not restrict operation of driver controls. Farebox location shall permit accessibility to the vault for easy manual removal or attachment of suction devices. Meters and counters on the farebox shall be readable on a daily basis. A 20-amp, 24-volt, DC, protected circuit shall be available to power the farebox. This power service shall include a grounded lead with both wires enclosed in a flexible conduit. The floor under the farebox shall be reinforced, as necessary, to provide a sturdy mounting platform and to prevent shaking of the farebox. A one inch inside diameter metallic conduit shall be provided from the radio box to the farebox mounting location, through the bus floor, subject to District approval.

## 2.6.6 WHEELCHAIR PASSENGERS

### 2.6.6.1 Accommodations

Space and body structural provisions shall be provided at the front entrance of the coach to accommodate a wheelchair loading system.

### 2.6.6.2 Legal Requirements

The Wheelchair Loading System as installed shall comply with all applicable federal, state and local regulations. Local regulations are defined as those below the state level including Wheelchair Loading System provisions of Title 13 of the California Administrative Code. In the event of any conflict between the requirements of this specification and any applicable legal requirement, the legal requirement shall prevail.

### 2.6.6.3 Loading System

A loading system shall provide safe ingress and egress quickly, comfortably, and in a forward direction for a passenger in a wheelchair from the street level or curb. The lift system shall be designed to operate in the District's service area where curb heights may reach 14 inches and road crowns are of varying degrees. When the system is not in use, the steps and passageway shall appear normal, and no portion of the stepwell shall move when the doors open. The controls shall be simple to operate with no complex phasing operations required, and the loading operation shall be under the surveillance and complete control of the driver.

The system shall include a master "power on/off" switch. The master "power on/off" switch must be activated prior to system operation.

Each loading system function shall be controlled by a single position on a master rotary (wafer) switch, Electrosch Corporation Switch No. 21301A or approved equal. Each system function can then only be activated by a momentary contact type push button switch. Each operation

shall require continuous manual pressure by the operator and shall not allow unintentional improper loading system operation. The outer barrier shall be automatically controlled and shall be such that it cannot be overridden by the loading system operator.

A dash mounted indicator light shall be provided and shall be illuminated when the loading system is not in the "steps" position.

The location of the controls shall preclude the simultaneous manipulation with one hand of the wafer switch and any other control.

All system controls shall be subject to District approval.

The coach shall be prevented from moving when the wheelchair loading system is activated. The wheelchair loading system shall not present a hazard, nor inconvenience any passenger. The wheelchair loading platform clear area shall be no less than 28 1/2 inches wide and 44 inches long and capable of accommodating a total load of 600 pounds. The stowing or folding of the platform must require two separate and distinct actions by the operator. The loading system platform shall be precluded from retracting or folding when a passenger is on the platform. The loading platform shall extend no less than 18-inches outward of the coach with the transition from the sidewalk to the loading device not exceeding 1/2 inch and it shall be ramped to the extent practicable. The platform shall be designed to protect the device from damage to itself, to the coach or to persons during any phase of operation. The loading platform shall be covered with a replaceable or renewable, nonskid material. Any portion of the loading system used as steps shall be covered with 5/16 inch non-skid ribbed, rubber composition material, RCA or approved equal, and shall be black in color. The edge of all steps shall be yellow in color and shall be integrally molded to the specified covering. The platform shall be fitted with barriers to prevent any powered or non-powered wheelchair from rolling or driven off the ends or sides during loading or unloading.

A wheelchair passenger on the loading platform shall be able to easily obtain support during the entire loading and unloading operations by grasping passenger assist(s) provided for this purpose. All areas of the passenger assist(s) including functional components used as passenger assists, shall be 3 mil PVC coating or nylon powder coating over a metal base. Assists shall withstand a force of 200 pounds applied over a 12-inch lineal dimension in any direction normal to the assist without permanent visible deformation. Brackets, clamps, screw heads, and other fasteners used on the passenger assists shall be anodized aluminum or stainless steel and shall be flush with the surface and free of rough edges.

When the loading platform is rising, no hazard shall be presented to passengers between the platform and the bottom edge of fixed step risers and other parts of the loading system mechanism. When fully raised, the transition from the platform to the floor shall be smooth. Deployment or storage of the lift shall require no more than 5 seconds. The time required to perform other phases of the loading or unloading operation shall not exceed 15 seconds. The device shall function without failure or adjustment for 500 cycles or 6,000 miles in all weather conditions encountered in District revenue service. A manual override system shall

permit unloading a wheelchair and storing the device in the event of a primary power failure. The lift control circuit shall be equipped with an electronic counting device recording numerically each time the lift is cycled. Mounting location of this device is subject to District approval.

#### 2.6.6.4 Wheelchair Accommodations

Seat assemblies, as close to the wheelchair loading system as practical, shall be replaced or modified to provide parking spaces and secure tiedowns for passengers in two wheelchairs. The exit signal shall be no higher than 4 feet above the floor in these areas. Maneuvering room inside the coach shall accommodate easy travel for a passenger in a wheelchair from the loading device through the coach to the designated parking area, and back out. No portion of the wheelchair or its occupant shall protrude into the normal aisle of the coach when parked in the designated parking space(s). No width dimension should be less than 30 inches, areas requiring 90 degree turns of wheelchairs should have a clearance arc dimension no less than 45 inches and in the parking area where 180 degree turns are expected, space should be clear in a full 60 inch diameter circle. A vertical clearance of 12 inches above the floor surface should be provided on the outside of turning areas for wheelchair foot rest clearance. Lights shall be provided above the doorway equipped with the wheelchair lift system to floodlight the loading area. The lamps shall illuminate when the lift system is in operation and shall illuminate the street surface to a level of no less than 1 footcandle for a distance of 3 feet square outward from the lowest stepread edge.

Accommodations, including passenger seat belts, wheelchair wheel clamps, wheelchair securement straps and fold down seats, for two wheelchair passengers shall be provided. Passenger seat belts shall be of sufficient length to accommodate passengers in electric powered wheelchairs and shall have a minimum useful length of 80 inches. Requirements for securement straps are included in Attachment C to Part II, Technical Specifications.

3.0 CHASSIS

### 3.1 PROPULSION SYSTEM

#### 3.1.1 VEHICLE PERFORMANCE

##### 3.1.1.1 Power Requirements

A U.S. manufactured propulsion system and drive train shall provide power to enable the coach to meet the defined acceleration, top speed, and gradability requirements. Sufficient excess power shall be available to operate all accessories.

##### 3.1.1.2 Top Speed

The coach shall be capable of a top speed of 60 mph (for emergency and passing maneuvers) on a straight, level road at GVWR with all accessories operating.

##### 3.1.1.3 Gradeability

Gradeability requirements shall be met on grades with a surface friction coefficient of 0.3 and above at GVWR with all accessories operating. The standard configuration powerplant shall enable the coach to maintain a speed of 44 mph on a 2-1/2 percent grade and 7 mph on a 16-percent grade.

##### 3.1.1.4 Acceleration

An average acceleration rate of at least 0.06g shall be achieved at GVWR between 0 and 15 mph. Acceleration measurement shall commence when the accelerator is depressed. The minimum acceleration rates are as follows:

<u>Speed (MPH)</u>	<u>Elapsed Time (Sec.)</u>
10	6.6
20	12.1
30	20.1
40	36.0
50	62.0

##### 3.1.1.5 Jerk

Jerk, the rate of change of acceleration, shall be minimized throughout the acceleration/deceleration range and shall be no greater than 0.3g/sec. This requirement shall be achieved regardless of driver actions.

##### 3.1.1.6 Operating Range

The operating range of the coach run in District revenue service shall be at least 400 miles on a fill-up of fuel.

### 3.1.2 POWERPLANT MOUNTING AND ACCESSORIES

#### 3.1.2.1 Mounting

The powerplant shall be mounted in a compartment in the rear of the coach. All powerplant mounting points shall be mechanically isolated to minimize transfer of vibration to the body structure.

#### 3.1.2.2 Service

The powerplant shall be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists, shall be required to remove the powerplant. Two 3M mechanics shall be able to remove, replace, and prepare the engine and transmission assembly for service in less than 20 total combined man-hours. The muffler, exhaust system, air cleaner, air compressor, starter, alternator, radiator, all accessories, and any other component requiring service or replacement shall be easily removable and independent of the engine and transmission removal. An engine oil pressure gauge and coolant temperature gauge shall be provided in the engine compartment. These gauges shall be easily read during service and mounted in an area where they shall not be damaged during minor or major repairs.

Engine tune-up, removal and replacement of transmission, cylinder heads, injectors, and accessories, such as, but not limited to, muffler, exhaust system, air compressor, alternator, starter, A/C compressor, etc., shall be serviceable from a flat floor and without the use of a pit or hoist.

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

The engine and transmission shall be equipped with sufficient heavy-duty fuel and oil filters for efficient operation and to protect the engine and transmission between scheduled filter changes. The filters shall be of the spin-on, disposable type. All filters shall be easily accessible and the filter bases shall be plumbed to assure correct reinstallation. Fuel and oil lines within the engine compartment shall be rigidly supported and shall be composed of steel tubing where practicable except in locations where flexible lines are specifically required by the District. Flexible fluid lines shall be kept at a minimum and shall be as short as practicable. They shall be routed or shielded so that failure of a line shall not allow fuel or oil to spray or drain onto any component operable above the autoignition temperature of the fluid. Flexible lines shall be teflon hoses with braided stainless steel jackets except in



applications where premium hoses are required and shall have standard SAE or JIC brass or steel, reusable, swivel, end fittings. Hoses shall be individually supported and shall not touch one another or any part of the coach. The engine shall be equipped with a fuel priming pump or a check valve fitted in the fuel suction line to aid restarting after fuel filter changes.

#### 3.1.2.3 Accessories

Engine-driven accessories shall be unit mounted for quick removal and repair. Accessory drive systems including belts shall operate without failure or unscheduled adjustment for 50,000 miles in District service. These accessories shall be driven at speeds sufficient to assure adequate system performance during extended periods of idle and low route speed operation.

#### 3.1.2.4 Hydraulic Drive

Any accessory may be driven hydraulically. The hydraulic system shall demonstrate a mean time between repairs in excess of 50,000 miles. Hydraulic system service tasks shall be minimized and scheduled no more frequently than those of other major coach systems. All elements of the hydraulic system shall be easily accessible for service or unit replacement. Sensors in the hydraulic system, excluding those in the power steering system, shall indicate on the driver's diagnostic panel conditions of low hydraulic fluid level and low system operation pressure. Critical points in the hydraulic system shall be fitted with service ports so that portable diagnostic equipment may be connected or sensors for an off-board diagnostic system permanently attached to monitor system operation. All lines shall be compatible with the hydraulic fluid and maximum pressures of the system. Flexible lines shall be minimized in quantity and length. Lines of the same size and with the same fittings as those on other piping systems of the coach, but not interchangeable, shall be tagged or marked for use on the hydraulic system only. Hydraulic lines shall be individually and rigidly supported to prevent chafing damage, fatigue failures, and tension strain on the lines and fittings. The hydraulic system shall be configured and/or shielded so that failure of any flexible line shall not allow hydraulic fluid to spray or drain onto any component operable above the autoignition temperature of the fluid. All elements of the hydraulic system shall meet the noise limits defined in Part II: Technical Specifications. A priority system shall prevent the loss of power steering during operation of the coach if other devices are also powered by the hydraulic system.

### 3.1.3 POWERPLANT

#### 3.1.3.1 Engine

The coach shall accept the installation of heavy-duty, diesel engines meeting the requirements without structural or major mechanical modifications. Engine provided shall be certified for use in California.

The engine shall operate for 300,000 miles in District revenue service without major failure or significant deterioration. Components of the fuel injector and/or control system shall operate for 150,000 miles without replacement or major service.

The engine shall meet all requirements of Part II: Technical Specifications when operating on Nos. 1 and 2 diesel fuel, as specified by the engine supplier. Durability of the engine and its components shall not be seriously reduced and the requirement of Section 3.1.4.1 shall be met by operation on either of the commercially available diesel fuels.

The engine shall be equipped with low oil level and hot engine sensing devices that shall activate an Engine Protection System to shut down the engine when the engine oil reaches the low oil mark as indicated on the dipstick, or the engine temperature reaches the maximum safe operating temperature. The device shall be activated when the oil level is close to the add mark on the dip stick.

The engine shall be equipped with an emergency stop and/or control device if the engine type is susceptible to runaway failure. The emergency stop shall be a guarded switch operable from the driver's compartment. Once the switch is activated, the engine shall not be operable until the emergency stop device located in the engine compartment is manually reset.

The engine shall be equipped with a fast idle device driver-controlled. The device shall activate only with the transmission in neutral. This device may be used to help meet the requirements of coach cool down in Section 3.7. The engine starter shall be protected by an interlock that prevents its engagement when the engine is running.

#### 3.1.3.2 Cooling System

Temperature of operating fluids on the coach shall be controlled by a cooling system(s). The cooling system shall be sized to maintain fluids at safe, continuous operating temperatures during the most severe operations possible with the coach loaded to GVWR and with ambient temperatures up to 115°F and with a 10% coolant loss. The engine shall be cooled by a water-based, pressure type, cooling system that does not permit boiling or coolant loss during the operations described above. Engine thermostats shall be easily accessible for replacement. The engine cooling system shall be equipped with a properly sized water filter with a spin-on, disposable, borate element filter. Shutoff valves shall allow filter replacement without coolant loss. Valves shall permit complete shutoff of both lines for the heating and defroster units. All low points in the water-based cooling system shall be equipped with drain cocks. Air vent valves shall be fitted at high points in the cooling system. It shall be demonstrated that the system is self-purging.

A sight glass to determine satisfactory engine coolant level shall be provided and shall be accessible by opening one of the engine

compartment's access doors. A spring-loaded, pushbutton type valve to safely release pressure or vacuum in the cooling system shall be provided with both it and the water filler cap no more than 60 inches above the ground and both shall be accessible through the same access door. Radiator filler cap shall have a safety lock.

The radiator shall be of durable corrosion-resistant construction with bolted-on removable tanks. Radiator piping shall be stainless steel or brass tubing. All fittings in cooling system shall be cast iron or brass. Water hoses shall be Gates Durion or Hadbar Purosil 70, silicone hose with 4-ply polyester fabric reinforcement. All hoses shall be protected from engine heat which may cause premature failure. All hose clamps shall be stainless steel. All hoses 2 inches or greater in diameter shall have hose clamps, 3/4 inch wide, spring loaded, T-bar type as manufactured by Voss Industries, or by Specialty Products, and shall have self-locking nuts. Fan speed shall be regulated to minimize fan noise. No heat producing components or climate control system components shall be mounted between the engine cooling air intake aperture and the radiator.

Radiator shall have a heat rejection capacity at least 25% over standard size unit. The engine cooling fan shall not be driven when the coolant temperature is less than 190°F.

#### 3.1.3.3 Transmission

The transmission shall be multiple speed, automatic electronically controlled shift with torque converter. A 3M mechanic, with optional assistance, shall be able to remove, replace, and prepare the transmission assembly for service in less than 8 total combined man-hours. The transmission shall operate for 100,000 miles in District's revenue service without repairs. The transmission shall be equipped with a low oil indicating device. The device shall be activated when the oil level is close to the add mark on the dip stick.

#### 3.1.4 EMISSIONS

##### 3.1.4.1 Gas and Smoke

The coach shall meet all applicable emission standards.

##### 3.1.4.2 Exhaust Location

Exhaust gases and waste heat shall not be discharged on the right side and shall be directed generally away from the coach. Exhaust piping shall not restrict the underbody clearances defined in Section 1.5.1.2.

Exhaust piping location shall preclude entrance of exhaust fumes into air intakes for the climate control system.

The exhaust shall discharge near the left rear corner below the bumper.

### 3.1.4.3 Exterior Noise

Airborne noise generated by the coach and measured from either side shall not exceed 83 dBA under full power acceleration when operated at speeds up to 60 mph, at curb weight and just prior to transmission upshift. The maximum noise level generated by the coach pulling away from a stop at full power shall not exceed 83 dBA. The coach-generated noise at curb idle shall not exceed 65 dBA. If the noise contains an audible discrete frequency, a penalty of 5 dBA shall be added to the sound level measured. All noise readings shall be taken 50 feet from, and perpendicular to the centerline of the coach with all accessories operating. Instrumentation, test sites, and other general requirements shall be in accordance with SAE Standard J366. The pullaway test shall begin with the front bumper even with the microphone. The curb idle test shall be conducted with the rear bumper even with the microphone.

## 3.2 FINAL DRIVE

### 3.2.1 GENERAL REQUIREMENTS

The coach shall be driven by a single heavy-duty full floating type axle at the rear. The rear axle shall be of separable carrier housing construction with a load rating sufficient for the coach loaded to GVWR. Transfer of gear noise to the coach interior shall be minimized. The driven axle shall operate for 200,000 miles in District revenue service without repairs. Load tubes shall be replaceable and the lubricant drain plug shall be magnetic type, external hex head of a standard size. The drive shaft shall be guarded to prevent it striking the floor of the coach or the ground in the event of a tube or universal joint failure.

### 3.3 SUSPENSION

#### 3.3.1 GENERAL REQUIREMENTS

The front axle shall be nondriven with a load rating sufficient for the coach loaded to GVWR. Both the front and rear axle suspensions shall be pneumatic type. The basic suspension system shall last the life of the coach without major overhaul or replacement. Items such as bushings and air springs shall be easily and quickly replaceable by a 3M mechanic. Adjustment points shall be minimized and shall not be subject to a loss of adjustment in service. Necessary adjustments shall be easily accomplished without removing or disconnecting the components.

#### 3.3.2 SPRING AND SHOCK ABSORBERS

##### 3.3.2.1 Travel

The suspension system shall permit a minimum wheel travel of 3.5 inches in jounce and 3 inches in rebound. Elastomeric bumpers shall be provided only at the limit of jounce travel. Rebound travel may be limited by elastomeric bumpers or hydraulically within the shock absorbers. Suspension system shall incorporate appropriate devices for automatic height control so that regardless of load the coach height relative to the centerline of the wheels does not change more than  $\pm 1/2$  inch at any point from the height required in Section 2.1.5.1.

##### 3.3.2.2 Kneeling

A driver-actuated kneeling device shall lower the coach 3.5 inches measured at the center of the bottom front step during loading or unloading operations regardless of load. Brake and throttle interlock shall prevent movement when the coach is kneeled. The coach shall kneel and rise at a maximum rate of 1.25 inches per second at essentially a constant rate. After kneeling, the coach shall rise within 2 seconds to a height permitting the coach to resume service and shall rise to the correct operating height within 7 seconds regardless of load up to G.V.W.R. During the lowering and raising operation, the maximum acceleration shall not exceed  $0.2g$  and the jerk shall not exceed  $0.3g/sec$  measured on the front door step tread. An indicator visible to the driver shall be illuminated until the coach is raised to a height adequate for safe street travel. An indicator visible to the waiting passenger shall be illuminated during the kneeling operation and shall remain illuminated until coach is raised to a height for safe street travel. An audible alarm, easily heard by boarding passengers shall sound during the kneeling process.

##### 3.3.2.3 Damping

Vertical damping of the suspension system shall be accomplished by hydraulic shock absorbers mounted to the suspension arms or axles and attached to an appropriate location on the chassis. Damping shall be

sufficient to control coach motion to 4 cycles or less after hitting road perturbations. Shock absorbers shall maintain their effectiveness for at least 50,000 miles in normal service, and each unit shall be replaceable by a 2M mechanic in less than 15 minutes.

#### 3.3.2.4 Lubrication

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

### 3.4 STEERING

#### 3.4.1 STRENGTH

Fatigue life of all steering components shall exceed 600,000 miles. No element of the steering system shall fail before suspension system components when one of the tires strikes a severe road hazard.

#### 3.4.2 TURNING RADIUS

Outside body corner turning radius for the specified 40-foot-long coach shall not exceed 44 feet at SLW.

#### 3.4.3 TURNING EFFORT

The steering wheel shall be no less than 19 inches in diameter and shall be shaped for firm grip with comfort for long periods of time. The steering wheel shall be removable with a standard or universal puller.

Hydraulically-assisted power steering shall be provided. The steering gear shall be an integral type with flexible lines eliminated or the number and length minimized. Steering torque applied by the driver shall not exceed 10-foot-pounds with the front wheels straight ahead to turned 10°. Steering torque may increase to 30-foot-pounds when the wheels are approaching the steering stops. Steering effort shall be measured with the coach at SLW, stopped with the brakes released and the engine at normal idling speed on clean, dry, level, commercial asphalt pavement and the tires inflated to recommended pressure. Power steering failure shall not result in loss of steering control. With the coach in operation the steering effort shall not exceed 55 pounds at the steering wheel rim and perceived free play in the steering system shall not materially increase as a result of power assist failure. Gearing shall require no more than seven turns of the steering wheel lock-to-lock.

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

## 3.5 BRAKES

### 3.5.1 SERVICE BRAKE

#### 3.5.1.1 Actuation

Service brakes shall be controlled and actuated by an air system. Force to activate the brake pedal control shall be an essentially linear function of the coach deceleration rate and shall not exceed 70 pounds at a point 7 inches above the heel point of the pedal to achieve maximum emergency braking.

#### 3.5.1.2 Friction Material

The entire service brake system, including friction material, shall have an overhaul or replacement life of at least 15,000 miles when running in District service. Brakes shall be self-adjusting throughout this period. The contractor shall provide non-asbestos brake lining material.

#### 3.5.1.3 Hubs and Drums

Wheel bearing seals shall run on replaceable wear surfaces. Wheel bearing and hub seals shall not leak or weep lubricant for 100,000 miles of District service.

#### 3.5.1.4 Air System

The coach air system shall operate all accessories and the braking system with reserve capacity. The engine-driven air compressor shall be sized to charge the air system from 40 psi to the governor cutoff pressure in less than 3 minutes while not exceeding the engine's rated speed. Regardless of the system's air pressure, idle up to the rated engine speed shall be available to the driver with the transmission in neutral and the parking brake applied.

Air lines, except necessary flexible lines, shall conform to the installation and material requirements of SAE Standard J844-Type 1 for copper tubing with standard, brass, flared or ball sleeve fittings, or SAE Standard J844-Type 3B for nylon tubing if not subject to temperatures over 200°F. Accessory and other noncritical lines may use Type 3A tubing. Nylon tubing shall be installed in accordance with the following color-coding standards:

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



Line supports shall prevent movement, flexing, tension strain, and vibration. Copper lines shall be supported by looms to prevent the lines from touching one another or any component of the coach. To the extent practicable and before installation, the lines shall be pre-bent on a fixture that prevents tube flattening or excessive local strain. Copper lines shall be bent only once at any point, including pre-bending and installation. Rigid lines shall be supported at no more than 5-foot intervals. Nylon lines may be grouped and shall be supported at no more than 2 1/2 foot intervals.

The compressor discharge line between powerplant and body-mounted equipment shall be flexible convoluted copper or stainless steel line, or may be flexible teflon hose with a braided stainless steel jacket. Other lines necessary to maintain system reliability shall be flexible teflon hose with a braided stainless steel jacket. End fittings shall be standard SAE or JIC brass or steel, flanged, reusable, swivel type fittings. Flexible hoses shall be as short as practicable and individually supported. They shall not touch one another or any part of the coach except for the supporting grommets. Flexible lines shall be supported at 2-foot intervals or less. Air lines shall be cleaned and blown out before installation and shall be installed to minimize air leaks. New coaches shall not leak down more than 6 psi as indicated on the instrument panel mounted air gauges, within 15 minutes from the point of governor cut-off.

All air lines shall be sloped toward a reservoir and routed to prevent water traps. Grommets shall protect the air lines at all points where they pass through understructure components. Provision shall be made to apply shop air to the coach air systems using a standard tire inflation type valve. This valve shall be conveniently located in the engine compartment and shall include a 3/8 FIP fitting ahead of the tire inflation valve. Air for the compressor shall be filtered through the main engine air cleaner system. All air reservoirs shall meet the requirements of SAE Standard J10 and shall be equipped with clean-out plugs and flush type drain valves. These valves and any automatic moisture ejector valves shall be protected from road hazards by major structural members. Reservoirs shall be sloped toward the drain valve. The air system shall be protected by a pressure relief valve set at 150 psi and shall be equipped with check valves and pressure protection valves to assure partial operation in case of line failures.

Contractor shall provide a desiccant type air dryer of sufficient size to meet the requirements of air system provided. Air dryer shall be Aeroquip Aerofina II, Bendix Air Dryer, or equal.

## 3.6 GENERAL CHASSIS

### 3.6.1 WHEELS AND TIRES

#### 3.6.1.1 Wheels

Wheels and rims shall be hub piloted and shall be integral formed steel drop center construction. All wheels shall be interchangeable and shall be removable without a puller. Wheels shall be compatible with tires in size and load-carrying capacity. Front wheels and tires shall be balanced as an assembly. Right rear outside wheel shall be equipped with an Veeder-Root or approved equal, hubodometer. Hubodometer tenth-of-a-mile position shall be blocked out. Wheels shall be painted black.

#### 3.6.1.2 Tires

Tires shall be suitable for the conditions of transit service and sustained operation at the maximum speed capability of the coach, or the national speed limit whichever is lower. Load on any tire at GVWR shall not exceed the tire supplier's rating.

Tires for the buses to be provided under this contract shall be provided by the District's mileage tire contractor, Goodyear. As such, price for tires shall not be included in the purchase price of the buses.

The District requires that "H" load range tires be provided for reasons of fleet standardization.

### 3.6.2 FUEL SYSTEM

#### 3.6.2.1 Fuel Tank

The fuel tank(s) shall be securely mounted to the coach to prevent movement during coach maneuvers, but shall be easily removable for cleaning or replacement. The fuel tank shall be equipped with an external, hex head, brass drain plug. The drain plug shall be at least a 3/8-inch size and shall be located at the lowest point of the tank. The tank shall have an inspection plate or removable filler neck to permit cleaning and inspection. The tank shall be baffled internally to prevent fuel sloshing noise regardless of fill level. The baffles or fuel pickup location shall assure continuous full power operation on a 6-percent upgrade for 15 minutes starting with no more than 25 gallons of fuel over the unusable amount in the tank. The coach shall operate at idle on a 6-percent downgrade for 30 minutes starting with no more than 10 gallons of fuel over the unusable amount in the tank.

Buses shall have a minimum capacity 150 gallon metal fuel tank. Tank must be complete with pressure relief valve, level control valve, and anti-spill device. The fuel tank shall be equipped with sensors for fuel level guage and low fuel indicator. A fuel level guage and low fuel indicator shall be mounted on the dash. The low fuel indicator shall be activated when the fuel level reaches fifteen usable gallons. Fuel tank must be constructed of metal material; plastic tank material is not acceptable.

The fuel tank shall be designed to maintain structural integrity throughout each fueling cycle. A pressure fill, anti-spill fueling system as manufactured by Emco Wheaton shall be installed. The system shall be capable of a 40 G.P.M. fill rate. The tank must be filled to the specified capacity. The installation is subject to District approval.

### 3.6.2.2 Fuel Filler

The fuel filler shall be located 7 to 25 feet behind the centerline of the front door on the right side of the coach. The filler neck shall be recessed into the body so that spilled fuel will not run onto the outside surface of the coach. The filler shall accommodate a 1-1/2 inch diameter nozzle and a fill rate of 40 gallons per minute of foam-free fuel without spitting back or causing the nozzle to shut off before the tank is full. An audible signal shall indicate when the tank is essentially full. The filler cap shall be retained to the filler neck with a steel cable.

The fuel filler neck shall be equipped with a positive stop cap for the closed position. Filler neck and cap are subject to District approval.

The diesel fuel lines forward of the engine bulkhead shall be in conformance to SAE Standard J844-Type 1 for copper tubing or SAE Standard J844-Type 3B for nylon tubing color coded orange.

### 3.6.3. BUMPER SYSTEM

#### 3.6.3.1 Location

Bumpers shall provide impact protection for the front and rear of the coach up to 26 inches above the ground. The bumpers shall wrap around the coach to the extent practicable without exceeding allowable coach width.

#### 3.6.3.2 Front Bumper

No part of the coach, including the bumper, shall be damaged as a result of a 5-mph impact of the coach at curb weight with a fixed, flat barrier perpendicular to the coach's longitudinal centerline. The bumper shall protect the coach from damage as a result of 6.5 mph impacts at any point by the striker defined in FMVSS #215 loaded to 4,000 pounds parallel to the longitudinal centerline of the coach and 5.5 mph impacts into the corners at a 30° angle to the longitudinal centerline of the coach. The energy absorption system of the bumper shall be independent of every power system of the coach and shall not require service or maintenance in normal operation during the service life of the coach. The flexible portion of the bumper may increase the overall coach length specified in Section 1.5.1.1 by no more than 6 inches.

#### 3.6.3.3 Rear Bumper

The rear bumper and its mounting shall provide impact protection to the coach at curb weight from a 2-mph impact with a fixed, flat barrier perpendicular to the longitudinal centerline of the coach. When using a

yard tug with a smooth, flat plate bumper 2 feet wide contacting the horizontal centerline of the rear bumper, the bumper shall provide protection at speeds up to 5 mph, over pavement discontinuities up to 1 inch high, and at accelerations up to 2 mph/sec. The rear bumper shall protect the coach, when impacted anywhere along its width by the striker defined in FMVSS #215 loaded to 4000 pounds, at 4 mph parallel to the longitudinal centerline of the coach or into the corners up to a 30° angle to the longitudinal centerline of the coach. The rear bumper or bumper extensions shall be shaped to preclude unauthorized riders standing on the bumper and shall wrap around the coach to protect the engine compartment doors and radiator. The bumper extensions shall not hinder service and shall be aired into the coach body with no protrusion or sharp edges. The bumper shall be independent of all power systems of the coach and shall not require service or maintenance in normal operation during the service life of the coach. Any flexible portion of the bumper may increase the overall coach length specified in Section 1.5.1.1 by no more than 6 inches.

#### 3.6.3.4 Bumper Material

Bumper material shall be corrosion-resistant. Visible surfaces shall be black. These qualities including color shall be sustained throughout the service life of the coach.

### 3.6.4 ELECTRICAL SYSTEM

#### 3.6.4.1 General Requirements

The electrical system shall provide and distribute power to ensure satisfactory performance of all electrical components. The system shall supply a nominal 12 and 24 volts of direct current, utilizing two independent alternators (voltage divider is not acceptable). Electrical power provided for the radio shall be 12 volts, DC. Precautions shall be taken to minimize hazards to service personnel. Transient voltages above 220 volts may be used in the fluorescent lighting system. The power generating systems shall be rated 50% higher than the total possible electrical load to maintain the charge on the batteries at all operating conditions. All circuits and circuit branches, except for those involved in propulsion system startup, shall be protected individually by circuit breakers or fuses installed at the source of the circuit. Fuses shall be used only where it can be demonstrated that circuit breakers are not practicable, and they shall be easily accessible for replacement.

Redundant grounds shall be used for all electrical equipment, except where it can be demonstrated that redundant grounds are not feasible or practicable. One ground may be the coach body and framing. Grounds shall not be carried through hinges, bolted joints (except those specifically designed as electrical connectors), or powerplant mountings. Electrical equipment shall not be located in an environment that will reduce the performance or shorten the life of the component or electrical system. Major wiring harnesses shall not be located under the coach floor, and underfloor wiring shall be eliminated to the extent practicable. Wiring and electrical equipment necessarily located under the coach shall be insulated from water, heat, corrosion, and mechanical damage.

#### 3.6.4.2 Modular Design

Design of the electrical system shall be modular so that each major component, apparatus panel, or wiring bundle is easily separable with standard hand tools or by means of connectors. Each module, except the main body wiring harness, shall be removable and replaceable in less than 30 minutes by a 3M mechanic. Powerplant wiring shall be an independent wiring module. Replacement of the engine compartment wiring module(s) shall not require pulling wires through any bulkhead or removing any terminals from the wires.

#### 3.6.4.3 Wiring and Terminals

All wiring between major electrical components and terminations, except battery wiring, shall have double electrical insulation, shall be waterproof, and shall meet specification requirements of SAE Recommended Practice J1292 and J878-Type SXL. Except as interrupted by the master battery disconnect switch, battery and starter wiring shall be continuous cables with connections secured by bolted terminals and shall conform to specification requirements of SAE Standard J1127-Type SGT or SGX and SAE Recommended Practice J541, grouped, numbered, and/or color coded full length. Installation shall permit ease of replacement. All wiring harnesses over 5-feet long and containing at least 5 wires shall include 2 spare wires that are the same size as the largest wire in the harness excluding the battery cables. Ends of all spare wires shall be terminated on a terminal board. Wiring harnesses shall not contain wires of different voltages unless all wires within the harness are sized to carry the current and insulated for the highest voltage wire in the harness. Double insulation shall be maintained as close to the terminals as practicable. The requirement for double insulation shall be met by wrapping harnesses with plastic electrical tape or by sheathing all wires and harnesses with nonconductive, rigid or flexible conduit. Grommets of elastomeric material shall be provided at points where wiring penetrates metal structure. Wiring supports shall be nonconductive. Precautions shall be taken to avoid damage from heat, water, solvents or chafing. Wiring length shall allow replacement of end terminals twice without pulling, stretching, or replacing the wire. Except for those on large wires such as battery cables, terminals shall be crimped to the wiring and may be soldered only if the wire is not stiffened above the terminal and no flux residue remains on the terminal. Terminals shall be full ring type and corrosion-resistant. T splices may be used when it is less than 25,000 circular mills of copper in cross-section: a mechanical clamp is used in addition to solder on the splice; the wire supports no mechanical load in the area of the splice; and the wire is supported to prevent flexing.

#### 3.6.4.4 Junction Boxes

All relays, controllers, flashers, manual resetting circuit breakers, and other electrical components shall be mounted in junction boxes. Primary junction box shall be located below the operator's window, accessible from outside the coach, or other location subject to District's approval. The boxes shall be sealed to prevent moisture from normal sources, including engine compartment cleaning, from reaching the electrical components and shall prevent fire that may occur inside the box

from propagating outside the box. The components and circuits in each box shall be identified and their locations recorded on a schematic drawing permanently glued to or printed on the inside of the box cover or door. The drawing shall be protected from oil, grease, fuel, moisture, and abrasion. The front junction box shall be completely serviceable from outside of the coach. The junction box shall be replaceable as a unit in less than 15 minutes by a 3M mechanic. A rear start and run control box shall be mounted in an accessible location in the engine compartment.

### 3.6.5 ELECTRICAL COMPONENTS

#### 3.6.5.1 General Requirements

All electrical components, including switches, relays, flashers, and circuit breakers, shall be heavy-duty designs. To the extent practicable, these components shall be designed to last the service life of the coach and shall be replaceable in less than 5 minutes by a 3M mechanic. Sockets of plug-in components shall be polarized where required for proper function and the components shall be positively retained. Any manual reset circuit breakers critical to the operation of the coach shall be mounted with visible indication of open circuits. All electric motors, except cranking motors, shall be heavy-duty type, with a constant duty rating of no less than 10,000 hours and shall withstand 3 brush changes and 1 commutator lathe turning. Components shall be polarized where required for proper function and the components shall be positively retained. Electric motors shall be located for easy replacement and except for the cranking motor the brushes shall be replaceable in less than 15 minutes by a 3M mechanic without removing the motor.

Contractor shall provide a quick connect-disconnect receptacle with direct connections through 00 cables to the battery circuit. Receptacle shall be designed to prevent incorrect connection to the external power source. System shall be of sufficient capacity to permit starting of the engine with an external booster battery. The receptacle shall be located at the left rear corner of the bus and protected with a spring-loaded cover. The District will supply the successful bidder with the part number of the parts appropriate to voltage of their model bus.

All electrical relays shall be equipped with screw type terminals and shall be Delco-Remy, Bosch or approved equal.

All electrical cable connectors of three or more wires shall utilize Deutsch pin connector or approved equal.

All circuit breakers shall be manual reset type.

#### 3.6.5.2 Batteries

Batteries shall be Delco-1150 Maintenance Free, or approved equal.

Batteries shall be easily accessible for inspection and serviceable only from outside the coach and shall be securely mounted on trays. Batteries shall be of premium construction and shall be fitted with threaded stud terminals. Positive and negative terminals shall have

different size studs, or the battery terminals and cables shall be arranged to prevent incorrect installation. Battery terminals shall be located for access in less than 30 seconds with jumper cables. Four batteries shall be provided. The battery tray shall accommodate the battery systems and shall pull out or swing out easily and properly support the batteries during service, filling with automatic equipment, inspection, and replacement. The pull out or swing out requirement is not applicable if the batteries are properly supported in a compartment that allows inspection of water levels, filling with automatic or manual equipment, and replacement of batteries without lifting. A positive lock shall retain the battery tray in the normal position. Battery cables shall be flexible and sufficiently long to reach the batteries in extended positions without stretching or pulling on any connection and shall not lie on top of the batteries. The battery terminals and cables shall be color-coded with red for the primary positive, black for negative, and another color for any intermediate voltage cables.

#### 3.6.5.3 Master Battery Switch

A master battery switch shall be provided near the batteries for complete disconnecting from all coach electrical systems. The master switch shall be accessible in less than 10 seconds for activation. The master switch shall be capable of carrying and interrupting the total circuit load. Opening the master switch with the powerplant operating shall not damage any component of the electrical system.

#### 3.6.5.4 Fire Detectors

At least 2 temperature-sensitive sensors shall be provided. They shall be located in the engine compartment under all horizontal bulkheads, above and downwind of the major heat sources, and in areas likely to be wetted by leaking flammable fluids. Additional sensors shall be located in other potentially critical areas. The sensors shall return to normal setting and deactivate alarms when the temperature returns to normal.

### 3.7 INTERIOR CLIMATE CONTROL

#### 3.7.1 CAPACITY AND PERFORMANCE

Interior climate control system shall maintain the interior of the coach at a level suitable for all climatic conditions found in the District's service area. The heating, ventilating, and cooling systems shall maintain an average passenger compartment temperature between 65° and 80°F with a relative humidity of 50 percent or less. The system shall maintain these conditions in ambient temperatures of 10° to 95°F with ambient humidities of 5 to 50 percent while the coach is running in the District's revenue service with a full standee load of passengers. In ambient temperatures of 95° to 115°F with relative humidities lower than 50 percent, the system shall maintain a temperature gradient of 15°F while the coach is running in District revenue service with a full standee load of passengers. The temperatures measured from a height of 6 inches below the ceiling shall be within +5°F of the average temperature at the top surface of the seat cushions. Temperatures measured more than 3 inches above the floor shall be within +10°F of the average temperature at the top surface of the seat cushions. The interior temperature, from front to rear of the coach, shall not vary more than +5°F from the average.

The cooling mode shall be capable of reducing the passenger compartment temperature from 110° to 90°F in less than 20 minutes after engine startup under the following conditions. Engine temperature shall be within the normal operating range at the time of startup of the cool down test and the engine speed shall be limited to fast idle that may be activated by a driver-controlled device. During the cool down period the refrigerant pressure shall not exceed 400 psi and the condenser discharge air shall not exceed 145°F, measured 6 inches from the surface of the coil. The coach shall be parked in direct sunlight with the ambient temperature at 100°F and humidity less than 20 percent. There shall be no passengers onboard and the doors shall be closed. The cooling mode may operate independent of the propulsion system and outside air may be cut off during the cool down period.

The climate control system shall be highly reliable since most failures are Class 2. Manually-controlled shutoff valves in the refrigerant lines shall allow isolation of the compressor and receiver for service. To the extent practicable, self-sealing couplings shall be used to break and seal the refrigerant lines during removal of major components such as the refrigerant compressor or condenser. The condenser shall be located to efficiently transfer heat to the atmosphere, and shall not ingest air warmed by the coach mechanical equipment above the ambient temperature or discharge air into any other system of the coach. The location of the condenser shall preclude its obstruction by wheel splash, road dirt or debris.

The air conditioning system freon compressor engagement clutch, if used, shall be equipped with greasable bearings. Bearing housing shall have zerk type fittings, grease passageways and a grease pressure relief valve.



Compressor shall be equipped with a solenoid type freon pressure unloading valve.

### 3.7.2 CONTROLS

All interior climate control system requirements shall be attained automatically. The driver shall control only the defroster and driver's heater. The interior climate control system shall switch automatically to the ventilating mode if the refrigerant compressor or condenser fan fails.

### 3.7.3 AIR FLOW

#### 3.7.3.1 Passenger Area

The cooling mode of the interior climate control system shall introduce air into the coach at or near the ceiling height at a minimum rate of 25 cubic feet per minute per passenger based on the standard configuration coach with full standee load. This air shall be composed of no less than 20 percent outside air. Air flow shall be evenly distributed throughout the coach with air velocity not exceeding 60 feet per minute on any passenger.

Air flow may be reduced to 15 cubic feet per minute per passenger when operating in the heating mode with full standee load. Heated air introduced into the coach shall contain no less than 20 percent outside air. The fans shall not activate until the heating element has warmed sufficiently to assure at 70°F air outlet temperature. Outside air flow may be cut off during initial warm up, provided no manual manipulation is required.

#### 3.7.3.2 Driver's Area

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

### 3.7.4 AIR INTAKES

Outside openings for air intake shall be located to ensure cleanliness of air entering the climate control system, particularly with respect to exhaust emissions from the coach and adjacent traffic. All intake openings shall be baffled to prevent entry of snow, sleet, or water.

Outside air shall be filtered before discharge into the passenger compartment. The filter shall meet the ASHRAE requirement for 5 percent or better atmospheric dust spot efficiency, 50 percent weight arrestance, and a minimum dust holding capacity of 120 gram per 1,000 cfm cell. More

efficient air filtration may be provided to maintain efficient heater and/or evaporator operation. Air filters shall be cleanable and easily removable for service. Moisture drains from air intake openings shall be located so that they will not be subject to clogging from road dirt.

## 3.8 RADIO AND PUBLIC ADDRESS

### 3.8.1 MOBILE RADIO SYSTEM

A compartment shall be provided to accommodate a communication system enabling the driver to contact the dispatcher. It shall be located within 5 feet of the driver's seat and shall be connected to the driver's area by waterproof, 2 1/4-inch inside diameter, metallic conduit. A 1 inch inside diameter metallic conduit with pull wire shall be provided from the termination of the 2-1/4 inch conduit to the driver's radio handset mounting location, subject to District approval. The compartment shall include a clear space 12 inches high, 18 inches wide, and 24 inches deep for location of the radio above the slide out radio tray. It shall be accessible from either inside or outside the coach and shall be splash proof when the service door is secured. The radio compartment shall be supplied with a 30-amp, 12-volt, DC, protected service with positive and negative leads. A location convenient to the driver shall be provided for the radio control head, speaker, and handset. Contractor shall provide an antenna attached to the roof and an antenna lead to the radio compartment including a 3/4-inch inside diameter conduit with a pull wire. The antenna mounting and lead termination shall be accessible from the coach interior. Antenna shall not be painted.

Manufacturer shall provide a low profile unity gain radio antenna, Antenna Specialty Company model ASPB-772 or approved equal which shall be compatible with the District's frequency 470 MHz.

### 3.8.2 PUBLIC ADDRESS SYSTEM

Contractor shall install a public address system that enables the driver to address passengers either inside or outside the coach. Amplifier shall be Mobil Page Model 470C, Microphone Assembly Model 180-245 or approved equal.

Interior and exterior speakers shall be of sufficient capacity to ensure that they are not damaged when full power of amplifier is applied to them. Inside speakers shall broadcast, in a clear tone, announcements that are clearly perceived from all seat positions at approximately the same volume level. A weather-proof speaker(s) shall be provided outside the coach so that announcements can be clearly heard by passengers standing near the door equipped with the wheelchair lift. A driver controlled switch shall select inside or outside announcements. A separate volume control shall be provided for the outside system if volume adjustment would otherwise be necessary when switching from inside to outside. The system shall be muted when not in use. The microphone shall be mounted on a heavy-duty, flexible gooseneck that allows the driver to comfortably speak into it without using his hands. The gooseneck shall be supported six to twelve inches from its reinforced mounting base, subject to District approval. An input jack shall be provided in the driver's area for a handheld microphone.

## 3.9 OPTIONS

3.9.1 OPTION A - RETARDER SYSTEM

Bidders shall quote pricing to provide an electric or hydraulic retarder system. Bidder shall provide with his Technical Submittal, information for the retarder proposed. Also, include the brake lining life increase over a bus without the retarder.

3.9.2 OPTION B - AIR STARTERS

Twenty-five coaches of the diesel powered buses shall be equipped with air starters and supporting system. Ingersoll-Rand, Start Master, or equal are approved. Contractor shall provide information pertaining to the starter system proposed.

3.9.3 OPTION C - SEATING ARRANGEMENT

The bidder shall quote pricing for equipping buses for this contract with the following seating arrangement which increases standee free floor space in the aisle:

- o Curbside of the bus - single passenger (single row) seating in lieu of standard double arrangement
- o Streetside of the bus - standard double (two passenger) seating

3.9.4 OPTION D - ADDITIONAL BUSES

Bidder shall state price to furnish 1 to 30 additional buses at a unit price to be extended for the number of optional buses purchased. The quantity of buses shall be determined at the time the District exercises the option.

Bidder's pricing for the optional quantity shall be firm for 60 days from the date of award by the District Board of Directors of the base contract. The District reserves the right to exercise this option in its own best interest at any time during the 60 day period.

Delivery for any option quantity shall be the same as that offered under the base contract. This delivery period shall begin on the date the District exercises this option. This option will not be used in evaluating the base bid.

### 3.10 TECHNICAL SUBMISSION

#### Instructions

Bidders shall complete all items included in this technical submission. If required information is not applicable, the appropriate block should be filled in with "none" or "not applicable". Bidder must be certain that all data are accurate, since they may be used in computing life cycle costs.

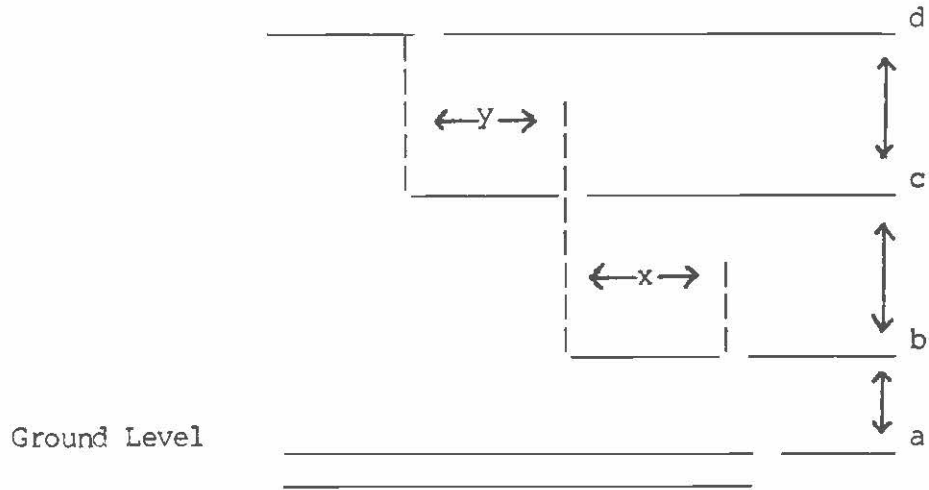
Technical Submission is for 40 foot Bus

A. Bus Model Number \_\_\_\_\_

B. General Dimensions

- |   |  |              |
|---|--|--------------|
| 1. Overall Length                               | _____ Ft.                                  | _____ In.    |
| 2. Overall Width                                |  | _____ In.    |
| Over Body                                       |  | _____ In.    |
| 3. Overall Height, Front                        |  | _____ In.    |
| 4. Overall Height, Rear                         |  | _____ In.    |
| 5. Wheelbase                                    |  | _____ In.    |
| 6. Overhang, Center Line of Axle Over Bumper    | Front _____ In.<br>Rear _____ In.          |              |
| 7. Turning Radius - Right (outside wheel)- Left | _____ Ft. _____ In.<br>_____ Ft. _____ In. |              |
| 8. Body Turning Radius                          |  |              |
| Right   | _____ Ft.                                  | _____ In.    |
| Left  | _____ Ft.                                  | _____ In.    |
| 9. Height, Floor to Ceiling                     |  | _____ In.    |
| Front of Bus                                    |  | _____ In.    |
| Center of Bus                                   |  | _____ In.    |
| Rear of Bus                                     |  | _____ In.    |
| 10. Minimum Road Clearances Body                |  | _____ In.    |
| 11. Road Clearance at Lowest Point              |  |              |
| 1st Axle  |  | _____ In.    |
| 2nd Axle  |  | _____ In.    |
| Tag Axle (If applicable)                        |  | _____ In.    |
| 12. Angles                                      |  |              |
| Approach  |  | _____ Degree |
| Departure                                       |  | _____ Degree |
| Breakover                                       |  | _____ Degree |

13. Step Height from Ground,  
Step Riser Heights, and  
Step Depths



Front Steps, Empty

a-b In. \_\_\_\_\_  
 b-c In. \_\_\_\_\_  
 c-d In. \_\_\_\_\_  
 a-d In. \_\_\_\_\_  
 x In. \_\_\_\_\_  
 y In. \_\_\_\_\_

Rear Steps, Empty

a-b In. \_\_\_\_\_  
 b-c In. \_\_\_\_\_  
 c-d In. \_\_\_\_\_  
 a-d In. \_\_\_\_\_  
 x In. \_\_\_\_\_  
 y In. \_\_\_\_\_

C. Weight of Bus, Complete  
With Full Complement of  
Fuel, Oil and Water, Minus  
Fare Box and Driver.

- 1. On 1st Axle \_\_\_\_\_
- 2. On 2nd Axle \_\_\_\_\_
- 3. Tag Axle (If applicable) \_\_\_\_\_
- Total \_\_\_\_\_

D. Engine (Diesel)

- 1. Manufacturer \_\_\_\_\_
- 2. Type \_\_\_\_\_

- 3. Model Number \_\_\_\_\_
- 4. Bore \_\_\_\_\_ In.
- 5. Stroke \_\_\_\_\_ In.
- 6. Displacement \_\_\_\_\_ Cu.In.
- 7. Compression Ratio \_\_\_\_\_
- 8. Injector Type and Size \_\_\_\_\_
- 9. Brake Horsepower \_\_\_\_\_ Hp.
- At \_\_\_\_\_ RPM
- 10. Torque \_\_\_\_\_ Ft. lb.
- \_\_\_\_\_ RPM

E. Transmission (Automatic)

- 1. Manufacturer \_\_\_\_\_
- 2. Type \_\_\_\_\_
- 3. Model Number \_\_\_\_\_
- 4. Gears \_\_\_\_\_
- 5. Ratio \_\_\_\_\_

F. Retarder

- 1. Manufacturer \_\_\_\_\_
- 2. Type \_\_\_\_\_
- 3. Model Number \_\_\_\_\_
- 4. Percent of Brake Lining  
Life Increase over Bus  
without Retarder \_\_\_\_\_ %

G. Maximum Warranted Speeds

- 1. Propulsion Engine
  - Load RPM \_\_\_\_\_
  - No Load RPM \_\_\_\_\_
- 2. 24 Volt Alternator RPM \_\_\_\_\_

Capacity \_\_\_\_\_

3. Freon Compressor RPM \_\_\_\_\_

4. 12 Volt Alternator RPM \_\_\_\_\_

Capacity \_\_\_\_\_

5. Bidder shall furnish gradeability, engine speed versus vehicle speed in direct drive, and time versus vehicle speed curves for the engine he proposes to furnish.

H. Energy Absorption Bumper, Front

1. Manufacturer \_\_\_\_\_

2. Model \_\_\_\_\_

3. Number of Sections \_\_\_\_\_

4. Capacity \_\_\_\_\_ Gal.  
or Cu.In.

I. 1st Axle

1. Manufacturer \_\_\_\_\_

2. Model \_\_\_\_\_

J. 2nd Axle Drive Tag (if used)

1. Manufacturer \_\_\_\_\_

2. Model \_\_\_\_\_

K. Drive Ratios

1. Transmission Output \_\_\_\_\_

2. Rear Axle \_\_\_\_\_

3. Final Gear Ratio \_\_\_\_\_

L. Brakes

1. Brake Chambers  
Vendor's Size and Part No.  
1st Axle \_\_\_\_\_  
2nd Axle \_\_\_\_\_



	Tag Axle	_____	
2.	Slack Adjusters		
	Vendor's Type and Part No.	_____	
	1st Axle right	_____	
	1st Axle left	_____	
	2nd Axle right	_____	
	2nd Axle left	_____	
	Tag Axle	_____	
	Push Rod Travel		
	1st Axle	_____	In.
	2nd Axle	_____	In.
	Tag Axle	_____	In.
3.	Brake Drums	1st Axle	2nd Axle
	Manufacturer	_____	_____
	Part Number	_____	_____
	Diameter	_____	_____
4.	Brake Block Manufacturer	_____	
5.	Brake Block Identification		
	1st Axle		
	Forward	_____	
	Reverse	_____	
6.	Brake Blocks Per Shoe		
	1st Axle	_____	
	2nd Axle	_____	
	Tag Axle	_____	
7.	Brake Block Widths		
	1st Axle	_____	In.
	2nd Axle	_____	In.
	Tag Axle	_____	
8.	Brake Block Lengths		
	1st Axle	_____	In.
	2nd Axle	_____	In.
	Tag Axle	_____	
9.	Brake Block Thickness	_____	In.
10.	Brake Block Area Per Drum		
	1st Axle	_____	In.
	2nd Axle	_____	In.
	Tag Axle	_____	
M.	<u>Air Reservoir Capacity</u>		
1.	No. 1 Reservoir	_____	Cu.In.
2.	No. 2 Reservoir	_____	Cu.In.
3.	No. 3 Reservoir	_____	Cu.In.
4.	Other	_____	Cu.In.

N. Total Coolant Capacity

Cooling and Heating System \_\_\_\_\_ Gal.

O. Air Conditioning Equipment

1. Compressor  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_  
No. of Cylinders \_\_\_\_\_  
Drive Ratio (to Diesel  
Engine) \_\_\_\_\_  
Oil Capacity - Dry \_\_\_\_\_  
Wet \_\_\_\_\_

Refrigerant \_\_\_\_\_

2. Condenser  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_  
No. of Rows \_\_\_\_\_  
No. of Fins/In \_\_\_\_\_  
O.D. of Tube \_\_\_\_\_  
Fin Size \_\_\_\_\_

3. Condenser Fan  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_  
Fan Diameter \_\_\_\_\_ In.  
Speed Maximum \_\_\_\_\_ RPM  
Flow Rate (maximum) \_\_\_\_\_ CFM

4. Receiver  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_ Lbs.

5. Condenser Fan Drive  
a. Alternator  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_  
(Max.) Rating \_\_\_\_\_ Amp.  
b. Motor  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_

P. Air Starters

1. Manufacturer \_\_\_\_\_ Miles
2. Model \_\_\_\_\_
3. Dedicated Air Reserve Capacity \_\_\_\_\_ Cu.In.
4. Start cycle capability on dedicated reserve air.      Events Duration Eng. RPM  
\_\_\_\_\_ Sec.  
\_\_\_\_\_
5. Noise emission during start cycle (max. air). \_\_\_\_\_ dBA
6. Pre-engaged drive      Yes \_\_\_\_\_ No \_\_\_\_\_

SPECIAL REQUIREMENTS - ATTACHMENT A

2.1.1.3 FINISH AND COLOR

Color scheme shall be in general conformance with the photograph attached to this specification. Exact color scheme requirements shall be provided to successful bidder.

The first production bus shall be striped according to this color scheme and approved by the District prior to application to the remainder of the buses.

Exterior painted surfaces shall have a minimum of .5 mil thick primer coat and a minimum 2.5 mil thick finish coat of Koppers Al266B-66 Polyuretane Coating or equal. The interior of both passenger doors shall be primed with acid-resistant paint. Koppers coatings are available from Koppers Company, 5431 District Blvd., Vernon, California 90040, Telephone (213) 560-5711.

The bus striping shall be of 3M type material as supplied by the Serigraphics Company, 14600 East Alondra Blvd., La Mirada, California 90638. The striping material shall include a baked-on clear coat.

Successful bidder shall provide four roof number per bus. The decals shall be five foot high. Material shall be 3M Scotchlite, Black #3655.

Contractor shall provide, with his bid, no less than one artist's watercolor painting of the bus bid upon, illustrating a proposed color scheme for bus exterior painting. Paint scheme shall be generally in conformance with the attached photograph. The artist's printing shall include a front side and rear view of the bus.

Colors:

SA15337 - White - Component A  
321-17038 - Black - Component A



## SPECIAL REQUIREMENTS - ATTACHMENT B

## 2.1.1.4 NUMBERING AND SIGNS

Contractor shall furnish and apply all decals. Decal locations shall be approved by the District. Two manufacturers who have supplied decals to the District are: Hesik Company, Inc., 17466 Damler St., Irvine, California 92705 and Serigraphic Displays, 13721 E. Bora Drive, Santa Fe Springs, California 90670. The Contractor shall certify that the decals, as listed below, are 3-M Scotchcal or Scotchlite, as indicated.

<u>Required</u>	<u>Exterior</u>	<u>Color</u>	<u>3-M Material</u>
4 sets	5" Digit Numbers	White	3280- Scotchlite
1	3" Bienvenidos	Black	3655
1	2" Southern California Rapid Transit District	White	3280 Scotchlite
1	5/8" Exact Fare Please	Clear	3669 Prtd. Black
1	3" Welcome Aboard	Black	3655
1 Set	5/8" Tenga Pasaje Exacto Por Favor	Clear	3669 Prtd. Black
1	10-1/2" Service Mark	Red	180-10
2 Sets	15-5/8" Service Mark 2-2/3" RTD	Red- Black	680 3655 Scotchlite
2	6" (International wheelchair symbol)	White	180-10 Printed-Blue Controltac
1 Set	5" Digit Numbers	Black	3655

INTERIOR

1 set	1-1/2" Digit Numbers 6-1/2"x13-7/8" (Inter- national Sign) PLEASE NO EATING-NO SMOKING-NO RADIO	Black   Clear	3655   3669 Printed Red-Black- White
-------	---	------------------------	---

1	7/16" UNNECESSARY CONVERSA- TION WITH OPERATOR IS FORBIDDEN BY LAW	Clear	3669 Printed- Black
1	11/16" Bus Drivers Carry No Cash or Token	"	"
1	11/16" El Conductor No Tiene Dinero Ni Tokens de Autobus	"	"
1	1/2" It is Unlawful for Passengers to Stand in Stepwell	"	"
2 Sets	7/8" Caution	"	"
1	1/2" Door Opens In	"	"
3-4	3/4" Priority to Aged and Handicapped	"	"
2*	3/4" Priority to Wheelchair Handicapped	"	"
1	1" Wait for Light	"	"
1	1/2" Then Push Door Handle Open Door	"	"
1	1/2" Espere La Luz	"	"
1	1/2" Y Empuje, Para Abrir	"	"
2	3/4" Take One	"	"
1 Set	To Open Door Push and Hold Handle	"	"
2	1-1/4" Watch Your Step	White	3280 Scotchlite

All "screened" markings shall be coated with 3-M clear coat. The Contractor is to certify that the following decal is 3-M Scotchlite:

\*One to be applied for each wheelchair position.

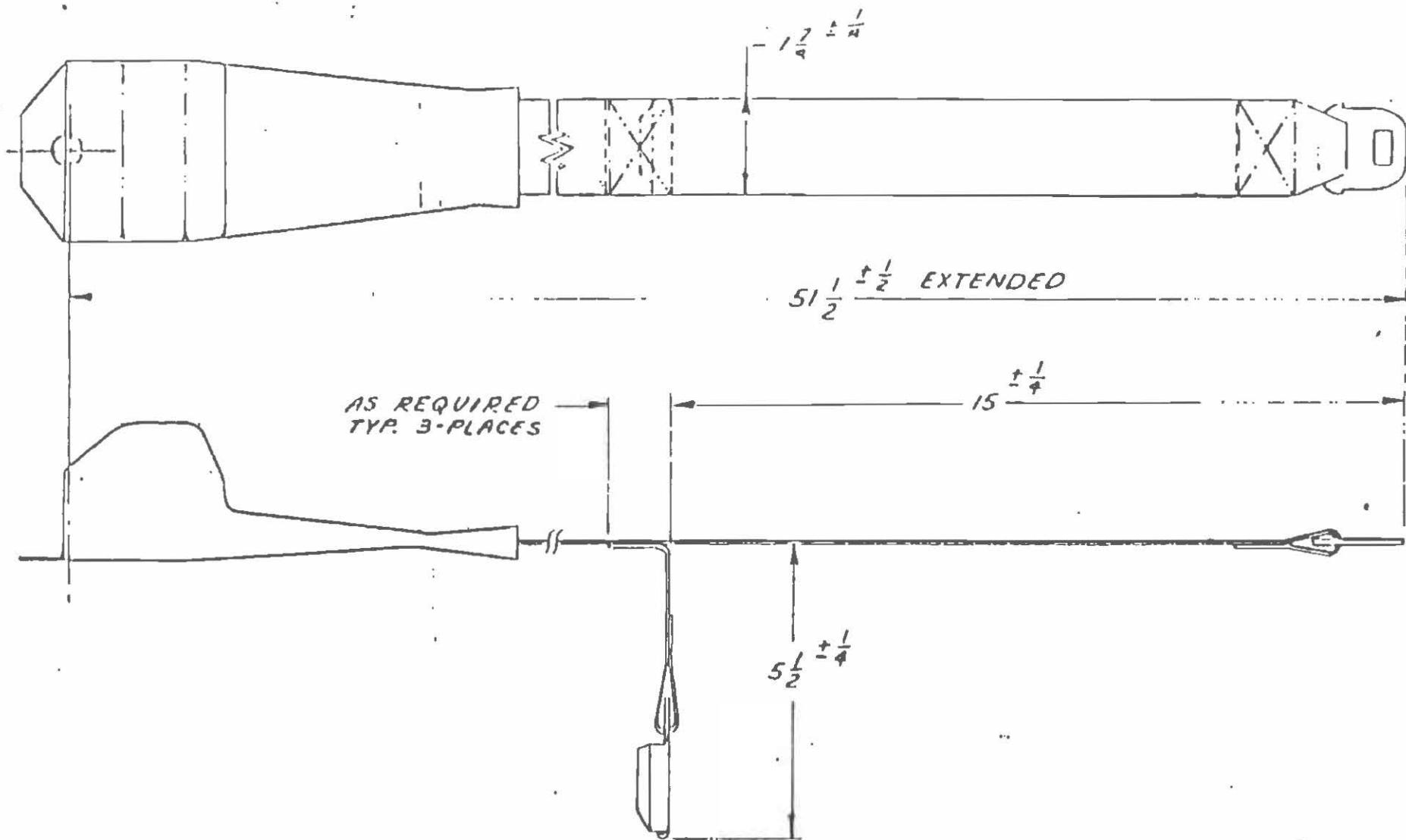
District shall furnish successful bidder with samples or drawings of all decals listed. Contractor shall furnish any other markings necessary for identification of windows, hatches, etc.

SPECIAL REQUIREMENTS ATTACHMENT C

2.6.6.3 WHEELCHAIR SECUREMENT STRAP

Contractor shall provide wheelchair securement strap assemblies for installation on District accessible transit coaches. Each securement strap assembly shall include the following:

1. Each securement strap shall be equipped with a male and female connector. When fully extended, the strap shall be 51.5 inches long from the mounting hole to the end of the female buckle. The strap webbing shall be red in color and shall be equal to automobile seat belt webbing material. (See attached drawing for details.)
2. An automotive type retractor for stowing webbing shall be provided. In the stowed position, no more than 11" of the securement straps shall be outside of the retractor assembly. The retractor assembly shall be black in color, or approved equal.
3. The securement strap assembly shall be used in a set of two units. A two unit set of securement straps shall hold a wheelchair and passenger weighing up to 450 lbs. in combined weight. See Figure II-7.



SPECIAL REQUIREMENTS - ATTACHMENT C

WHEEL CHAIR SECUREMENT  
 FOR SCRTD  
 LW. NO. SK-8502



PART III: QUALITY ASSURANCE

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1.0 CONTRACTOR'S IN-PLANT QUALITY  
ASSURANCE REQUIREMENTS

## 1.1 QUALITY ASSURANCE ORGANIZATION

The Contractor shall establish and maintain an effective in-plant quality assurance organization. It shall be a specifically defined organization and should be directly responsible to the Contractor's top management.

### 1.1.1 CONTROL

The quality assurance organization shall exercise quality control over all phases of production from initiation of design through manufacture and preparation for delivery. The organization shall also control the quality of supplied articles.

### 1.1.2 AUTHORITY AND RESPONSIBILITY

The quality assurance organization shall have the authority and responsibility for reliability, quality control, inspection planning, establishment of the quality control system, acceptance/rejection of materials and manufactured articles in the production of the transit coaches.

## 1.2 QUALITY ASSURANCE ORGANIZATION FUNCTIONS

The quality assurance organization shall include the following minimum functions.

### 1.2.1 WORK INSTRUCTIONS

The quality assurance organization shall verify inspection operation instructions to ascertain that the manufactured product meets all prescribed requirements.

### 1.2.2 RECORDS MAINTENANCE

The quality assurance organization shall maintain and use records and data essential to the effective operation of its program. These records and data shall be kept up-to-date, and shall be available for review by the Resident Inspectors, upon written request, within a reasonable time, but in no event to exceed 24 hours from the time of such request. Inspection and test records for this procurement shall be available for a minimum of 1 year after inspections and tests are completed.

### 1.2.3 CORRECTIVE ACTIONS

The quality assurance organization shall detect and promptly assure correction of any conditions that may result in the production of defective transit coaches. These conditions may occur in designs, purchases, manufacture, tests, or operations that culminate in defective supplies, services, facilities, technical data, or standards.

### 1.3 STANDARDS AND FACILITIES

The following standards and facilities shall be basic in the quality assurance process.

#### 1.3.1 CONFIGURATION CONTROL

The Contractor shall maintain drawings and other documentation that completely describe a qualified coach that meets all of the options and special requirements of this procurement. The quality assurance organization shall verify that each transit coach is manufactured in accordance with these controlled drawings and documentation.

#### 1.3.2 MEASURING AND TESTING FACILITIES

The Contractor shall provide and maintain the necessary gauges and other measuring and testing devices for use by the quality assurance organization to verify that the coaches conform to all specification requirements. These devices shall be calibrated at established periods against certified measurement standards that have known valid relationships to national standards.

#### 1.3.3 PRODUCTION TOOLING

Production jigs, fixtures, tooling masters, templates, patterns, and other devices used in production, shall be proved for accuracy at formally established intervals and adjusted, replaced, or repaired as required to maintain quality.

#### 1.3.4 EQUIPMENT USE BY RESIDENT INSPECTORS

The Contractor's gauges and other measuring and testing devices shall be made available for use by the Resident Inspectors to verify that the coaches conform to all specification requirements. If necessary, the Contractor's personnel shall be made available to operate the devices and to verify their condition and accuracy.

### 1.4 CONTROL OF PURCHASES

The Contractor shall maintain quality control of purchases.

#### 1.4.1 SUPPLIER CONTROL

The Contractor shall require that each supplier maintain a quality control program for the services and supplies that it provides. The contractor's quality assurance organization shall inspect and test materials provided by suppliers, according to ASTM standards, for conformity to specification requirements. Materials that have been inspected, tested, and approved shall be identified as acceptable to the point of use in the manufacturing or assembly processes. Controls shall be established to prevent inadvertent use of non-conforming materials.

#### 1.4.2 PURCHASING DATA

The Contractor shall verify that all applicable specification requirements are properly included or referenced in purchase orders of articles to be used on transit coaches.

#### 1.5 MANUFACTURING CONTROL

The Contractor shall ensure that all basic production operations, as well as other processing and fabricating, are performed under controlled conditions. Establishment of these controlled conditions shall be based on the documented work instructions, adequate production equipment, and special working environments if necessary.

##### 1.5.1 COMPLETED ITEMS

A system for final inspection and test of completed transit coaches shall be provided by the quality assurance organization. It shall measure the overall quality of each completed coach.

##### 1.5.2 NONCONFORMING MATERIALS

The quality assurance organization shall monitor the Contractor's system for controlling nonconforming materials. The system shall include procedures for identification, segregation, and disposition.

##### 1.5.3 STATISTICAL TECHNIQUES

Statistical analyses, tests, and other quality control procedures may be used when appropriate in the quality assurance processes.

##### 1.5.4 INSPECTION STATUS

A system shall be maintained by the quality assurance organization for identifying the inspection status of components and completed transit coaches. Identification may include cards, tags, or other normal quality control devices.

#### 1.6 INSPECTION SYSTEM

The quality assurance organization shall establish, maintain, and periodically audit a fully-documented inspection system. The system shall prescribe inspection and test of materials, work in progress, and completed articles. As a minimum, it shall include the following controls.

##### 1.6.1 INSPECTION STATIONS

Inspection stations shall be at the best locations to provide for the work content and characteristics to be inspected. Stations shall provide the facilities and equipment to inspect structural, electrical, hydraulic, and other components and assemblies for compliance with the design requirements and with SAE, AWS, and ANSI standards.

Each station shall also have completely up-to-date engineering processing sheets and drawings for the assembly process performed in that section. In addition, samples of approved and non-approved articles shall be displayed at each station.

Stations shall also be at the best locations to inspect or test characteristics before they are concealed by subsequent fabrication or assembly operations. These locations shall, minimally, include underbody structure completion, body framing completion, body prior to paint preparation, water test before interior trim and insulation installation, engine installation completion, underbody dress-up and completion, coach prior to final paint touchup, coach prior to road test, and coach final road test completion.

#### 1.6.2 INSPECTION PERSONNEL

Sufficient trained inspectors shall be used to ensure that all materials, components, and assemblies are inspected for conformance with the qualified coach design.

#### 1.6.3 INSPECTION RECORDS

Acceptance, rework, or rejection identification shall be attached to inspected articles. Articles that have been accepted as a result of approved materials review actions shall be identified. Articles that have been reworked to specified drawing configurations shall not require special identification. Articles rejected as unsuitable or scrap shall be plainly marked and controlled to prevent installation on the coach. Articles that become obsolete as a result of engineering changes or other actions shall be controlled to prevent unauthorized assembly or installation. Unusable articles shall be isolated and then scrapped.

Discrepancies noted by the Contractor or Resident Inspector during assembly shall be entered by the inspection personnel on a record that accompanies the major component, subassembly, assembly, or coach from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, procedures, or other conditions that cause articles to be in nonconformity with the requirements of the contract specifications. The inspection personnel shall verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, the District shall approve the modification, repair, or method of correction to the extent that the contract specifications are affected.

#### 1.6.4 QUALITY ASSURANCE AUDITS

The quality assurance organization shall establish and maintain a quality control audit program. Records of this program shall be subject to review by the District.



## 1.7 RESIDENT INSPECTOR

The District shall be represented at the Contractor's plant by Resident Inspectors. They shall monitor, in the Contractor's plant, the manufacture of transit coaches built under this procurement. The Resident Inspectors shall be authorized to approve the predelivery acceptance tests, and to release the coaches for delivery. Upon request to the quality assurance supervisor, the Resident Inspectors shall have access to the Contractor's quality assurance files related to this procurement. These files shall include drawings, material standards, parts lists, inspection processing and reports, and records of defects.

No less than 30 days prior to the beginning of coach manufacture, the Resident Inspectors shall meet with the Contractor's quality assurance manager. They shall review the inspection procedures and checklists. The Resident Inspectors may begin monitoring coach construction activities 2 weeks prior to the start of coach fabrication.

The Contractor shall provide office space for the Resident Inspectors in close proximity to the final assembly area. This office space shall be equipped with desks, outside and interplant telephones, file cabinet, chairs, and clothing lockers sufficient to accommodate the Resident Inspector staff.

The presence of these Resident Inspectors in the plant shall not relieve the Contractor of its responsibility to meet all of the requirements of this procurement.

## 1.8 INITIAL ENGINE START-UP

The fuel system shall be primed and pressure tested after installation of the engine in the coach and before it is started for the first time. The pressure test shall assure that the fuel system is free of leaks that can dilute engine oil. This requirement shall be verified by visual inspection of injectors and jumper lines with a minimum of 60 psi applied at the secondary fuel filter inlet and the fuel return line blocked. Ether and/or other starting aids shall not be used to initially start engine during coach assembly.

2.0 ACCEPTANCE TESTS

## 2.1 RESPONSIBILITY

Fully documented tests shall be conducted on each production coach following manufacture to determine its acceptance to the District. These acceptance tests shall include predelivery inspections and testing by the Contractor, and inspections and testing by the District after the coaches have been delivered.

## 2.2 PREDELIVERY TESTS

The Contractor shall conduct acceptance tests at its plant on each coach following completion of manufacture and before delivery to the District. These predelivery tests shall include visual and measured inspections, as well as testing the total coach operation. The tests shall be conducted and documented in accordance with written test plans. Additional tests may be conducted at the Contractor's discretion to ensure that the completed coaches have attained the desired quality and have met the requirements in Part II: Technical Specifications. This additional testing shall be recorded on appropriate test forms provided by the Contractor.

The Resident Inspector shall select a bus at random for pre-delivery testing. The predelivery tests shall be scheduled and conducted with sufficient notice so that they may be witnessed by the Resident Inspectors, who may accept or reject the results of the tests. The results of predelivery tests, and any other tests, shall be filed with the assembly inspection records for each coach. The underfloor equipment shall be made available for inspection by the Resident Inspectors, using a pit or coach hoist provided by the Contractor. A hoist, scaffold, or elevated platform shall be provided by the Contractor to easily and safely inspect coach roofs. Delivery of each coach shall require written authorization of a Resident Inspector. Authorization forms for the release of each coach for delivery shall be provided by the Contractor. An executed copy of the authorization shall accompany the delivery of each coach.

### 2.2.1 INSPECTION-VISUAL AND MEASURED

Visual and measured inspections shall be conducted with the coach in a static condition. The purpose of the inspection testing is to verify overall dimensional and weight requirements, to verify that required components are included and are ready for operation, and to verify that components and subsystems that are designed to operate with the coach in a static condition do function as designed.

### 2.2.2 TOTAL COACH OPERATION

Total coach operation shall be evaluated during road tests. The purpose of the road tests is to observe and verify the operation of the coach as a system and to verify the functional operation of the subsystem that can be operated only while the coach is in motion.

Each coach shall be driven for a minimum of 15 miles during the road tests. Observed defects shall be recorded on the test forms. The coach shall be retested when defects are corrected and adjustments are made. This process shall continue until defects or required adjustments are no longer detected. Results shall be pass/fail for these coach operation tests.

### 2.3 POST-DELIVERY TESTS

The District may conduct acceptance tests on each delivered coach. These tests shall be completed within 15 days after coach delivery and shall be conducted in accordance with written test plans. The purpose of these tests is to identify defects that have become apparent between the time of coach release and delivery to the District. The post-delivery tests shall include visual inspection and coach operations.

Coaches that fail to pass the post-delivery tests are subject to nonacceptance. The District shall record details of all defects on the appropriate test forms and shall notify the Contractor of nonacceptance of each coach within 5 days after completion of the tests. The defects detected during these tests shall be repaired according to procedures defined in Part I: Solicitation. Offer and Award/Contractual Provisions.

#### 2.3.1 VISUAL INSPECTION

The post-delivery inspection is similar to the inspection at the Contractor's plant and shall be conducted with the coach in a static condition. Any visual delivery damage shall be identified and recorded during the visual inspection of each coach.

#### 2.3.2 COACH OPERATION

The road tests for total coach operation are similar to those conducted at the Contractor's plant. Operational deficiencies of each coach shall be identified and recorded.

PART IV - WARRANTY PROVISIONS

S.C.R.T.D. LIBRARY

2.0 REPAIR PROCEDURES

## 2.1 REPAIR PERFORMANCE

The District may require the Contractor or its designated representative to perform warranty-covered repairs that are clearly beyond the scope of the District's capabilities.

## 2.2 REPAIRS BY CONTRACTOR

If the District requires the Contractor to perform warranty-covered repairs, the Contractor's representative must begin, within 10 working days after receiving notification of a defect from the District, work necessary to effect repairs. The District shall make the coach available to complete repairs timely with the Contractor repair schedule.

The Contractor shall provide at its own expense all spare parts, tools, and space required to complete repairs. At the District's option, the Contractor may be required to remove the coach from the District's property while repairs are being effected. If the coach is removed from the District's property, repair procedures must be diligently pursued by the Contractor's representative.

## 2.3 REPAIRS BY DISTRICT

### 2.3.1 PARTS USED

If the District performs the warranty-covered repairs, it shall correct or repair the defect and any related defects using Contractor-specified spare parts available from its own stock or those supplied by the Contractor specifically for this repair. Monthly, or at a period to be mutually agreed upon, reports of all repairs covered by this warranty shall be submitted by the District to the Contractor for reimbursement or replacement of parts. The Contractor shall provide forms for these reports.

### 2.3.2 CONTRACTOR SUPPLIED PARTS

The District may request that the Contractor supply new parts for warranty-covered repairs being performed by the District. These parts shall be shipped prepaid to the District from any source selected by the Contractor within 10 working days of receipt of the request for said parts.

### 2.3.3 DEFECTIVE COMPONENTS RETURN

The Contractor may request that parts covered by the warranty be returned to the manufacturing plant. The total cost for this action shall be paid by the Contractor. Materials should be returned in accordance with Contractor's instructions.

### 2.3.4 REIMBURSEMENT FOR LABOR

The District shall be reimbursed by the Contractor for labor. The amount shall be determined by multiplying the number of person-hours actually required to diagnose and correct the defect by the current per hour, 5M mechanic, straight wage rate, plus 80 percent fringe benefits, plus the cost of towing in the coach if such action was necessary and if the coach was in the normal service area. These wage and fringe benefit rates shall not exceed the rates in effect in the District's service garage at the time the defect correction is made.

### 2.3.5 REIMBURSEMENT FOR PARTS

The District shall be reimbursed by the Contractor for defective parts and for parts that must be replaced to correct the defect. The reimbursement shall be at the price indicated on the Contractor's master price list at the time of repair, and shall include taxes, where applicable, plus 25 percent handling charge.

The District shall base warranty parts pricing, throughout warranty period, on contractor's parts price book in effect at delivery of buses.

## 2.4 WARRANTY AFTER REPLACEMENT/REPAIRS

If any component, unit, or subsystem is repaired, rebuilt or replaced by the Contractor or by the District's personnel, with the concurrence of the Contractor, the subsystem shall have the unexpired warranty period of the original subsystem.



## 2.5 WARRANTY CLAIM SUBMITTALS

Warranty claim forms submitted by the District, with regards to paragraphs 2.3.4 Reimbursement For Labor and 2.3.5 Reimbursement For Parts, shall be typed and shall contain no more than the following information:

### IDENTIFICATION DATA:

1. Warranty repair claim number as furnished by vendor on vendor form.
2. District name and address
3. Bus number
4. Vehicle ID number
5. Bus model
6. Bus mileage
7. In-service date
8. Repair date
9. Claim date
10. Customer code number (if needed)
11. Engine serial number (if needed)
12. Transmission serial number (if needed)
13. Failure description

### PART INFORMATION:

1. Quantity
2. Part number
3. Part description

### LABOR INFORMATION:

1. Labor hours
2. Labor amount

Section No.: 2.3.4.4

Section Title: Wheelchair Parking Space Flooring

TECHNICAL SPECIFICATIONS  
ANTISLIP SAFETY WALK MATERIAL  
SPECIFICATIONS NO. EE 85-04

1.0 SCOPE

1.1 The material covered by this specification shall consist of General Purpose Mineral coated Antislip Safety Walk Material (Material) for use by the Southern California Rapid Transit District (District).

1.2 The vendor shall furnish, deliver and warranty the Material in accordance with these specifications.

1.3 The District shall inspect the Material after delivery to verify that the material meets these technical specifications.

2.0 GENERAL REQUIREMENTS

2.1 The Material shall be new, complete and ready for installation upon delivery to the District.

2.2 The Material shall be in compliance with all applicable federal, state and local laws pertaining to this type of material. Bidder may be required to furnish proof of compliance.

2.3 The Vendor shall warrant the Material furnished to be free from defects in design, material and workmanship, or by the manufacturer's standard warranty whichever is greater.

2.7 In the event that the manufacturer offers any extended warranty for this material, bidder shall state the terms of such warranty or warranties.

2.8 Delivery and acceptance of the material shall be at the District's Division 3314, 5413 South Avalon Blvd., Los Angeles, California 90011. Attn: Storekeeper. Acceptance shall be after the inspection demonstrates that the material complies with the specifications.

3.0 FEATURES AND CAPACITIES

3.1 The Material furnished shall be 3M Products General Purpose Antislip Safety Walk or approved equal.

3.2 The color shall be the manufacturer's standard black.

3.3 The Material shall have a pressure sensitive adhesive backing covered by a removable protective paper liner.

3.4 The Materials packaging shall be marked with the product name, size, color and manufacturers tradename.

## SPECIAL REQUIREMENTS ATTACHMENT C

### 2.6.6.3 WHEELCHAIR SECUREMENT STRAP

Contractor shall provide wheelchair securement strap assemblies for installation on District accessible transit coaches. Each securement strap assembly shall include the following:

1. Each securement strap shall be equipped with a male and female connector. When fully extended, the strap shall be 51.5 inches long from the mounting hole to the end of the female buckle. The strap webbing shall be red in color and shall be equal to automobile seat belt webbing material. (See attached drawing for details.)
2. An automotive type retractor for stowing webbing shall be provided. In the stowed position, no more than 11" of the securement straps shall be outside of the retractor assembly. The retractor assembly shall be black in color, or approved equal.
3. The securement strap assembly shall be used in a set of two units. A two unit set of securement straps shall hold a wheelchair and passenger weighing up to 450 lbs. in combined weight. See Figure II-7.

30 METHANOL 40-FOOT TRANSIT COACHES

PART II: B TECHNICAL SPECIFICATIONS

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FINISH AND COLOR

SPECIAL REQUIREMENTS - ATTACHMENT B

NUMBERING AND SIGNING

SPECIAL REQUIREMENTS - ATTACHMENT C

WHEELCHAIR SECUREMENT STRAP

1.0 GENERAL



## 1.1 SCOPE

Part II: Technical Specifications covers requirements for a powered 2 or 3 axle wheelchair accessible 40-foot methanol fuel powered transit coach. It is intended for the widest possible spectrum of passengers, including children, adults, the elderly, and the handicapped.

## 1.2 DEFINITIONS

The following are definitions of special terms used in Part II.

- (1) dBA. Decibels reference to 0.0002 microbar as measured on the "A" scale.
- (2) Audible Discrete Frequency. An Audible Discrete Frequency is determined to exist if the sound power level in any 1/3-octave band exceeds the average of the sound power levels of the two adjacent 1/3-octave bands by 4 decibels, (dB) or more.
- (3) Standee Line. A line marked across the coach aisle in line with the driver's barrier to designate the forward area which passengers may not occupy when the coach is moving.
- (4) Free Floor Space. Floor area available to standees, excluding ingress/egress areas, area under seats, area occupied by feet of seated passengers, and the vestibule area.
- (5) Curb Weight. Weight of vehicle, including maximum fuel, oil, and coolant; and all equipment required for operation and required by this Specification, but without passengers or driver.
- (6) Seated Load. One hundred fifty pounds for every designed passenger seating position and for the driver.
- (7) Gross Load. One hundred fifty pounds for every designed passenger seating position, for the driver, and for each 1.5 square feet of free floor space.
- (8) SLW (Seated Load Weight). Curb weight plus seated load.
- (9) GVWR (Gross Vehicle Weight Rated). Curb weight plus gross load.
- (10) Driver's Eye Range. The 95th-percentile eyellipse defined in SAE Recommended Practice J941, except that the height of the eyellipse shall be determined from the seat at its reference height.
- (11) Fireproof. Materials that will not burn or melt at temperatures less than 2,000 degrees Fahrenheit.
- (12) Fire-Resistant. Materials that have a flame spread index less

than 150 as measured in a radiant panel flame test per ASTM-E 162-75.

(13) **Human Dimensions.** The human dimensions used in Part II: Technical Specifications are defined in SAE Recommended Practice J833.

(14) **HIC (Head Injury Criteria).** The following equation presents the definition of head injury criteria:

$$\left[ \frac{1}{t_2 - t_1} \int_{t_1}^{t_2} (a) dt \right]^{2.5} (t_2 - t_1)$$

where

a = the resultant acceleration at the center of gravity of the head form expressed as a multiple of g, the acceleration of gravity. t1 and t2 = any two points in time during the impact.

(15) **Classes of Failures.** Classes of failures are described below.

(a) **Class 1: Physical Safety.** A failure that could lead directly to injury of passenger, driver or other, and represents a severe crash situation.

(b) **Class 2: Road Call.** A failure resulting in an enroute interruption of revenue service. Service is discontinued until the coach is replaced or repaired at the point of failure.

(c) **Class 3: Coach Change.** A failure that requires removal of the coach from service during its assignments. The coach is operable to a rendezvous point with a replacement coach.

(d) **Class 4: Bad Order.** A failure that does not require removal of the coach from service during its assignments but does degrade coach operation. The failure shall be reported by driver, inspector, or hostler.

(16) **Maintenance Personnel Skill Levels.** Defined below are maintenance personnel skill levels used in Part II: Technical Specifications.

(a) 5M: Specialist Mechanic or Class A Mechanic Leader.

(b) 4M: Journeyman or Class A Mechanic.

(c) 3M: Service Mechanic or Class B Serviceman.

(d) 2M: Mechanic Helper or Coach Serviceman.

(e) 1M: Cleaner, Fueller, Oiler, Hostler, or Shifter.

(17) **Standards:** Standards referenced in Part II: Technical Specifications are the latest revisions unless otherwise stated.

(18) **Neat Methanol:** 100 percent methyl alcohol, CH<sub>3</sub>OH.

### 1.3 ABBREVIATIONS

The following is a list of abbreviations used in Part II: Technical Specifications and Part III: Quality Assurance.

- (1) ASTM: American Society for Testing and Materials.
- (2) SAE: Society of Automotive Engineers
- (3) ANSI: American National Standards Institute
- (4) ASHRAE: American Society of Heating, Refrigerating, and Air Conditioning Engineers
- (5) SPI: Society of the Plastics Industry
- (6) USDHEW: United States Department of Health, Education, and Welfare
- (7) UL: Underwriter's Laboratory
- (8) BMCS: Bureau of Motor Carrier Safety
- (9) FMVSS: Federal Motor Vehicle Safety Standards
- (10) AWS: American Welding Society

## 1.4 LEGAL REQUIREMENTS

The coach shall meet all applicable FMVSS and all applicable BMCS regulations in effect at the date of manufacture.

The Contractor shall comply with all applicable Federal, State, and local regulations. Local regulations are defined as those below the state level. In the event of any conflict between the requirements of this Specification and any applicable legal requirement, then the legal requirement shall prevail.

A 5-pound multi-purpose fire extinguisher, complete with mounting bracket shall be provided. Fire extinguisher shall be compatible with methanol fuel.

Provide emergency reflector kit, Cat's Eye 7500, KD 610-4645 or approved equal.

Both the fire extinguisher and reflector kit shall be mounted in a position that is convenient and accessible to the operator and out of the reach of passengers, subject to District approval.

## 1.5 OVERALL REQUIREMENTS

### 1.5.1 AS-BUILT DRAWING

The Contractor shall, prior to commencing production, supply an "as-built" 3/16" = 1 ft. scale drawings photographically reproduced on stable base matte finish Mylar film. This drawing shall have sufficient detail and data to describe all interior and exterior technical body features of the buses to be furnished. Drawings shall minimally include passenger assist layouts, seat placement and dimensions, passenger door and window dimensions. Format of drawing shall be approved by the District.

#### 1.5.1.1 Physical Size

With the exception of exterior mirrors, marker, and signal lights, flexible portions of the bumpers, radio antenna, roof mounted escape hatches, fender skirts, and rubrail, the coach shall have the following overall dimensions. Roof mounted escape hatches shall not be more than two inches higher than roofline in the closed position.

- (1) Length: 40 feet, 0 inches (+0, -1 inch)
- (2) Width: 8 feet, 6 inches (+0, -1 inch)
- (3) Height: 10 feet, maximum.

(4)	Step Height from Street Level to 1st Step - Front	14.5 In. Max.
(5)	Step Height from Street Level to 1st Step - Rear	16 In. Max.
(6)	Step Riser Height - Front - Rear	10.25 In. Max. 10.75 In. Max.
(7)	Head Room Over Aisle	78 In. Min.
(8)	Floor Height At Front Entrance At Rear Exit	34 In. Max. 36 In. Max.
(9)	Front door opening, clear between hardware and assists Rear door opening, clear between hardware and assists	30 In. Min. 25 In. Min.
(10)	Passenger seating capacity	43 Seat Min.
(11)	Seat Width (Two Positions)  Seat Back Height	35 In. Min.  36 In.
(12)	Body Turning Radius Right Left	44 Ft. Max. 44 Ft. Max.

#### 1.5.1.2 Underbody Clearance

The coach shall maintain the minimum clearance dimensions as shown in Figure II-3 and defined in SAE Standard J689, regardless of load up to the gross vehicle weight rating.

- (1) Ramp Clearances. Approach angle shall be no less than 10 degrees. Breakover angle shall be no less than 10 degrees. Departure angle shall be no less than 9 degrees.
- (2) Ground Clearance. Ground clearance shall be no less than 10 inches except within the axle zone, and wheel area.
- (3) Axle Clearance. Axle zone clearance which is the projected area between tires and wheels on the same axial centerline, shall be no less than 6 1/2 inches.
- (4) Wheel Area Clearance. Wheel area clearance shall be no less than 8 inches for parts fixed to the coach body and 6-1/2 inches for parts that move vertically with the axles.

II-7

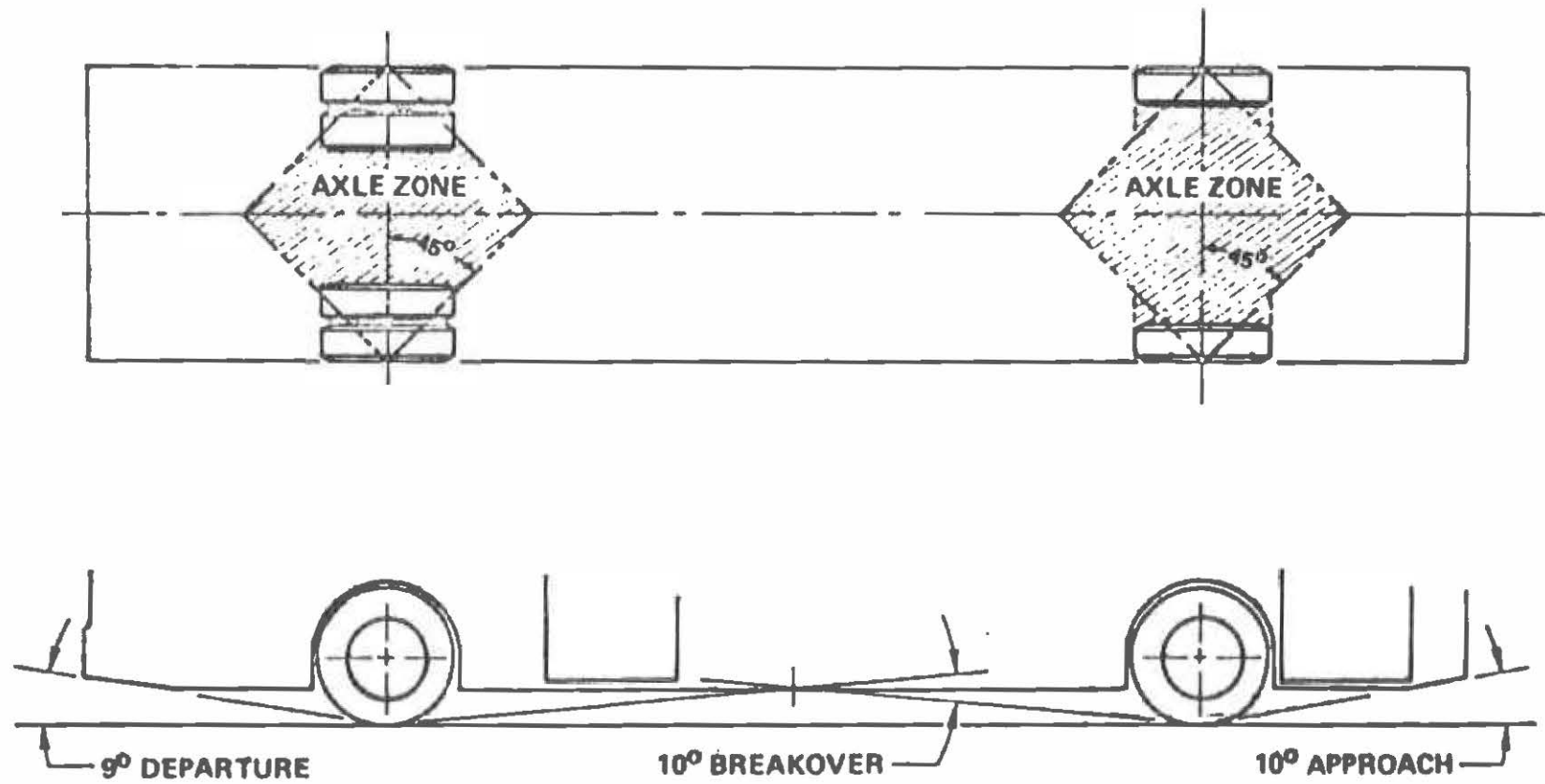


FIGURE II-3. TRANSIT COACH MINIMUM ROAD CLEARANCE

1.5.2 WEIGHT

1.5.2.1 Gross Vehicle Weight

Gross vehicle weight shall not exceed 20,500 pounds for each axle. Weight shall include a full complement of fuel, oil, water, seated and standee passengers including driver. Any weight in excess of the above maximum shall carry a penalty of five dollars (\$5.00) per pound, which shall be deducted from the Contractor's invoice by the District.

The Contractor shall submit a certified weight slip for the curb weight of each axle and a certified weight slip for the total curb weight of each bus upon delivery.

1.5.3 CAPACITY

Rated capacity of the standard configuration coach shall be no less than 43 seated passengers with the specified seating arrangement, subject to the terms of the Life Cycle Costing factor. A \$600 per seat incentive shall be paid to the contractor's invoice price for each seat provided over the 43 specified.

1.5.4 SERVICE LIFE AND MAINTENANCE

1.5.4.1 Service Life

The coach shall be designed to operate in District revenue service for a minimum of 50,000 miles per year or 600,000 miles.

1.5.4.2 Maintenance and Inspection

Scheduled maintenance or inspection tasks as specified by the Contractor shall require a skill level of 3M or less. Scheduled maintenance tasks shall be related and shall be grouped in maximum mileage intervals. Routine scheduled maintenance actions, such as filter replacement and adjustments on all coach components, including the wheelchair lift system, shall not be required at intervals of less than 6,000 miles, except for routine daily service performed during the fueling operations. Higher levels of scheduled maintenance tasks shall occur at even multiples of mileages for lower level tasks.

1.5.4.3 Mean Mileage Between Failures

The following are design goals for mean mileage between failures by failure class, provided that all specified preventive maintenance procedures are followed.

- (1) Class 1: Physical Safety. Mean mileage shall be greater than 1,000,000 miles.
- (2) Class 2: Road Call. Mean mileage shall be greater than 10,000 miles.
- (3) Class 3: Coach Change. Mean mileage shall be greater than

8,000 miles.

- (4) Class 4: Bad Order. Mean mileage shall be greater than 6,000 miles.

#### 1.5.4.4 Mean Time to Repair

Repair time and skill levels required for various repairs to coach components shall be stated by the Contractor which will be used for Life Cycle Costing purposes in determining the contract award. The District may require a demonstration of actual time requirements.

#### 1.5.4.5 Accessibility

All systems or components serviced as part of periodic maintenance or whose failure may result in Class 1 or Class 2 failures shall be readily accessible for service and inspection. To the extent practicable, removal or physical movement of components unrelated to the specific maintenance and/or repair tasks involved shall be unnecessary.

Relative accessibility of components, measured in time required to gain access, shall be inversely proportional to frequency of maintenance and repair of the components.

Due to the need to check Transmission fluid levels on a daily basis, an access door shall be provided which permits both the inspection and filling of the fluid from outside the rear of the bus with the engine compartment door closed.

#### 1.5.4.6 Interchangeability

Components with identical functions shall be interchangeable. These components shall include, but not be limited to passenger window hardware, interior trim, lamps, lamp lenses, and seat assemblies. Components with nonidentical functions shall not be, or appear to be interchangeable.

#### 1.5.5 OPERATING ENVIRONMENT

The coach shall achieve normal operation in the environmental conditions normally occurring in the District's service area. Temperature ranges of 20 degrees Fahrenheit to 115 degrees Fahrenheit, at relative humidities between 5 percent and 100 percent, and at altitudes up to 3,000 feet above sea level. Degradation of performance due to atmospheric conditions shall be minimized at temperatures above 115 degrees Fahrenheit, or at altitudes above 3,000 feet. Special equipment or procedures may be employed to start the coach after a 12 hour or more exposure to temperatures below 30 degrees Fahrenheit without the engine in operation. Speed, gradability, and acceleration performance requirements shall be met at, or corrected to, 85 degrees Fahrenheit, 29.00 inches Hg. dry air with all accessories on including A/C. Performance degradation at conditions other than the test standard shall not exceed 1 percent for each 3 degrees Fahrenheit and 4 percent for each 1,000 feet of altitude above the standard. The interior climate control system shall perform in accordance



with Section 3.7.1.

2.0 BODY

## 2.1 SHELL

### 2.1.1 GENERAL

#### 2.1.1.1 Design

The coach shall have a clean, smooth, simple design, primarily derived from coach performance requirements and passenger service criteria established by Part II: Technical Specifications. The exterior and body features, including grilles and louvers, shall be shaped to allow complete and easy cleaning by automatic bus washers without snagging washer brushes. Water and dirt shall not be retained in or on any body feature to freeze or bleed out onto the coach after leaving the washer. Body, windows and doors shall be sealed to prevent leaking of air, dust, or water under normal operating conditions and during cleaning in automatic bus washers for the service life of the coach. Accumulation on any window of the coach of spray and splash generated by the coach's wheels on a wet road shall be minimized.

#### 2.1.1.2 Materials

Body materials shall be selected and the body fabricated to reduce maintenance, extend durability, and provide consistency of appearance throughout the life of the coach. Detailing shall be kept simple; add-on devices and trim shall be minimized and, where necessary, integrated into the basic design.

#### 2.1.1.3 Finish and Color

All exterior surfaces shall be smooth and free of visible fasteners, wrinkles, and dents. Exterior surfaces to be painted shall be properly cleaned and primed as appropriate for the paint used, prior to application of paint to assure a proper bond between the basic surface and successive coats of original paint for the service life of the coach. Paint shall be applied smoothly and evenly with the finished surface free of dirt, runs, orange peel, and other imperfections. All exterior finished surfaces shall be impervious to diesel fuel, gasoline, and commercial cleaning agents. Finished surfaces including striping shall not be damaged by controlled applications of commonly used graffiti-removing chemicals. Exterior painted surfaces shall have minimum of .5 mil thick primer coat and minimum 2.5 mil thick finish coat of Koppers or approved polyurethane paint. Colors and paint schemes shall be in accordance with plan detailed in Special Requirements - Part II, Attachment A, Technical Specification. Contractor shall provide color rendering of proposed color scheme depicting Contractor's bus and RTD color requirements for use by the District in approving the color scheme.

#### 2.1.1.4 Numbering and Signs

Monograms, numbers, and other special signing specified by the District shall be applied to the inside and outside of the coach as required. Signs shall be durable and fade-, chip-, and peel-resistant; they may be decals, or pressure-sensitive appliques. All decals shall be sealed with clear, waterproof sealant around the edges and on all exposed

surfaces. At least one sign shall be provided on each side of the coach interior to indicate that seats at the front are priority seats for elderly and handicapped passengers. The exact wording, size, color, and location for these signs shall be subject to District approval. A listing of all decal requirements is provided in Special Requirements - Part II, Attachment B.

#### 2.1.1.5 Pedestrian Safety

Exterior protrusions greater than 1/2 inch and within 80 inches of the ground shall have a radius no less than the amount of the protrusion. The left side rearview mirror and required lights and reflectors are exempt from the protrusion requirement. Advertising frames shall protrude no more than 7/8 inch from the body surface and shall have the exposed edges and corners radiused to the extent practicable. Grilles, doors, bumpers and other features on the sides and rear of the coach shall be designed to minimize the ability of unauthorized riders to secure toeholds or handholds.

#### 2.1.1.6 Passenger Windows

A minimum of 12,000 square inches of window area, including door windows, shall be required on each side of the standard configuration coach. Section 2.4.2 describes the specific requirements for passenger windows.

#### 2.1.1.7 Passenger Doors

Two doors shall be provided in the right side of the coach for passenger ingress and egress. The front door shall be forward of the front wheels and located so that the driver is able to collect or monitor the collection of fares. The rear door centerline shall be rearward of the point midway between the front door centerline and the rearmost seat back. Specific requirements for doors are in Section 2.1.8. Requirements for operation of doors are in Section 2.2.1.

#### 2.1.1.8 Advertising

Provisions shall be made to integrate advertising, which is specified by the District, into the exterior design of the coach. Advertising media, frames, or supporting structures shall not detract from the readability of destination signs and signal lights, and shall not compromise passenger visibility. Advertising provisions shall not cause pedestrian hazards or foul automatic bus washing equipment, and shall not cover or interfere with doors, air passages, vehicle fittings, or in any other manner restrict the operation or serviceability of the coach. All frames and hardware will be painted as per Specification, Section 2.1.1.3, Special Requirements - Part II, Attachment A.

Ad frames shall be provided on the exterior of both sides and rear of the coach to display and securely retain flat or molded advertising media. Ad frame supports shall locate the signs above the rubrail and shall retain flat signs within 1/2 inch of the coach body. The sign supports shall be installed to reduce the possibility of them being used as

handholds. Frames on both sides of bus shall be 30" by 144" and ad frame on rear of bus shall be 21" by 72". Supports for rear ad frames are subject to District approval.

## 2.1.2 STRUCTURE

### 2.1.2.1 Strength and Fatigue Life

Under conditions of transit service throughout the service life of the coach, the basic structure shall withstand fatigue damage that is sufficient to cause injury to passenger, driver or others.

### 2.1.2.2 Distortion

The coach, at GVWR and under static conditions, shall not exhibit deformation or deflection that impairs operation of doors, windows, or other mechanical elements. Static conditions include the vehicle at rest with any one wheel or dual set of wheels on a 6-inch curb or in a 6-inch deep hole.

### 2.1.2.3 Resonance

All structure, body, and panel-bending mode frequencies, including vertical, lateral, and torsional modes, shall be sufficiently removed from all primary excitation frequencies to minimize audible, visible, or sensible resonant vibrations during service.

### 2.1.2.4 Material

Reinforced fiberglass and plastic materials shall be excluded from the basic body construction, except for replaceable panels or doors.

### 2.1.2.5 Corrosion

The coach shall resist corrosion from atmospheric conditions and road salts. The understructure and exterior shall maintain structural integrity and nearly maintain original appearance throughout its service life, provided it is maintained in accordance with the procedures specified in the service manual by the Contractor. Materials exposed to the elements and all joints and connections of dissimilar metals shall be corrosion-resistant and shall be protected from galvanic corrosion. Representative samples shall withstand a 2-week salt spray test in accordance with ASTM Procedure B-117 with no visual or structural detrimental effects to normally visible surfaces, and no significant structural degradation or weight loss of over 1 percent for other members or components.

### 2.1.2.6 Towing

Towing devices shall be provided on each end of the coach. The front towing device when used with a load equalizing sling shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the coach within 20 degrees of the longitudinal axis of the coach. The rear towing device(s) shall not provide a toehold for

unauthorized riders. The front towing devices shall allow attachment of a rigid tow bar and shall permit safe lifting of the coach, at curb weight, by the towing devices and the tow bar until the wheels are clear of the ground. The method of attaching the tow bar shall require the specific approval of the District. The front towing devices shall accommodate a crane hook with a 1-inch throat. The successful bidder shall provide a written procedure for lift towing the coach from the rear in case of an emergency.

#### 2.1.2.7 Jacking

It shall be possible to safely jack up the coach, at curb weight, with a common 10-inch-high hand jack or a 10-ton floor jack, at the discretion of the District, when a tire or dual set is completely flat and the coach is on a level, hard surface, without crawling under any portion of the coach. Jacking from a single point shall permit raising the coach sufficiently high to remove and reinstall a wheel and tire assembly. Jacking pads located on the axle or suspension near the wheels shall permit easy and safe jacking with the flat tire or dual set on a 6-inch-high run-up block not wider than a single tire. Jacking and changing any one tire shall be completed by a 2M serviceman in less than 30 minutes from the time the coach is approached. The coach shall withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage.

#### 2.1.2.8 Hoisting

The coach axles or jacking plates shall accommodate the lifting pads of a 2-post hoist system. Jacking plates, if used as hoisting pads, shall be approximately 5 inches square, with a turned-down flange not less than 1 inch deep on each side to prevent the coach from falling off the hoist. Other pads on the coach structure shall support the coach on jack stands independent of the hoist.

#### 2.1.2.9 Fire Protection

The passenger and engine compartments shall be separated by a barrier(s) which shall, by incorporation of fireproof materials in its construction, be a firewall. This firewall shall preclude or retard propagation of an engine compartment fire into the passenger compartment. Only necessary openings shall be allowed in the firewall, and these shall be fireproofed. Any passageways for the climate control system air shall be separated from the engine compartment by fireproof material. Piping through the bulkhead shall have copper, brass, or fireproof fittings sealed at the firewall with copper or steel piping on the forward side. Wiring may pass through the bulkhead only if connectors or other means are provided to prevent or retard fire propagation through the firewall. The conduit and bulkhead connectors shall be sealed with fire proof material at the firewall. Engine access panels in the firewall shall be fabricated of fireproof material and secured with fireproof fasteners. These panels, their fasteners, and the firewall shall be constructed and reinforced to minimize warping of the panels during a fire that will compromise the integrity of the firewall.

The engine compartment shall also be equipped with a Halon automatic fire extinguishment system or approved equal. Activation of the fire extinguishment system will simultaneously turn off the methanol fuel supply to the engine compartment. The coach shall be equipped with a methanol compatible fire extinguisher.

#### 2.1.2.10 Crashworthiness

The coach body and roof structure shall withstand a static load equal to 150 percent of the curb weight evenly distributed on the roof with no more than a 6-inch reduction in any interior dimension. Windows shall remain in place and shall not open under such a load.

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

Exterior panels below the rubrail and their supporting structural members shall withstand a static load of 2,000 pounds applied perpendicular to the coach anywhere below the rubrail by a pad no larger than 5 inches square. This load shall not result in deformation that prevents installation of new exterior panels to restore the original appearance of the coach.

### 2.1.3 EXTERIOR AND APPLIED PANELS

#### 2.1.3.1 Strength and Installation

Only exterior panels that are above the rubrail may be structural components. Exterior surface panels shall not be installed or retained with visible rivets or fasteners.

#### 2.1.3.2 Repair and Replacement

Exterior panels below the rubrail shall be divided into sections that are repairable or replaceable by a 3M mechanic in less than 30 minutes for a section up to 5 feet long (excludes painting).

Exterior side panels above the rubrail and below the lower daylight opening shall be repairable or replaced by a 3M mechanic in less than 1-1/2 hours for a section up to 5 feet long (excludes painting).

#### 2.1.3.3 Rain Gutters

Gutters shall be provided to prevent water flowing from the roof onto the side windows and passenger doors. When the coach is decelerated, the gutters shall not drain onto the windshield, or driver's side window, or into the door boarding area.

#### 2.1.3.4 License Plates

Provisions shall be made to mount standard size U.S. license

plates on the front and rear of the coach. These provisions shall flush mount or recess the license plates so that they can be cleaned by automatic bus washing equipment without being caught by the brushes. License plates shall be mounted on, or to the left of, the coach center and shall not allow a toehold or handhold for unauthorized riders.

#### 2.1.3.5 Rubrails

Rubrails composed of flexible, resilient material shall be provided to protect both sides of the coach body from damage caused by minor sideswipe accidents with automobiles. Rubrails shall have vertical dimensions of no less than 2 1/2 inches with the centerline no higher than 33 inches above the ground. The rubrails shall be capable of withstanding impacts of 200 foot-pounds of energy from a steel-faced spherical missile no less than 9 inches in diameter and of a 500-pound load applied anywhere along their length by a rigid plate 1 foot in length, wider than the rubrail and with 1/4-inch end radii with no visible damage to the rubrail, retainer, or supporting structure. The rubrail may be discontinued at doorways. A damaged portion of the rubrail shall be replaceable without requiring removal or replacement of the entire rubrail.

#### 2.1.4 INTERIOR

##### 2.1.4.1 Headroom

Headroom above the aisle and at the centerline of the aisle seats shall be no less than 78 inches. At the centerline of the window seats, headroom shall be no lower than the required top of the side window. Headroom at the back of the rear bench seat may be reduced to a minimum of 56 inches, but it shall increase to the normal ceiling height at the front of the seat cushion. In any area of the coach directly over the head of a seated passenger and positioned where a passenger entering or leaving the seat is prone to strike his head, padding shall be provided on the overhead paneling.

##### 2.1.4.2 Driver's Barrier

A barrier or bulkhead between the driver and the left front passenger seat shall be provided. The barrier shall eliminate glare and reflections in the windshield directly in front of the barrier from interior lighting during night operation. The barrier shall extend from below the level of the passenger or driver's seat cushion, whichever is lower, to within 1 inch of the ceiling and side wall and shall fit the coach side windows and wall to prevent passengers from reaching the driver or his personal effects. Specified trim panel materials are District standard. Driver's barrier shall be of 1/4 inch thick polycarbonate material of similar color but darker than the passenger side windows. Driver's barrier shall follow the contour of the bus side wall and ceiling. A portion of the driver's barrier along the aisle side shall be cut out to provide a passenger assist. A driver's coat hook and strap shall be installed at a point near where the driver's barrier meets the side wall, subject to District approval. A 1-1/2" knuckle clearance shall be provided between the driver's barrier and any support thereof which may be used as a passenger assist.



#### 2.1.4.3 Modesty Panels

Sturdy divider panels constructed of solid durable, unpainted, corrosion-resistant material complementing the interior trim shall be provided at the rear of both stepwells. Modesty panels may be installed at the sides of longitudinal seats when the required armrests are integral. These dividers shall be mounted on the side wall and shall project toward the aisle no further than passenger knee projection in longitudinal seats or the aisle side of the transverse seats. Modesty panels shall extend no higher than the lower daylight opening of the side windows and those forward of transverse seats shall be mounted a nominal 1-1/4 inches of the floor. Panels forward of longitudinal seats shall extend to below the level of the seat cushion. Dividers positioned at the doorways shall provide no less than a 2 1/4 inch clearance between the modesty panel and the opened door to protect passengers from being pinched. The modesty panel and its mounting shall withstand normal kicking, pushing, and pulling loads of 200-pound passengers without permanent visible deformation.

#### 2.1.4.4 Rear Bulkhead

The rear bulkhead paneling shall be contoured to fit the ceiling, side walls, and seat backs so that any litter, such as a cigarette package or newspaper, will tend to fall to the floor or seating surface when the coach is on a level surface. Any air vents in this area shall be louvered to reduce air flow noise and to reduce the probability of trash or litter being thrown or drawn through the grille. The panel, or sections thereof, shall be easily and quickly removable to service components located behind the rear bulkhead.

#### 2.1.4.5 Construction

Interior panels may be integral with, or applied to, the basic coach structure. They shall be decorated in accordance with the interior specified. Use of moldings and small pieces of trim shall be minimized, and all parts shall be functional.

#### 2.1.4.6 Fastening

Interior panels shall be attached so that there are no exposed edges or rough surfaces. Panels and fasteners shall not be easily removable by passengers. Interior trim fasteners, where required, shall be rivets or cross-recessed head screws.

### 2.1.5 FLOOR

#### 2.1.5.1 Height

Height of the floor above the street shall be no more than 34 inches, measured at the centerline of the front door. The floor may be inclined only along the longitudinal axis of the coach, and the incline shall be less than 1 1/2 degrees of the horizontal. All floor measurements shall be with the coach at the design height and on a level surface.

#### 2.1.5.2 Strength

The floor deck may be integral with the basic structure or mounted on the structure securely to prevent chafing or horizontal movement. Sheet metal screws shall not be used to retain the floor and all floor fasteners shall be serviceable from one side only. Tapping plates used for the floor fasteners shall be no less than the same thickness as a standard nut for that fastener, and all floor fasteners shall be secured and protected from corrosion for the service life of the coach. The floor deck shall be reinforced as needed to support passenger loads. At GVWR, the floor shall have an elastic deflection of no more than 0.60 inches from the normal plane. The floor shall withstand the application of 2.5 times gross load weight without permanent detrimental deformation. Floor and step treads, with coverings applied, shall withstand a static load of at least 150 pounds applied through the flat end of a 1/2-inch diameter rod, with 1/32-inch radius, without permanent visible deformation.

#### 2.1.5.3 Edges

The floor shall be essentially a continuous flat plane, except at the stepwells and wheel housings. Where the floor meets the walls of the coach, the surface edges shall be blended with a circular section of radius not less than 1 inch, and a molding or cove shall prevent debris accumulation between the floor and wheel housings.

#### 2.1.5.4 Floor Protection

The floor, as assembled, including the sealer, attachments, and covering, shall be waterproof, nonhygroscopic, resistant to wet and dry rot, resistant to mold growth, and impervious to insects. Plywood shall be no less than 3/4 inch thick, 7 ply, American Plywood Association, Marine grade, A-C, and shall be installed with the A side up and with all edges sealed.

### 2.1.6 STEPS AND STEPWELLS

#### 2.1.6.1 Steps

A maximum of three steps shall be required for passenger ingress and egress. The steps in each doorway shall be in a fixed location relative to the floor of the coach. At the front door, the first step up from street level shall not exceed 14.5 inches with the coach at the design height, and all step riser heights to coach floor level shall be the same height which shall be no more than 10.25 inches. At the rear door, the interior steps down from floor level shall not exceed 10 3/4 inches, and the final step to street level shall not exceed 16 inches with the coach at the design height. Risers shall be continuous, flat, planes across the entire width of the stepwell except for notches which may be required at either end to accommodate the opened doors. These notches shall not exceed 1 1/2 inches in depth and 3 inches in length. Step risers may be inclined, not to exceed 10 degrees from the vertical with only the lower edge inward. All corners shall have radii no less than 1/2-inch to facilitate cleaning.

All step treads shall be of uniform depth which shall be no less than 11 inches and the plane of the step treads shall be parallel to the plane of the floor. Treads shall be covered with 5/16-inch, nonskid,

ribbed composition rubber material that shall remain effective in all weather conditions. Tread covering shall be black to match the vestibule flooring. The edge of the vestibule floor shall have no overhang at the step riser. The edge of the vestibule floor and the end of the step tread shall have a bright, contrasting yellow band no less than 2 inches wide on the full width of the step. The color shall be permanently blended into the tread covering material. The color bands on the edges of the steps shall be a bright yellow.

#### 2.1.6.2 Stepwell Structure

Stepwells shall be corrosion-resistant throughout the life of the coach. Stepwells shall be replaceable as units if they are constructed of nonmetallic material. The steps shall simultaneously support 300-pound loads on a six inch wide section at the center of each step tread without permanent deformation and with elastic deflection of no more than 0.125 inches. Each step tread shall support a load of 500-pounds evenly distributed over the center half of the tread without permanent deformation. The steps shall be sloped only sufficient to preclude water accumulation in the stepwells. All corners in the stepwell shall have radii no less than 1/2-inch.

#### 2.1.7 WHEEL HOUSING

##### 2.1.7.1 Construction

Wheel housings shall be constructed of corrosion-resistant, fire-resistant material. Wheel housings, as installed and trimmed, shall withstand impacts of a tire tread dislodging from the tire at 55 mph without penetration.

##### 2.1.7.2 Clearance

Sufficient clearance and air circulation shall be provided around the tires, wheels, and brakes to preclude overheating when the coach is operating in District revenue service. Tire chain clearance shall be provided on all driven wheels in accordance with SAE information Report J683.

Interference between the tires and any portion of the coach shall not be possible in maneuvers up to the limit of tire adhesion with weights from curb weight to GVWR.

##### 2.1.7.3 Fender Skirts

Features to minimize water spray from the coach in wet conditions shall be included in wheel housing design. Any fender skirts shall be unbreakable and easily replaceable. They shall be flexible if they extend beyond the allowable body width. Wheels and tires shall be removable without disturbing the fender skirts.

##### 2.1.7.4 Splash Aprons

Splash aprons, composed of 1/4-inch-minimum composition or

rubberized fabric, shall be installed behind each wheel and shall extend downward to within 4 inches of the road surface. Apron widths shall be no less than tire widths, except for the front apron which shall extend across the width of the coach. Splash aprons shall be bolted to the coach understructure. Splash aprons and their attachments shall be inherently weaker than the structure to which they are attached. Splash aprons and their attachments shall not be included in the road clearance measurements. Other splash aprons shall be installed where necessary to protect coach equipment.

#### 2.1.8 PASSENGER DOORS

##### 2.1.8.1 Materials

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

##### 2.1.8.2 Dimensions

When open, the doors shall leave an opening no less than 84 inches in height. Front door opening width shall be no less than 34.5 inches with the doors fully opened. Rear door opening width shall be no less than 30 inches with the doors fully opened. Door opening widths may be reduced 3 inches on the sides of the extreme top and extreme bottom of each door opening. This 3-inch projection shall be reduced to 0 inches within 26 inches of the bottom and within 18 inches of the top. Allowable projection into the door opening is shown on Figure 11-4. Projections shall not form a hazard to passengers. The clear door opening widths, including door-mounted passenger assists or touch bars, shall be no less than 30 inches for the front door and 25 inches for the rear door.

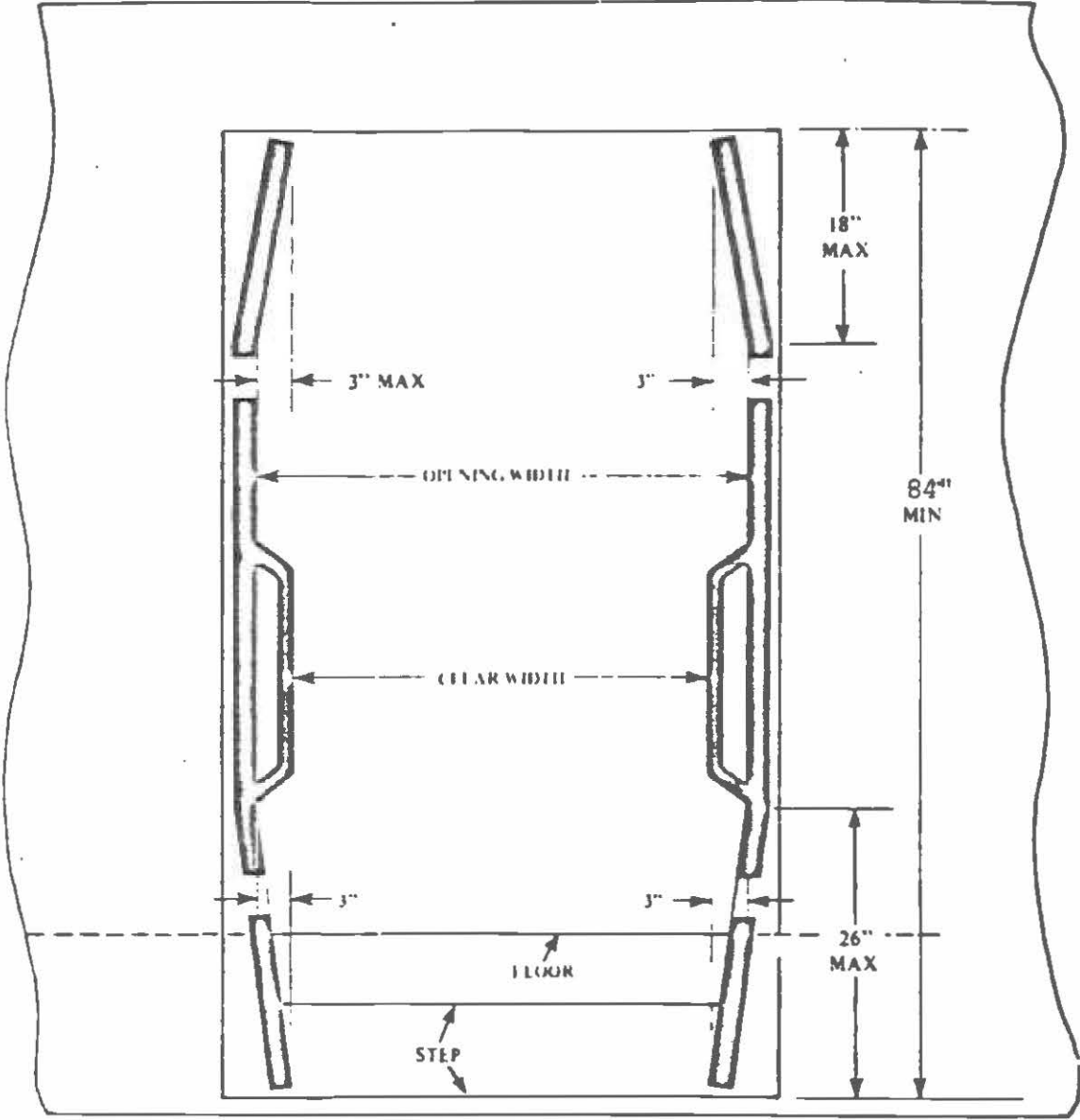


FIGURE II-4. TRANSIT COACH MINIMUM DOOR OPENING

### 2.1.8.3 Door Glazing

The upper section (1/2 door height) of both front and rear doors shall be glazed for no less than 45 percent of the respective door opening area of each section. The lower section of the front door shall be glazed for no less than 25 percent of the door opening area of the section. The edge of a 6-inch high curb shall be visible to the seated driver through the closed front door when the coach is no more than 12 inches from the curb.

### 2.1.8.4 Door Projection

Exterior projection of the doors shall be minimized and shall not exceed 13 inches during the opening or closing cycles or when doors are fully opened. Projection inside the coach shall not exceed 20 inches. The closing edge of each door panel shall have no less than 2 inches of soft weather stripping. The doors, when closed, shall be effectively sealed and the hard surfaces of the doors shall be at least 4 inches apart.

### 2.1.8.5 Door Height Above Pavement

It shall be possible to open and close either passenger door when the coach loaded to GVWR is not kneeled and parked with the tires touching an 8-inch high curb on a street sloping toward the curb so that the left side wheels are 5 inches higher than the right side wheels. The bottom edge of the doors shall be a minimum of 14-1/2 inches above the pavement in an opened or closed position.

## 2.1.9 SERVICE COMPARTMENTS AND ACCESS DOORS

### 2.1.9.1 Interior

Access for maintenance and replacement of equipment shall be provided by panels and doors that appear to be an integral part of the interior. Removal of fixtures or equipment unrelated to the repair task to gain access shall be minimized. Access doors shall be hinged with positively retained props, as necessary, to hold the doors out of the mechanic's way. Retention of all interior access panels, except on the door actuator compartments shall be with cross-recessed head screws. Panel fasteners shall be standardized so that only one tool is required to service all special fasteners within the coach. Access doors for the door actuator compartments shall be secured with hand screws or latches and shall prevent entry of mechanism lubricant into the coach interior. All fasteners that retain access panels shall be captive in the cover.

Access openings in the floor shall be sealed to prevent entry of fumes and water into the coach interior. Floor access openings shall be flush with the floor and shall be edge bound with stainless steel or black anodized aluminum to prevent the edges from coming loose. Access openings shall be nonsymmetrical so that the ribs of reinstalled flooring shall be properly aligned. Fasteners shall tighten flush with the floor.

### 2.1.9.2 Exterior

Conventional or pantograph hinged doors shall be used for the engine compartment and for all auxiliary equipment compartments including separate access doors for checking the quantity and adding to the engine coolant, engine lubricant, transmission fluid and the windshield washer reservoir. Access to these compartments shall be from outside the coach.

Access openings shall be sized for easy performance of tasks within the compartment including tool operating space. Access doors shall be of rugged construction and shall be capable of withstanding severe abuse throughout the life of the coach. They shall close flush with the surface. All doors shall be hinged at the top or on the forward edge and shall be prevented from coming loose or opening during transit service or in coach washing operations. Doors with top hinges shall have safety props stored behind the door or on the door frame. All access doors shall be retained in the open position by props or counterbalancing with overcenter or gas-filled springs. Springs and hinges shall be corrosion-resistant and shall last for the coach's service life. Latch handles shall be flush with, or recessed behind the body contour and shall be sized to provide an adequate grip for opening. Engine door shall be equipped with flush mounted T-handle type latches.

Large access doors shall hinge up and out of the way or fold flat against the coach body and shall be easily openable by one person. These doors, when opened, shall not restrict access for servicing other components or systems. Major access doors, except engine door, shall be equipped with locks requiring a nominal 5/16-inch, square end tool to open. The locks shall be standardized so that only one tool is required to open all major access doors on the coach. A counter-balance or spring system should operate large doors but, if not practicable, a powered assist device may be used, provided it is equipped with an emergency system to open the doors manually in less than 30 seconds. The emergency system shall be easily accessible and quickly operable by one person in the event of a power or air system failure or engine compartment fire.

The battery compartment shall prevent accumulation of debris on top of the batteries and shall be vented and self-draining. It shall be accessible only from outside the coach. The battery compartment and battery support hardware shall be stainless steel. The inside surface of the battery compartment's access door shall be electrically insulated, as required, to prevent the battery terminals short circuiting on the door if the door is damaged in an accident or if a battery comes loose.

## 2.2 OPERATING COMPONENTS

### 2.2.1 DOORS

#### 2.2.1.1 Control

Operation of, and power to, the passenger doors shall be completely controlled by the driver. Doors shall open or close completely in 1 to 1.5 seconds from the time of touch bar actuation and shall be subject to adjustment requirements of Section 2.2.1.3. A control or valve in the driver's compartment shall shut off the power to, and/or dump the power from, the front door mechanism to permit manual operation of the front door with the coach shut down. A master door switch, which is not within reach of the seated driver, shall when set in the "Off" position close and lock the rear doors, deactivate the rear door control system, release the interlocks and permit normal operation of the front doors. In the event of a front door electrical circuitry failure, the door must remain open or go to the open position. Pantographic type passenger doors are unacceptable.

To preclude movement of the coach, an accelerator interlock shall lock the accelerator in the closed position and a brake interlock shall engage a portion of the service brake system when the rear door control is activated. The braking effort shall be adjustable with hand tools only, from zero effort to the maximum capability of the brake system. The adjustment device shall be enclosed in a tamperproof housing, if located inside the coach.

Passenger-Controlled Rear Door. The rear door control shall be limited to unlocking and enabling the opening mechanism, which shall be signaled by illumination of a green light near the door. The door is actually opened by touching either of the rear door vertical passenger assists with a force of 5 to 10 pounds. The touch bars shall meet the general requirements for passenger assist size, strength and knuckle clearance defined in Section 2.6.3.1 and shall not self-activate if the coach is stopped with the left side 10 inches higher than the right side. The touch bar assists shall be located near the opened edge of the door panels and extend from 36 inches above the floor to within 36 inches of the street surface. The doors shall close when the touch bar is released.

If the doors are power-assist type, the doors shall close within 1 to 1.5 seconds from the fully opened position. If power operated, the doors shall close in 2.5 seconds. A separate switch, convenient to the driver, shall convert the rear door to a power door with both opening and closing controlled by the driver. If the door controls fail, the front doors must remain in an open position. The front doors shall remain open if the bus engine is shut off. Closed rear doors shall be locked by means of a positive mechanical device.



#### 2.2.1.2 Closing Force

No more than a 10 pound force shall be imposed on a 1-square inch area of any passenger struck by a closing rear door. A maximum force of 35 pounds shall be required for a passenger to free himself after having either door close upon him, even if the sensitive edge or safety device on the rear door is inoperative.

#### 2.2.1.3 Door Speed Control

Door opening and closing speeds shall be independently controlled by a pre-set orifice. Power assisted doors shall open and close in 1-1/2 seconds after actuation. Power operated doors shall open in 2 seconds and close in 2-1/2 seconds after actuation. Door mechanism shall be concealed from passengers but shall be easily accessible for servicing. All elements of the door and actuator system shall operate without a Class 3 failure for 50,000 miles in District revenue service. Door activator systems are subject to District approval.

#### 2.2.1.4 Emergency Operation

In the event of an emergency, it shall be possible to open the doors manually from inside the coach using a force of no more than 25 pounds after actuating an unlocking device at each door. The unlocking devices shall be clearly marked as an emergency only device and shall require two distinct actions to actuate. The door emergency unlocking device shall be accessible from the stepwell areas. When this emergency device is actuated the door interlock brake system shall apply to stop the coach.

Locked doors shall require a force of more than 100 pounds to open manually. When the locked doors are manually forced to open, damage shall be limited to the bending of minor door linkage with no resulting damage to the doors, engines, and complex mechanism.

#### 2.2.1.5 Roof Ventilators

The coach shall be designed to accommodate the installation of roof ventilators. Two ventilators shall be provided in the roof of the coach approximately over each axle. These ventilators shall be easily opened and closed manually by one person. When open with the coach in motion, these ventilators shall provide fresh air inside the coach. Each ventilator shall cover an opening area no less than 425 square inches and shall be capable of being positioned as a scoop with either the leading or trailing edge open no less than 4 inches, or with all four edges raised simultaneously to a height no less than 3 1/2 inches. An escape hatch shall be incorporated into the rear roof ventilator. When opened the escape hatch shall not become detached from the coach.

## 2.2.2 WINDSHIELD WIPERS AND WASHERS

### 2.2.2.1 Windshield Wipers

The coach shall be equipped with a variable speed windshield wiper for each half of the windshield with separate controls for each side. Exhaust from the wiper motors powered by compressed air, shall be muffled or piped under the floor of the coach. No part of the windshield wiper mechanism shall be damaged by manual manipulation of the arms. At 60 mph, no more than 10 percent of the wiped area shall be lost due to windshield wiper lift. Both wipers shall park along the edges of the windshield glass. Windshield wiper motors and mechanisms shall be easily accessible for repairs or service from inside or outside the coach and shall be removable as complete units.

### 2.2.2.2 Windshield Washers

The windshield washer system shall deposit washing fluid on the windshield and, when used with the wipers, shall evenly and completely wet the entire wiped area. Compressed air shall purge all fluid from the lines after each use of the washers.

The windshield washer system shall have a minimum 2-gallon reservoir, located for easy refilling from outside of the coach. Reservoir pumps, lines and fittings shall be corrosion-resistant, and the reservoir itself shall be translucent for easy determination of fluid level if visible, or a fluid level indicator shall be provided.

## 2.2.3 LIGHTING, CONTROLS, INSTRUMENTS

### 2.2.3.1 Exterior Lighting

All exterior lights shall be sealed to prevent entry and accumulation of moisture or dust, and each lamp shall be replaceable in less than 5 minutes by a 2M mechanic. Lights mounted on the engine compartment doors shall be protected from the impact shock of door opening and closing. Lamps, lenses and fixtures shall be interchangeable to the extent practicable. Lamps at the rear of the coach shall be visible from behind when the engine service doors are opened.

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

Lamps at the front and rear doors shall activate only when the doors open and shall illuminate the street surface to a level of no less than 1 foot-candle for a distance of 3 feet square outward from the lowest step tread edge. The lights may be positioned above or below the lower daylight opening of the windows and shall be shielded to protect passengers' eyes from glare.

Turn signal lights shall be provided at front, rear and sides of bus. Front side turn signal lights shall be located in standard position near front wheel housing.

Clearance lamps shall be provided at each bus corner to delineate bus height in accordance with Title 13 of the California Administrative Code Section 641. These four corner lamps shall be equipped with dual-filament bulbs. The three candlepower filament shall be lighted when the bus headlights are lit. The thirty-two candlepower filament shall be connected through a silent type electronic flasher unit to a switch located on the left side of the operator's control panel. This crime alarm lighting system is authorized under Section 25275.5 of the California Vehicle Code and an agreement with the District's operator's union. Exact switch location and type shall be subject to District approval.

Micro switch, Part No. 4TL 1-3 is a District standard for the silent alarm system switch. The crime alarm activation switch shall be mounted on control panel located to left of seated driver. Switch shall be protected with black, spring loaded cover. Mounting of the SAS switch is subject to District approval.

#### 2.2.3.2 Service Area Lighting

Lights shall be provided in the engine compartment to generally illuminate the area for night emergency repairs or adjustments. The lights shall be controlled by a switch located near the rear start controls in the engine compartment. Necessary lights, located in other service compartments, shall be provided with momentary contact switches on the light fixture or convenient to the light.

#### 2.2.3.3 Passenger Interior Lighting

An overhead fluorescent lighting system shall provide general illumination in the passenger compartment and shall be controlled independent of the master run switch. The system shall provide no less than 15 foot-candles of illumination on a 1-square foot plane at an angle of 45 degrees centered 33 inches above the floor and 24 inches in front of the seat back at each seating position except at the rear cross seat where the illumination may be decreased to 7 foot candles.

Floor surface in the aisle shall be illuminated at no less than 10 foot candles. The floor surface in the vestibule shall be illuminated to no less than 4 foot candles with the front door open and to no less than 2 foot candles when the front door is closed. Fluorescent light fixtures shall be located above the side windows at or near the juncture of the coach ceiling and the side wall and may be provided over the rear door. Fluorescent lighting shall not be installed above the driver's side window and the front door. Lamp fixtures and lenses shall be fire-resistant and shall not drip flaming material onto seats or interior trim if burned.

Advertising media located in this area shall be illuminated by direct lighting. Interior lighting requirements shall be attained with advertising media installed. The fixtures shall be sealed to prevent accumulation of dust and insects but shall be easily openable on hinges for cleaning and service. The lenses shall be retained in a closed position and if threaded fasteners are used, they must be captive in the lens with cross-recessed type heads. Power supplies shall be enclosed with fire-proof material and shall be located at the individual light fixtures. Power supplies shall be inaudible with an operating frequency above 18,000 Hz. Interchangeability of fluorescent lamps, lenses, fixtures, and power supplies shall be maximized.

In addition to the features specified in this section, the District further requires that the contractor modify the master run switch and the interior passenger lighting control switch to achieve the following:

1. All interior passenger lights are on when the master run switch is in the "Nite/Run" position.
2. Only the curb side interior passenger lights are on when the master run switch is in the "CL/ID" position.

A stepwell lighting system shall be illuminated when the master run switch is in "RUN" and "NITE/RUN", except the front stepwell lamps which shall be extinguished when the front doors are closed. The system shall provide no less than 2 foot candles of illumination on the entry and exit step treads with the doors open. These lights shall be shielded to protect passengers' eyes from glare. Light fixtures shall be totally enclosed, splashproof, designed to provide ease of cleaning as well as lamp and housing removal, and shall not be easily removable by passengers. Stepwell lights shall be protected from damage caused by passengers kicking lenses or fixtures and shall not be a hazard to passengers.

#### 2.2.3.4 Driver's Lighting

The driver's area shall have a light to provide general illumination and it shall illuminate the half of the steering wheel nearest the driver to a level of 10 to 15 foot candles. This light shall be controlled by a switch that is convenient to the driver.

#### 2.2.3.5 Driver Controls

All switches and controls necessary for the operation of the coach shall be conveniently located in the driver's area and shall provide for ease of operation. Switches and controls shall be essentially within the hand reach envelope described in SAE Recommended Practice, J287, Driver Hand Control Reach. Controls shall be located so that boarding passengers may not easily tamper with control settings.

Accelerator and brake pedals shall be designed for ankle motion, subject to District approval. Foot surfaces of the pedals shall be faced with wear-resistant, nonskid, replaceable material. Pedal travel shall be limited by stops under the pedals.

Controls for engine operation shall be closely grouped within the driver's compartment. These controls include separate master run switch and start switch or button. The master run switch shall be a four position rotary switch with the following functions:

OFF-All electrical systems off, except power available for the passenger interior lighting, turn lights, hazard lights, silent alarm, horn and fare box.

CL/ID-All electrical systems off, except those listed in OFF and power to radio and marker lights.

RUN-All electrical systems and engine on, except the headlights, parking lights, and marker lights.

NITE/RUN-All electrical systems and engine on.

The door control, kneel control, windshield wiper/washer controls, and run switch shall be in the most convenient driver locations. They shall be identifiable by shape, touch, and markings. Doors shall be operated by a single control, conveniently located and operable in a horizontal plane by the driver's left hand. The setting of this control shall be easily determined by position and touch. Turn signal controls shall be floor-mounted, left foot-controlled, waterproof, heavy-duty, momentary contact switches.

All switches and controls shall be marked with easily read identifiers. All panel-mounted switches and controls shall be replaceable, and the wiring at these controls shall be serviceable from the vestibule or the driver's seat. Switches, controls, and instruments shall be dust and water-resistant consistent with the coach washing practice described in Section 2.3.1.

#### 2.2.3.6 Instrumentation

The speedometer, air pressure gauge(s), and certain indicator lights shall be located on the front cowl immediately ahead of the steering wheel. The steering wheel spokes or rim shall not obstruct the driver's vision of the instruments when the steering wheel is in the straight-ahead position. Illumination of the instruments shall be simultaneous with the marker lamps. Glare or reflection in the windshield, side window, or front door windows from the instruments, indicators, or other controls shall be minimized. Instruments and indicators shall be easily readable in direct sunlight. Driver control area shall include the following identified switches and lights which are readily and visibly accessible:

## SWITCHES

Master run switch  
Start button or switch  
Kneel switch  
Turn signal switch(es)  
Interior lighting switch  
Instrument panel lighting intensity control  
Passenger chime switch  
Driver's area light switch  
Hazard warning switch  
Horn button in steering wheel hub, protected to preclude accumulation debris such as transfer punches in steering wheel hub (no identifier required)  
Foot-controlled headlight dimmer switch, waterproof (no identifier required)  
Fast idle switch  
Diagnostic light panel test switch(es)  
Emergency stop switch (guarded)  
Motor guard  
Wheelchair lift switches as required

## CONTROLS AND INDICATORS

Accelerator pedal  
Brake pedal  
Door control  
Master Door Switch  
Windshield wipers  
Windshield washers  
Interior climate control  
Defroster control  
Driver's heater control  
Parking emergency brake control (actuation of brake, not control, shall be indicated to the driver)  
Front door dump valve  
Transmission control  
Public address system controls  
Destination sign controls  
Indicator Lights (Diagnostics)  
High headlamp beam  
Right turn  
Left turn  
Hazard warning (may be common with turn signal indicators)  
Exit door open or unlocked  
Parking brake applied  
Service brakes applied (may be common with parking brake indicator)  
Engine Protection System (Low coolant, lubricant, excessive temperature)

Transmission Protection System (Low lubricant)  
Low Fuel Indicator  
Stop Request

The instrument panel shall include a speedometer indicating up to 80 mph and calibrated in maximum increments of 5 mph. The speedometer shall be a rotating pointer type, with a dial deflection of 220 degrees to 270 degrees and 40 mph near the top of the dial. It shall be equipped with an odometer with a capacity reading no less than 999,999 miles. The speedometer shall be sized and accurate in accordance with SAE Recommended Practice J678. The instrument panel shall also include air brake reservoir pressure gauge(s) with indicators for primary and secondary air tanks. Also included on the instrument panel shall be a dial type fuel level gauge indicating fuel level with minimum 1/4 tank increments from fuel to empty. This gauge shall be calibrated to show empty with approximately 15 gallons of usable fuel remaining. The instrument panel and wiring shall be easily accessible for service from the driver's seat or top of the panel. Wiring shall have sufficient length and be routed to permit service without stretching or chafing the wires.

#### 2.2.3.7 Onboard Diagnostics

Critical systems or components shall be monitored with a built-in diagnostic system. This diagnostic system shall have visual and audible indicators. The diagnostic indicator lamp panel shall be located in clear sight of the driver but need not be immediately in front of him. The intensity of indicator lamps shall permit easy determination of on/off status in bright sunlight but shall not cause a distraction or visibility problem at night. All indicators shall have a method of momentarily testing the operation of the lamp. Wherever possible, sensors shall be of the closed circuit type, so that failure of the circuit and/or sensor shall activate the malfunction indicator. An audible alarm shall be loud enough for the driver to be aware of its operation and to be inclined to discontinue operation of the coach. Malfunction and other indicators listed in Figure II-6 shall be supplied on all coaches.

Space shall be provided on the panel for future additions of no less than 5 indicators as the capability of onboard diagnostic systems improves.

VISIBLE INDICATOR	AUDIBLE ALARM	FUNCTION
Low oil pressure	Yes	Engine oil pressure low
Hot engine*	Yes	Engine coolant temperature high
Low air	Yes	Air system pressure low in primary or secondary reservoirs
Low coolant*	Yes	Radiator water level low
Charging System(s) stop	No	Alternator not charging
Kneel	No	Kneeling system activated
Low engine oil level	Yes	Engine oil level low failure (if applicable)
A/C stop	No	Compressor off at high/low switch (if applicable)
Fire	Yes [This alarm shall be a bell, separate from the other audible alarm(s)]	Overtemperature in engine compartment (Section 3.6.5.4.)
Low fuel	No	Indicates low fuel condition
Engine emergency stop	Yes	Engine protection system
Low transmission oil level	Yes	

\*Indicators may be common. However, both functions shall be provided.



## 2.3 INTERIOR TRIM

### 2.3.1 GENERAL REQUIREMENTS

The interior shall be generally pleasing - simple, modern and free from superficial design motifs. It shall have no sharp depressions or inaccessible areas and shall be easy to clean and maintain. To the extent practicable, all interior surfaces more than 10 inches below the lower edge of the side windows or windshield shall be shaped so that objects placed on them fall to the floor when the coach is parked on a level surface. The entire interior shall be cleanable with a hose, using a liquid soap attachment. Water and soap should not normally be sprayed directly on the instrument and switch panels. Handrails, lights, air vents, armrests, and other interior fittings shall appear to be integral with the coach interior. There shall be no sharp, abrasive edges and surfaces and no unnecessary hazardous protuberances. All plastic and synthetic materials used inside the coach shall be fire resistant except vinyl seat coverings which shall meet the requirements of Federal Specification CCC-A 680a Class 2(a)1 and seating upholstery textiles which shall meet the requirements for textiles in Federal Aviation Regulations 25.853(b), as tested in accordance with Appendix F of that part.

Materials shall be selected on the basis of maintenance, durability, appearance, safety, flammability, and tactile qualities. Trim and attachment details shall be kept simple and unobtrusive. Materials shall be strong enough to resist everyday abuse and vandalism; they shall be resistant to scratches and markings. Interior trim shall be secured to avoid resonant vibrations under normal operational conditions.

#### 2.3.1.1 Trim Panels

Interior side trim panels shall be textured stainless steel, anodized aluminum, or plastic melamine type material. It shall permit easy removal of paint, greasy fingerprints, and ink from felt tip pens. Panels shall be easily replaceable and tamper-resistant. They shall be reinforced, as necessary, to resist vandalism and other rigors. Interior mullion trim, moldings, and trim strips shall be plastic, textured stainless steel, or anodized aluminum. Individual trim panels and parts shall be interchangeable to the extent practicable.

Side panels and modesty panels below bus windows shall be of laminated plastic Formica Bookmatched 232(-64) or Consoweld Dura Beauty, Select Walnut W-46-T or approved equal.

#### 2.3.1.2 Headlining

Headlining shall be of a laminated plastic such as Formica Gemina, White 749(-30) or Consoweld Dura Beauty Antique White Cantina C-25T or approved equal. Headlining shall be supported to prevent buckling, drumming, or flexing and shall be secured without loose edges. Headlining

materials shall be treated or insulated to prevent marks due to condensation where panels are in contact with metal members. Moldings and trim strips, as required to make the edges tamperproof, shall be stainless steel, aluminum, or plastic, colored to complement the ceiling material. Headlining panels covering operational equipment that is mounted above the ceiling shall be on hinges for ease of service but retained to prevent inadvertent opening.

#### 2.3.1.3 Front End

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

#### 2.3.1.4 Rear End

Rear bulkhead and rear interior surfaces shall be paneled with the same material or approved equal as used in the trim panels.

#### 2.3.1.5 Passenger Information and Advertising

An aluminum frame, provided by the contractor, to retain information sized 15-3/4 inches wide, 13 inches high posted by the District, such as routes and schedules shall be mounted to the rear of the driver's barrier, subject to District approval. Finish to be bronze anodized.

Advertising media 11 inches high and 0.09 inches thick shall be retained near the juncture of the coach ceiling and side wall. The retainers may be concave and shall support the media without adhesives. The media shall be illuminated by the interior fluorescent lighting system.

### 2.3.2 PASSENGER SEATS

#### 2.3.2.1. Arrangements

Passenger seats forward of the exit door shall be arranged in a transverse, forward facing configuration, except at the wheel housings where seats may be arranged as appropriate with due regard for passenger access and comfort. Perimeter seating shall be provided rearward of the exit door.

Seating capacity with this arrangement shall be no less than 46. Hip-to-knee room, measured from the front of one transverse, seat back

cushion horizontally across the highest part of the transverse seat or panel immediately in front, shall be no less than 27.5 inches. Foot room, measured at the floor forward from a point vertically below the front of the seat cushion, shall be no less than 14 inches. Seats immediately behind the wheel housings may have foot room reduced, provided the wheel house is shaped so that it may be used as a footrest.

Each transverse, forward facing seat, except the rear seats, shall accommodate two adult passengers. Thickness of the transverse seat backs shall be minimized to increase passenger knee room and coach capacity. The area between the longitudinal seat backs and the attachment to the coach side walls shall be enclosed to prevent debris accumulation.

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

#### 2.3.2.2 Structure and Design

The passenger seat frame and its supporting structure shall be constructed and mounted so that space under the seat is maximized to increase wheelchair maneuvering room and is completely free of obstructions. The structure may be pedestal mount or fully cantilevered from the side wall with sufficient strength for the intended service. The lowest part of the seat assembly that is within 12 inches of the aisle shall be at least 10 inches above the floor. The underside of the seat and the side wall shall be configured to prevent debris accumulation and the transition from the seat underside to the coach side wall to the floor cove radius shall be smooth. All transverse objects, including seat backs, modesty panels, and longitudinal seats, in front of forward facing seats shall not impart a compressive load in excess of 1,000 pounds onto the femur of passengers ranging in size from a 5th-percentile female of a 95th-percentile male during a 10g deceleration of the coach. This deceleration shall peak at  $.05 + .015$  seconds from initiation. Permanent deformation of the seat resulting from two 95th-percentile males striking the seat back during this 10g deceleration shall not exceed 2 inches, measured at the aisle side of the seat. Structural failure of any part of the seat or side wall shall not introduce a laceration hazard.

The back of each transverse seat shall incorporate a handhold no less than  $7/8$  inches in diameter for standees and seat access/egress. The handhold shall not be a safety hazard during severe decelerations. The handhold shall extend above the seat back near the aisle so that standees shall have a convenient vertical assist, no less than 4 inches long that may be grasped with the full hand. This handhold shall not cause a standee using this assist to interfere with a seated 50th-percentile male passenger. The handhold shall also be usable by a 5th-percentile female, as well as by larger passengers, to assist with seat access/egress for either transverse seating position. The seat back handhold may be deleted from seats that do not have another transverse seat directly behind and where a vertical assist is provided in accordance with Section 2.6.3. Armrests shall not be included in the design of transverse seats.

Longitudinal seats shall be the same general design as transverse seats but without seat back handholds. Longitudinal seats may be mounted on the wheelhouses. Armrests shall be included on the ends of each set of longitudinal seats except on the forward end of a seat set that is immediately to the rear of a transverse seat, the driver's barrier or a modesty panel and these fixtures perform the function of restraining passengers from sliding forward off the seat. Armrests are not required on longitudinal seats located in the wheelchair parking area that fold up when the armrest on the adjacent fixed longitudinal seat is within 1 1/2 to 3 1/2 inches of the end of the seat cushion. Armrests shall be located from 7 to 9 inches above the seat cushion surface. The area between the armrest and the seat cushion shall be closed by a barrier or panel and shall be constructed and trimmed to complement the modesty panels. The top and sides of the armrests shall have a minimum width of 2 inches and shall be free from sharp protrusions that form a safety hazard. Soft padded arm rests shall not be utilized.

Seat back handholds and armrests shall withstand static horizontal and vertical forces of 250 pounds applied anywhere along their length with less than 3/4-inch permanent deformation. Seat back handholds and armrests shall withstand 25,000 impacts in each direction of a horizontal force of 125 pounds with less than 1/4-inch permanent deformation and without visible deterioration.

#### 2.3.2.3 Construction and Materials

Seats installed rearward of the exit door shall be non-padded fiberglass, polycarbonate, or nylon and shall be attached to the frame with tamperproof fasteners. Coloring shall be consistent throughout the seat material, with no visually exposed portion painted. All visually exposed metal of the standard seat structure including mounting brackets and other components shall be stainless steel. The seats shall be contoured for individuality, lateral support, and maximum comfort and shall fit the framework to reduce exposed edges. The seat back thickness shall not exceed 1/4-inch in the knee room area. The seat forward of a seated passenger shall absorb energy in a severe crash by allowing the passenger's knees to deform the seat back in accordance with the requirements of Section 2.3.2.2. Complete seat assemblies shall be interchangeable to the extent practicable.

Cushioned seats shall be installed from the exit door area forward. Seating and interior trim shall have features to maximize safety, comfort, and capacity. At other seating positions hip-to-knee room shall be no less than 27.5 inches. The seat bottom cushion shall be supported by springs. The seat cushion and back shall be padded with neoprene foam, or material with equal properties subject to District approval, no less than 2 inches thick in areas contacted and loaded by passengers in the normal seated position and shall be upholstered with vinyl and fabric materials. Springs and cushions shall be shaped for individuality, lateral support, and comfort.

The upper rear portion of the seat back, the seat back handhold, and the upper rear surface of the modesty panels located immediately forward of transverse seats shall be padded and/or constructed of energy

absorbing materials to provide passenger head protection. Protection shall be afforded to passengers ranging in size from a 6-year old child to a 95th-percentile male to prevent head injury of more than 400 HIC during the 10g deceleration of Section 2.3.2.2. The minimum radius of equipment in any portion of the head or chest impact zone shall be a nominal 1/4-inch. Armrests shall be padded with material that is the same as, or similar to, the seat back padding and handholds. Color of the padding shall complement the other interior materials. Seats, back cushions, and other pads shall be securely attached and shall be detachable by means of a simple release mechanism employing a special tool so that they are easily removable by the maintenance staff but not by the passengers. To the extent practicable, seat cushions and pads shall be interchangeable throughout the coach and the pad coloring shall be consistent throughout the materials. All material and workmanship shall conform to SPI standards and specifications in tests for plastic foam. The material shall have high resistance to tearing, flexing, and wetting.

Crash requirement shall be met without the use of readily vandalized material or pads on the back portion of the seat.

Seat cushion and backs shall be individual and easily removed for maintenance.

Cushioned seats shall be upholstered as follows:

Seats shall be covered with woven fabric and shall have a 6" wide vinyl panel at the top of the seat back and at the front of the seat cushion. The vinyl trim shall be Uniroyal Naugahyde Ebony Brown, DOE grain RTD-3978 or approved equal.

Fabric panels shall be Craftex pattern K8758N/69411 or approved equal.

Neoprene foam cushions and backs shall be provided. Specified seat covering materials and neoprene foam cushions are District standard.

Non-padded seat colors shall be coordinated with cushioned seat fabric colors, subject to District approval.

<u>Manufacturer</u>	<u>Location</u>	<u>Seat Type</u>	<u>Model No.</u>
1. American Seating	a.	Forward Facing (cushion)	6466
	b.	Standard Seat	6468
2. Coach and Car	a.	Forward Facing (cushion)	298 Alt. 2
	b.	Standard Seat	300

### 2.3.3 DRIVER'S SEAT

#### 2.3.3.1 Dimensions

Driver's seat shall be latest model National air-ride, low back type with heavy duty shock absorbers.

Seat shall be comfortable and adjustable so that persons ranging in size from the 95th-percentile male to the 5th-percentile female may operate the coach. The driver's seat cushion shall have a minimum width of 18 inches, a length of 16 to 18 inches, and rearward slope of 5 degrees. The driver's seat back height, measured from the point of intersection of the uncompressed seat cushion to the top of the seat back, shall be 20 + 2 inches. The angle formed between the seat back and the seat cushion shall be adjustable in the range of 95 to 110 degrees. Height of the seat shall be adjustable so that the distance between the top of the uncompressed seat cushion and the floor may vary between 17 and 21 inches with the seat in the forward position, the distance from the center of the steering wheel to the seat back shall be no less than 23 inches. The seat shall be adjustable for a minimum travel of 6 inches. While seated, the driver shall be able to make all of these adjustments by hand without complexity, excessive effort, or being pinched. Adjustment mechanisms shall hold the adjustments and shall not be subject to inadvertent changes.

#### 2.3.3.2 Structure and Materials

The driver's seat shall be contoured to provide maximum comfort for extended period of time. Cushions shall be fully padded with at least 3 inches of neoprene foam, or material with equal properties subject to District approval, in the seating areas at the bottom and back. Upholstery shall be ventilated. All visually exposed metal on the driver's seat, including the pedestal, shall be unpainted stainless steel. Required seat belts shall be fastened to the seat so that the seat may be adjusted by the driver without resetting the seat belt. Seat belts shall be stored in automatic retractors. The driver's seat shall be cushioned supplementally by an air cylinder or air diaphragm. These devices may also provide the seat height adjustments. Damping shall be provided as required. Driver's seat shall be upholstered in same vinyl material as used on passenger seats.

#### 2.3.4 FLOOR COVERING

##### 2.3.4.1 Vestibule

The floor in the vestibule shall be covered with 5/16-inch, nonskid, ribbed black, rubber composition material that remains effective in all weather conditions. The floor covering, as well as transitions of flooring material to the main floor and to the stepwell area shall be smooth and present no tripping hazards. Floor covering ribs shall run transversely in line with the entrance, longitudinally in line with the aisle, and shall be joined smoothly and matched in 45 degrees mitered joints. The integrally molded yellow standee line shall be at least 2 inches wide and shall extend across the coach aisle in line with the driver's barrier. Color shall be consistent throughout the floor covering.

##### 2.3.4.2 Driver's Compartment

The floor in the driver's compartment shall be easily cleaned and shall be arranged to prevent debris accumulation. Any floor coverings shall be 3/16-inch thick, ribbed surface, heavy-duty, rubber composition material. Color of the driver's floor covering shall be the same as the

vestibule.

#### 2.3.4.3 Passenger Area

The floor in the passenger area shall be covered with black nonskid rubber composition material that remains effective in all weather conditions. A one-piece center strip shall extend from the rear seat between the aisle sides of transverse seats to the standee line. The covering between the center strip and the wheel housings may be separate pieces. The material shall be 3/16-inch thick in the aisle section and longitudinally-ribbed. At the rear door, however, a separate transversely-ribbed strip as wide as the door shall extend from the center strip to the top step.

The floor under the seats shall be covered with 1/8-inch thick, smooth surface flooring material. The floor covering shall closely fit the sidewall cove or extend to the top of the cove. Color of the floor covering in the passenger compartment shall be the same as that in the vestibule.

#### 2.3.4.4 Wheelchair Parking Space Flooring

The wheelchair parking area floor shall be covered with 3/16-inch thick, longitudinally-ribbed rubber flooring material. The rubber flooring shall be applied to the wheelchair parking spaces so that the ribs run perpendicularly to the center aisle.

## 2.4 WINDOWS

### 2.4.1 DRIVER'S WINDOWS

#### 2.4.1.1 Windshield

The windshield shall permit a driver's field of view as referenced in SAE Recommended Practice J1050. The vertically upward view shall be a minimum of 15 degrees, measured above the horizontal and excluding any shaded band. The vertically downward view shall permit detection of an object 3 1/2 feet high no more than 2 feet in front of the coach. The peripheral view shall be a minimum of 90 degrees about the line of sight. Any binocular obscuration due to a center divider may be ignored when determining the 90 degree requirement provided that the divider does not exceed a 3 degree angle in the driver's field of view. Windshield pillars shall not exceed 10 degrees of binocular obscuration. The windshield shall be designed and installed to minimize external glare as well as reflections from inside the coach. When the coach is operated at night with the passenger interior lighting on, essentially no reflections shall be visible in the windshield immediately forward of the driver's barrier. Reflections in the remainder of the windshield shall be minimized, and no reflection of any part of the coach interior behind the driver's barrier shall be visible in the windshield. Windshield glare shall be subject to the approval of the California Highway Patrol.

The windshield shall be easily replaceable by removing zip-locks from the windshield retaining moldings. Bonded-in-place windshields shall not be used. The glazing material shall have single density tint. The upper portion of the windshield above the driver's field of view shall have a dark, shaded band with a minimum luminous transmittance of 6 percent when tested in accordance to ASTM D-1003.

#### 2.4.1.2 Driver's Side Window

The driver's side window shall open sufficiently to permit the seated driver to easily adjust the left outside rearview mirror. This window section shall slide rearward a nominal 5 inches full height in tracks or channels designed to last the service life of the coach full height. The driver's side window shall not be bonded in place and shall be easily replaceable. The glazing material shall have a single density tint.

Any driver's side window glass area above the sunvisor in the lowered position shall be tinted to the same degree as the shaded band on the windshield.

### 2.4.2 SIDE WINDOWS

#### 2.4.2.1 Dimensions

Side windows shall extend from the shoulder height of a 5th-percentile, seated, female passenger to the eye level of a 95th-percentile, standing male passenger. Vertical mullions between windows including the trim shall not exceed 7 inches in width. All side windows shall be easily replaceable without disturbing adjacent windows and



shall be mounted so that flexing or vibration from engine operation or normal road excitation is not apparent.

The side windows shall open in sections sliding forward and rearward. The sliding portion of the window shall open no more than a nominal six inches. The windows shall be retained in the closed or stationary position by an anodized aluminum latch.

Slide open windows shall provide a minimum clear opening of three square feet at the rear of the coach to provide air flow for the cyclone cleaning process.

#### 2.4.2.2 Materials

Side window plastic glazing material shall have a 1/2-inch nominal thickness. The material shall conform with the requirements of ANSI Z26.1-1977 Standard for Type AS-5 Safety Glazing Materials except for Test Number 17 which shall subject the specimens to 1000 cycles and the arithmetic mean of the percentages of light scattered shall not exceed 5 percent. Windows on the coach sides and in the rear door shall be tinted a neutral color, complementary to the coach exterior, subject to District approval. The maximum solar energy transmittance shall not exceed 37 percent, as measured by ASTM E-424, and the luminous transmittance shall be no less than 16 percent as measured by ASTM D-1003. Plastic glazing is exempt from the interior trim flammability requirement of Section 2.3.1.

The glazing material for the front and side destination sign shall be clear safety glass.

### 2.5 INSULATION

#### 2.5.1 MATERIAL

##### 2.5.1.1 Properties

Any insulation material used between the inner and outer panels shall be fire-resistant and sealed to minimize entry of moisture and to prevent its retention in sufficient quantities to impair insulation properties. Insulation properties shall be unimpaired by vibration compacting or settling during the life of the coach. The insulation material shall be nonhygroscopic and resistant to fungus and breeding of insects. Any insulation material used inside the engine compartment shall be fire-resistant and shall not absorb or retain oil or water.

## 2.5.2 PERFORMANCE

### 2.5.2.1 Thermal Insulation

The combination of inner and outer panels on the sides, roof, and ends of the coach, and any material used between these panels shall provide a thermal insulation sufficient to meet the interior temperature requirements of Part II: Technical Specifications. The coach body shall be thoroughly sealed so that drafts cannot be felt by the driver or passengers during normal operations with the passenger doors closed.

### 2.5.2.2 Sound Insulation

The combination of inner and outer panels and any material used between them shall provide sufficient sound insulation so that a sound source with a level of 80 dBA measured at the outside skin of the coach shall have a sound level of 65 dBA or less at any point inside the coach. These conditions shall prevail with all openings, including doors and windows, closed and with the engine and accessories switched off.

The coach-generated noise level experienced by a passenger at any seat location in the coach shall not exceed 83 dBA and the driver shall not experience a noise level of more than 75 dBA under the following test conditions. The coach shall be empty except for test personnel, not to exceed 4 persons, and the test equipment. All openings shall be closed and all accessories shall be operating during the test. The coach shall accelerate at full throttle from a standstill to 60 mph on level commercial asphalt or concrete pavement in an area free of large reflecting surfaces within 50 feet of the coach path. During the test, the ambient noise level in the test area shall be at least 10 dBA lower than the coach under test. Instrumentation and other general requirements shall conform to SAE Standard J366. If the noise contains an audible discrete frequency, a penalty of 5 dBA shall be added to the sound level measured.

## 2.6 ANCILLARY FEATURES

### 2.6.1 DRIVER'S AREA

#### 2.6.1.1 Dash Panels

To the extent practicable, areas that are visible from outside the coach in the vicinity of the dash panel and cowl shall be configured to preclude use for storage of items.

#### 2.6.1.2 Visors

Adjustable sun visors shall be provided for concurrent use on both the driver's side of the windshield and the driver's side window. Visors shall be shaped to minimize light leakage between the visor and windshield pillars. Visors shall store out of the way and shall not obstruct air flow from the climate control system or interfere in the operation of other equipment such as the radio handset or the destination control, etc. Deployment of the visors shall not restrict vision of the rearview mirrors.

Visor adjustments shall be made easily by hand with positive locking and releasing devices and shall not be subject to damage by overtightening. Sun visor construction and materials shall be strong enough to resist breakage during adjustments. Visors shall not be transparent. Visors, when deployed, shall be effective in the driver's field of view simultaneously at all angles more than 5 degrees above the horizontal.

#### 2.6.1.3 Exit Signal

A passenger chime signal audible to the driver and to passengers anywhere inside the coach shall be provided. The chime shall have pull cords that are convenient to seated passengers, standees, and passengers standing at the rear door. Standees shall be able to easily reach the chime signal located near the passenger interior lighting fixtures. Push buttons may be provided on all vertical window mullions for the convenience of seated passengers and passengers at the rear door. A driver-controlled switch shall deactivate the chime system. A vertical pull cord shall be provided adjacent to each wheelchair riding position, subject to District approval.

Contractor shall supply a "Stop Requested" sign which shall be illuminated when the passenger chime exit signal is activated. Sign signal shall remain illuminated until one or both passenger doors are opened. The sign shall normally appear white when illuminated, the sign letters shall be white on a red background. The passenger chime shall sound only when the sign is first illuminated. The sign shall be mounted on the extreme front center of the ceiling panel in a position visible to the seated driver and seated passengers. An indicator light on the dash panel shall be provided and activated when the stop request sign illuminated.

#### 2.6.2 MIRRORS

##### 2.6.2.1 Outside Mirrors

The coach shall be equipped with a corrosion-resistant, outside rearview mirror with 1/4" plate glass mirror and metal mounting stud on each side of the coach subject to District approval. Mirrors shall permit the driver to view the highway along both sides of the coach, including the rear wheels. Mirrors shall be firmly attached to coach to prevent vibration and loss of adjustment, but not so firmly attached that the coach or its structure is damaged when the mirror is struck in an accident. The right side rearview mirror shall be mounted so that its lower edge is no less than 80 inches above the street surface. Mirrors shall retract or fold sufficiently to allow coach washing operations. The right side mirror shall be mounted on the front windshield/front door area structure and not on the front passenger door. It shall provide visibility of the mirror through the right side of the windshield.

##### 2.6.2.2 Inside Mirrors

Mirrors shall be provided for the driver to observe passengers throughout the coach without leaving his seat and without shoulder movement. A mirror above the front stepwell, for use by the operator in determining that the front door is clear of passengers, shall be provided.

With a full standee load, including standees in the vestibule, he shall be able to observe passengers in the front and rear stepwells, anywhere in the aisle, and in the rear seats. Inside mirrors shall not be in the line of sight to the right outside mirror.

#### Approved Mirrors

Exterior: Rosco - No. 8805 TQ (right and left side)  
Interior: Rosco - No. 416 Driver's Mirror  
Acme  
Speciality - No. 1653  
Exit Door: Rosco - No. 2066-380 12" Mirror  
No. 2159-608 6" Mirror

### 2.6.3 PASSENGER ASSISTS

#### 2.6.3.1 General Requirements

Passenger assists in the form of full grip, vertical stanchions or handholds shall be provided for the safety of standees and for ingress/egress. Passenger assists shall be convenient in location, shape, and size for both the 95th-percentile male and the 5th-percentile female standee. Starting from the entrance door and moving anywhere in the coach and out the exit door, a vertical assist shall be provided either as the vertical portion of seat back assist (see Section 2.3.2.3) or as a separate item so that a 5th-percentile female passenger may easily move from one assist to another using one hand and the other without losing support. Excluding those mounted on the seats and doors, the assists shall be between 1 1/4 and 1 1/2-inches in diameter or width with radii no less than 1/2 inch. All passenger assists shall permit a full hand grip with no less than 1 1/2-inches of knuckle clearance around the assist, except the assists mounted on the door panels which shall have no less than 1 inch of knuckle clearance. A crash resulting in a 1-foot intrusion shall not produce sharp edges, loose rails, or other potentially dangerous conditions associated with a lack of structural integrity of the assist. Any joints in the assist structure shall be underneath supporting brackets and securely clamped to prevent passengers from moving or twisting the assists. Assists shall withstand a force of 300 pounds applied over a 12-inch linear dimension in any direction normal to the assist without permanent visible deformation. Brackets, clamps, screw heads, and other fasteners used on the passenger assists shall be flush with the surface and free of sharp edges. Assists that are handled by passengers including functional components used as passenger assists, shall be of stainless steel or PVC over metal base. All assists located forward of the seated operator shall be black PVC coated. PVC coating shall be black and 3 mil minimum. PVC covering is available from "Tube Craft, Inc.", 1311 West 80th Street, Cleveland, Ohio.

#### 2.6.3.2 Front Doorway

Front doors, or the entry area, shall be fitted with assists no less than 3/4-inch in width. Assists shall be as far outward as practicable, but shall be no further than 6-inches from the outside edge of lower step tread and shall be easily grasped by a 5th-percentile female

boarding from street level. Door assists shall be functionally continuous with the horizontal front passenger assist and the vertical assist on the front modesty panel.

#### 2.6.3.3 Vestibule

The aisle side of the driver's barrier and the modesty panels shall be fitted with vertical passenger assists that are functionally continuous with the overhead assist and that extend to within 36-inches of the floor. These assists shall have sufficient clearance from the barrier to prevent inadvertent wedging of a passenger's arm. A horizontal passenger assist shall be located across the front of the coach and shall prevent passengers from sustaining injuries on the fare collection device or windshield in the event of a sudden deceleration. Without restricting the vestibule space, the assist shall provide support for a boarding passenger from the front door through the fare collection procedure. Passengers shall be able to lean against the assist for security while paying fares. The assist shall be no less than 36 inches above the floor or the average step tread surface. The assists at the front of the coach shall be arranged to permit a 5th-percentile female passenger to easily reach from the door assist, to the front assist, to vertical assists on the driver's barrier or front modesty panel. The front assist shall not impede the boarding of wheelchairs, if applicable, and should provide space to mount and vault a Cubic Western Data electronic farebox.

#### 2.6.3.4 Overhead

Except forward of the standee line and at the rear door, a continuous, full grip, overhead assist shall be provided. This assist shall be convenient to standees anywhere in the coach and shall be located over the center of the aisle seating position of the transverse seats. The assist shall be no less than 70 inches above the floor. Overhead assists shall simultaneously support 150 pounds on any 12-inch length. No more than 5 percent of the full grip feature shall be lost due to assist supports.

#### 2.6.3.5 Longitudinal Seats

Longitudinal seats shall have vertical assists located between every other designated seating position, except for fold-up seats. Assists shall extend from near the leading edge of the seat and shall be functionally continuous with the overhead assist. Assists shall be staggered across the aisle from each other where practicable and shall be no more than 52 inches apart.

#### 2.6.3.6 Rear Doorway

Vertical assists that are functionally continuous with the overhead assist shall be provided at the aisle side of the transverse seat immediately forward of the rear door and on the aisle side of the rear door modesty panel. Rear doors, or the exit area, shall be fitted with assists no less than 3/4 inch in width and shall provide at least 1 1/2 inches of knuckle clearance between the assists and their mounting. A 5th-percentile

female shall be provided assists that are functionally continuous during the entire exiting process, and the assists shall be no more than 6 inches from the outside edge of the lower step tread.

#### 2.6.4 EXTERIOR ROUTE DISPLAYS

##### 2.6.4.1 Electronic Destination Signs

The contractor shall equip all buses with Transign System BVK 9004, Electronic Destination Sign System. Both front and side signs shall display identical message. Both signs shall display destination messages only when the coach engine is running. When the master run switch is in the "Off" position the signs shall appear blank (all blank).

Bidder shall supply and install an electronic destination sign system that is equivalent in performance and memory capacity as the Transign BVK 9004 system. Programming of signing system provided shall be compatible with that used for the Transign BVK 9004 system.

Destination sign controls shall not utilize membrane type switches due to their reliability problems in a transit bus environment. Thumbwheel type switches shall be used to change destination codes. The exterior viewing window on both front and side destination signs shall be double strength clear glass.

Any sign system proposed as equal to the Transign DVS 10000-8 system shall include the following features:

1. Front sign.
2. Side sign.
3. Control Console (Route Number Option).
4. 2,000 lines of memory.
5. Zero insertion force EPROM sockets.
6. Complete maintenance documentation for both field and depot level repair. Depot level documentation shall provide fault isolation and repair procedures for all circuit components of all modules and circuit boards used in the sign system.
7. Engineering drawings and circuit schematics.
8. Complete installation.
9. Emergency alarm feature must function with the District's standard emergency alarm system.

##### 2.6.4.2 Run Numbers

All three character spaces shall have the capability to display 0,1,2,3,4,5,6,7,8,9,0 and X readings.

Run number sign shall be Transign model D15005 or approved equal. This model sign has been approved for use in transit buses by the California Highway Patrol.

#### 2.6.5 FARE COLLECTION

Space, as far forward as practicable, and structural provisions shall be made for installation of a Cubic Western Data electronic farebox. Location of the farebox shall not restrict traffic in the vestibule, including wheelchairs if a front door loading device is used, and shall allow the driver to easily reach the coin drop levers and to view the change platform. The farebox mounting location shall not restrict access to the driver's area and shall not restrict operation of driver controls. Farebox location shall permit accessibility to the vault for easy manual removal or attachment of suction devices. Meters and counters on the farebox shall be readable on a daily basis. A 20-amp, 24-volt, DC, protected circuit shall be available to power the farebox. This power service shall include a grounded lead with both wires enclosed in a flexible conduit. The floor under the farebox shall be reinforced, as necessary, to provide a sturdy mounting platform and to prevent shaking of the farebox. A one inch inside diameter metallic conduit shall be provided from the radio box to the farebox mounting location, through the bus floor, subject to District approval.

## 2.6.6 WHEELCHAIR PASSENGERS

### 2.6.6.1 Accommodations

Space and body structural provisions shall be provided at the front entrance of the coach to accommodate a wheelchair loading system.

### 2.6.6.2 Legal Requirements

The Wheelchair Loading System as installed shall comply with all applicable federal, state and local regulations. Local regulations are defined as those below the state level including Wheelchair Loading System provisions of Title 13 of the California Administrative Code. In the event of any conflict between the requirements of this specification and any applicable legal requirement, the legal requirement shall prevail.

### 2.6.6.3 Loading System

A loading system shall provide safe ingress and egress quickly, comfortably, and in a forward direction for a passenger in a wheelchair from the street level or curb. The lift system shall be designed to operate in the District's service area where curb heights may reach 14 inches and road crowns are of varying degrees. When the system is not in use, the steps and passageway shall appear normal, and no portion of the stepwell shall move when the doors open. The controls shall be simple to operate with no complex phasing operations required, and the loading operation shall be under the surveillance and complete control of the driver.

The system shall include a master "power on/off" switch. The master "power on/off" switch must be activated prior to system operation.

Each loading system function shall be controlled by a single position on a master rotary (wafer) switch, Electroswitch Corporation Switch No. 21301A or approved equal. Each system function can then only be activated by a momentary contact type push button switch. Each operation

shall require continuous manual pressure by the operator and shall not allow unintentional improper loading system operation. The outer barrier shall be automatically controlled and shall be such that it cannot be overridden by the loading system operator.

A dash mounted indicator light shall be provided and shall be illuminated when the loading system is not in the "steps" position.

The location of the controls shall preclude the simultaneous manipulation with one hand of the wafer switch and any other control.

All system controls shall be subject to District approval.

The coach shall be prevented from moving when the wheelchair loading system is activated. The wheelchair loading system shall not present a hazard, nor inconvenience any passenger. The wheelchair loading platform clear area shall be no less than 28 1/2 inches wide and 44 inches long and capable of accommodating a total load of 600 pounds. The stowing or folding of the platform must require two separate and distinct actions by the operator. The loading system platform shall be precluded from retracting or folding when a passenger is on the platform. The loading platform shall extend no less than 18-inches outward of the coach with the transition from the sidewalk to the loading device not exceeding 1/2 inch and it shall be ramped to the extent practicable. The platform shall be designed to protect the device from damage to itself, to the coach or to persons during any phase of operation. The loading platform shall be covered with a replaceable or renewable, nonskid material. Any portion of the loading system used as steps shall be covered with 5/16 inch non-skid ribbed, rubber composition material, RCA or approved equal, and shall be black in color. The edge of all steps shall be yellow in color and shall be integrally molded to the specified covering. The platform shall be fitted with barriers to prevent any powered or non-powered wheelchair from rolling or driven off the ends or sides during loading or unloading.

A wheelchair passenger on the loading platform shall be able to easily obtain support during the entire loading and unloading operations by grasping passenger assist(s) provided for this purpose. All areas of the passenger assist(s) including functional components used as passenger assists, shall be 3 mil PVC coating or nylon powder coating over a metal base. Assists shall withstand a force of 200 pounds applied over a 12-inch lineal dimension in any direction normal to the assist without permanent visible deformation. Brackets, clamps, screw heads, and other fasteners used on the passenger assists shall be anodized aluminum or stainless steel and shall be flush with the surface and free of rough edges.

When the loading platform is rising, no hazard shall be presented to passengers between the platform and the bottom edge of fixed step risers and other parts of the loading system mechanism. When fully raised, the transition from the platform to the floor shall be smooth. Deployment or storage of the lift shall require no more than 5 seconds. The time required to perform other phases of the loading or unloading operation shall not exceed 15 seconds. The device shall function without failure or adjustment for 500 cycles or 6,000 miles in all weather conditions encountered in District revenue service. A manual override system shall



permit unloading a wheelchair and storing the device in the event of a primary power failure. The lift control circuit shall be equipped with an electronic counting device recording numerically each time the lift is cycled. Mounting location of this device is subject to District approval.

#### 2.6.6.4 Wheelchair Accommodations

Seat assemblies, as close to the wheelchair loading system as practical, shall be replaced or modified to provide parking spaces and secure tie-downs for passengers in two wheelchairs. The exit signal shall be no higher than 4 feet above the floor in these areas. Maneuvering room inside the coach shall accommodate easy travel for a passenger in a wheelchair from the loading device through the coach to the designated parking area, and back out. No portion of the wheelchair or its occupant shall protrude into the normal aisle of the coach when parked in the designated parking space(s). No width dimension should be less than 30 inches, areas requiring 90 degree turns of wheelchairs should have a clearance arc dimension no less than 45 inches and in the parking area where 180 degree turns are expected, space should be clear in a full 60 inch diameter circle. A vertical clearance of 12 inches above the floor surface should be provided on the outside of turning areas for wheelchair foot rest clearance. Lights shall be provided above the doorway equipped with the wheelchair lift system to floodlight the loading area. The lamps shall illuminate when the lift system is in operation and shall illuminate the street surface to a level of no less than 1 footcandle for a distance of 3 feet square outward from the lowest step-tread edge.

Accommodations, including passenger seat belts, wheelchair wheel clamps, wheelchair securement straps and fold down seats, for two wheelchair passengers shall be provided. Passenger seat belts shall be of sufficient length to accommodate passengers in electric powered wheelchairs and shall have a minimum useful length of 80 inches. Requirements for securement straps are included in Attachment C to Part II, Technical Specifications.

3.0 CHASSIS

### 3.1 PROPULSION SYSTEM

#### 3.1.1 VEHICLE PERFORMANCE

##### 3.1.1.1 Power Requirements

A U.S. manufactured propulsion system and drive train shall provide power to enable the coach to meet the defined acceleration, top speed, and gradeability requirements. Sufficient excess power shall be available to operate all accessories.

##### 3.1.1.2 Top Speed

The coach shall be capable of a top speed of 60 mph (for emergency and passing maneuvers) on a straight, level road at GVWR with all accessories operating.

##### 3.1.1.3 Gradeability

Gradeability requirements shall be met on grades with a surface friction coefficient of 0.3 and above at GVWR with all accessories operating. The standard configuration powerplant shall enable the coach to maintain a speed of 44 mph on a 2-1/2 percent grade and 7 mph on a 16-percent grade.

##### 3.1.1.4 Acceleration

An average acceleration rate of at least 0.06g shall be achieved at GVWR between 0 and 15 mph. Acceleration measurement shall commence when the accelerator is depressed. The minimum acceleration rates are as follows:

<u>Speed (MPH)</u>	<u>Elapsed Time (Sec.)</u>
10	6.6
20	12.1
30	20.1
40	36.0
50	62.0

##### 3.1.1.5 Jerk

Jerk, the rate of change of acceleration, shall be minimized throughout the acceleration/deceleration range and shall be no greater than 0.3g/sec. This requirement shall be achieved regardless of driver actions.

##### 3.1.1.6 Operating Range

The operating range of the coach run in district revenue service shall be a minimum of 300 miles on a full tank.

#### 3.1.2 POWERPLANT MOUNTING AND ACCESSORIES

##### 3.1.2.1 Mounting

The powerplant shall be mounted in a compartment in the rear of the coach. All powerplant mounting points shall be mechanically isolated to minimize transfer of vibration to the body structure.

#### 3.1.2.2 Service

The powerplant shall be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists, shall be required to remove the powerplant. Two 3M mechanics shall be able to remove, replace, and prepare the engine and transmission assembly for service in less than 20 total combined man-hours. The muffler, exhaust system, air cleaner, air compressor, starter, alternator, radiator, all accessories, and any other component requiring service or replacement shall be easily removable and independent of the engine and transmission removal. An engine oil pressure gauge and coolant temperature gauge shall be provided in the engine compartment. These gauges shall be easily read during service and mounted in an area where they shall not be damaged during minor or major repairs.

Engine tune-up, removal and replacement of transmission, cylinder heads, injectors, and accessories, such as, but not limited to, muffler, exhaust system, air compressor, alternator, starter, A/C compressor, etc., shall be serviceable from a flat floor and without the use of a pit or hoist.

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

The engine and transmission shall be equipped with sufficient heavy-duty fuel and oil filters for efficient operation and to protect the engine and transmission between scheduled filter changes. The filters shall be of the spin-on, disposable type. All filters shall be easily accessible and the filter bases shall be plumbed to assure correct reinstallation. Fuel and oil lines within the engine compartment shall be rigidly supported and shall be composed of stainless steel tubing where practicable except in locations where flexible lines are specifically required by the District. Flexible fluid lines shall be kept at a minimum and shall be as short as practicable. They shall be routed or shielded so that failure of a line shall not allow fuel or oil to spray or drain onto any component operable above the autoignition temperature of the fluid. Flexible lines shall be teflon hoses with braided stainless steel jackets except in applications where premium hoses are required and shall have standard SAE or JIC brass or steel, reusable, swivel, end fittings. Hoses shall be individually supported and shall not touch one another or any part of the coach. The engine shall be equipped with a fuel priming pump or a check valve fitted in the fuel suction line to aid restarting after fuel filter changes. Flexible methanol fuel lines shall be Aeroquip AQP-FBA or approved equal.

### 3.1.2.3 Accessories

Engine-driven accessories shall be unit mounted for quick removal and repair. Accessory drive systems including belts shall operate without failure or unscheduled adjustment for 50,000 miles in District service. These accessories shall be driven at speeds sufficient to assure adequate system performance during extended periods of idle and low route speed operation.

### 3.1.2.4 Hydraulic Drive

Any accessory may be driven hydraulically. The hydraulic system shall demonstrate a mean time between repairs in excess of 50,000 miles. Hydraulic system service tasks shall be minimized and scheduled no more frequently than those of other major coach systems. All elements of the hydraulic system shall be easily accessible for service or unit replacement. Sensors in the hydraulic system, excluding those in the power steering system, shall indicate on the driver's diagnostic panel conditions of low hydraulic fluid level and low system operation pressure. Critical points in the hydraulic system shall be fitted with service ports so that portable diagnostic equipment may be connected or sensors for an off-board diagnostic system permanently attached to monitor system operation. All lines shall be compatible with the hydraulic fluid and maximum pressures of the system. Flexible lines shall be minimized in quantity and length. Lines of the same size and with the same fittings as those on other piping systems of the coach, but not interchangeable, shall be tagged or marked for use on the hydraulic system only. Hydraulic lines shall be individually and rigidly supported to prevent chafing damage, fatigue failures, and tension strain on the lines and fittings. The hydraulic system shall be configured and/or shielded so that failure of any flexible line shall not allow hydraulic fluid to spray or drain onto any component operable above the autoignition temperature of the fluid. All elements of the hydraulic system shall meet the noise limits defined in Part II: Technical Specifications. A priority system shall prevent the loss of power steering during operation of the coach if other devices are also powered by the hydraulic system.

## 3.1.3 POWERPLANT

### 3.1.3.1 Engine

The coach shall accept the installation of a heavy duty Neat Methanol fueled engine meeting the requirements without structural modifications.

The engine shall operate for 300,000 miles in District revenue service without major failure or significant deterioration. Components of the fuel injector and/or control system shall operate for 150,000 miles without replacement or major service.

The engine shall meet all requirements of Part II: Technical Specifications when operating on Neat Methanol, as specified by the engine supplier. Durability of the engine and its components shall not be seriously reduced and the requirement of Section 3.1.4.1 shall be met by

operation on commercially available Neat Methanol.

The engine shall be equipped with low oil level and hot engine sensing devices that shall activate an Engine Protection System to shut down the engine when the engine oil reaches the low oil mark as indicated on the dipstick, or the engine temperature reaches the maximum safe operating temperature. The device shall be activated when the oil level is close to the add mark on the dip stick.

The engine shall be equipped with an emergency stop and/or control device if the engine type is susceptible to runaway failure. The emergency stop shall be a guarded switch operable from the driver's compartment. Once the switch is activated, the engine shall not be operable until the emergency stop device located in the engine compartment is manually reset.

The engine shall be equipped with a fast idle device driver-controlled. The device shall activate only with the transmission in neutral. This device may be used to help meet the requirements of coach cool down in Section 3.7. The engine starter shall be protected by an interlock that prevents its engagement when the engine is running.

The engine shall be equipped with Type K thermocouples at each exhaust port. A reader shall be supplied compatible with Type K thermocouples. The reader shall have sufficient channels to read all engine cylinder exhaust gas temperatures and four spare channels.

#### 3.1.3.2 Cooling System

Temperature of operating fluids on the coach shall be controlled by a cooling system(s). The cooling system shall be sized to maintain fluids at safe, continuous operating temperatures during the most severe operations possible with the coach loaded to GVWR and with ambient temperatures up to 115°F and with a 10% coolant loss. The engine shall be cooled by a water-based, pressure type, cooling system that does not permit boiling or coolant loss during the operations described above. Engine thermostats shall be easily accessible for replacement. The engine cooling system shall be equipped with a properly sized water filter with a spin-on, disposable, borate element filter. Shutoff valves shall allow filter replacement without coolant loss. Valves shall permit complete shutoff of both lines for the heating and defroster units. All low points in the water-based cooling system shall be equipped with drain cocks. Air vent valves shall be fitted at high points in the cooling system. It shall be demonstrated that the system is self-purging.

A sight glass to determine satisfactory engine coolant level shall be provided and shall be accessible by opening one of the engine compartment's access doors. A spring-loaded, pushbutton type valve to safely release pressure or vacuum in the cooling system shall be provided with both it and the water filler cap no more than 60 inches above the ground and both shall be accessible through the same access door. Radiator filler cap shall have a safety lock.

The radiator shall be of durable corrosion-resistant construction with bolted-on removable tanks. Radiator piping shall be stainless steel

or brass tubing. All fittings in cooling system shall be cast iron or brass. Water hoses shall be Gates Durion or Hadbar Purosil 70, silicone hose with 4-ply polyester fabric reinforcement. All hoses shall be protected from engine heat which may cause premature failure. All hose clamps shall be stainless steel. All hoses 2 inches or greater in diameter shall have hose clamps, 3/4 inch wide, spring loaded, T-bar type as manufactured by Voss Industries, or by Specialty Products, and shall have self-locking nuts. Fan speed shall be regulated to minimize fan noise. No heat producing components or climate control system components shall be mounted between the engine cooling air intake aperture and the radiator.

Radiator shall have a heat rejection capacity at least 25% over standard size unit. The engine cooling fan shall not be driven when the coolant temperature is less than 190°F.

### 3.1.3.3 Transmission

The transmission shall be multiple speed, automatic electronically controlled shift with torque converter. A 3M mechanic, with optional assistance, shall be able to remove, replace, and prepare the transmission assembly for service in less than 8 total combined man-hours. The transmission shall operate for 100,000 miles in District's revenue service without repairs. The transmission shall be equipped with a low oil indicating device. The device shall be activated when the oil level is close to the add mark on the dip stick.

### 3.1.4 EMISSIONS

#### 3.1.4.1 Gas and Smoke

The manufacturer shall employ a catalytic converter or other equally affective emission control technology available to insure that the design goal for the engine shall be to meet the 1991 EPA emission standards for heavy duty bus engine. Using the 1984 EPA Heavy Duty Transient Test Procedure, the coach shall meet the following levels: exhaust emission levels for unburned methanol (METH), carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), particulate matter, (PM) and formaldehyde (FORM). These values shall<sup>x</sup> be expressed in grams per brake horsepower-hour (g/bhp-hr).

METH	CO	NO <sub>x</sub>	PM	FORM
1.3	15.5	5.0 <sup>x</sup>	0.10	0.05

There shall be an emission control failure indicator and/or by-pass device to prevent the destruction of the Emission Control System.

#### 3.1.4.2 Exhaust Location

Exhaust gases and waste heat shall not be discharged on the right side and shall be directed generally away from the coach. Exhaust piping shall not restrict the underbody clearances defined in Section 1.5.1.2.

Exhaust piping location shall preclude entrance of exhaust fumes into air intakes for the climate control system.

The exhaust shall discharge near the left rear corner below the bumper.

#### 3.1.4.3 Exterior Noise

Airborne noise generated by the coach and measured from either side shall not exceed 83 dBA under full power acceleration when operated at speeds up to 60 mph, at curb weight and just prior to transmission upshift. The maximum noise level generated by the coach pulling away from a stop at full power shall not exceed 83 dBA. The coach-generated noise at curb idle shall not exceed 65 dBA. If the noise contains an audible discrete frequency, a penalty of 5 dBA shall be added to the sound level measured. All noise readings shall be taken 50 feet from, and perpendicular to the centerline of the coach with all accessories operating. Instrumentation, test sites, and other general requirements shall be in accordance with SAE Standard J366. The pullaway test shall begin with the front bumper even with the microphone. The curb idle test shall be conducted with the rear bumper even with the microphone.

### 3.2 FINAL DRIVE

#### 3.2.1 GENERAL REQUIREMENTS

The coach shall be driven by a single heavy-duty full floating type axle at the rear. The rear axle shall be of separable carrier housing construction with a load rating sufficient for the coach loaded to GVWR. Transfer of gear noise to the coach interior shall be minimized. The driven axle shall operate for 200,000 miles in District revenue service without repairs. Load tubes shall be replaceable and the lubricant drain plug shall be magnetic type, external hex head of a standard size. The drive shaft shall be guarded to prevent it striking the floor of the coach or the ground in the event of a tube or universal joint failure.



### 3.3 SUSPENSION

#### 3.3.1 GENERAL REQUIREMENTS

The front axle shall be nondriven with a load rating sufficient for the coach loaded to GVWR. Both the front and rear axle suspensions shall be pneumatic type. The basic suspension system shall last the life of the coach without major overhaul or replacement. Items such as bushings and air springs shall be easily and quickly replaceable by a 3M mechanic. Adjustment points shall be minimized and shall not be subject to a loss of adjustment in service. Necessary adjustments shall be easily accomplished without removing or disconnecting the components.

#### 3.3.2 SPRING AND SHOCK ABSORBERS

##### 3.3.2.1 Travel

The suspension system shall permit a minimum wheel travel of 3.5 inches in jounce and 3 inches in rebound. Elastomeric bumpers shall be provided only at the limit of jounce travel. Rebound travel may be limited by elastomeric bumpers or hydraulically within the shock absorbers. Suspension system shall incorporate appropriate devices for automatic height control so that regardless of load the coach height relative to the centerline of the wheels does not change more than  $\pm 1/2$  inch at any point from the height required in Section 2.1.5.1.

##### 3.3.2.2 Kneeling

A driver-actuated kneeling device shall lower the coach 3.5 inches measured at the center of the bottom front step during loading or unloading operations regardless of load. Brake and throttle interlock shall prevent movement when the coach is kneeled. The coach shall kneel and rise at a maximum rate of 1.25 inches per second at essentially a constant rate. After kneeling, the coach shall rise within 2 seconds to a height permitting the coach to resume service and shall rise to the correct operating height within 7 seconds regardless of load up to G.V.W.R. During the lowering and raising operation, the maximum acceleration shall not exceed 0.2g and the jerk shall not exceed 0.3g/sec. measured on the front door step tread. An indicator visible to the driver shall be illuminated until the coach is raised to a height adequate for safe street travel. An indicator visible to the waiting passenger shall be illuminated during the kneeling operation and shall remain illuminated until coach is raised to a height for safe street travel. An audible alarm, easily heard by boarding passengers shall sound during the kneeling process.

##### 3.3.2.3 Damping

Vertical damping of the suspension system shall be accomplished by hydraulic shock absorbers mounted to the suspension arms or axles and attached to an appropriate location on the chassis. Damping shall be sufficient to control coach motion to 4 cycles or less after hitting road perturbations. Shock absorbers shall maintain their effectiveness for at least 50,000 miles in normal service, and each unit shall be replaceable by

a 2M mechanic in less than 15 minutes.

#### 3.3.2.4 Lubrication

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

### 3.4 STEERING

#### 3.4.1 STRENGTH

Fatigue life of all steering components shall exceed 600,000 miles. No element of the steering system shall fail before suspension system components when one of the tires strikes a severe road hazard.

#### 3.4.2 TURNING RADIUS

Outside body corner turning radius for the specified 40-foot-long coach shall not exceed 44 feet at SLW.

#### 3.4.3 TURNING EFFORT

The steering wheel shall be no less than 19 inches in diameter and shall be shaped for firm grip with comfort for long periods of time. The steering wheel shall be removable with a standard or universal puller.

Hydraulically-assisted power steering shall be provided. The steering gear shall be an integral type with flexible lines eliminated or the number and length minimized. Steering torque applied by the driver shall not exceed 10-foot-pounds with the front wheels straight ahead to turned 10°. Steering torque may increase to 30-foot-pounds when the wheels are approaching the steering stops. Steering effort shall be measured with the coach at SLW, stopped with the brakes released and the engine at normal idling speed on clean, dry, level, commercial asphalt pavement and the tires inflated to recommended pressure. Power steering failure shall not result in loss of steering control. With the coach in operation the steering effort shall not exceed 55 pounds at the steering wheel rim and perceived free play in the steering system shall not materially increase as a result of power assist failure. Gearing shall require no more than seven turns of the steering wheel lock-to-lock.

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

## 3.5 BRAKES

### 3.5.1 SERVICE BRAKE

#### 3.5.1.1 Actuation

Service brakes shall be controlled and actuated by an air system. Force to activate the brake pedal control shall be an essentially linear function of the coach deceleration rate and shall not exceed 70 pounds at a point 7 inches above the heel point of the pedal to achieve maximum emergency braking.

#### 3.5.1.2 Friction Material

The entire service brake system, including friction material, shall have an overhaul or replacement life of at least 15,000 miles when running in District service. Brakes shall be self-adjusting throughout this period. The contractor shall provide non-asbestos brake lining material.

#### 3.5.1.3 Hubs and Drums

Wheel bearing seals shall run on replaceable wear surfaces. Wheel bearing and hub seals shall not leak or weep lubricant for 100,000 miles of District service.

#### 3.5.1.4 Air System

The coach air system shall operate all accessories and the braking system with reserve capacity. The engine-driven air compressor shall be sized to charge the air system from 40 psi to the governor cutoff pressure in less than 3 minutes while not exceeding the engine's rated speed. Regardless of the system's air pressure, idle up to the rated engine speed shall be available to the driver with the transmission in neutral and the parking brake applied.

Air lines, except necessary flexible lines, shall conform to the installation and material requirements of SAE Standard J844-Type 1 for copper tubing with standard, brass, flared or ball sleeve fittings, or SAE Standard J844-Type 3B for nylon tubing if not subject to temperatures over 200° F. Accessory and other noncritical lines may use Type 3A tubing. Nylon tubing shall be installed in accordance with the following color-coding standards:

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

Line supports shall prevent movement, flexing, tension strain, and vibration. Copper lines shall be supported by looms to prevent the lines from touching one another or any component of the coach. To the extent

practicable and before installation, the lines shall be pre-bent on a fixture that prevents tube flattening or excessive local strain. Copper lines shall be bent only once at any point, including pre-bending and installation. Rigid lines shall be supported at no more than 5-foot intervals. Nylon lines may be grouped and shall be supported at no more than 2 1/2 foot intervals.

The compressor discharge line between powerplant and body-mounted equipment shall be flexible convoluted copper or stainless steel line, or may be flexible teflon hose with a braided stainless steel jacket. Other lines necessary to maintain system reliability shall be flexible teflon hose with a braided stainless steel jacket. End fittings shall be standard SAE or JIC brass or steel, flanged, reusable, swivel type fittings. Flexible hoses shall be as short as practicable and individually supported. They shall not touch one another or any part of the coach except for the supporting grommets. Flexible lines shall be supported at 2-foot intervals or less. Air lines shall be cleaned and blown out before installation and shall be installed to minimize air leaks. New coaches shall not leak down more than 6 psi as indicated on the instrument panel mounted air gauges, within 15 minutes from the point of governor cut-off.

All air lines shall be sloped toward a reservoir and routed to prevent water traps. Grommets shall protect the air lines at all points where they pass through understructure components. Provision shall be made to apply shop air to the coach air systems using a standard tire inflation type valve. This valve shall be conveniently located in the engine compartment and shall include a 3/8 FIP fitting ahead of the tire inflation valve. Air for the compressor shall be filtered through the main engine air cleaner system. All air reservoirs shall meet the requirements of SAE Standard J10 and shall be equipped with clean-out plugs and flush type drain valves. These valves and any automatic moisture ejector valves shall be protected from road hazards by major structural members. Reservoirs shall be sloped toward the drain valve. The air system shall be protected by a pressure relief valve set at 150 psi and shall be equipped with check valves and pressure protection valves to assure partial operation in case of line failures.

Contractor shall provide a desiccant type air dryer of sufficient size to meet the requirements of air system provided. Air dryer shall be Aeroquip Aerofina II, Bendix Air Dryer, or equal.

## 3.6 GENERAL CHASSIS

### 3.6.1 WHEELS AND TIRES

#### 3.6.1.1 Wheels

Wheels and rims shall be hub piloted and shall be integral formed steel drop center construction. All wheels shall be interchangeable and shall be removable without a puller. Wheels shall be compatible with tires in size and load-carrying capacity. Front wheels and tires shall be balanced as an assembly. Right rear outside wheel shall be equipped with an Veeder-Root or approved equal, hubodometer. Hubodometer tenth-of-a-mile position shall be blocked out. Wheels shall be painted black.

#### 3.6.1.2 Tires

Tires shall be suitable for the conditions of transit service and sustained operation at the maximum speed capability of the coach, or the national speed limit whichever is lower. Load on any tire at GVWR shall not exceed the tire supplier's rating.

Tires for the buses to be provided under this contract shall be provided by the District's mileage tire contractor, Goodyear. As such, price for tires shall not be included in the purchase price of the buses.

The District requires that "H" load range tires be provided for reasons of fleet standardization.

### 3.6.2 FUEL SYSTEM

#### 3.6.2.1 Fuel Tank

The fuel tank(s) shall be securely mounted to the coach to prevent movement during coach maneuvers, but shall be easily removable for cleaning or replacement. The fuel tank shall be equipped with an external, hex head, stainless steel drain plug. The drain plug shall be at least a 3/8-inch size and shall be located at the lowest point of the tank. The tank shall have an inspection plate or removable filler neck to permit cleaning and inspection. The tank shall be baffled internally to prevent fuel sloshing noise regardless of fill level. The baffles or fuel pickup location shall assure continuous full power operation on a 6-percent upgrade for 15 minutes starting with no more than 25 gallons of fuel over the unusable amount in the tank. The coach shall operate at idle on a 6-percent downgrade for 30 minutes starting with no more than 10 gallons of fuel over the unusable amount in the tank.

Buses shall have a minimum capacity 250 gallon of fuel or a minimum 300 mile range in District revenue service. Tank must be complete with pressure relief valve, level control valve, and anti-spill device. The fuel tank shall be equipped with sensors for fuel level guage and low fuel indicator. A fuel level guage and low fuel indicator shall be mounted on the dash. The low fuel indicator shall be activated when the fuel level reaches fifteen usable gallons. Fuel tank must be constructed of stainless steel; plastic tank material is not acceptable.

The fuel tank shall be designed to maintain structural integrity throughout each fueling cycle. A pressure fill, anti-spill fueling system as manufactured by Emco Wheaton shall be installed. The system shall be capable of a 40 G.P.M. fill rate. The tank must be filled to the specified capacity. The installation is subject to District approval.

On methanol powered coaches, the fuel tank shall be constructed of stainless steel. The fuel tank shall have Underwriters Laboratories' approved flame arresters in the filler neck and vents. The filler neck shall be so designed as to preclude the entry of a District standard diesel fueling nozzle.

The filler neck shall be the "dry break and/or standard diesel dry break type," Emco-Wheaton Model 563349 or approved equal. There shall be a provision for grounding (earth) the vehicle during the fueling process. All methanol fuel lines, fittings, and connections forward of the engine bulkhead shall be stainless steel.

### 3.6.2.2 Fuel Filler

The fuel filler shall be located 7 to 25 feet behind the centerline of the front door on the right side of the coach. The filler neck shall be recessed into the body so that spilled fuel will not run onto the outside surface of the coach. The filler shall accommodate a 1-1/2 inch diameter nozzle and a fill rate of 40 gallons per minute of foam-free fuel without spitting back or causing the nozzle to shut off before the tank is full. An audible signal shall indicate when the tank is essentially full. The filler cap shall be retained to the filler neck with a steel cable.

The fuel filler neck shall be equipped with a positive stop cap for the closed position. Filler neck and cap are subject to District approval.

The fuel lines forward of the engine bulkhead shall be in conformance to SAE Standard J844-Type 1 for copper tubing or SAE Standard J844-Type 3B for nylon tubing color coded orange.

### 3.6.3. BUMPER SYSTEM

#### 3.6.3.1 Location

Bumpers shall provide impact protection for the front and rear of the coach up to 26 inches above the ground. The bumpers shall wrap around the coach to the extent practicable without exceeding allowable coach width.

#### 3.6.3.2 Front Bumper

No part of the coach, including the bumper, shall be damaged as a result of a 5-mph impact of the coach at curb weight with a fixed, flat barrier perpendicular to the coach's longitudinal centerline. The bumper shall protect the coach from damage as a result of 6.5 mph impacts at any point by the striker defined in FMVSS #215 loaded to 4,000 pounds parallel to the longitudinal centerline of the coach and 5.5 mph impacts into the

corners at a 30° angle to the longitudinal centerline of the coach. The energy absorption system of the bumper shall be independent of every power system of the coach and shall not require service or maintenance in normal operation during the service life of the coach. The flexible portion of the bumper may increase the overall coach length specified in Section 1.5.1.1 by no more than 6 inches.

### 3.6.3.3 Rear Bumper

The rear bumper and its mounting shall provide impact protection to the coach at curb weight from a 2-mph impact with a fixed, flat barrier perpendicular to the longitudinal centerline of the coach. When using a yard tug with a smooth, flat plate bumper 2 feet wide contacting the horizontal centerline of the rear bumper, the bumper shall provide protection at speeds up to 5 mph, over pavement discontinuities up to 1 inch high, and at accelerations up to 2 mph/sec. The rear bumper shall protect the coach, when impacted anywhere along its width by the striker defined in FMVSS #215 loaded to 4000 pounds, at 4 mph parallel to the longitudinal centerline of the coach or into the corners up to a 30° angle to the longitudinal centerline of the coach. The rear bumper or bumper extensions shall be shaped to preclude unauthorized riders standing on the bumper and shall wrap around the coach to protect the engine compartment doors and radiator. The bumper extensions shall not hinder service and shall be aired into the coach body with no protrusion or sharp edges. The bumper shall be independent of all power systems of the coach and shall not require service or maintenance in normal operation during the service life of the coach. Any flexible portion of the bumper may increase the overall coach length specified in Section 1.5.1.1 by no more than 6 inches.

### 3.6.3.4 Bumper Material

Bumper material shall be corrosion-resistant. Visible surfaces shall be black. These qualities including color shall be sustained throughout the service life of the coach.

## 3.6.4 ELECTRICAL SYSTEM

### 3.6.4.1 General Requirements

The electrical system shall provide and distribute power to ensure satisfactory performance of all electrical components. The system shall supply a nominal 12 and 24 volts of direct current, utilizing two independent alternators (voltage divider is not acceptable). Electrical power provided for the radio shall be 12 volts, DC. Precautions shall be taken to minimize hazards to service personnel. Transient voltages above 220 volts may be used in the fluorescent lighting system. The power generating systems shall be rated 50% higher than the total possible electrical load to maintain the charge on the batteries at all operating conditions. All circuits and circuit branches, except for those involved in propulsion system startup, shall be protected individually by circuit breakers or fuses installed at the source of the circuit. Fuses shall be used only where it can be demonstrated that circuit breakers are not practicable, and they shall be easily accessible for replacement.

Redundant grounds shall be used for all electrical equipment, except where it can be demonstrated that redundant grounds are not feasible or practicable. One ground may be the coach body and framing. Grounds shall not be carried through hinges, bolted joints (except those specifically designed as electrical connectors), or powerplant mountings. Electrical equipment shall not be located in an environment that will reduce the performance or shorten the life of the component or electrical system. Major wiring harnesses shall not be located under the coach floor, and underfloor wiring shall be eliminated to the extent practicable. Wiring and electrical equipment necessarily located under the coach shall be insulated from water, heat, corrosion, and mechanical damage.

#### 3.6.4.2 Modular Design

Design of the electrical system shall be modular so that each major component, apparatus panel, or wiring bundle is easily separable with standard hand tools or by means of connectors. Each module, except the main body wiring harness, shall be removable and replaceable in less than 30 minutes by a 3M mechanic. Powerplant wiring shall be an independent wiring module. Replacement of the engine compartment wiring module(s) shall not require pulling wires through any bulkhead or removing any terminals from the wires.

#### 3.6.4.3 Wiring and Terminals

All wiring between major electrical components and terminations, except battery wiring, shall have double electrical insulation, shall be waterproof, and shall meet specification requirements of SAE Recommended Practice J1292 and J878-Type SXL. Except as interrupted by the master battery disconnect switch, battery and starter wiring shall be continuous cables with connections secured by bolted terminals and shall conform to specification requirements of SAE Standard J1127-Type SGT or SGX and SAE Recommended Practice J541, grouped, numbered, and/or color coded full length. Installation shall permit ease of replacement. All wiring harnesses over 5-feet long and containing at least 5 wires shall include 2 spare wires that are the same size as the largest wire in the harness excluding the battery cables. Ends of all spare wires shall be terminated on a terminal board. Wiring harnesses shall not contain wires of different voltages unless all wires within the harness are sized to carry the current and insulated for the highest voltage wire in the harness. Double insulation shall be maintained as close to the terminals as practicable. The requirement for double insulation shall be met by wrapping harnesses with plastic electrical tape or by sheathing all wires and harnesses with nonconductive, rigid or flexible conduit. Grommets of elastomeric material shall be provided at points where wiring penetrates metal structure. Wiring supports shall be nonconductive. Precautions shall be taken to avoid damage from heat, water, solvents or chafing. Wiring length shall allow replacement of end terminals twice without pulling, stretching, or replacing the wire. Except for those on large wires such as battery cables, terminals shall be crimped to the wiring and may be soldered only if the wire is not stiffened above the terminal and no flux residue remains on the terminal. Terminals shall be full ring type and corrosion-resistant. T splices may be used when it is less than 25,000 circular mills of copper in cross-section: a mechanical clamp is used in addition



to solder on the splice; the wire supports no mechanical load in the area of the splice; and the wire is supported to prevent flexing.

#### 3.6.4.4 Junction Boxes

All relays, controllers, flashers, manual resetting circuit breakers, and other electrical components shall be mounted in junction boxes. Primary junction box shall be located below the operator's window, accessible from outside the coach, or other location subject to District's approval. The boxes shall be sealed to prevent moisture from normal sources, including engine compartment cleaning, from reaching the electrical components and shall prevent fire that may occur inside the box from propagating outside the box. The components and circuits in each box shall be identified and their locations recorded on a schematic drawing permanently glued to or printed on the inside of the box cover or door. The drawing shall be protected from oil, grease, fuel, moisture, and abrasion. The front junction box shall be completely serviceable from outside of the coach. The junction box shall be replaceable as a unit in less than 15 minutes by a 3M mechanic. A rear start and run control box shall be mounted in an accessible location in the engine compartment.

#### 3.6.5 ELECTRICAL COMPONENTS

##### 3.6.5.1 General Requirements

All electrical components, including switches, relays, flashers, and circuit breakers, shall be heavy-duty designs. To the extent practicable, these components shall be designed to last the service life of the coach and shall be replaceable in less than 5 minutes by a 3M mechanic. Sockets of plug-in components shall be polarized where required for proper function and the components shall be positively retained. Any manual reset circuit breakers critical to the operation of the coach shall be mounted with visible indication of open circuits. All electric motors, except cranking motors, shall be heavy-duty type, with a constant duty rating of no less than 10,000 hours and shall withstand 3 brush changes and 1 commutator lathe turning. Components shall be polarized where required for proper function and the components shall be positively retained. Electric motors shall be located for easy replacement and except for the cranking motor the brushes shall be replaceable in less than 15 minutes by a 3M mechanic without removing the motor.

Contractor shall provide a quick connect-disconnect receptacle with direct connections through 00 cables to the battery circuit. Receptacle shall be designed to prevent incorrect connection to the external power source. System shall be of sufficient capacity to permit starting of the engine with an external booster battery. The receptacle shall be located at the left rear corner of the bus and protected with a spring-loaded cover. The District will supply the successful bidder with the part number of the parts appropriate to voltage of their model bus.

All electrical relays shall be equipped with screw type terminals and shall be Delco-Remy, Bosch or approved equal.

All electrical cable connectors of three or more wires shall

utilize Deutsch pin connector or approved equal.

All circuit breakers shall be manual reset type.

#### 3.6.5.2 Batteries

Batteries shall be Delco-1150 Maintenance Free, or approved equal.

Batteries shall be easily accessible for inspection and serviceable only from outside the coach and shall be securely mounted on trays. Batteries shall be of premium construction and shall be fitted with threaded stud terminals. Positive and negative terminals shall have different size studs, or the battery terminals and cables shall be arranged to prevent incorrect installation. Battery terminals shall be located for access in less than 30 seconds with jumper cables. Four batteries shall be provided. The battery tray shall accommodate the battery systems and shall pull out or swing out easily and properly support the batteries during service, filling with automatic equipment, inspection, and replacement. The pull out or swing out requirement is not applicable if the batteries are properly supported in a compartment that allows inspection of water levels, filling with automatic or manual equipment, and replacement of batteries without lifting. A positive lock shall retain the battery tray in the normal position. Battery cables shall be flexible and sufficiently long to reach the batteries in extended positions without stretching or pulling on any connection and shall not lie on top of the batteries. The battery terminals and cables shall be color-coded with red for the primary positive, black for negative, and another color for any intermediate voltage cables.

#### 3.6.5.3 Master Battery Switch

A master battery switch shall be provided near the batteries for complete disconnecting from all coach electrical systems. The master switch shall be accessible in less than 10 seconds for activation. The master switch shall be capable of carrying and interrupting the total circuit load. Opening the master switch with the powerplant operating shall not damage any component of the electrical system.

#### 3.6.5.4 Fire Detectors

At least 2 temperature-sensitive sensors shall be provided. They shall be located in the engine compartment under all horizontal bulkheads, above and downwind of the major heat sources, and in areas likely to be wetted by leaking flammable fluids. Additional sensors shall be located in other potentially critical areas. The sensors shall return to normal setting and deactivate alarms when the temperature returns to normal.

The sensors shall turn off the methanol fuel supply to the engine compartment. Fire Detection System shall be a separate system from the Fire Extinguishment System.

### 3.7 INTERIOR CLIMATE CONTROL

#### 3.7.1 CAPACITY AND PERFORMANCE

Interior climate control system shall maintain the interior of the coach at a level suitable for all climatic conditions found in the District's service area. The heating, ventilating, and cooling systems shall maintain an average passenger compartment temperature between 65° and 80°F with a relative humidity of 50 percent or less. The system shall maintain these conditions in ambient temperatures of 10° to 95°F with ambient humidities of 5 to 50 percent while the coach is running in the District's revenue service with a full standee load of passengers. In ambient temperatures of 95° to 115°F with relative humidities lower than 50 percent, the system shall maintain a temperature gradient of 15°F while the coach is running in District revenue service with a full standee load of passengers. The temperatures measured from a height of 6 inches below the ceiling shall be within +5°F of the average temperature at the top surface of the seat cushions. Temperatures measured more than 3 inches above the floor shall be within +10°F of the average temperature at the top surface of the seat cushions. The interior temperature, from front to rear of the coach, shall not vary more than +5°F from the average.

The cooling mode shall be capable of reducing the passenger compartment temperature from 110° to 90°F in less than 20 minutes after engine startup under the following conditions. Engine temperature shall be within the normal operating range at the time of startup of the cool down test and the engine speed shall be limited to fast idle that may be activated by a driver-controlled device. During the cool down period the refrigerant pressure shall not exceed 400 psi and the condenser discharge air shall not exceed 145°F, measured 6 inches from the surface of the coil. The coach shall be parked in direct sunlight with the ambient temperature at 100°F and humidity less than 20 percent. There shall be no passengers onboard and the doors shall be closed. The cooling mode may operate independent of the propulsion system and outside air may be cut off during the cool down period.

The climate control system shall be highly reliable since most failures are Class 2. Manually-controlled shutoff valves in the refrigerant lines shall allow isolation of the compressor and receiver for service. To the extent practicable, self-sealing couplings shall be used to break and seal the refrigerant lines during removal of major components such as the refrigerant compressor or condenser. The condenser shall be located to efficiently transfer heat to the atmosphere, and shall not ingest air warmed by the coach mechanical equipment above the ambient temperature or discharge air into any other system of the coach. The location of the condenser shall preclude its obstruction by wheel splash, road dirt or debris.

The air conditioning system freon compressor engagement clutch, if used, shall be equipped with greasable bearings. Bearing housing shall have zerk type fittings, grease passageways and a grease pressure relief valve.

Compressor shall be equipped with a solenoid type freon pressure unloading valve.

### 3.7.2 CONTROLS

All interior climate control system requirements shall be attained automatically. The driver shall control only the defroster and driver's heater. The interior climate control system shall switch automatically to the ventilating mode if the refrigerant compressor or condenser fan fails.

### 3.7.3 AIR FLOW

#### 3.7.3.1 Passenger Area

The cooling mode of the interior climate control system shall introduce air into the coach at or near the ceiling height at a minimum rate of 25 cubic feet per minute per passenger based on the standard configuration coach with full standee load. This air shall be composed of no less than 20 percent outside air. Air flow shall be evenly distributed throughout the coach with air velocity not exceeding 60 feet per minute on any passenger.

Air flow may be reduced to 15 cubic feet per minute per passenger when operating in the heating mode with full standee load. Heated air introduced into the coach shall contain no less than 20 percent outside air. The fans shall not activate until the heating element has warmed sufficiently to assure at 70°F air outlet temperature. Outside air flow may be cut off during initial warm up, provided no manual manipulation is required.

#### 3.7.3.2 Driver's Area

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

### 3.7.4 AIR INTAKES

Outside openings for air intake shall be located to ensure cleanliness of air entering the climate control system, particularly with respect to exhaust emissions from the coach and adjacent traffic. All intake openings shall be baffled to prevent entry of snow, sleet, or water.

Outside air shall be filtered before discharge into the passenger compartment. The filter shall meet the ASHRAE requirement for 5 percent or better atmospheric dust spot efficiency, 50 percent weight arrestance, and a minimum dust holding capacity of 120 gram per 1,000 cfm cell. More

efficient air filtration may be provided to maintain efficient heater and/or evaporator operation. Air filters shall be cleanable and easily removable for service. Moisture drains from air intake openings shall be located so that they will not be subject to clogging from road dirt.

## 3.8 RADIO AND PUBLIC ADDRESS

### 3.8.1 MOBILE RADIO SYSTEM

A compartment shall be provided to accommodate a communication system enabling the driver to contact the dispatcher. It shall be located within 5 feet of the driver's seat and shall be connected to the driver's area by waterproof, 2 1/4-inch inside diameter, metallic conduit. A 1 inch inside diameter metallic conduit with pull wire shall be provided from the termination of the 2-1/4 inch conduit to the driver's radio handset mounting location, subject to District approval. The compartment shall include a clear space 12 inches high, 18 inches wide, and 24 inches deep for location of the radio above the slide out radio tray. It shall be accessible from either inside or outside the coach and shall be splash proof when the service door is secured. The radio compartment shall be supplied with a 30-amp, 12-volt, DC, protected service with positive and negative leads. A location convenient to the driver shall be provided for the radio control head, speaker, and handset. Contractor shall provide an antenna attached to the roof and an antenna lead to the radio compartment including a 3/4-inch inside diameter conduit with a pull wire. The antenna mounting and lead termination shall be accessible from the coach interior. Antenna shall not be painted.

Manufacturer shall provide a low profile unity gain radio antenna, Antenna Specialty Company model ASPB-772 or approved equal which shall be compatible with the District's frequency 470 MHz.

### 3.8.2 PUBLIC ADDRESS SYSTEM

Contractor shall install a public address system that enables the driver to address passengers either inside or outside the coach. Amplifier shall be Mobil Page Model 470C, Microphone Assembly Model 180-245 or approved equal.

Interior and exterior speakers shall be of sufficient capacity to ensure that they are not damaged when full power of amplifier is applied to them. Inside speakers shall broadcast, in a clear tone, announcements that are clearly perceived from all seat positions at approximately the same volume level. A weather-proof speaker(s) shall be provided outside the coach so that announcements can be clearly heard by passengers standing near the door equipped with the wheelchair lift. A driver controlled switch shall select inside or outside announcements. A separate volume control shall be provided for the outside system if volume adjustment would otherwise be necessary when switching from inside to outside. The system shall be muted when not in use. The microphone shall be mounted on a heavy-duty, flexible gooseneck that allows the driver to comfortably speak into it without using his hands. The gooseneck shall be supported six to twelve inches from its reinforced mounting base, subject to District approval. An input jack shall be provided in the driver's area for a handheld microphone.

## 3.9 OPTIONS

### 3.9.1 OPTION A - RETARDER SYSTEM

Bidders shall quote pricing to provide an electric or hydraulic retarder system. Bidder shall provide with his Technical Submittal, information for the retarder proposed. Also, include the brake lining life increase over a bus without the retarder.

### 3.9.2 OPTION B - AIR STARTERS

Twenty-five coaches of the diesel powered buses shall be equipped with air starters and supporting system. Ingersoll-Rand, Start Master, or equal are approved. Contractor shall provide information pertaining to the starter system proposed.

### 3.9.3 OPTION C - SEATING ARRANGEMENT

The bidder shall quote pricing for equipping the buses delivered under this contract with the following seating arrangement which increases standee free floor space in the aisle:

- o Curbside of the bus - single passenger (single row) seating in lieu of standard double arrangement
- o Streetside of the bus - standard double (two passenger) seating

### 3.9.4 OPTION D - ADDITIONAL BUSES

Bidder shall state price to furnish 1 to 30 additional buses at a unit price to be extended for the number of optional buses purchased. The quantity of buses shall be determined at the time the District exercises the option.

Bidder's pricing for the optional quantity shall be firm for 60 days from the date of award by the District Board of Directors of the base contract. The District reserves the right to exercise this option in its own best interest at any time during the 60 day period.

Delivery for any option quantity shall be the same as that offered under the base contract. This delivery period shall begin on the date the District exercises this option. This option will not be used in evaluating the base bid.

### 3.10 TECHNICAL SUBMISSION

#### Instructions

Bidders shall complete all items included in this technical submission. If required information is not applicable, the appropriate block should be filled in with "none" or "not applicable". Bidder must be certain that all data are accurate, since they may be used in computing life cycle costs.

Technical Submission is for 40 foot methanol Bus

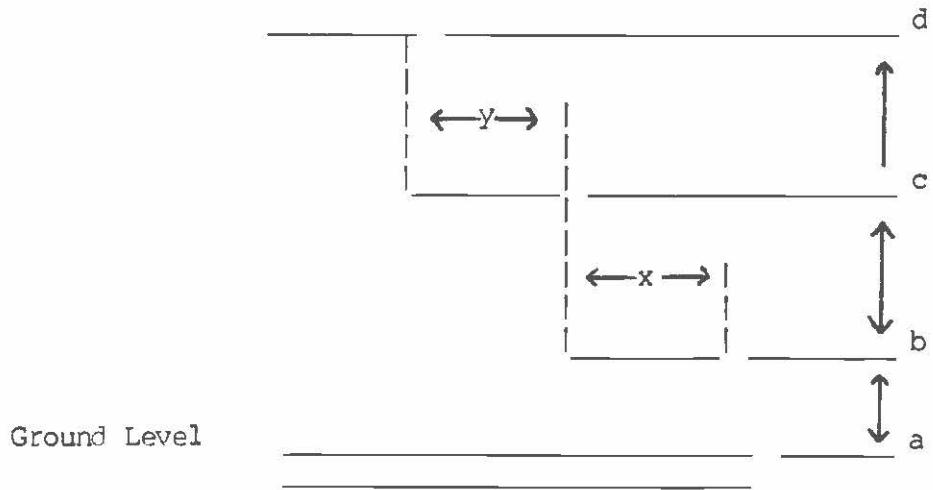
#### A. Bus Model Number \_\_\_\_\_

#### B. General Dimensions

- |   |                           |                        |
|---|---------------------------|------------------------|
| 1. Overall Length                               | _____ Ft.                 | _____ In.              |
| 2. Overall Width                                |                           | _____ In.              |
| Over Body                                       |                           | _____ In.              |
| 3. Overall Height, Front                        |                           | _____ In.              |
| 4. Overall Height, Rear                         |                           | _____ In.              |
| 5. Wheelbase                                    |                           | _____ In.              |
| 6. Overhang, Center Line of Axle Over Bumper    | Front _____<br>Rear _____ | _____ In.<br>_____ In. |
| 7. Turning Radius - Right (outside wheel)- Left | _____ Ft.<br>_____ Ft.    | _____ In.<br>_____ In. |
| 8. Body Turning Radius                          |                           |                        |
| Right   | _____ Ft.                 | _____ In.              |
| Left  | _____ Ft.                 | _____ In.              |
| 9. Height, Floor to Ceiling                     |                           | _____ In.              |
| Front of Bus                                    |                           | _____ In.              |
| Center of Bus                                   |                           | _____ In.              |
| Rear of Bus                                     |                           | _____ In.              |
| 10. Minimum Road Clearances Body                |                           | _____ In.              |
| 11. Road Clearance at Lowest Point              |                           |                        |
| 1st Axle  |                           | _____ In.              |
| 2nd Axle  |                           | _____ In.              |
| Tag Axle  |                           | _____ In.              |
| 12. Angles                                      |                           |                        |
| Approach  |                           | _____ Degree           |
| Departure                                       |                           | _____ Degree           |
| Breakover                                       |                           | _____ Degree           |



13. Step Height from Ground,  
Step Riser Heights, and  
Step Depths



Front Steps, Empty

a-b In. \_\_\_\_\_  
 b-c In. \_\_\_\_\_  
 c-d In. \_\_\_\_\_  
 a-d In. \_\_\_\_\_  
 x In. \_\_\_\_\_  
 y In. \_\_\_\_\_

Rear Steps, Empty

a-b In. \_\_\_\_\_  
 b-c In. \_\_\_\_\_  
 c-d In. \_\_\_\_\_  
 a-d In. \_\_\_\_\_  
 x In. \_\_\_\_\_  
 y In. \_\_\_\_\_

C. Weight of Bus, Complete  
With Full Complement of  
Fuel, Oil and Water, Minus  
Fare Box and Driver.

- 1. On 1st Axle \_\_\_\_\_
- 2. On 2nd Axle \_\_\_\_\_
- 3. Tag Axle (If applicable) \_\_\_\_\_
- Total \_\_\_\_\_

D. Engine (Methanol)

- 1. Manufacturer \_\_\_\_\_
- 2. Type \_\_\_\_\_

- 3. Model Number \_\_\_\_\_
- 4. Bore \_\_\_\_\_ In.
- 5. Stroke \_\_\_\_\_ In.
- 6. Displacement \_\_\_\_\_ Cu. In.
- 7. Compression Ratio \_\_\_\_\_
- 8. Injector Type and Size \_\_\_\_\_
- 9. Brake Horsepower \_\_\_\_\_ Hp.
- At \_\_\_\_\_ RPM
- 10. Torque \_\_\_\_\_ Ft. lb.
- \_\_\_\_\_ RPM

E. Transmission (Automatic)

- 1. Manufacturer \_\_\_\_\_
- 2. Type \_\_\_\_\_
- 3. Model Number \_\_\_\_\_
- 4. Gears \_\_\_\_\_
- 5. Ratio \_\_\_\_\_

F. Retarder

- 1. Manufacturer \_\_\_\_\_
- 2. Type \_\_\_\_\_
- 3. Model Number \_\_\_\_\_
- 4. Brake Lining Life -  
Percent of Increase over  
Bus without Retarders \_\_\_\_\_ %

G. Maximum Warranted Speeds

- 1. Propulsion Engine  
Load RPM \_\_\_\_\_  
No Load RPM \_\_\_\_\_
- 2. 24 Volt Alternator RPM \_\_\_\_\_

Capacity \_\_\_\_\_  
3. Freon Compressor RPM \_\_\_\_\_

4. 12 Volt Alternator RPM \_\_\_\_\_

Capacity \_\_\_\_\_

5. Bidder shall furnish gradeability, engine speed versus vehicle speed in direct drive, and time versus vehicle speed curves for the engine he proposes to furnish.

H. Energy Absorption Bumper, Front

- 1. Manufacturer \_\_\_\_\_
- 2. Model \_\_\_\_\_
- 3. Number of Sections \_\_\_\_\_
- 4. Capacity \_\_\_\_\_ Gal.  
or Cu.In.

I. 1st Axle

- 1. Manufacturer \_\_\_\_\_
- 2. Model \_\_\_\_\_

J. 2nd Axle Drive Tag (if used)

- 1. Manufacturer \_\_\_\_\_
- 2. Model \_\_\_\_\_

K. Drive Ratios

- 1. Transmission Output \_\_\_\_\_
- 2. Rear Axle \_\_\_\_\_
- 3. Final Gear Ratio \_\_\_\_\_

L. Brakes

- 1. Brake Chambers  
Vendor's Size and Part No.  
1st Axle \_\_\_\_\_  
2nd Axle \_\_\_\_\_  
Tag Axle \_\_\_\_\_

2. Slack Adjusters
  - Vendor's Type and Part No. \_\_\_\_\_
  - 1st Axle right \_\_\_\_\_
  - 1st Axle left \_\_\_\_\_
  - 2nd Axle right \_\_\_\_\_
  - 2nd Axle left \_\_\_\_\_
  - Tag Axle \_\_\_\_\_
  
  - Push Rod Travel
  - 1st Axle \_\_\_\_\_ In.
  - 2nd Axle \_\_\_\_\_ In.
  - Tag Axle \_\_\_\_\_ In.
  
3. Brake Drums    1st Axle    2nd Axle
  - Manufacturer \_\_\_\_\_
  - Part Number    \_\_\_\_\_
  - Diameter        \_\_\_\_\_
  
4. Brake Block Manufacturer \_\_\_\_\_
  
5. Brake Block Identification
  - 1st Axle
  - Forward \_\_\_\_\_
  - Reverse \_\_\_\_\_
  
6. Brake Blocks Per Shoe
  - 1st Axle \_\_\_\_\_
  - 2nd Axle \_\_\_\_\_
  - Tag Axle \_\_\_\_\_
  
7. Brake Block Widths
  - 1st Axle \_\_\_\_\_ In.
  - 2nd Axle \_\_\_\_\_ In.
  - Tag Axle \_\_\_\_\_ In.
  
8. Brake Block Lengths
  - 1st Axle \_\_\_\_\_ In.
  - 2nd Axle \_\_\_\_\_ In.
  - Tag Axle \_\_\_\_\_ In.
  
9. Brake Block Thickness \_\_\_\_\_ In.
  
10. Brake Block Area Per Drum
  - 1st Axle \_\_\_\_\_ In.
  - 2nd Axle \_\_\_\_\_ In.
  - Tag Axle \_\_\_\_\_ In.

M. Air Reservoir Capacity

1. No. 1 Reservoir \_\_\_\_\_ Cu.In.
2. No. 2 Reservoir \_\_\_\_\_ Cu.In.
3. No. 3 Reservoir \_\_\_\_\_ Cu.In.
4. Other \_\_\_\_\_ Cu.In.

N. Total Coolant Capacity

Cooling and Heating System \_\_\_\_\_ Gal.

O. Air Conditioning Equipment

1. Compressor  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_  
No. of Cylinders \_\_\_\_\_  
Drive Ratio (to Methanol  
Engine) \_\_\_\_\_  
Oil Capacity - Dry \_\_\_\_\_  
Wet \_\_\_\_\_  
  
Refrigerant \_\_\_\_\_

2. Condenser  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_  
No. of Rows \_\_\_\_\_  
No. of Fins/In \_\_\_\_\_  
O.D. of Tube \_\_\_\_\_  
Fin Size \_\_\_\_\_

3. Condenser Fan  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_  
Fan Diameter \_\_\_\_\_ In.  
Speed Maximum \_\_\_\_\_ RPM  
Flow Rate (maximum) \_\_\_\_\_ CFM

4. Receiver  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_ Lbs.

5. Condenser Fan Drive  
  
a. Alternator  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_  
(Max.) Rating \_\_\_\_\_ Amp.  
  
b. Motor  
Manufacturer \_\_\_\_\_  
Model \_\_\_\_\_

## SPECIAL REQUIREMENTS - ATTACHMENT A

### 2.1.1.3 FINISH AND COLOR

Color scheme shall be in general conformance with the photograph attached to this specification. Exact color scheme requirements shall be provided to successful bidder.

The first production bus shall be striped according to this color scheme and approved by the District prior to application to the remainder of the buses.

Exterior painted surfaces shall have a minimum of .5 mil thick primer coat and a minimum 2.5 mil thick finish coat of Koppers Al266B-66 Polyuretane Coating or equal. The interior of both passenger doors shall be primed with acid-resistant paint. Koppers coatings are available from Koppers Company, 5431 District Blvd., Vernon, California 90040, Telephone (213) 560-5711.

The bus striping shall be of 3M type material as supplied by the Serigraphics Company, 14600 East Alondra Blvd., La Mirada, California 90638. The striping material shall include a baked-on clear coat.

Successful bidder shall provide four roof number per bus. The decals shall be five foot high. Material shall be 3M Scotchlite, Black #3655.

Contractor shall provide, with his bid, no less than one artist's watercolor painting of the bus bid upon, illustrating a proposed color scheme for bus exterior painting. Paint scheme shall be generally in conformance with the attached photograph. The artist's printing shall include a front side and rear view of the bus.

#### Colors:

SA15337 - White - Component A  
321-17038 - Black - Component A



## SPECIAL REQUIREMENTS - ATTACHMENT B

## 2.1.1.4 NUMBERING AND SIGNS

Contractor shall furnish and apply all decals. Decal locations shall be approved by the District. Two manufacturers who have supplied decals to the District are: Hesik Company, Inc., 17466 Damler St., Irvine, California 92705 and Serigraphic Displays, 13721 E. Bora Drive, Santa Fe Springs, California 90670. The Contractor shall certify that the decals, as listed below, are 3-M Scotchcal or Scotchlite, as indicated.

<u>Required</u>	<u>Exterior</u>	<u>Color</u>	<u>3-M Material</u>
4 sets	5" Digit Numbers	White	3280- Scotchlite
1	3" Bienvenidos	Black	3655
1	2" Southern California Rapid Transit District	White	3280 Scotchlite
1	5/8" Exact Fare Please	Clear	3669 Prtd. Black
1	3" Welcome Aboard	Black	3655
1 Set	5/8" Tenga Pasaje Exacto Por Favor	Clear	3669 Prtd. Black
1	10-1/2" Service Mark	Red	180-10
2 Sets	15-5/8" Service Mark		
	2-2/3" RTD	Red- Black	680 3655 Scotchlite
2	6" (International wheelchair symbol)	White	180-10 Printed-Blue Controltac
1 Set	5" Digit Numbers	Black	3655
<u>INTERIOR</u>			
1 set	1-1/2" Digit Numbers	Black	3655
	6-1/2"x13-7/8" (Inter- national Sign) PLEASE NO EATING-NO SMOKING-NO RADIO	Clear	3669 Printed Red-Black- White

1	7/16" UNNECESSARY CONVERSA- TION WITH OPERATOR IS FORBIDDEN BY LAW	Clear	3669 Printed- Black
1	11/16" Bus Drivers Carry No Cash or Token	"	"
1	11/16" El Conductor No Tiene Dinero Ni Tokens de Autobus	"	"
1	1/2" It is Unlawful for Passengers to Stand in Stepwell	"	"
2 Sets	7/8" Caution	"	"
1	1/2" Door Opens In	"	"
3-4	3/4" Priority to Aged and Handicapped	"	"
2*	3/4" Priority to Wheelchair Handicapped	"	"
1	1" Wait for Light	"	"
1	1/2" Then Push Door Handle Open Door	"	"
1	1/2" Espere La Luz	"	"
1	1/2" Y Empuje, Para Abrir	"	"
2	3/4" Take One	"	"
1 Set	To Open Door Push and Hold Handle	"	"
2	1-1/4" Watch Your Step	White	3280 Scotchlite

All "screened" markings shall be coated with 3-M clear coat. The Contractor is to certify that the following decal is 3-M Scotchlite:

\*One to be applied for each wheelchair position.

District shall furnish successful bidder with samples or drawings of all decals listed. Contractor shall furnish any other markings necessary for identification of windows, hatches, etc.

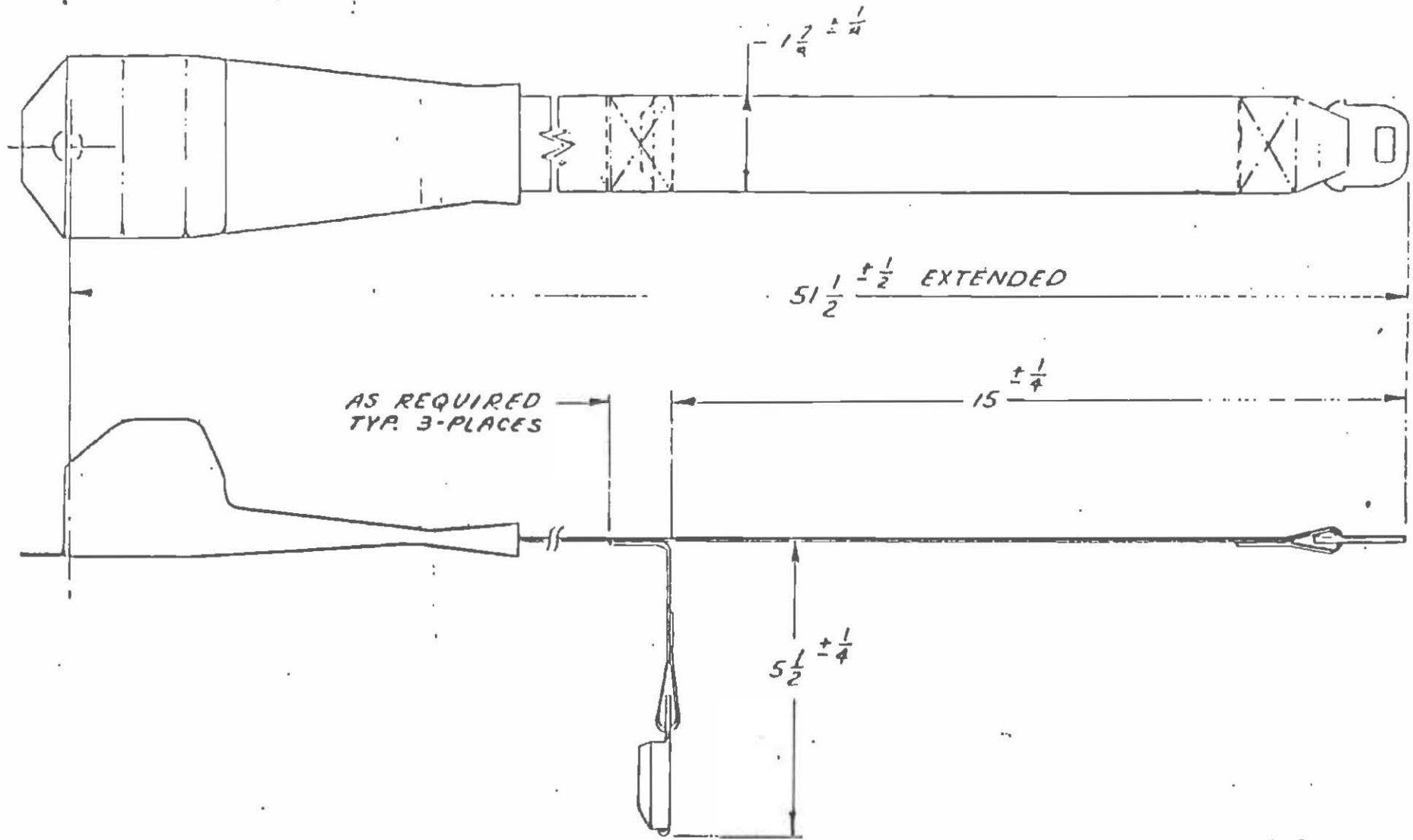


SPECIAL REQUIREMENTS ATTACHMENT C

2.6.6.3 WHEELCHAIR SECUREMENT STRAP

Contractor shall provide wheelchair securement strap assemblies for installation on District accessible transit coaches. Each securement strap assembly shall include the following:

1. Each securement strap shall be equipped with a male and female connector. When fully extended, the strap shall be 51.5 inches long from the mounting hole to the end of the female buckle. The strap webbing shall be red in color and shall be equal to automobile seat belt webbing material. (See attached drawing for details.)
2. An automotive type retractor for stowing webbing shall be provided. In the stowed position, no more than 11" of the securement straps shall be outside of the retractor assembly. The retractor assembly shall be black in color, or approved equal.
3. The securement strap assembly shall be used in a set of two units. A two unit set of securement straps shall hold a wheelchair and passenger weighing up to 450 lbs. in combined weight. See Figure II-7.



SPECIAL REQUIREMENTS - ATTACHMENT C

WHEEL CHAIR SECUREMENT  
FOR SCRTD

LW's. NO. SK-8502

PART III: QUALITY ASSURANCE

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1.0 CONTRACTOR'S IN-PLANT QUALITY  
ASSURANCE REQUIREMENTS

## 1.1 QUALITY ASSURANCE ORGANIZATION

The Contractor shall establish and maintain an effective in-plant quality assurance organization. It shall be a specifically defined organization and should be directly responsible to the Contractor's top management.

### 1.1.1 CONTROL

The quality assurance organization shall exercise quality control over all phases of production from initiation of design through manufacture and preparation for delivery. The organization shall also control the quality of supplied articles.

### 1.1.2 AUTHORITY AND RESPONSIBILITY

The quality assurance organization shall have the authority and responsibility for reliability, quality control, inspection planning, establishment of the quality control system, acceptance/rejection of materials and manufactured articles in the production of the transit coaches.

## 1.2 QUALITY ASSURANCE ORGANIZATION FUNCTIONS

The quality assurance organization shall include the following minimum functions.

### 1.2.1 WORK INSTRUCTIONS

The quality assurance organization shall verify inspection operation instructions to ascertain that the manufactured product meets all prescribed requirements.

### 1.2.2 RECORDS MAINTENANCE

The quality assurance organization shall maintain and use records and data essential to the effective operation of its program. These records and data shall be kept up-to-date, and shall be available for review by the Resident Inspectors, upon written request, within a reasonable time, but in no event to exceed 24 hours from the time of such request. Inspection and test records for this procurement shall be available for a minimum of 1 year after inspections and tests are completed.

### 1.2.3. CORRECTIVE ACTIONS

The quality assurance organization shall detect and promptly assure correction of any conditions that may result in the production of defective transit coaches. These conditions may occur in designs, purchases, manufacture, tests, or operations that culminate in defective supplies, services, facilities, technical data, or standards.

### 1.3 STANDARDS AND FACILITIES

The following standards and facilities shall be basic in the quality assurance process.

#### 1.3.1 CONFIGURATION CONTROL

The Contractor shall maintain drawings and other documentation that completely describe a qualified coach that meets all of the options and special requirements of this procurement. The quality assurance organization shall verify that each transit coach is manufactured in accordance with these controlled drawings and documentation.

#### 1.3.2 MEASURING AND TESTING FACILITIES

The Contractor shall provide and maintain the necessary gauges and other measuring and testing devices for use by the quality assurance organization to verify that the coaches conform to all specification requirements. These devices shall be calibrated at established periods against certified measurement standards that have known valid relationships to national standards.

#### 1.3.3 PRODUCTION TOOLING

Production jigs, fixtures, tooling masters, templates, patterns, and other devices used in production, shall be proved for accuracy at formally established intervals and adjusted, replaced, or repaired as required to maintain quality.

#### 1.3.4 EQUIPMENT USE BY RESIDENT INSPECTORS

The Contractor's gauges and other measuring and testing devices shall be made available for use by the Resident Inspectors to verify that the coaches conform to all specification requirements. If necessary, the Contractor's personnel shall be made available to operate the devices and to verify their condition and accuracy.

### 1.4 CONTROL OF PURCHASES

The Contractor shall maintain quality control of purchases.

#### 1.4.1 SUPPLIER CONTROL

The Contractor shall require that each supplier maintain a quality control program for the services and supplies that it provides. The contractor's quality assurance organization shall inspect and test materials provided by suppliers, according to ASTM standards, for conformity to specification requirements. Materials that have been inspected, tested, and approved shall be identified as acceptable to the point of use in the manufacturing or assembly processes. Controls shall be established to prevent inadvertent use of non-conforming materials.



#### 1.4.2 PURCHASING DATA

The Contractor shall verify that all applicable specification requirements are properly included or referenced in purchase orders of articles to be used on transit coaches.

### 1.5 MANUFACTURING CONTROL

The Contractor shall ensure that all basic production operations, as well as other processing and fabricating, are performed under controlled conditions. Establishment of these controlled conditions shall be based on the documented work instructions, adequate production equipment, and special working environments if necessary.

#### 1.5.1 COMPLETED ITEMS

A system for final inspection and test of completed transit coaches shall be provided by the quality assurance organization. It shall measure the overall quality of each completed coach.

#### 1.5.2 NONCONFORMING MATERIALS

The quality assurance organization shall monitor the Contractor's system for controlling nonconforming materials. The system shall include procedures for identification, segregation, and disposition.

#### 1.5.3 STATISTICAL TECHNIQUES

Statistical analyses, tests, and other quality control procedures may be used when appropriate in the quality assurance processes.

#### 1.5.4 INSPECTION STATUS

A system shall be maintained by the quality assurance organization for identifying the inspection status of components and completed transit coaches. Identification may include cards, tags, or other normal quality control devices.

### 1.6 INSPECTION SYSTEM

The quality assurance organization shall establish, maintain, and periodically audit a fully-documented inspection system. The system shall prescribe inspection and test of materials, work in progress, and completed articles. As a minimum, it shall include the following controls.

#### 1.6.1 INSPECTION STATIONS

Inspection stations shall be at the best locations to provide for the work content and characteristics to be inspected. Stations shall provide the facilities and equipment to inspect structural, electrical, hydraulic, and other components and assemblies for compliance with the design requirements and with SAE, AWS, and ANSI standards.

Each station shall also have completely up-to-date engineering processing sheets and drawings for the assembly process performed in that section. In addition, samples of approved and non-approved articles shall be displayed at each station.

Stations shall also be at the best locations to inspect or test characteristics before they are concealed by subsequent fabrication or assembly operations. These locations shall, minimally, include underbody structure completion, body framing completion, body prior to paint preparation, water test before interior trim and insulation installation, engine installation completion, underbody dress-up and completion, coach prior to final paint touchup, coach prior to road test, and coach final road test completion.

#### 1.6.2 INSPECTION PERSONNEL

Sufficient trained inspectors shall be used to ensure that all materials, components, and assemblies are inspected for conformance with the qualified coach design.

#### 1.6.3 INSPECTION RECORDS

Acceptance, rework, or rejection identification shall be attached to inspected articles. Articles that have been accepted as a result of approved materials review actions shall be identified. Articles that have been reworked to specified drawing configurations shall not require special identification. Articles rejected as unsuitable or scrap shall be plainly marked and controlled to prevent installation on the coach. Articles that become obsolete as a result of engineering changes or other actions shall be controlled to prevent unauthorized assembly or installation. Unusable articles shall be isolated and then scrapped.

Discrepancies noted by the Contractor or Resident Inspector during assembly shall be entered by the inspection personnel on a record that accompanies the major component, subassembly, assembly, or coach from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, procedures, or other conditions that cause articles to be in nonconformity with the requirements of the contract specifications. The inspection personnel shall verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, the District shall approve the modification, repair, or method of correction to the extent that the contract specifications are affected.

#### 1.6.4 QUALITY ASSURANCE AUDITS

The quality assurance organization shall establish and maintain a quality control audit program. Records of this program shall be subject to review by the District.

### 1.7 RESIDENT INSPECTOR

The District shall be represented at the Contractor's plant by Resident Inspectors. They shall monitor, in the Contractor's plant, the manufacture of transit coaches built under this procurement. The Resident Inspectors shall be authorized to approve the predelivery acceptance tests, and to release the coaches for delivery. Upon request to the quality assurance supervisor, the Resident Inspectors shall have access to the Contractor's quality assurance files related to this procurement. These files shall include drawings, material standards, parts lists, inspection processing and reports, and records of defects.

No less than 30 days prior to the beginning of coach manufacture, the Resident Inspectors shall meet with the Contractor's quality assurance manager. They shall review the inspection procedures and checklists. The Resident Inspectors may begin monitoring coach construction activities 2 weeks prior to the start of coach fabrication.

The Contractor shall provide office space for the Resident Inspectors in close proximity to the final assembly area. This office space shall be equipped with desks, outside and interplant telephones, file cabinet, chairs, and clothing lockers sufficient to accommodate the Resident Inspector staff.

The presence of these Resident Inspectors in the plant shall not relieve the Contractor of its responsibility to meet all of the requirements of this procurement.

### 1.8 INITIAL ENGINE START-UP

The fuel system shall be primed and pressure tested after installation of the engine in the coach and before it is started for the first time. The pressure test shall assure that the fuel system is free of leaks that can dilute engine oil. This requirement shall be verified by visual inspection of injectors and jumper lines with a minimum of 60 psi applied at the secondary fuel filter inlet and the fuel return line blocked. Ether and/or other starting aids shall not be used to initially start engine during coach assembly.

2.0 ACCEPTANCE TESTS

## 2.1 RESPONSIBILITY

Fully documented tests shall be conducted on each production coach following manufacture to determine its acceptance to the District. These acceptance tests shall include predelivery inspections and testing by the Contractor, and inspections and testing by the District after the coaches have been delivered.

## 2.2 PREDELIVERY TESTS

The Contractor shall conduct acceptance tests at its plant on each coach following completion of manufacture and before delivery to the District. These predelivery tests shall include visual and measured inspections, as well as testing the total coach operation. The tests shall be conducted and documented in accordance with written test plans. Additional tests may be conducted at the Contractor's discretion to ensure that the completed coaches have attained the desired quality and have met the requirements in Part II: Technical Specifications. This additional testing shall be recorded on appropriate test forms provided by the Contractor.

The Resident Inspector shall select a bus at random for pre-delivery testing. The predelivery tests shall be scheduled and conducted with sufficient notice so that they may be witnessed by the Resident Inspectors, who may accept or reject the results of the tests. The results of predelivery tests, and any other tests, shall be filed with the assembly inspection records for each coach. The underfloor equipment shall be made available for inspection by the Resident Inspectors, using a pit or coach hoist provided by the Contractor. A hoist, scaffold, or elevated platform shall be provided by the Contractor to easily and safely inspect coach roofs. Delivery of each coach shall require written authorization of a Resident Inspector. Authorization forms for the release of each coach for delivery shall be provided by the Contractor. An executed copy of the authorization shall accompany the delivery of each coach.

### 2.2.1 INSPECTION-VISUAL AND MEASURED

Visual and measured inspections shall be conducted with the coach in a static condition. The purpose of the inspection testing is to verify overall dimensional and weight requirements, to verify that required components are included and are ready for operation, and to verify that components and subsystems that are designed to operate with the coach in a static condition do function as designed.

### 2.2.2 TOTAL COACH OPERATION

Total coach operation shall be evaluated during road tests. The purpose of the road tests is to observe and verify the operation of the coach as a system and to verify the functional operation of the subsystem that can be operated only while the coach is in motion.

Each coach shall be driven for a minimum of 15 miles during the road tests. Observed defects shall be recorded on the test forms. The coach shall be retested when defects are corrected and adjustments are made. This process shall continue until defects or required adjustments are no longer detected. Results shall be pass/fail for these coach operation tests.

### 2.3 POST-DELIVERY TESTS

The District may conduct acceptance tests on each delivered coach. These tests shall be completed within 15 days after coach delivery and shall be conducted in accordance with written test plans. The purpose of these tests is to identify defects that have become apparent between the time of coach release and delivery to the District. The post-delivery tests shall include visual inspection and coach operations.

Coaches that fail to pass the post-delivery tests are subject to nonacceptance. The District shall record details of all defects on the appropriate test forms and shall notify the Contractor of nonacceptance of each coach within 5 days after completion of the tests. The defects detected during these tests shall be repaired according to procedures defined in Part I: Solicitation. Offer and Award/Contractual Provisions.

#### 2.3.1 VISUAL INSPECTION

The post-delivery inspection is similar to the inspection at the Contractor's plant and shall be conducted with the coach in a static condition. Any visual delivery damage shall be identified and recorded during the visual inspection of each coach.

#### 2.3.2 COACH OPERATION

The road tests for total coach operation are similar to those conducted at the Contractor's plant. Operational deficiencies of each coach shall be identified and recorded.

PART IV - WARRANTY PROVISIONS

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1.0 BASIC PROVISIONS

## 1.1 WARRANTY REQUIREMENTS

Warranties in this document are in addition to any statutory remedies or warranties imposed on the Contractor. Consistent with this requirement the Contractor warrants and guarantees to the original District each complete coach, and specific subsystems and components as follows:

### 1.1.1 COMPLETE COACH

The coach is warranted and guaranteed to be free from defects\* and related defects\* for one year or 50,000 whichever comes first, beginning on the date of acceptance of each coach. \*\* Brake drums shall be warranted for 50,000 miles. During this warranty period, the coach shall maintain its structural and functional integrity. The warranty is based on regular operation of the coach under the operating conditions prevailing in the in District service. Brake lining material shall be warranted for 15,000 miles.

### 1.1.2 SUBSYSTEMS AND COMPONENTS

Specific subsystems and components are warranted and guaranteed to be free from defects and related defects for the times and/or mileages given in Figure IV-1.

ITEM	WHICHEVER OCCURS FIRST	
	YEARS	MILEAGE
Engine	2	200,000
Transmission	2	100,000
Drive axle	2	100,000
Brakes (Excluding Lining and drums wear)	2	50,000
Air conditioning system	2	n/a
Basic body structure	3	150,000

FIGURE IV-1. SUBSYSTEM AND COMPONENT WARRANTY

\* For definitions, see Part I: Solicitation, Offer and Award/Contractual Provisions.

\*\* For acceptance requirements, see Part I: Solicitation, Offer and Award/Contractual Provisions.

## 1.2 VOIDING OF WARRANTY

The warranty shall not apply to any part or component of the coach that has been subject to misuse, negligence, accident, or that has been repaired or altered in any way so as to affect adversely its performance or reliability, except insofar as such repairs were in accordance with the Contractor's maintenance manuals and the workmanship was in accordance with recognized standards of the industry. The warranty shall also be void if the District fails to conduct normal inspections and scheduled preventive maintenance procedures as recommended in the Contractor's maintenance manuals.

## 1.2 EXCEPTIONS TO WARRANTY

The warranty shall not apply to scheduled maintenance items, and items such as tires and tubes, nor to items furnished by the District such as radios, fare boxes, and other auxiliary equipment, except insofar as such equipment may be damaged by the failure of a part of component for which the Contractor is responsible.

## 1.4 DETECTION OF DEFECTS

If the District detects a defect within the warranty periods defined in Section 1.1, it shall promptly notify the Contractor's representative. Within 5 working days after receipt of notification, the Contractor's representative shall either agree that the defect is in fact covered by warranty, or reserve judgment until the subsystem or component is inspected by the Contractor's representative or is removed and examined at the District's property or at the Contractor's plant. At that time the status of warranty coverage on the subsystem or component shall be mutually resolved between the District and the Contractor. Work necessary to effect the repairs defined in Section 2.2 shall commence within 10 working days after receipt of notification by the Contractor.

## 1.5 SCOPE OF WARRANTY REPAIRS

When warranty repairs are required, the District and the Contractor's representative shall agree within 5 days after notification on the most appropriate course for the repairs and the exact scope of the repairs to be performed under the warranty. If no agreement is obtained within the 5-day period, the District reserves the right to commence the repairs in accordance with Section 2.3.

## 1.6 FLEET DEFECTS

A fleet defect is defined as the failure of identical items covered by the warranty and occurring in 20% of the coaches in this contract during the warranty period.

### 1.6.1 SCOPE OF WARRANTY PROVISIONS

The Contractor shall correct a fleet defect under the warranty provisions defined in Section 2 of Part IV: Warranty Provisions. After correcting the defect, the Contractor shall promptly undertake and complete a work program reasonably designed to prevent the occurrence of the same defect in all other coaches purchased under this contract. The work program shall include inspection and/or correction of the potential or defective parts in all of the coaches.

The warranty on items determined to be fleet defects shall be extended for the time and/or miles of the original warranty. This extended warranty shall begin on the date a fleet defect was determined to exist, or on the repair/replacement date for corrected items.

### 1.6.2 VOIDING OF WARRANTY PROVISIONS

The fleet defect provisions shall not apply to coach defects caused by non-compliance with the Contractor's recommended normal maintenance practices and procedures.

### 1.6.3 EXCEPTIONS TO WARRANTY PROVISIONS

Fleet defect warranty provisions shall not apply to damage that is a result of normal wear and tear in service to such items as seats, floor covering, windows, interior trim, and paint. The provisions shall not apply to District supplied items such as fareboxes and radios.

2.0 REPAIR PROCEDURES

## 2.1 REPAIR PERFORMANCE

The District may require the Contractor or its designated representative to perform warranty-covered repairs that are clearly beyond the scope of the District's capabilities.

## 2.2 REPAIRS BY CONTRACTOR

If the District requires the Contractor to perform warranty-covered repairs, the Contractor's representative must begin, within 10 working days after receiving notification of a defect from the District, work necessary to effect repairs. The District shall make the coach available to complete repairs timely with the Contractor repair schedule.

The Contractor shall provide at its own expense all spare parts, tools, and space required to complete repairs. At the District's option, the Contractor may be required to remove the coach from the District's property while repairs are being effected. If the coach is removed from the District's property, repair procedures must be diligently pursued by the Contractor's representative.

## 2.3 REPAIRS BY DISTRICT

### 2.3.1 PARTS USED

If the District performs the warranty-covered repairs, it shall correct or repair the defect and any related defects using Contractor-specified spare parts available from its own stock or those supplied by the Contractor specifically for this repair. Monthly, or at a period to be mutually agreed upon, reports of all repairs covered by this warranty shall be submitted by the District to the Contractor for reimbursement or replacement of parts. The Contractor shall provide forms for these reports.

### 2.3.2 CONTRACTOR SUPPLIED PARTS

The District may request that the Contractor supply new parts for warranty-covered repairs being performed by the District. These parts shall be shipped prepaid to the District from any source selected by the Contractor within 10 working days of receipt of the request for said parts.

### 2.3.3 DEFECTIVE COMPONENTS RETURN

The Contractor may request that parts covered by the warranty be returned to the manufacturing plant. The total cost for this action shall be paid by the Contractor. Materials should be returned in accordance with Contractor's instructions.

### 2.3.4 REIMBURSEMENT FOR LABOR

The District shall be reimbursed by the Contractor for labor. The amount shall be determined by multiplying the number of person-hours actually required to diagnose and correct the defect by the current per hour, 5M mechanic, straight wage rate, plus 80 percent fringe benefits, plus the cost of towing in the coach if such action was necessary and if the coach was in the normal service area. These wage and fringe benefit rates shall not exceed the rates in effect in the District's service garage at the time the defect correction is made.

### 2.3.5 REIMBURSEMENT FOR PARTS

The District shall be reimbursed by the Contractor for defective parts and for parts that must be replaced to correct the defect. The reimbursement shall be at the price indicated on the Contractor's master price list at the time of repair, and shall include taxes, where applicable, plus 25 percent handling charge.

The District shall base warranty parts pricing, throughout warranty period, on contractor's parts price book in effect at delivery of buses.

## 2.4 WARRANTY AFTER REPLACEMENT/REPAIRS

If any component, unit, or subsystem is repaired, rebuilt or replaced by the Contractor or by the District's personnel, with the concurrence of the Contractor, the subsystem shall have the unexpired warranty period of the original subsystem.

## 2.5 WARRANTY CLAIM SUBMITTALS

Warranty claim forms submitted by the District, with regards to paragraphs 2.3.4 Reimbursement For Labor and 2.3.5 Reimbursement For Parts, shall be typed and shall contain no more than the following information:

### IDENTIFICATION DATA:

1. Warranty repair claim number as furnished by vendor on vendor form.
2. District name and address
3. Bus number
4. Vehicle ID number
5. Bus model
6. Bus mileage
7. In-service date
8. Repair date
9. Claim date
10. Customer code number (if needed)
11. Engine serial number (if needed)
12. Transmission serial number (if needed)
13. Failure description

### PART INFORMATION:

1. Quantity
2. Part number
3. Part description

### LABOR INFORMATION:

1. Labor hours
2. Labor amount