



# FLEET MANAGEMENT PROCEDURES

APRIL 2012

# **Metropolitan Council**

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## **INTRODUCTION**

The procedures contained within this document are aimed at four objectives:

1. To facilitate compliance with all requirements as established by the Federal Transit Administration.
2. To facilitate compliance with federal requirements contained within 42 U.S.C. Section 2000d, also known as Title VI of the Civil Rights Act.
3. To assure that vehicles purchased meet minimum standards.
4. To create efficiencies and improve flexibility in the deployment/reassignment of vehicles to the extent feasible.

These procedures may be periodically reviewed and revised.

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**SELECTION AND PURCHASE Policy 1: Selection of Vehicle Type Guidelines**

Vehicle type should be determined and purchased according to service type and passenger loads. Interlined and start-up services may provide exceptions.

<b>Vehicle type</b>	<b>Passenger Loads<sup>1</sup></b>	<b>Service Type</b>	<b>Approx. GVW</b>	<b>Minimum Vehicle Life<sup>2</sup></b>
Commuter Coach	Min: 30 Max: 57	Express with a one-way trip length of greater than 15 miles AND duration greater than 30 minutes		14 years <sup>3</sup>
Articulated Diesel Transit Bus	Min: 30 Max: 58 (Express) Max: 73 (Urban Local)	Express, Local		12 years
Articulated Hybrid Transit Bus	Min: 44 Max: 73	Local		12 years
40' Hybrid Transit Bus	Min: 29 Max: 48	Local		12 years
40' Diesel Transit Bus	Min: 20 Max: 38 (express) Max: 48 (local)	Express, local		12 years
30' Transit Bus	Min: 13 Max: 26	Medium volume local; low volume express	> 26,000	12 years
Medium-Duty Transit Bus	Min: 13 Max: 26	Suburban circulator services with limited service window (e.g., peak only)	16,000-26,000	7 years
Heavier-Duty Small Bus	Min: 12 Max: 24	Limited stop or express with 4-6 weekday trips or dial-a-ride services	> 14,500	5 years
Light-Duty Small Bus	Min: 2-4 pass./hr. Max: 6	Limited stop or express with 4-6 weekday trips or dial-a-ride services	< 14,500	5 years and: 200,000 (diesel) 175,000 (gas)

<sup>1</sup>Peak loading pattern.

<sup>2</sup>The start of a bus's useful life will be no earlier than:

- Three months prior to the start of expansion service in the case of expansion vehicles, and
- Three months prior to the Council-established retirement date of the vehicles being removed from service in the case of replacement vehicles. (Footnotes continued on next page.)

The Regional Administrator can authorized exceptions if buses are needed more than three months in guideway or BRT systems.

<sup>3</sup>Coach bus model years 2000, 2001 and 2002 will be programmed for replacement after 12 years.

**Policy 2:  
Guiding  
Principles of New  
Vehicle  
Purchases**

All federally funded vehicles purchased under agreements not directly executed by the Council shall be purchased in accordance with the Council's Procedures for Suburban Provider procurements.

Vehicles shall be purchased in accordance with these guiding principles:

- 1) Upon request by a suburban provider, the Council will include the provider in the development of bus specifications and coordinate the procurement to maximize quantity and leverage optimal pricing.
- 2) The regional fleet will be standardized to the greatest extent feasible in accordance with the Standard Vehicle Configurations (Exhibits A through F). This standardization does not preclude the procurement of innovative vehicles for a specific or demonstration purpose.
- 3) The Council will consider life-cycle costing.
- 4) The Council will consider commercial availability.
- 5) Hybrid Buses and Alternative Fuel Buses are appropriate in any vehicle type if:
  - a) a complete life-cycle cost-benefit analysis suggests that they would represent a more effective use of capital or operating dollars, or;
  - b) broader public policy issues suggest a significantly higher than usual value of factors such as emissions, noise profiles and support of advanced technologies compared to traditional diesel buses.

Rationale:

The Council will create efficiencies, to the greatest extent possible and practical, by standardizing vehicle options upon purchase.

**Policy 3:  
Vehicle  
Ownership**

Vehicles funded in whole or in part by the Council shall be owned by the Council. Fleet vehicle titles or Certificates of Origin shall be delivered to the Council within 15 days of vehicle acceptance.

Rationale:

It is important to establish a regional fleet comprehensive plan and effectively manage resources in a dynamic and unpredictable environment. Council ownership satisfies the Federal Transit Administration's requirement for *Satisfactory Continuing Control*.

## **MAINTENANCE, REPAIRS, INSPECTIONS**

### **Policy 4: Mid-life Rehab Costs**

Publicly funded vehicles with a useful life of 12 years or more per Council policy will be eligible for planned mid-life rehabs to include seat upholstery replacements, repair of uneven flooring, other interior hardware such as grab rails, privacy shields and seat frames, exterior paint, body work, lift overhauls, articulated joints and bus frames. In the event of a capital funding shortfall, funding major component failures will be a higher priority than funding mid-life rehabs.

### **Policy 5: Major Component Failures**

For vehicles in which the Council holds the title or the Certificate of Origin, the Council will cover the cost of major component replacements, through the capital budget, that meet the following criteria:

- 1) Are one of the following components: engine core, transmission or lift; and
- 2) Have a cost of \$5,000 or more (including the cost of labor) per unit.

Major component replacements will be completed on an as-needed basis. "As needed" means that engine cores and transmissions will be replaced or rehabbed on a preemptive basis based on technical criteria that indicates component failure is imminent. The Council's fleet manager will consider verifiable and substantive technical information for individual vehicles and, based on such information, may authorize replacement of major components prior to failure. Technical information to be considered in the decision making process includes but is not limited to:

1. Age of the vehicle.
2. Vehicles of the same make, model and year.
3. Expected remaining life on the engine or transmission.
4. History of that particular vehicle engine or transmission.
5. Type of engine or transmission and the typical lifespan of that particular model.
6. Type of service the vehicle is used for.
7. Results of oil analysis.
8. Results of compression test.
9. Oil consumption trend line.
10. Antifreeze in the oil.
11. Fuel consumption trend line.

Rationale:

An April 2007 study conducted by the FTA entitled *Useful Life of Transit Buses and Vans* states that only very large cities with "severe" service conduct planned mid-life overhauls. The majority of transit agencies across the U.S. invest in major repairs on an as-needed basis. Replacing items on an as-needed basis assures that funding is utilized as efficiently as possible.

**Policy 6:  
Preventative  
Maintenance  
Schedule**

The Council and Lessees of Council-owned vehicles agree to comply with the manufacturer's preventive maintenance plan (or better) and will provide a written statement to the Council attesting to this agreement. Any deviation that reduces the level of maintenance from that prescribed by the manufacturer must be approved in advance and in writing by the Council.

Rationale: The Council is obligated, as owner of the regional fleet vehicles, to ensure that these assets are being maintained and utilized in a manner that will maximize the vehicle life in an effective manner.

**Policy 7:  
Quality  
Assurance  
Inspections**

The Council will conduct quality assurance inspections to ensure compliance with prescribed preventative maintenance schedules.

1. The Council will conduct, at its sole discretion, vehicle inspections to include fluid samples.
2. All inspections will be documented and retained on file at the Council.
3. Test results will be shared with the provider.
4. Failure to comply with the manufacturer-specified preventive maintenance schedule will result in the Council's right to deny payment of costs related to engine, transmission or lift failures.

Rationale:

The Council is obligated to ensure that all assets are being maintained and utilized in a manner most advantageous to the residents of the metropolitan area.



**VEHICLE  
TRANSFER,  
REPLACEMENT  
AND DISPOSAL**

**Policy 8:  
Vehicle Transfer  
to Another  
Provider**

The Council reserves the right to redeploy regional fleet vehicles to another provider within the region.

When the transferor is subject to DOT vehicle inspections, vehicles transferred from that provider to another provider must pass a Department of Transportation (DOT) inspection prior to the transfer of such vehicle. The transferor shall arrange for the inspection and pay any relevant costs. Any deficiency identified by the DOT must be fully remedied at the expense of the transferor. The receiving provider reserves the right to conduct an inspection prior to transfer and any significant defects identified during that inspection shall be repaired by the transferor.

When the vehicle is transferring from a provider that is exempt from DOT inspections, the receiving provider shall inspect the buses before transfer takes place, and any significant defects identified during that inspection shall be repaired by the transferor. The receiving provider must be given the opportunity to inspect the vehicle over a lift or maintenance pit provided by the transferring provider upon request.

The transferring provider must provide the receiving provider with a copy of maintenance records of the bus being transferred.

**Rationale:**

Used buses must often be transferred to successor contractors at the beginning of a new contract term. Successor providers are entitled to receive vehicles that have been properly maintained and are in good working condition. All providers must be held accountable for the proper maintenance of vehicles up to the date of transfer.

**Policy 9:  
Vehicle Disposal**

Vehicles that have met or exceeded their useful life, per the rules and guidelines established by the Federal Transit Administration, the State Department of Administration and Council policy shall be eligible for disposal. Vehicles where the cost of repairs as determined by the Council Fleet Manager exceeds the remaining net book value will be considered eligible for disposal.

1. For unplanned removals, suburban and private providers must receive prior written or electronic approval by the Council's Manager of Fleet Services or designee in the Metropolitan Transportation Services Department before removing the vehicle from revenue service. Prior written or electronic approval or denial must be received within 14 calendar days of the request or it can be accepted as tacit approval.

2. Buses shall be sold either from the provider's site or shall be delivered to a site designated by the Council.
3. All ancillary equipment will be removed by the provider to include, but not limited to, fare collection equipment, AVL/APC equipment and bike racks unless otherwise approved in writing by the Council.
4. The provider shall deliver the vehicle to the designated site under its own power unless authorized in advance by the Council.
5. All vehicle graphics that are established by the Council (for example, regional striping and Council logos) shall be removed or covered with matching paint at the expense of the provider.
6. All vehicle graphics that were added by the provider shall be removed from the vehicle at the expense of the provider unless authorized in advance by the Council.
7. Any proceeds obtained through the disposal of a vehicle shall be transferred to the Council.
8. Proceeds obtained by the Council for the disposal of assets shall be deposited back to the capital fund.

Rationale:

All publicly funded assets shall be disposed of in a fashion that allows any interested party to have equal access to the retired asset. Logos, striping and other agency identifiers must be removed upon removal from service for security-related reasons and to protect the public image of all regional transit providers.

<p><b>COUNCIL FUNDING</b></p> <p><b>Policy 10: Non-revenue Vehicles</b></p>	<p>The Council will fund a reasonable number of non-revenue vehicles for use by Metro Transit, Metropolitan Transportation Services and the suburban providers.</p>
<p><b>Policy 11: Maximum Council Funding per Vehicle Type</b></p>	<p>The Council will provide a maximum amount of funding per vehicle based on the price of the vehicle with "standardized" options (see Policy 17) plus 5% to allow for modest upgrades to be determined by each provider. Any vehicle procurement shall include a pricing proposal for the standard vehicle in addition to a vehicle priced with the desired options.</p> <p>For regional fleet vehicles, the average cost of all ancillary items, excluding fare collection capital, will be included in the maximum Council funding. All costs in excess of the maximum Council funding will be the responsibility of the provider.</p>

Rationale:

The Council should provide for a consistent and equitable allocation of available funds and equipment/vehicles to all passengers regardless of provider. Decisions made at the local level that inflate capital costs should not impact all other regional providers.

See also:

Policy 18 on funding-eligible vehicle equipment and ancillary items.

**VEHICLE IDENTITY**

**Policy 12: Assignment of Bus Numbers**

Bus numbers should be assigned to new vehicles based on the following schema:

<b>Provider Name</b>	<b>Assigned Range of Numbers</b>
Metro Transit	0-3999, 7100-9999
Minnesota Valley Transit Authority	4000-4999
South West Transit	5000-5999
Metro Mobility	6100-6599 OR 61000-63199 OR 64100-64199
Scott County	64000-64099
Other Regional Providers:	Big Buses 6000-6099 OR 60000-60999
<ul style="list-style-type: none"> <li>•Plymouth Metro Link</li> <li>•Maple Grove</li> <li>•Shakopee</li> <li>•Prior Lake</li> <li>•MTS contracts</li> </ul>	Small Buses 6600-6699 OR 64200-66999

**Policy 13:  
Vehicle Graphics**

All vehicles funded by the Council shall be outfitted with the following graphics:

1. Small buses operated by dial-a-ride providers, shall display exterior graphics in compliance with the Council's adopted plan. The dial-a-ride public operator may include graphics that identify the local service in a manner that does not cover or interfere with the Council's graphics package.
2. Small buses that are operated by a private contractor under direct contract with the Council in a dial-a-ride mode shall display exterior graphics in compliance with the Council's adopted plan. The operator may include up to two private company logos incorporated with their DOT operator number that are no larger than 12" x 12" each and shall be placed in an area that does not interfere with the Council's graphics package. A county or counties that administer Transit Link dial-a-ride service may include graphics that identify the local service (for example, "Edina Dial-a-Ride") in a manner that does not cover or interfere with the Council's graphics package.
3. Large buses, operated by a private contractor under direct contract with the Council, shall display outward graphics in compliance with the Council's adopted plan. The operator may include up to two company logos that are no larger than 16" x 16" each and shall be placed in an area that does not interfere with the Council's graphics package.
4. U.S. DOT numbers must be displayed per U.S. DOT requirements.
5. Buses operated directly by the Council shall comply with the Council-approved graphics package.
6. Buses operated by suburban providers are not subject to this policy, with the exception of regional transitways.

Rationale:

All vehicles that are linked to the regional transit system and that are funded by the Council should be readily identifiable as such by the general public. The Council's objective is to create a seamless service and consistent image to its riders.

See also:

Policy 9, disposal terms numbers 6 and 7.

## FLEET MANAGEMENT

### Policy 14a: Spare Vehicle Ratio

Regular-route and general public dial-a-ride transit service contracts should utilize the following service to spare ratio:

Column A Total Number of Vehicles in Fleet	Column B Number of Vehicles Operated in Annual Maximum Service*	Column C Appropriate Number of Spare Vehicles
2-5	1-4	1
6-11	5-9	2
12-18	10-15	3
19-24	16-20	4
25-30	21-25	5
31-36	26-30	6
37-42	31-35	7
43-49	36-41	8
50 +	42+	< or = 20% of column B

\*Includes vehicles as allowed per Procedure 14b.

Active fixed route revenue fleets of 50 buses or more cannot exceed a 20% spare factor, per FTA, using the following formula to calculate the fixed-route bus (NTD Motorbus category) spare bus ratio:

a=Total number of revenue vehicles

b=Number of vehicles required for maximum service (per procedures 14b and 14c below)

c=Actual number of spare vehicles (a minus b)

d=Actual spare ratio (c divided by b)

### Policy 14b: Scheduled Standby Vehicles

As a general guideline, a maximum of one scheduled standby vehicle should be provided for every 50 peak buses.

Rationale:

Strategically deployed scheduled standby vehicles maintain service quality and reliability, and are included in peak revenue-service fleet counts. Because the number of scheduled standby vehicles directly impacts both operating and capital costs, a guideline for scheduled standby to peak bus counts is provided.

<p><b>Policy 14c: State Fair Fleet</b></p>	<p>Vehicles to deliver service improvements for the Minnesota State Fair are not to be counted as part of the fleet to meet the annual maximum service requirement (vehicles operated in annual maximum service – VOMS)</p> <p>Rationale: The Minnesota State Fair is an atypical or special event, per FTA guidance.</p>
<p><b>Policy 14d: Expansion Buses</b></p>	<p>Operating funds for a minimum of three years are to be identified for any expansion fleet prior to initiating the procurement. A fleet management plan that identifies peak vehicle requirements and calculates spare ratio factor with the expansion vehicles must be provided with an expansion fleet request.</p> <p>Rationale: Most regional vehicles have a programmed life of 12 years or more. Identification of operating funds justifies the capital investment. The FTA requires a fleet management plan with grant requests for vehicle procurement.</p>
<p><b>Policy 15: Metro Mobility Fleet Size</b></p>	<p>Metro Mobility’s fleet size will be determined according to the maximum number of routes operated during the peak periods of March and October. Analysis will be conducted using March and October data to determine the maximum number of routes in operation during each period. The fleet size for each contractor shall be equal to the maximum number of routes at any time during those periods plus a 10-15% spare factor.</p> <p>Rationale: It is the Council’s responsibility to provide resources to its Metro Mobility contractors so that all requested trips can be delivered both efficiently and effectively.</p>
<p><b>VEHICLE EQUIPMENT AND ANCILLARY ITEMS</b></p> <p><b>Policy 16: Fare Collection Equipment</b></p>	<p>The Council will identify needs and purchase fare collection equipment for all regional providers using a capital account specifically designated for all regional fleet fare-equipment needs. The capital budget for fare collection system purchases will include the cost of installation labor.</p> <p>Rationale: The fare collection system is a regional responsibility and should be coordinated and funded by the Council.</p>

**Policy 17:  
Standard Bus  
Configuration**

Regional transit providers (suburban transit providers, MTS and Metro Transit) will review and determine standard bus costs and upgraded technology at least every two years.

The Council will consider the following items, by vehicle type, as included in the base vehicle price:

<b>Vehicle Type</b>	<b>Standard Options</b>
Coach Bus	Exhibit A
Articulated Transit Bus	Exhibit B
Hybrid Transit Bus	Exhibit C
40' Transit Bus	
30' Transit Bus	Exhibit D
Medium-Duty Transit Bus	
Heavier-Duty Small Bus (GVW: >14,500)	Exhibit E
Light-Duty Small Bus (GVW: ≤14,500)	Exhibit F

The Council will fund buses built to the Council's standard bus configurations (Exhibits A through F). Modifications to these configurations may be approved by the Metropolitan Council's Regional Administrator.

**Policy 18:  
Ancillary Items**

The Council will fund ancillary items limited to those listed in the tables below and up to the maximum amount shown. The table below shows January 2009 pricing. Adjustments to these amounts for equipment purchases independent of regional equipment purchased by the Council shall be made according the change in the Producer Price Indexes as listed below, as published by the U.S. Department of Labor, Bureau of Labor Statistics Series ID:  
Security System Hardware– PCU334310334310  
Radio Hardware – PCU3342203342201  
Bike Racks - PCU331210331210P

The maximum Council contribution for regional fare collection equipment, AVL and APC equipment will be adjusted to reflect actual purchase prices.

**Policy 18:  
Ancillary Items  
(continued)**

**Replacement Buses: Included Ancillary Costs**

<b>Vehicle/ Service Type</b>	<b>30'/40'/Articulated/ Commuter Coach</b>	<b>*Small Buses Used for Fixed Routes</b>	<b>*Small Buses with No Regional Fare Collection Equip./DAR Service</b>
Covered Items	<ul style="list-style-type: none"> <li>▪ Security System AND installation</li> <li>▪ Radio system AND installation</li> <li>▪ Fare system hardware and installation</li> <li>▪ Vehicle graphics AND installation</li> <li>▪ Bike racks AND installation</li> <li>▪ Regional AVL equipment AND installation</li> <li>▪ Spare parts / diagnostic equipment</li> </ul>	<ul style="list-style-type: none"> <li>▪ Security System installation</li> <li>▪ Radio system installation</li> <li>▪ Fare system hardware and installation</li> <li>▪ Vehicle graphics AND installation</li> <li>▪ Bike rack installation</li> <li>▪ Regional AVL installation</li> <li>▪ Spare parts / diagnostic equipment</li> </ul>	<ul style="list-style-type: none"> <li>▪ Radio system installation</li> <li>▪ Vehicle graphics AND installation</li> <li>▪ Security System installation</li> <li>▪ Spare parts / diagnostic equipment</li> </ul>
Max. Council Contribution	<b>\$43,500</b>	<b>\$6,000</b>	<b>\$1,500</b>
Optional Item	<ul style="list-style-type: none"> <li>▪ APC equipment AND installation</li> <li>▪ Interior sign and street enunciator system</li> </ul>	<ul style="list-style-type: none"> <li>▪ APC equipment installation</li> <li>▪ Interior sign and street enunciator installation</li> </ul>	<ul style="list-style-type: none"> <li>▪ AVL/MDC equipment installation</li> </ul>
Max. Council Contribution	<b>\$6,000</b>	<b>\$1,000</b>	<b>\$500</b>

\* Small buses, with replacement cycles of 5 or 7 years, are assumed to use existing ancillary equipment for two consecutive vehicle cycles. The cost covered shall use the Expansion Bus figures for every other replacement cycle to assure that ancillary equipment is used for at least 10 years before replacement.



## **STANDARD VEHICLE CONFIGURATIONS**

### **Exhibit A:**

#### **45' Coach Bus**

##### 1. Engine Size/Type

The engine shall be designed to operate for not less than 500,000 miles without major failure or deterioration. The engine shall be designated as "Heavy Duty" for use in a mass transit application. The engine shall be sized such that performance and fuel economy are maximized and operating costs and capital costs are minimized.

##### 2. Transmission

The transmission shall be multiple-speed, automatic shift with torque converter, retarder and electronic controls with a heavy-duty transit application. Gross input power, gross input torque and rated input speed shall be compatible with the engine. The diesel transmission shall be designed to operate for not less than 500,000 miles on the design operating profile without replacement or major service. Brand name and specs shall be compatible to the engine chosen.

##### 3. Engine block heater

Special equipment or procedures may be employed to start the engine when exposed to temperatures less than 30°F, for a minimum of four hours without the engine in operation. All cold-weather engine-heating devices shall be of the type recommended by the engine manufacturer and approved by the procuring agency.

##### 4. Cooling System

The engine shall be cooled by a water-based, pressure-type cooling system that does not permit boiling or coolant loss during normal vehicle operation. The system shall be of sufficient size to maintain all engine and transmission fluids and intake air at a safe, continuous temperature. The cooling system will maintain a safe and operable temperature range during the most severe operations possible and in accordance with the engine and transmission manufacturers' cooling-system requirements. The cooling fan should engage when any fluid is above safe operating temperature.

##### 5. Brakes

Service brakes shall be controlled and actuated by a compressed air system, and shall meet FMVSS 121 requirements. A microprocessor-controlled ABS system shall be provided. The entire brake system, including friction material shall have a minimum overhaul or replacement life of 30,000 miles with a brake retarder on operating profile. Brakes shall be self-adjusting throughout this period. Wheel bearings and seals shall be replaceable and should not leak or weep lubricant for at least 100,000 miles.

## 6. Suspension

The suspension system shall permit a minimum wheel travel of 3 inches jounce upward travel of a wheel when the bus hits a bump. Suspensions shall incorporate appropriate devices for automatic height control, so that regardless of load the bus height does not deviate more than ½ inches from center line. Shock absorbers shall be used to dampen bus motion and variable road conditions. Shock absorbers shall maintain their effectiveness for at least 50,000 miles.

## 7. Frame and Body

The preferred chassis material is stainless steel and the upper frame components may be stainless steel, corrosion-protected aluminum or corrosion-protected carbon steel. Exterior body panels shall be corrosion protected aluminum, composite material or stainless steel.

## 8. Bumpers

The bumpers shall provide impact protection for the front and rear of the bus. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other. The front and rear bumper shall not be damaged as a result of an impact of up to 5 MPH. The bumper shall be corrosion-resistant and withstand repeated impacts of up to 5 MPH without sustaining damage.

## 9. Rust Proofing

The bus shall resist corrosion from atmospheric conditions and road salts. It shall maintain structural integrity and original appearance throughout its service life. All exposed surfaces and the interior surfaces of tubing and other enclosed members shall be protected with corrosion-resistant coatings. All joints and connections of different metals shall be corrosion-resistant and shall be protected from galvanic corrosion.

## 10. Undercoating

The underside of the bus shall be coated with an appropriate and flame retardant undercoating to protect the undercarriage of the bus from any type of fire or corrosion that may result from road salt or variable weather or road conditions. Corrosion-protection materials shall not require inspection or repair more often than bi-annually and should not require cleaning other than from a standard automated bus wash rack.

The following Items are specified to meet the manufacturer's standard:

1. Transit bus amenities to include grab rails, pull cords, destination headers, bus stop enunciators, placard holders (fixed-route buses only)
2. ADA-compliant wheelchair lift or ramp
3. Seats and seat upholstery
4. Exterior body style
5. Flooring style and material
6. Exterior paint finish: Powder white is the standard; no clear coat
7. All interior signage to comply with ADA

**Exhibit B:  
60' Articulated Transit Bus**

1. Engine Size/Type

The diesel engine shall be designed to operate for not less than 300,000 miles without major failure or deterioration. The engine shall be designated as "Heavy Duty" for use in a mass transit application and shall be sized such that performance and fuel economy are maximized and operating costs and capital costs are minimized.

2. Transmission

The transmission shall be multiple-speed, automatic shift with torque converter, retarder and electronic controls for use in a mass transit application. Gross input power, gross input torque and rated input speed shall be compatible with the engine and provide maximum performance and fuel economy. The transmission shall be designed to operate for not less than 300,000 miles on the design operating profile without replacement or major service. Brand name and specs shall be compatible to the engine chosen.

3. Engine Block Heater

Special equipment or procedures may be employed to start the engine when exposed to temperatures less than 30°F, for a minimum of four hours without the engine in operation. All cold-weather engine-heating devices shall be of the type recommended by the engine manufacturer and approved by the procuring agency.

4. Cooling System

The engine shall be cooled by a water-based, pressure type, cooling system that does not permit boiling or coolant loss during normal vehicle operation. The system shall be of sufficient size to maintain all engine and transmission fluids and intake air at a safe, continuous temperature in accordance with the engine and transmission manufacturers' requirements.

5. Brakes

Service brakes shall be controlled and actuated by a compressed-air system. A microprocessor-controlled ABS system shall be provided. The entire brake system, including friction material, shall have a minimum overhaul or replacement life of 30,000 miles with a brake retarder on operating profile. Brakes shall be self-adjusting throughout this period. Wheel bearings and seals shall be replaceable and should not leak or weep lubricant for 100,000 miles.

6. Suspension

Suspensions shall incorporate appropriate devices for automatic height control. Shock absorbers shall be used to dampen bus motion and variable road conditions. Shock absorbers shall maintain their effectiveness for at least 50,000 miles.

## 7. Frame and Body

The preferred chassis material is stainless steel and the upper frame components may be stainless steel, corrosion-protected aluminum or corrosion-protected carbon steel. Exterior body panels shall be corrosion-protected aluminum, composite material or stainless steel.

## 8. Bumpers

The bumpers shall provide impact protection for the front and rear of the bus. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other. The front and rear bumper shall not be damaged as a result of an impact of up to 5 mph. The bumper shall be corrosion-resistant and withstand repeated impacts of up to 5 mph without sustaining damage.

## 9. Rust Proofing

The bus shall resist corrosion from atmospheric conditions and road salts. It shall maintain structural integrity and original appearance throughout its service life. All exposed surfaces and the interior surfaces of tubing and other enclosed members shall be protected with corrosion-resistant coatings. All joints and connections of different metals shall be corrosion-resistant and shall be protected from galvanic corrosion.

## 10. Undercoating

The underside of the bus shall be coated with an appropriate and flame-retardant undercoating to protect the undercarriage of the bus from any type of fire or corrosion that may result from road salt or from variable weather or road conditions. Corrosion-protection materials shall not require inspection or repair more often than bi-annually and should not require cleaning other than from a standard automated bus wash rack.

The following items are specified to meet the manufacturer's standard:

1. Transit bus amenities to include grab rails, pull cords, destination headers, bus stop enunciators, placard holders (fixed-route buses only)
2. ADA compliant wheelchair lift or ramp
3. Seats and seat upholstery
4. Exterior body style
5. Flooring style and material
6. Exterior paint finish: Powder white is the standard; no clear coat
7. All interior signage to comply with ADA

## **Exhibit C: 40' Lowfloor Diesel Bus and Hybrid Bus**

### **1. Engine Size/Type**

The diesel and hybrid engines shall be designed to operate for not less than 400,000 miles without major failure or deterioration. The engines shall be designated as "Heavy Duty" for use in a mass transit application. The engines shall be sized such that performance and fuel economy are maximized and operating costs and capital costs are minimized.

### **2. Transmission**

The transmission shall be multiple-speed, automatic shift with torque converter, retarder and electronic controls with a heavy-duty transit application. Gross input power, gross input torque and rated input speed shall be compatible with the engine. The diesel transmission shall be designed to operate for not less than 400,000 miles on the design operating profile without replacement or major service.

### **3. Engine Block Heater**

Special equipment or procedures may be employed to start the engine when exposed to temperatures less than 30°F, for a minimum of four hours without the engine in operation. All cold-weather engine-heating devices shall be of the type recommended by the engine manufacturer and approved by the procuring agency.

### **4. Cooling System**

The engine shall be cooled by a water-based, pressure-type cooling system that does not permit boiling or coolant loss during normal vehicle operation. The system shall be of sufficient size to maintain all engine and transmission fluids and intake air at a safe, continuous temperature. The cooling system will maintain a safe and operable temperature range during the most severe operations possible and in accordance with the engine and transmission manufacturers' cooling-system requirements. The cooling fan should engage when any fluid is above safe operating temperature.

### **5. Brakes**

Service brakes shall be controlled and actuated by a compressed air system, and shall meet FMVSS 121 requirements. A microprocessor-controlled ABS system shall be provided. The entire brake system, including friction material, shall have a minimum overhaul or replacement life of 30,000 miles with a brake retarder on operating profile. Brakes shall be self-adjusting throughout this period. Wheel bearings and seals shall be replaceable and should not leak or weep lubricant for at least 100,000 miles.

### **6. Suspension**

The suspension system shall permit a minimum wheel travel of 3 inches jounce upward travel of a wheel when the bus hits a bump. Suspensions shall incorporate appropriate devices for automatic height control, so that regardless of load the bus

height does not deviate more than ½ inch from center line. Shock absorbers shall be used to dampen bus motion and variable road conditions. Shock absorbers shall maintain their effectiveness for at least 50,000 miles.

#### 7. Frame and Body

The preferred chassis material is stainless steel and the upper frame components may be stainless steel, corrosion-protected aluminum or corrosion-protected carbon steel. Exterior body panels shall be corrosion protected aluminum, composite material or stainless steel.

#### 8. Bumpers

The bumpers shall provide impact protection for the front and rear of the bus. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other. The front and rear bumper shall not be damaged as a result of an impact of up to 5 MPH. The bumper shall be corrosion-resistant and withstand repeated impacts of up to 5 MPH without sustaining damage.

#### 9. Rust Proofing

The bus shall resist corrosion from atmospheric conditions and road salts. It shall maintain structural integrity and original appearance throughout its service life. All exposed surfaces and the interior surfaces of tubing and other enclosed members shall be protected with corrosion-resistant coatings. All joints and connections of different metals shall be corrosion-resistant and shall be protected from galvanic corrosion.

#### 10. Undercoating

The underside of the bus shall be coated with an appropriate and flame retardant undercoating to protect the undercarriage of the bus from any type of fire or corrosion that may result from road salt or variable weather or road conditions. Corrosion protection materials shall not require inspection or repair more often than bi-annually and should not require cleaning other than from a standard automated bus wash rack.

The following items are specified to meet the manufacturer's standard:

1. Transit bus amenities to include grab rails, pull cords, destination headers, bus stop enunciators, placard holders (fixed-route buses only)
2. ADA compliant wheelchair lift or ramp
4. Seats and seat upholstery
5. Exterior body style
6. Flooring style and material
7. Exterior paint finish: Powder white is the standard; no clear coat
8. All interior signage to comply with ADA

**Exhibit D:  
30' Transit Bus and Medium-Duty Transit Bus**

1. Engine Size/Type

The engine shall be designed to operate for not less than 300,000 miles without major failure or deterioration. The engine shall be designated as "Heavy Duty" for use in a mass transit application.

2. Transmission

The transmission shall be multiple-speed, automatic shift with torque converter, retarder and electronic controls with a heavy-duty transit application. Gross input power, gross input torque and rated input speed shall be compatible with the engine. The transmission shall be designed to operate for not less than 300,000 miles on the design operating profile without replacement or major service.

3. Engine Block Heater

Special equipment or procedures may be employed to start the engine when exposed to temperatures less than 30°F, for a minimum of four hours without the engine in operation. All cold-weather engine-heating devices shall be of the type recommended by the engine manufacturer and approved by the procuring agency.

4. Cooling System

The engine shall be cooled by a water-based, pressure-type cooling system that does not permit boiling or coolant loss during normal vehicle operation. The system shall be of sufficient size to maintain all engine and transmission fluids and intake air at a safe, continuous temperature. The cooling system will maintain a safe and operable temperature range during the most severe operations possible and in accordance with the engine and transmission manufacturers' cooling-system requirements. The cooling fan should engage when any fluid is above safe operating temperature.

5. Brakes

Service brakes shall be controlled and actuated by a compressed air system and shall meet FMVSS 121 requirements. A microprocessor-controlled ABS system shall be provided. The entire brake system, including friction material shall have a minimum overhaul or replacement life of 30,000 miles with a brake retarder on operating profile. Brakes shall be self-adjusting throughout this period. Wheel bearings and seals shall be replaceable and should not leak or weep lubricant for at least 100,000 miles.

6. Suspension

Suspensions shall incorporate appropriate devices for automatic height control. Shock absorbers shall be used to dampen bus motion and variable road conditions. Shock absorbers shall maintain their effectiveness for at least 50,000 miles.



## 7. Frame and Body

The preferred chassis material is stainless steel and the upper frame components may be stainless steel, corrosion-protected aluminum or corrosion protected carbon steel. Exterior panels shall be corrosion-protected aluminum, composite material or stainless steel.

## 8. Bumpers

The bumpers shall provide impact protection for the front and rear of the bus. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other. The front and rear bumper shall not be damaged as a result of an impact of up to 5 MPH. The bumper shall be corrosion-resistant and withstand repeated impacts of up to 5 MPH without sustaining damage.

## 9. Rust Proofing

The bus shall resist corrosion from atmospheric conditions and road salts. It shall maintain structural integrity and original appearance throughout its service life. All exposed surfaces and the interior surfaces of tubing and other enclosed members shall be protected with corrosion-resistant coatings. All joints and connections of different metals shall be corrosion-resistant and shall be protected from galvanic corrosion.

## 10. Undercoating

The underside of the bus shall be coated with an appropriate and flame retardant undercoating to protect the undercarriage of the bus from any type of fire or corrosion that may result from road salt or variable weather or road conditions.

The following items are specified to meet the manufacturer's standard:

1. Transit bus amenities to include grab rails, pull cords, destination headers, bus stop enunciators, placard holders (fixed-route buses only)
2. ADA compliant wheelchair lift or ramp
4. Seats and seat upholstery
5. Exterior body style
6. Flooring style and material
7. Exterior paint finish: Powder white is the standard; no clear coat
8. All interior signage to comply with ADA

## **Exhibit E: Heavier-Duty Small Bus**

### **1. Engine Size/Type**

The engine shall be designed to operate for not less than 250,000 miles without major failure or deterioration. The engine shall be designated as "Heavy Duty" for use in a mass transit application.

### **2. Transmission**

The transmission shall be multiple-speed, automatic shift with torque converter, retarder and electronic controls with a heavy-duty transit application. Gross input power, gross input torque and rated input speed shall be compatible with the engine. The transmission shall be designed to operate for not less than 250,000 miles on the design operating profile without replacement or major service. Transmission brand name and specs shall be compatible to the engine chosen.

### **3. Engine Block Heater**

Special equipment or procedures may be employed to start the engine when exposed to temperatures less than 30°F, for a minimum of four hours without the engine in operation. All cold-weather engine-heating devices shall be of the type recommended by the engine manufacturer and approved by the procuring agency.

### **4. Cooling System**

The engine shall be cooled by a water-based, pressure-type cooling system that does not permit boiling or coolant loss during normal vehicle operation. The system shall be of sufficient size to maintain all engine and transmission fluids and intake air at a safe, continuous temperature. The cooling system will maintain a safe and operable temperature range during the most severe operations possible and in accordance with the engine and transmission manufacturers' cooling-system requirements. The cooling fan should engage when any fluid is above safe operating temperature.

### **5. Brakes**

Service brakes shall be controlled and actuated by a hydraulic disc system. A microprocessor-controlled ABS system shall be provided. The entire brake system, including friction material, shall have a minimum overhaul or replacement life of 30,000 miles. Brakes shall be self-adjusting throughout this period. Wheel bearings and seals shall be replaceable and should not leak or weep lubricant for 100,000 miles.

### **6. Suspension**

The suspension system shall permit a minimum wheel travel of 3 inches jounce upward travel of a wheel when the bus hits a bump. Suspensions shall incorporate appropriate devices for automatic height control, so that regardless of load, the bus height does not deviate more than ½ inch from center line. Shock absorbers shall be used to dampen bus motion and variable road conditions. Shock absorbers shall maintain their effectiveness for at least 50,000 miles.

## 7. Stainless Steel Where Practical

Stainless steel options should be provided during option selection. Possible uses for this type of material would be framing, skirting, lower body panels, rivets, screws and body detailing.

## 8. Bumpers

The bumpers shall provide impact protection for the front and rear of the bus. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other. The front and rear bumper shall not be damaged as a result of an impact of up to 5 mph. The bumper shall be corrosion-resistant and withstand repeated impacts of up to 5 mph without sustaining damage.

## 9. Rust Proofing

The bus shall resist corrosion from atmospheric conditions and road salts. It shall maintain structural integrity and original appearance throughout its service life. All exposed surfaces and the interior surfaces of tubing and other enclosed members shall be protected with corrosion-resistant coatings. All joints and connections of different metals shall be corrosion-resistant and shall be protected from galvanic corrosion.

## 10. Undercoating

The underside of the bus shall be coated with an appropriate and flame retardant undercoating to protect the undercarriage of the bus from any type of fire or corrosion that may result from road salt or variable weather or road conditions.

The following items are specified to meet the manufacturer's standard:

1. Transit bus amenities to include grab rails, pull cords, destination headers, bus stop enunciators, placard holders (fixed-route buses only)
2. ADA compliant wheelchair lift or ramp
3. Seats and seat upholstery
4. Exterior body style
5. Flooring style and material
6. Exterior paint finish: Powder white is the standard; no clear coat
7. All interior signage to comply with ADA

## **Exhibit F: Light-Duty Small Bus**

### **1. Engine Size/Type**

The engine shall be designed to operate for not less than 200,000 miles without major failure or deterioration. The engine shall be designated as "Heavy Duty" for use in a mass transit application.

### **2. Transmission**

The transmission shall be multiple-speed, automatic shift with torque converter, retarder and electronic controls with a heavy-duty transit application. Gross input power, gross input torque and rated input speed shall be compatible with the engine. The transmission shall be designed to operate for not less than 200,000 miles on the design operating profile without replacement or major service. Transmission brand name and specs shall be compatible to the engine chosen.

### **3. Engine Block Heater**

Special equipment or procedures may be employed to start the engine when exposed to temperatures less than 30°F, for a minimum of four hours without the engine in operation. All cold-weather engine-heating devices shall be of the type recommended by the engine manufacturer and approved by the procuring agency.

### **4. Cooling System**

The engine shall be cooled by a water-based, pressure-type cooling system that does not permit boiling or coolant loss during normal vehicle operation. The system shall be of sufficient size to maintain all engine and transmission fluids and intake air at a safe, continuous temperature. The cooling system will maintain a safe and operable temperature range during the most severe operations possible and in accordance with the engine and transmission manufacturers' cooling-system requirements. The cooling fan should engage when any fluid is above safe operating temperature.

### **5. Brakes**

Service brakes shall be controlled and actuated by a hydraulic disc system. A microprocessor-controlled ABS system shall be provided. The entire brake system, including friction material shall have a minimum overhaul or replacement life of 30,000 miles. Brakes shall be self-adjusting throughout this period. Wheel bearings and seals shall be replaceable and should not leak or weep lubricant for 100,000 miles.

### **6. Suspension**

The suspension system shall permit a minimum wheel travel of 3 inches jounce upward travel of a wheel when the bus hits a bump. Suspensions shall incorporate appropriate devices for automatic height control, so that regardless of load, the bus height does not deviate more than ½ inch from center line. Shock absorbers shall be used to dampen bus motion and variable road conditions. Shock absorbers shall maintain their effectiveness for at least 50,000 miles.

## 7. Stainless Steel Where Practical

Stainless steel options should be provided during option selection. Possible uses for this type of material would be framing, skirting, lower body panels, rivets, screws and body detailing.

## 8. Bumpers

The bumpers shall provide impact protection for the front and rear of the bus. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other. The front and rear bumper shall not be damaged as a result of an impact of up to 5 MPH. The bumper shall be corrosion resistant and withstand repeated impacts of up to 5 MPH without sustaining damage.

## 9. Rust Proofing

The bus shall resist corrosion from atmospheric conditions and road salts. It shall maintain structural integrity and original appearance throughout its service life. All exposed surfaces and the interior surfaces of tubing and other enclosed members shall be protected with corrosion-resistant coatings. All joints and connections of different metals shall be corrosion-resistant and shall be protected from galvanic corrosion.

## 10. Undercoating

The underside of the bus shall be coated with an appropriate and flame retardant undercoating to protect the undercarriage of the bus from any type of fire or corrosion that may result from road salt or variable weather or road conditions.

The following items are specified to meet the manufacturer's standard:

1. Transit bus amenities to include grab rails, pull cords, destination headers, bus stop enunciators, placard holders (fixed-route buses only)
2. ADA compliant wheelchair lift or ramp
3. Seats and seat upholstery
4. Exterior body style
5. Flooring style and material
6. Exterior paint finish: Powder white is the standard; no clear coat
7. All interior signage to comply with ADA