

Chapter 7: Fleet Program

Background and Key Issues

Purpose and Objectives

The Fleet Program described in this chapter is based on Muni's 2007 Fleet Management Plan (FMP). The Fleet Program chronicles Muni's fleet-related accomplishments for the past two years and maps out a systematic approach to the on-going rehabilitation and replacement of Muni's fleet of vehicles. The Fleet Program anticipates changes in service delivery, vehicle demand, fleet composition, and ridership and uses these factors to determine the number and mix of vehicles Muni needs to meet its peak demand. The Fleet Program guides the programming of funds from multiple sources for vehicle replacements and potential fleet expansions. The Fleet Program demonstrates Muni's focus on maintaining the vehicle fleet needed to provide the level of service necessary to meet anticipated demand. It also demonstrates that sufficient managerial, mechanical, and financial resources are coordinated to maintain and replace the vehicle fleet in a manner to adequately meet existing and future service demand levels.

Issues and Considerations

Muni's new revenue fleet incorporates new technologies and new devices not present in the fleets they replaced. The proper maintenance of these items requires new procedures and skills to be developed by the Operations Department. Muni's Planning and Schedules Departments are also acquiring new skills sets in order to take advantage of the ridership and travel data obtained from the new information systems that many of these vehicles are now equipped with.

Muni is in a process to replace and upgrade a large portion of the revenue vehicle fleet with newer and less polluting vehicles. Eighty-six Orion VII hybrid diesel-electrics are arriving in the second half of 2007. Muni's fleet investments over the past five years represent a significant improvement in the quality of service to Muni's 672,000 daily customers, the dependability of the revenue fleet, and the reliability of Muni service on the street.

Third Street light rail service started in April of 2007. In the peak morning time period between 7 and 9 AM Muni replaced the 15-Line's 31 articulated motor coaches with 12 LRVs. At this time Muni implemented other improvements to service between Fisherman's Wharf and City College. Changes to the 9X, 10, and 54 bus lines were also altered to replace service formerly covered by the 15 Third Street bus, but not served by the new T Line. The southbound 10 Townsend Line was rerouted in the Financial District to replace service formerly provided by the 15 Third Street Line along Sansome and 2nd Streets. The 9X (AX/BX) San Bruno Express service hours were extended so that it now runs seven days a week between the hours of 5 a.m. and 1 a.m. The 9X and 9BX were extended on the north end of the corridor to North Point and Kearney Streets. On the City's southern side, the 9X, 9AX, and 9BX routes were both extended out Geneva Avenue to City College. This service expansion required six coaches in the AM and 12 coaches in the PM.

Construction has also started on new facilities. Muni Metro East located adjacent to Third Street and Cesar Chavez will provide maintenance and storage space for 80 LRVs and will also help to relieve current overcrowding at the Green Division. However, additional contiguous property at this location originally obtained by Muni to economically allow expansion of Metro East may no longer be available due to a proposed Power Plant. The planned nearby Islais Creek Bus Yard will provide a modern motor coach maintenance facility for the expanding fleet of advanced

technology buses. Muni has also expanded its historic streetcar fleet with newly refurbished PCC cars. These cars were obtained in anticipation of future E-line service along The Embarcadero between Fisherman's Wharf and the AT&T Ballpark.

Overall Approach and Recommendations

A plan to stagger fleet procurements more evenly over time is under consideration. This approach would involve extending the useful life of a portion of the fleet to create smaller, regularly spaced procurements. This issue will need to be revisited as individual sub-fleets come due for replacement. Regularly replacing Muni's over one thousand vehicle fleet is one of the most cost-effective and reliable ways to deliver high quality service to its customers.

Expected population growth in the City is expected to be concentrated along the Third Street Corridor. It is recommended that Muni start the process to better identify how this expected housing densification along the Third Street Corridor will impact existing and projected fleet needs.

This new population growth will likely require significantly more LRVs than previously identified. Given the long time it takes Muni to procure LRVs and because the Breda railcars are what may be considered a "mature" design, there may be issues concerning how much long they will be commercially available. If Muni wishes to maintain a single uniform fleet, it may be prudent to initiate the process for further LRV fleet expansions, or consider alternative designs to carry the agency beyond 2024 when the initial Bredas procured by Muni will be at the end of their lifespan.

System Operating Policies

Muni's service structure is based on a number of specific service design standards. The standards guide decisions to determine the spacing of routes throughout the city, the frequency of buses and streetcars, the spacing of stops along a line, and the average loads experienced by passengers on vehicles. The service standards are currently under review by the on-going Transit Effectiveness Project, discussed in more detail in the following section.

Existing Service Guidelines

The standards that guide service planning and development are as follows:

- A. Facilitate multi-destination travel that allows most trips to be made with a maximum of one transfer by maintaining a modified grid route network with a radial grid of lines serving downtown, with circumferential cross-town and feeder lines on a general north/south and east/west orientation at approximately one-half mile spacing throughout the City, except where constrained by geography or the street grid.
- B. All residential locations in San Francisco should be within approximately one-quarter mile of a Muni route that operates at least 19 hours per day.
- C. Muni's policy headways represent the maximum amount of time allowed between vehicle arrivals for the various line types as shown in Figure 7-1.

- D. When ridership warrants, more frequent service may be operated than provided by these standards.
- E. Operate service such that the peak period passenger load factor does not exceed the service standard goal of “no greater than 85% of combined capacity.”
- F. Provide passenger stop spacing of approximately 800-1000 feet on motor coach and trolley coach lines except where there are steep grades (over 10%), and a stop spacing of 1000-1200 feet between stops on LRV surface lines.

Figure 7-1: Policy Headways

Weekday	Peak	Base	Evening	Owl
Radial	10	15	20	30
Express	10	--	--	--
Cross-town	15	15	20	30
Feeder	20	30	30	--

Weekend	Base	Evening	Owl
Radial	15	20	30
Cross-town	20	30	30
Feeder	30	30	--

Figure 7-2: Peak Period Load Factor Performance

	FY2002	FY2003	FY2004	FY2005	FY2006	FY2007 Q2
# of Lines Checked	176	178	169	157	153	78
# of Lines Over 85%	23	10	14	24	31	11
% of Lines Over 85%	13.1%	5.6%	8.3%	15.3%	20.3%	14.1%

- G. Construct appropriate transit guideways in major corridors to reduce transit travel time and increase capacity.
- H. Provide increased capacity at equal or lower cost by substituting articulated vehicles where loads and frequencies warrant.
- I. Reduce service (without exceeding policy headways) on lines that continuously experience diminished ridership.

System Peak Requirements

Muni has a peak period passenger load factor service standard goal of “no greater than 85% of combined seating and standing capacity.” Figure 7-3 shows the load standards for the vehicles in Muni’s revenue fleet. Figure 7-2 shows how the percentage of Muni lines operating above this 85% peak load factor has varied over the past five years.

With the recent implementation of Automated Passenger Counting (APC) devices on 10% of Muni’s operating fleet, Muni now has the ability to monitor the performance and ridership of its system more frequently and in greater detail. Coaches equipped with these APC devices will be

deployed in a randomized manner to obtain a statistically valid monthly base inventory of all Muni’s scheduled motor coach and electric trolley coach route pull-outs. The initial APC counts were conducted during the 4th quarter of 2006. Ridership levels on the LRVs, Historic Streetcars, and the Cable Cars will continue to be monitored manually by Muni ridecheck staff. Prior to the installation of the of the APC devices Muni lines were checked twice a year based on a randomized selection process. Over the next year Muni staff will collect APC ridership data and manual ridecheck collected data to determine if and how these two methods vary.

Figure 7-3: Load Factor Standards

Fleet	Representative Vehicle Capacity	85% Load Standard
Motor Coach		
-Small (30')	45	38
-Standard (40')	63	54
-Articulated (60')	94	80
Trolley Coach		
-Standard (40')	63	54
-Articulated (60')	94	80
Light Rail Vehicle	119	101
Historic Streetcar	60	51
Cable Car	63	54

The number of revenue vehicles needed to provide daily service is expressed as the peak (regular service) vehicle demand. Peak vehicle demand is defined as the largest number of vehicles required to be out on the street at any single moment of the day. Vehicle Demand for the AM and PM peak periods is shown along with peak Saturday and Sunday Vehicle Demands in Figure 7-4.

Figure 7-4: Vehicle Demands (August 2007)

	Lines Operated (Weekdays)	Maximum Weekday Peak Service Vehicle Demand	Peak (regular service) Vehicle Demand
Motor Coach Demand	57	448 (includes 70 coaches for Mon. PM Football)	378
Trolley Coach Demand	18	232	232
Light Rail Vehicle Demand	7	118 (includes 6 Wkdy PM ML Baseball)	112
Historic Streetcar Demand	1	20	20
Cable Car	3	30	30

Third Street Light Rail Line Startup Peak Impacts

The Third Street Light Rail Line Phase 1, Initial Operating Segment (IOS), replaced the 15-Third motor coach line on Third Street between the Caltrain Station and Visitacion Valley in April

2007. At the same time the 9X San Bruno Express and 10 Townsend motor coach lines service frequency and routes were adjusted to meet the service delivery impacted by the discontinuance of the 15 Line.

Central Subway (The Third Street Light Rail Line Phase 2)

The Central Subway was initially expected to increase LRV peak demand by 3 vehicles. The more recent Central Subway Operations Plan (see Figure 7-) shows that 7 more LRVs may be needed to meet combined forecast 2015 service demands along the Third Street and Central Subway Corridors. At the same time, the 30-Stockton short line that operates between Van Ness Avenue and North Point and the Caltrain Depot at Fourth & Townsend streets will be eliminated. This change will reduce the peak demand for trolley coaches by 8 vehicles.

System Maintenance and Overhaul Program

While Muni and its award winning carpentry staff has won acclaim for preserving and maintaining San Francisco's unique historic high-profile cable car fleet, Muni's maintenance and fleet staff has also taken an active role in the evaluation of low-emission and alternative-fuel bus technology. Muni staff has also taken active steps to more efficiently manage its maintenance and overhaul programs with the successful utilization of maintenance tracking software (SHOPS) and investments in equipment and training that allows some common major overhauls to be performed by Muni staff on the property.

Towards a Zero Emission Fleet

In March 2004, San Francisco voters passed Proposition I, which directs SFMTA to replace all diesel buses purchased before 1991 with cleaner, low-emissions vehicles. Working towards this end, Muni purchased 45 "clean diesel" Gillig buses from AC Transit. These buses have allowed Muni to remove from revenue service 45 1989 New Flyer 40-foot diesel buses. The retrofitted Gillig buses will be transferred to the reserve fleet when the Orion Hybrid delivery is complete.

The Clean Air Plan (CAP)

The Clean Air Plan (CAP) was drafted after two years of collaboration with SFMTA Fleet Engineering, northern California air quality and transit agencies, local advocates, national CNG proponents, PG&E, the Mayor's office, SF Environment, and the California Air Resources Board (CARB). Muni's Clean Air Plan (CAP) was released jointly with the SF Environment and adopted-announced by Mayor Newsom in March 2004. It was subsequently adopted by the BOS. The CAP was built around five major goals and additional goals for certain milestone years. Goals and Status are summarized below in Figure 7-5.

- 2004 Goals:
 - Help negotiate CARB Transit Bus Fleet Rule changes. Status: successful.
 - RFP for 40' hybrid diesel-electrics. Status: met.
 - RFP for 30' battery-electric buses. Status: met through conversion to hybrid procurement.
 - New funding source to address reserve fleet repower/replacements. Status: Prop. K, CMAQ, and TFCA funds used for Gillig rehabs.

- Implement biodiesel conversion: CARB approved in 2006, SFMTA pilot program in 2007 pending Cleaire compatibility.
- 2005 Goal:
- Articulated Bus Repowering. Status: Recommendation to CPWC Directors is to eliminate this project. Buses would be retired. Status: Buses to be retired
- 2008 Goal:
 - Islais Creek Facility on-line. Status: delayed, estimated completion 2012.

Figure 7-5. Clean Air Plan Goals and Status

Goals	Status	Next Steps
2004: Cleaire PM/NO _x reduction devices installed on all compliant buses.	Completed in 2006 on all 374 1999+ buses	N/A
2007: 98% PM reduction through procurements, Cleaire installations, repowers, and retire oldest buses.	86 Orion VII hybrids on schedule to be delivered in second half of 2007; 45 Gilligs from AC Transit now being retrofitted and entering service; 12 articulated New Flyers retired 44 standard New Flyers to be retired	1. Complete Orion delivery 2. Complete Gillig retrofits 3. Retire '88-'91 New Flyers
2012-13: Hybrid procurement (45 standard and 12 articulated coaches)	Investigating FTA procurement pool that would provide 90% FTA share.	Determine procurement strategy and relation to BRT Project fleet requirements.
2015-17: Hybrid or fuel cell procurement (206 standard and 124 articulated coaches). 2019 12 Articulated coaches	Investigating combining the 2012 and 2015 procurements.	Determine procurement strategy.
2020: All hybrids converted to fuel cell ('06 and '12 fleets).	Considering joining Bay Area fuel cell advanced demonstration project as non-funding member.	1. Gain Fuel cell bus operating and maintenance experience prior to 2015. 2. Audit existing bus facilities for fuel cell compliance.

The Clean Air Plan sets out a course for Muni to achieve the lowest possible fleet emissions, with the goal of a 100% zero emission fleet by the year 2020. This strategy includes replacing diesel buses with electric drive vehicles, and retrofitting any remaining diesel buses with state-of-the-art low-emission coaches. In the near term SFMTA will significantly reduce Particulate Matter (PM) and NO_x (Oxides of Nitrogen) by adding PM/NO_x reduction devices to all low-emission diesel buses.

SFMTA, the San Francisco Board of Supervisors, the Bay Area Air Quality Management District (BAAQMD), the California Air Resources Board (CARB), and local environmental

groups have been cooperating to achieve a 85% reduction in PM emissions since 1997 and continue on an aggressive plan to reduce Muni's total fleet emissions even further by:

- Reducing emissions from new and existing diesels through advanced emissions reduction technologies and use of cleaner fuels.
- Replacing the oldest diesels with advanced technology buses and moving toward the fleet-wide use of electric drive vehicles; and
- Moving towards the goal of a 100% zero emission fleet by 2020.

Alternative Fuel Pilot Program

The first step in this process was the evaluation of several alternative fuel bus types and emission reduction technologies. The information and experience gained from these evaluations helped Muni make informed decisions about using these technologies for future motor coach procurements and retrofits. Muni completed an Alternative Fuel Pilot Program (AFPP) made up of six 40-foot buses using alternative technologies: two powered by Compressed Natural Gas (CNG), two hybrid diesel-electrics, and two conventional diesels fitted with exhaust particulate matter (PM) filters. Over a period of two years, Muni evaluated the vehicles' performance on San Francisco's hilly terrain; their reliability rates; their operating, capital, and lifecycle costs; and vehicle safety issues. In partnership with the University of California at Davis, Muni performed pioneering research by being the first transit agency ever to test and evaluate heavy-duty vehicle emissions on hills.

Muni supplemented the original six alternative fuel prototypes by performing limited evaluations of newer hybrid diesel-electrics, battery-electric, and compression-ignition liquid natural gas (LNG) technologies. Based on conclusions gained from the AFPP, and new CARB regulations, Muni determined that hybrid diesel-electrics buses would best address Muni's short-term fleet goals. Purchase of hybrid diesel-electric buses will enable Muni to retire the older, diesel buses, and will also lead Muni towards a fleet composed of all electric drive vehicles, the most effective and efficient drives for the San Francisco terrain.

In 2006 Muni completed the retrofit of diesel buses purchased since 1999 with PM (particulate matter) filters and NO_x (oxides of nitrogen) reduction devices. These installations will reduce each vehicle's PM by 85% and NO_x by 25%. To comply with state regulations, Muni was required to complete the PM filter retrofits no later than January 1, 2007. Muni converted the entire motor coach fleet over to ultra low sulfur diesel (ULSD) fuel, which is a prerequisite for the PM filter retrofits. ULSD has roughly one-tenth the sulfur content of conventional diesel fuel. At the direction of the Mayor's Office and SF Environment Muni is performing an advanced biodiesel demonstration project prior to full implementation of B20 (a blend of 20% biodiesel with 80% ULSD) by the end of calendar 2007.

The following measures will also be undertaken to move Muni toward the eventual goal of a 100% zero emission fleet.

- Implement safety provisions for lighter-than-air fuel in the new Islais Creek bus maintenance and refueling facility. Lighter-than-air fuels include natural gas and hydrogen. It is anticipated that lighter than air fuels will be used to power a portion of Muni's motor coach fleet by the next two decades.

- Develop an electric trolley coach expansion plan, with support from the SFCTA (See Route Electrification Study).
- Deploy the least-polluting buses in neighborhoods most afflicted by multiple pollutant sources. All neighborhoods will eventually benefit from substantially cleaner bus technology.
- Build fleet-wide experience with the use of electric drive propulsion technologies.
- Participate in fuel cell bus demonstration programs, in cooperation with regional transit agencies.

Maintenance Management

Maintenance demand can be broken down into four primary areas: 1) Running Repair, 2) Modification and/or Retrofit, 3) Overhauls or Major Repairs, and 4) Preventive Maintenance.

Running repair consists of vehicles that are not out of service for a scheduled maintenance activity such as a major repair or preventive maintenance. Running repair is comprised of defects identified by an in service breakdown, defects noted on an Operator Defect card, unscheduled cleaning of debris or bodily fluids and minor accident damage. Most of these tasks are completed and the coach is returned to revenue service within a day or two, but frequently the workload can back up due to staffing or volume. This is an ongoing activity that remains fairly constant over time.

Modifications and retrofits require that coaches be kept out of revenue service to allow this work to be done. Retrofits can include technology upgrades such as video surveillance camera installation or environmental modifications like the installation of clean air traps on the diesel fleet.

Overhauls and major repairs are labor intensive and require considerable material resources. Heavy repair can include engine and transmission overhauls, vehicle body rehabilitation, and maintaining brake, cooling and other systems.

Preventive maintenance is a mainstay of Muni's maintenance efforts. It is Muni's intention to constantly improve the PM program to enable us to move from a position of reactive maintenance to a planned, maintenance program consistent with a more proactive maintenance operation. With the implementation of new Maintenance Management software, we project an ability to plan our scheduled maintenance more accurately, plan better resource utilization and build a more cost effective maintenance program.

Future Forecasts and System and Service Expansion

System and service adjustments are made in response to changes in demand. Regional model based forecasts of future demographic factors such as population and employment like those generated by the Association of Bay Area Governments (ABAG) can help local transit planners anticipate where future demand changes may occur and what the magnitude of these changes may be. These ABAG forecasts are shown and discussed more in Chapter 5. Actual ridership trends and project based projections also help to supplement these forecasts. When these future forecasts and projections are then compared with existing load factors, service adjustments can be made system wide.

According to ABAG forecasts, San Francisco’s population is expected to grow by 19.5%, to a population of 956,800 in the next 35 years. This is much smaller growth than the 25.8% growth that ABAG projects for the nine-county Bay Area region as a whole during the same period. The city is projected to have 832,860 jobs in 2035, a 24.3% increase from 642,500 jobs in 2000.

Ridership

Ridership trends are discussed in Chapter 4. Ridership peaked in FY 2001 during the dot-com boom. With the subsequent economic downturn, ridership has returned to pre-2000 levels. (See Figures 7-6 and 7-7.) There are factors that could tend to limit future ridership increases (such as the increasing proportion of work trips destined outside San Francisco). However, several current projects (including the Third Street Line, BRT projects and the Transit Effectiveness Project) could all create major changes in ridership patterns.

Figure 7-6: Annual Ridership FY 1995-FY 2006 (millions)

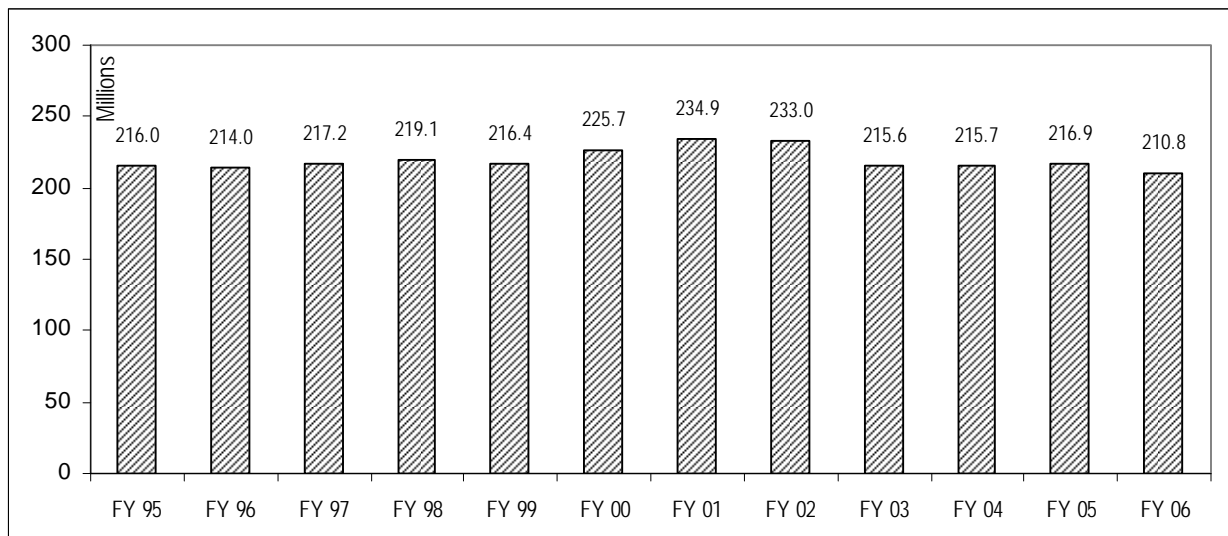


Figure 7-7 shows how Muni’s reported annual ridership figures break down by mode.

Figure 7-7: Historical Annual Ridership By Mode (millions)

	Motor Coach	Trolley Coach	LRV	Cable Car	Total
FY95	90.6	79.3	37.2	8.8	216.0
FY96	89.9	77.8	36.7	9.6	214.0
FY97	89.8	80.8	36.7	9.8	217.2
FY98	92.8	77.5	38.9	9.9	219.1
FY99	93.0	78.3	35.7	9.5	216.4
FY00	96.4	78.5	41.6	9.2	225.7
FY01	96.0	80.9	49.7	8.3	234.9
FY02	98.6	78.8	47.9	7.7	233.0
FY03	90.9	74.4	42.9	7.4	215.6
FY04	87.5	75.2	45.2	7.9	215.7

	Motor Coach	Trolley Coach	LRV	Cable Car	Total
FY 05	88.2	74.9	46.8	7.0	216.9
FY 06	90.6	69.1	43.7	7.5	210.8

Source: Muni (NTD) National Transit Database Reports

In 2030, The Third Street Transit Line, with the Central Subway, is expected to carry about 77,000 daily riders. This would represent a 160% increase over the discontinued 15-Third Street bus line ridership.

The two separate Bus Rapid Transit Corridor Studies; on Van Ness Avenue and on Geary Boulevard and the Transit Effectiveness Project are also seeking ways to improve performance through a combination of relatively moderate infrastructure improvements and potentially large service changes and route re-alignments.

Figure 7-38 at the end of this Fleet Program Section, shows the 20-year fleet plan. It describes how various vehicle fleets move into and out of the revenue fleet. It graphically displays the replacement and retirement of individual vehicle fleets. It also provides a summary of many key statistics of the fleets, including overall size, peak vehicle demand, spare ratio, and average vehicle age. Each of the fleets is described in greater detail in the sections that follow.

Changes to service are made in response to ridership trends, demographic changes, and load factors. The need for service must be balanced with budget constraints. Chapter 6 identifies the costs to operate vehicles in Muni's fleet and the forecasted annual cost of providing the known and proposed service changes. This chapter also identifies the number of vehicles and the hours and miles of service forecast to provide future service. It is important to note that the additional 48 LRVs and 115 buses anticipated to be needed in 2020 (Listed as "Projected Growth") are only included in the Fleet Vehicle needs and vehicle demands section. The added operational and maintenance costs of these new vehicles has not yet been included in the longer term financial plans.

New Development and Fleet Needs

While a large portion of San Francisco is built out and will not likely see major increases in the number of new residents, there are currently underway several trends and external residential development policy changes that may have the potential to have major impacts on Muni service demands and directly impact the fleet demands.

The Third Street Corridor passes through a traditional industrial and residential area that was already undergoing a major transition prior to the arrival of the light rail line. Since the Third Street Light rail line is now in service, Muni may have to re-evaluate its fleet projections and start the long term process to acquire new transit vehicles to meet the burgeoning levels of development along the route.

The City has been seeking to create greater balance between housing and employment. The lack of affordable middle class housing in the City requires that many non-executive workers make increasingly longer commutes into San Francisco. The San Francisco Planning Department and the San Francisco Redevelopment Agency have started to plan for significant growth and increased residential densities along the City's eastern waterfront in a corridor extending from Rincon Hill, south to Visitacion Valley. This corridor includes SOMA, Potrero Hill, the former

Shipyard, and Candlestick Point. Much of this new growth is expected to be located along or in close proximity to Muni's new Third Street light rail corridor.

The construction of Muni's new Third Street transit line justifies higher housing densities in locations that were not possible prior to its construction. The anticipated concentration of development along Third Street will present several challenges for Muni. While there are many opportunities for redevelopment directly on Third Street, this issue continues to be sensitive. There are concerns that such redevelopment will harm existing neighborhood centers and that such development will eliminate some of the few remaining large industrial sites on Third Street. The recent proposals to establish large new mixed commercial and residential developments at Hunters Point and at Candlestick Point are indicative of this trend.

Muni challenges will be compounded by situations in which new high density development will rely on proximity to Muni lines for development, but may require supplemental shuttles and new connecting service to provide access to and from the Third Street corridor. Future high density housing along Third Street and along the southeastern Bayside will place greater service demands on Muni, and will likely concurrently increase vehicular congestion levels along the length of the Third Street Corridor.

Like the redevelopment pressures in the vicinity of the Kirkland, Presidio and Potrero garages, as the density and population values increase along the Third Street Corridor, the resultant congestion related access problems and changes to surrounding land uses may put renewed pressures to once again relocate Muni's fleet maintenance facilities. Taken together, these projected future conditions and the potential need for a dedicated BRT fleet, may require that Muni start considering ways to further expand the number of and/or the size of its fleet facilities.

8 shows the scale of the proposed projects that could directly impact Muni Service requirements, focusing especially along Third Street and Upper Market. These development plans indicate that over 40,000 new residential units and 10 million square feet of commercial space could be in place by 2020. These growth figures have been incorporated into the 20-year Fleet Plan Figure 7-35 and are itemized as Projected Growth.

Figure 7-8: Estimated Transit Vehicle Demands Related to Transit Oriented Development

Project	Status	Estimated New Dwelling Units	Commercial Space	New Vehicles Requirements
10 Year Horizon				
JKLMN Expansion	Unfunded	NA	NA	10 LRVs (Unfunded)
Mission Bay (2016)	Density Increasing Cross-town Service on 16 th Street Difficult to Increase.	6,000 DU	500 Room Hotel 2.65 million sq. ft. campus	10 LRVs
Rincon Hill Plan	SF Planning Department EIR Certified 5/5/05	4,790-6,005 DU	TBD	TBD
City College Chinatown Campus	Draft EIR	NA	NA	15 LRVs (or 20 Artic. Coaches (60'))
Central Subway (2016)	Supplemental EIR	NA	NA	4 LRVs
Executive Park	Executive Park Sub area Amendments to the General Plan	1,600 DU	Removal of - 320,000 sq. ft. of office space, and conversion to residential	TBD
Market and Octavia Neighborhood Plan	SF Planning Department EIR Under Review	5,960 DU by 2025	TBD	TBD
20 Year Horizon (Rough Cut Estimate)				
<u>Eastern Neighborhoods Plan</u> SOMA Mission District Potrero Hill Central Waterfront	SF Planning Department EIR Under Review	2,871- 9,858 DU	TBD	2 LRVs 11 Artic. Coaches (60') 18 Stand. Coaches (40')
Western SOMA	Task Force Assembled	TBD	TBD	TBD
Hunters Point Shipyard Redevelopment	Redevelopment EIR	3,700 DU	2,000,000 sq. ft. of research and development uses on the Shipyard	84 Motor Coaches (40'-Equivalent) 5 Trolley Coaches (40')
Candlestick Point	Conceptual Framework	6,500 DU	500,000 to 700,000 sq. ft. of retail 150,000 sq. ft. of office space	31 LRVs
Visitation Valley Strategic Concept Plan	SF Planning Department Strategic Concept Plan	740 DU	100,000 sq. ft. of retail/commercial	TBD
Southern Terminal (Universal Paragon's Baylands) Brisbane	Under Study Phase I Specific Plan Applications Submitted	NA	5,000,000 sq. ft. commercial retail, office, entertainment and industrial uses	TBD
		40,360 DU	10,280,000 sq. ft.	
Total LRVs				72
Total 60' Articulated Motor Coaches				11
40' Motor Coach Equivalent				102
40' Trolley Coach				5

System Spare Ratio

The spare ratio is calculated by dividing the number of spare vehicles by the regular peak vehicle demand. The number of spare vehicles is the difference between the total fleet and the peak demand. The peak demand is the number of vehicles operated during regular peak conditions, excluding rare or special events. For motor coaches, this is less than the "maximum demand." Vehicles operated in maximum service is defined as the revenue vehicle count during the peak season of the year, on the week and day that maximum service is provided. For Muni, this

maximum demand occurs when there is a Monday Night Football Game, when 70 additional motor coaches enter service. Federal Transit Administration (FTA) standard guidelines state that the spare ratio for motor coaches should not exceed 20 percent of the vehicles operated in maximum service. This restriction does not apply to other vehicles, such as trolley buses and rail vehicles. For those vehicles, FTA requires that Muni provide a reasonable justification for the spare ratio assigned to those modes. Current spare ratios are shown in 9.

Muni has continued a process to eliminate some of the oldest vehicles from the fleet. This reduction in vehicles will bring Muni's spare ratio towards FTA standards. The service changes implemented at the start up of Third Street have resulted in an increased demand of 13 LRVs in the AM peak and 29 PM LRVs in the PM peak.

In the trolley coach fleet, future extensions to existing trolley coach lines, or conversions of motor coach to trolley coach lines could be accomplished without having to purchase additional vehicles, if the maintenance demand can be brought down, a reduction of motor coaches.

The procurement of 151 Bredas was sized to accommodate the additional LRV demand for Third Street. PM peak demand for LRVs was 109 before the start of Third Street and increased to 112 with the Third Street start-up (PM Peak hour with additional 6 cars on game day service).

Figure 7-9: 2008 Spare Ratio Summary

Fleet	Fleet Size Jan 2008	Regular Peak Demand	Regular Spares	Regular Spare Ratio
Motor Coach	460	378	822	21.7%
Trolley Coach	333	243	104	42.8%
Light Rail Vehicle	151	120	39	26.0%

Fleet Replacement

FTA establishes guidelines for the frequency with which revenue vehicles can be replaced using federal funds. These replacement cycles establish the useful life over which the vehicle must operate. If an operator chooses to remove vehicles from revenue service operation before their useful life has been reached, the operator must reimburse the FTA for the unused portion of the vehicle's life. In addition, MTC establishes policies at the regional level that govern fleet replacement cycles. Under the MTC Transit Capital Priorities guidelines, a transit operator is only eligible to program funds for vehicle replacement once the vehicle has reached the end of its useful life. Thus, due to the time needed to develop specifications, award the procurement, and to test and receive the vehicles, transit vehicles must effectively remain in revenue service for two years beyond their useful life. It is this combination of FTA and MTC requirements that establish the effective replacement cycles for Muni's revenue fleet as shown in the table below:

Figure 7-10: Vehicle Life

Fleet	FTA Useful Life	MTC Effective Life
Motor Coach	12	14
Trolley Coach	18	20
Light Rail Vehicle	25	27

Fleet Mid-life Rehabilitation

To ensure that the revenue fleet can operate reliably and efficiently throughout its useful life, a regular program of vehicle mid-life rehabilitation should be scheduled. Each fleet has its own rehabilitation cycle based on its useful life and the industry standards for that fleet. These are shown in 11 below.

Figure 7-11: Fleet Rehabilitation

Fleet	Rehabilitation
Motor Coach	At 7 years
Trolley Coach	Every 6 years
Light Rail Vehicle	Every 5 years

Muni has not historically scheduled midlife rehabilitations through the capital program, but has instead relied on operating funds to rebuild vehicles and vehicle components as needed. Funding constraints is the often cited reason for not meeting middle rehabilitation goals. Muni also operates two fleets that are unique to the transit industry: Historic Streetcars and Cable Cars. Due to their unique nature, established replacement guidelines do not exist for these fleets. Instead of replacement cycles, Muni has developed rehabilitation cycles based on past experience as shown in Figure 7-12 below.

Figure 7-12: Special Fleet Rehabilitation

Fleet	Rehabilitation
Historic Streetcar	Every 10 years
Cable Car	Every 15 years

MTC's Transit Capital Priorities guidelines require that rail vehicles useful life be extended for 20 years to receive federal funds for these types of rehabilitation projects. The Operating Budget or some non-federal capital source will need to be used in combination with the infusion of federal funds every 20 years.

System Fleet Expansion

Several fleet expansion projects are currently planned. In the LRV fleet, four additional vehicles will be needed for Central Subway operation, 10 vehicles to provide supplemental service to Mission Bay on the new Third Street T Line, and 10 vehicles to provide additional capacity on the existing Metro Lines (J, K, L, M, and N). The revenue vehicle needs for the various phases of the Third Street project will be reassessed as part of the Supplemental Environmental document being prepared for the Central Subway project, expected to be completed in April 2008. In the Historic Streetcar fleet, Eleven PCC cars were acquired from New Jersey and they are now entering revenue service. Based on initial estimates, 7 additional Historic Streetcars will be needed for E-line service and additional capacity on the F-line.

New Revenue Fleet Vehicle Types

Muni has been requested on numerous occasions to use small vans to replace standard buses in the evening on lightly traveled lines to reduce noise and operating costs. Muni has investigated the use of vans, and has identified the following issues with their use:

- Van capacity is insufficient to meet the ridership demands on most Muni lines, even into the evening hours.
- Providing a separate fleet of vans for evening service increases Muni's operating and maintenance costs, as the vans would not replace existing vehicles, but would be an additional fleet, requiring additional maintenance, parts and facility capacity.
- Positioning vans to replace buses for late-evening service would add deadheading and other operating costs.
- Operating costs for vans are equivalent to standard coaches, as the primary cost in providing van or bus service is the cost of the operator, which remains the same regardless of vehicle size.

Double-deck buses could be an alternative to articulated buses for high-capacity vehicles. Muni has tested double-deck buses in the past. Double-deck buses could solve many of Muni's street space issues, and would also make space available in facilities for parking additional vehicles, if the facilities could be modified to accommodate double-deckers. This type of vehicle has not traditionally been widely available in the North American market, though a few transit properties have recently acquired them for urban transit use.

Motor Coaches

Motor Coach Operating Policies

Muni operates a fleet of 460 motor coaches in revenue service, providing service on 60 lines, carrying nearly 282,000 riders each weekday. The motor coach fleet is a combination of 30-foot small, 40-foot standard, and 60-foot articulated vehicles, as shown in Figure 7-13.

Figure 7-13: Motor Coach Fleet (Dec 31, 2007)

Motor Coach Fleet	Manufacturer	Vehicles
Small (30ft)	Orion Hybrids	30
Standard (40ft)	NABI	45
Standard (40ft)	Neoplan	205
Standard (40ft)	Orion Hybrid	56
Articulated (60ft)	Neoplan	124
Total		460

Motor Coach Peak Requirements

For Federal reporting guidelines, the FTA allows a vehicle demand calculation based on those demands where vehicle demands are highest. This demand can be based on those days when extra service is scheduled in anticipation of special events like football games, bay to breakers, baseball or the San Francisco Marathon.

In the September 2007 operator sign-up, 378 motor coaches are required to provide for the regular service.

Motor Coach Maintenance/Overhaul Program

To ensure that the fleet of motor coaches is able to function in good working order throughout their service life, it is prudent to conduct a midlife rehabilitation of major vehicles systems. The fleet plan includes midlife rehabilitation projects scheduled at 7 years in revenue service, although the funding for these projects has not been identified in the Capital Plan.

At this time, fleet rehabilitation projects that only allow the vehicle to reach the end of its useful life are placed relatively low on the region's funding priorities. This means that these types of rehabilitation projects must be funded by non-federal sources. However, vehicle rehabilitation that extends the life of the vehicle by at least half of its useful life ranks high on the region's funding priorities, comparable to fleet replacement projects. Muni has funded midlife rehabilitations through the Operating Budget on an as needed basis.

Maintenance Demand

To determine the total vehicles required for the peak period for both maintenance and service requirements, Muni tracked current maintenance demand between December 2004 and March 2005. The source of the data is Muni's "Shop History and Online Parts System" (SHOPS). This software is transit specific for maintenance and inventory tracking and is an off the shelf product from Spear Technologies. Vehicle availability data is saved twice daily in SHOPS by each of the seven maintenance facilities. The status of each revenue vehicle is saved prior to 8 a.m. for the AM Availability and prior to 4 p.m. for the PM Availability, and then measured against peak demand requirements. Vehicle availability data used for calculating the averages was for weekdays only, excluding holidays and weekends. The data was extracted from the SHOPS Facility Control Module, which provides a breakdown by type of vehicle holds. The AM Availability data was used exclusively for this exercise.

Motor coach management falls into four areas:

- Running Repair
- Modification and/or Retrofit
- Overhauls or Major Repairs
- Preventive Maintenance

Running Repair

Running repair includes coaches that are not in the shop for a scheduled activity such as a major repair or preventive maintenance. Running repair is comprised of defects made known by an in-service breakdown, a defect noted on an Operator Defect Card, unscheduled cleaning of debris or bodily fluids and minor accident damage. Most of these tasks are completed and the coach is returned to revenue service within an hour or so, but frequently the workload can back up due to staffing or volume. This is an ongoing activity that remains fairly constant over time.

Modification/Retrofit

Modifications fall into two main categories and five subcategories of technology upgrades:

1. Neoplan retrofit program

2. Technology upgrade installations (avg. 4 coaches out of service)
 - a. Claire or equivalent Particulate trap (Complete)
 - b. Video Surveillance Systems
 - c. NextMuni® (future daily requirements unknown)
 - d. TransLink® (future daily requirements unknown)
 - e. Automated Passenger Counters (APC) (installed during evening layovers)

Some of these programs have required that coaches be kept out of revenue service to allow for this work to be done.

Overhauls/Major Repairs

Heavy repairs fall into four categories:

1. Engines
2. Transmissions
3. Frame cracks
4. Brakes/Cooling/other systems

These repairs are labor intensive and require considerable material resources. A significant challenge in this area is eliminating the backlog of heavy repair needs. In addition to addressing the individual failure of an engine, Muni also addresses future transmission failures on the coach by assembling engine modules comprised of a rebuilt engine and transmission package.

Muni has purchased 45 1993 Gilligs from AC Transit. These vehicles recently underwent an engine overhaul and are in good working condition. The few remaining New Flyers will be replaced by the procurement of Orion VII hybrid diesel-electric coaches scheduled for delivery by July of 2007.

The 1990 30-foot diesel Orion fleet has operated beyond its useful life and is due for replacement by new hybrid diesel-electric fleet scheduled to be delivered by Orion by July of 2007. In the meantime, the frames on these coaches have developed cracks, leading to a large number of these vehicles being held out of daily service.

Brakes, cooling, heaters, and other systems all require routine repairs that can at times put a strain on the maintenance capability of the system. These are often seasonal (heaters and defrosters in winter or cooling problems in the summer), and require intense efforts to keep maximum fleet availability.

Preventive Maintenance

Preventive maintenance is a mainstay of Muni's maintenance efforts, with reliability improving steadily over the past three years in spite of the accumulation of the work backlog this Recovery Plan addresses.

Muni intends to constantly improve this PM program to move from a position of reactive maintenance to a better planned, more consistent and more proactive maintenance operation. With the implementation of the new Maintenance Management software, Muni projects an

ability to schedule maintenance more accurately, plan better resource utilization, and build a more cost-effective maintenance program.

Figure 7-14: Motor Coach Maintenance Average Daily Demand Summary

Maintenance Demand	FY05	FY06	FY07	FY08	FY09
Running Repair	42	42	42	42	42
Mod/Retrofit	15	10	10	10	0
Overhauls/Major Repairs	64	27	25	25	25
Preventive Maintenance	7	7	7	7	7
Total	128	86	84	84	74

Recovery Plan

In the past Muni has maintained service levels by utilizing its reserve fleet to bridge the gap between available equipment and service demand. Muni recognizes the importance of discontinuing this practice. The following recovery measures outline Muni’s efforts that are now underway to restore fleet availability to acceptable levels.

Transmission Repair Capability

Muni has recently been certified by Allison to diagnose and rebuild transmissions. Muni also procured a dynamometer to better evaluate transmissions in-house. These capabilities now allow Muni staff to perform major transmission work in-house which has improved vehicle availability. There is no longer a backlog of transmission repairs as there was in 2005. As of April 2007, there were 18 transmissions in stock, ready to go into a bus.

Figure 7- 15 Motor Coach Daily Average Availability

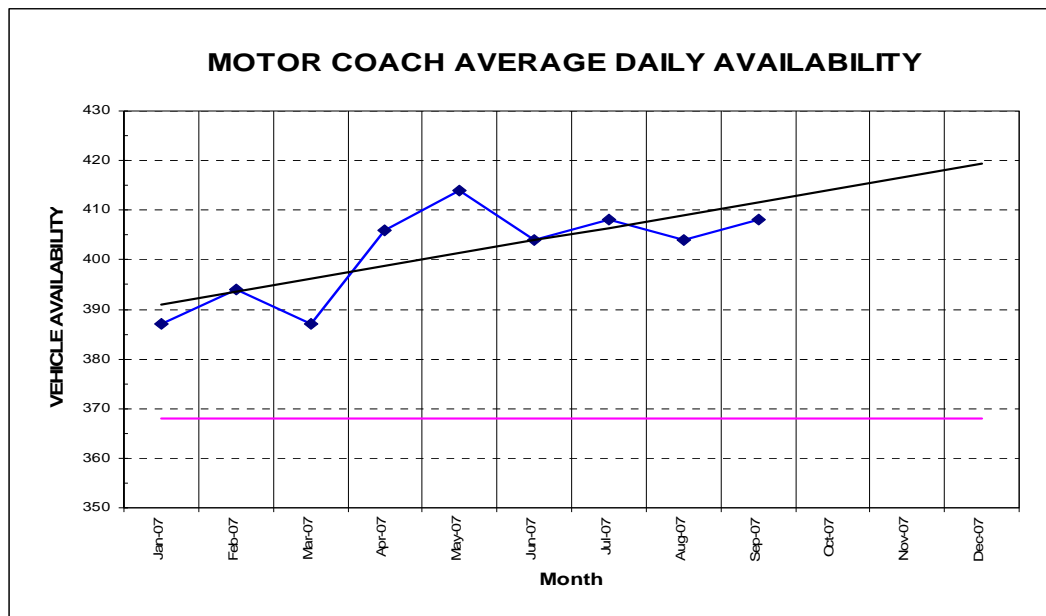


Figure 7-16: Motor Coach Maintenance Recovery Plan

Year	FY05	FY06	FY07	FY08	FY09
Maintenance Demand	128	86	84	84	74
Peak Demand	397	382	382	382	382
Revenue Fleet	495	453	453	453	453
Vehicle Surplus/Deficit	-30	-15	-13	-13	-3

Brakes/Cooling/Heaters

The on-going retrofit by Neoplan and the installation of Young/Touchstone radiators should reduce future fleet defects. Nevertheless, these types of repairs are always in house and represent considerable allocation of the system's skilled worker resources and material expenditures.

Clean Air Devices

Muni has completed the retrofitting the remaining diesel buses obtained prior to 1999 with Cleaire PM (particulate matter) filters and NO_x (oxides of nitrogen) reduction devices. These installations reduce each vehicle's PM by 85% and NO_x by 25%. Cleaire devices have also been installed on the 45 Gillig buses acquired from AC Transit now entering service.

Hybrid Procurements

Muni is completing the replacement of its motor coach fleet with clean air technologies. Muni is scheduled to receive 56 standard 40-foot Orion VII hybrid diesel-electric buses in July of 2007. Farebox and radio systems will be installed on all buses at Woods before entering service. Muni is also currently preparing to receive 30 new smaller 30-foot Orion hybrid diesel-electrics by July of 2007.

AC Transit Gilligs

To replace its oldest diesel engines with modern, ultra-low emission engines, Muni has purchased 45 1993 Gillig buses from AC Transit. The 1993 Gilligs have been repowered with modern diesel engines that are nearly identical to the engines in Muni's existing fleet of 375 Neoplan buses. These low emission engines will also be retrofitted with clean air devices, allowing them to reach 2007 regulatory requirements for new engine PM emissions. These vehicles will initially be used in revenue service allowing Muni to retire almost all of the 1988/1989 New Flyers out of the revenue fleet. After the hybrid diesel-electric procurements are complete, the Gilligs will be used in the reserve fleet.

Preventive Maintenance Funds

To help address a shortfall in the FY2006 Operating Budget, Muni postponed the replacement of two subfleets of motor coaches. The 30-foot Orion Hybrid procurement was reduced from 40 vehicles to 30. Pending certification of the hybrid purchase by CARB, Muni has deferred procuring these 10 buses until 2008.

Motor Coach Service Expansion

Te TEP is performing a comprehensive review of current Muni Service levels. This study may recommend service changes that could alter fleet requirements. The Route Electrification Study, has also identified a number of potential conversions of motor coach lines to electric trolley

operation. It is anticipated that conversion projects of this type would allow for trolley coaches to replace motor coaches equal in number to those needed to operate the line. Thus, while the trolley coach fleet would increase, the motor coach fleet would decrease by a similar number of vehicles (also see Trolley Coach Expansion and Route Electrification Study). As these proposals develop they will be incorporated into future revisions to the Fleet Plan.

New, different types of motor coaches may be added to Muni's fleet as part of the Bus Rapid Transit program. Bus Rapid Transit (BRT) is a high quality, state-of-the-art bus service that reduces travel time, increases reliability and improves passenger comfort. BRT combines the flexibility of buses and the quality of light rail at a fraction of the cost.

A key feature of BRT systems across the US and the world are high-capacity buses, designed to mimic light rail vehicles. BRT vehicles are designed with wider doors for faster boarding and exiting, low floors or special equipment for level boarding, and more comfortable interiors. BRT vehicles will use alternative fuels. The current BRT feasibility studies have included alignment option variations with side platforms and center platforms. The location of the platform in relation to the lane drives what side of the bus the door needs to be on. To have a more spacious shared center platform, rather than two split side platforms, new buses with left side doors (or doors on both sides) would need to be procured. The Geary Corridor BRT and Van Ness BRT studies will assess the benefits and costs of acquiring new vehicles, including the costs of meeting the City's ZEV (zero emission vehicle) requirements and the associated costs of infrastructure and facilities upgrades. While new buses are desirable, it may be possible to implement BRT with existing buses and transition to new vehicles at the end of the useful life of the current fleet.

Motor Coach Procurements/Schedules

FTA requires that motor coaches purchased using federal funds operate in revenue service for a minimum of 10 years for small vehicles and 12 years for standard and articulated vehicles. At the regional level, MTC allows transit agencies to program federal funds for the replacement of motor coaches when they have reached their 12th year in revenue service, for all types of vehicles. Due to the time needed to develop and award the procurement, and to test and receive the vehicles, motor coaches must effectively remain in revenue service for 14 years.

It is with this replacement cycle that motor coach procurements are scheduled in Muni's Fleet Plan. As mentioned previously, Muni is nearing completion of replacement of a significant portion of the motor coach fleet. The remaining 86 coaches are anticipated to be replaced with alternative fuel vehicles, as discussed in greater detail below.

Depending on the findings of the BRT studies now underway, new motor coaches associated BRT service with may enter the fleet sooner.

Motor Coach Spare Ratio

At the end of 2007, Muni will have 460 motor coaches with a maximum demand of 448 vehicles. This resulted in a 2.7% spare ratio. The breakdown of the motorcoach fleet by vehicle type and the respective service demands for those vehicles is shown in Figure 7-.

Figure 7-17: Motor Coach Spare Ratios by Vehicle Type

Vehicle Type	Number of Vehicles (Jan 2008)	Regular Peak Service Demands (9/2007 Sign-Up)	Spares	Spare ratio
30'	30	20	10	50.0%
40'	306	259	47	18.1%
60'	124	99	25	25.3%
Total	460	378	82	21.7%

Trolley Coaches

Trolley Coach Operating Policies

Muni's 333 vehicle trolley coach fleet carries over 236,000 riders each weekday. Trolley coaches are rubber-tired vehicles, powered electrically through a pair of overhead wires above the street right-of-way. Trolley coaches are zero-emission vehicles, operate with very little noise, and can perform effectively on grades far steeper than motor coaches or most rail vehicles. Currently, Muni operates the largest trolley coach fleet in the United States. The trolley coach fleet is a mix of 40-foot standard and 60-foot articulated coaches. With the completion of the ETI procurement, the trolley coach fleet mix is as shown in Figure 7-18.

Figure 7-18: Trolley Coach Fleet

Manufacturer	Year	Type	Vehicles
ETI	2000	Standard (40ft)	240
New Flyer	1992	Articulated (60ft)	60
ETI	2003	Articulated (60ft)	33
Total			333

Trolley Coach Peak Requirements

As of January 2007, Muni had 333 trolley coaches with a peak demand of 216 vehicles in the AM and 232 vehicles in the PM. When ridership demand warrants, service on the 30-Stockton or 45-Presidio line will be extended into Mission Bay, increasing peak demand by 6 trolley coaches. With the opening of the Central Subway, the "short line" trips on the 30-Stockton line will be eliminated, decreasing peak vehicle demand by 8 vehicles.

Trolley Coach Maintenance/Overhaul Program

To ensure that the fleet of trolley coaches is able to function in good working order throughout their 20-year service life, it is prudent to conduct a periodic rehabilitation of major vehicle systems. It is currently anticipated that rehabilitation campaigns should be conducted at 6 and 12 years in service. At this time, fleet rehabilitation projects that only allow the vehicle to reach the end of its useful life are placed relatively low on the region's funding priorities. This means that these types of rehabilitation projects must be funded by non-federal sources. For these reasons the midlife rehabilitation program is currently not funded through the capital program. However, vehicle rehabilitation which extends the life of the vehicle by at least half of its useful life rank high on the region's funding priorities, comparable to fleet replacement projects.

In-House Retrofit Projects by MTA

The MTA has started an in-house retrofit program to improve reliability and reduce maintenance. MTA has completed 150 of 273 coaches. Improvements addressed by this effort include,

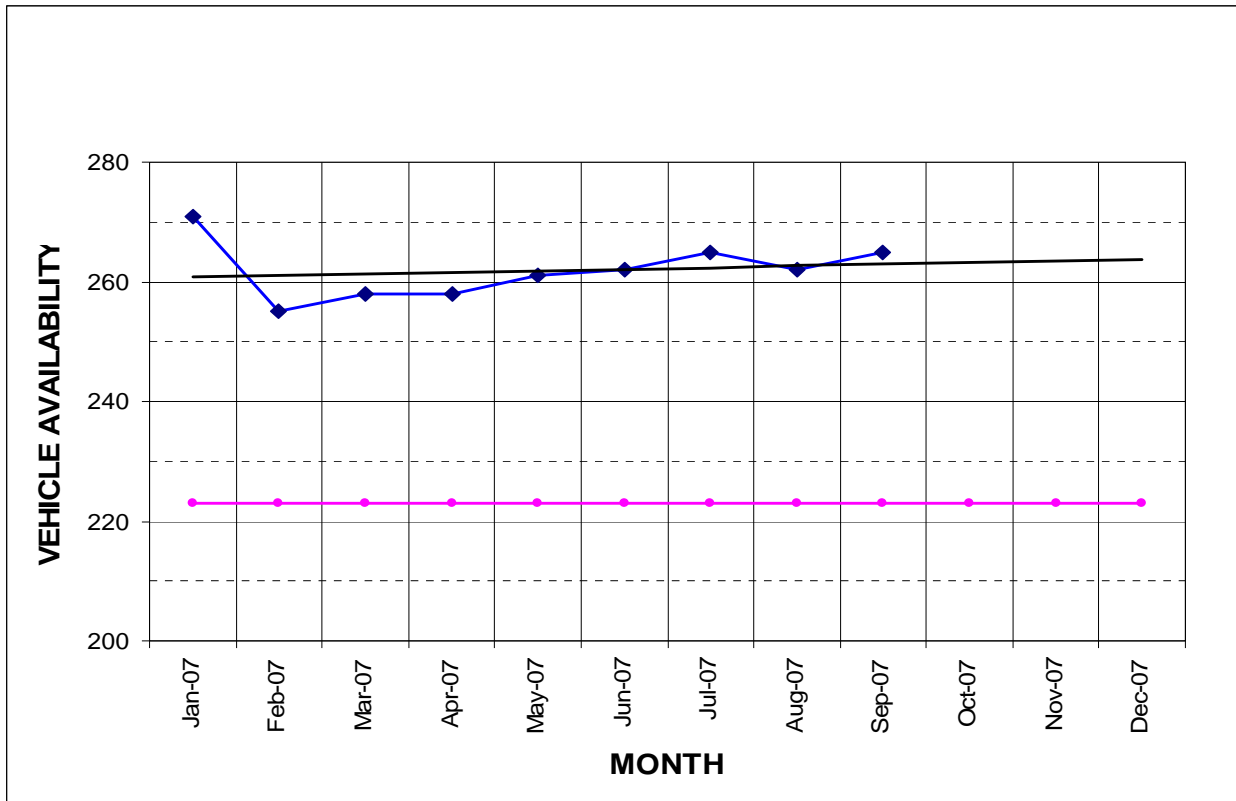
- Door controller relocation,
- battery tray insulator modifications,
- lamp replacements,
- windshield wiper motor modification,
- EOVP heat shield &
- thermal switch installation, and
- trolley pole base modification.

Retrofit Projects by SKODA

The MTA is working with SKODA to correct fleet defects in the Electric Transit, Inc. (ETI) fleet. These retrofits were completed in of July of 2007. The retrofits included,

- Roof unit reinforcement,
- resistor bank replacement,
- radius rod replacement,
- frame crossbeam upgrade,
- compartment reinforcement, and
- traction motor insulator re-torque.

Figure 7-19 Trolley Coach Availability



Trolley Coach System and Service Expansion

With the recent ETI trolley coach procurement completed, the total number of trolley coaches decreased from 355 to 333 vehicles, as a number of standard coaches were replaced with articulated vehicles. There are no expansions to the trolley coach fleet that are funded at this time. However there are two efforts that Muni is exploring which may impact the number of vehicles in the trolley coach fleet. The Transit Effectiveness Project (TEP) which is presently performing a comprehensive review of Muni’s route structure and service guidelines.

The second effort is the Route Electrification Study, which identifies a number of potential trolley coach extensions and conversions of motor coach lines to electric trolley coach operation. The extents of the trolley coach extension(s) would determine the number of new coaches needed to maintain current service frequencies on the line. In the case of converting motor coach lines to electric trolley operation, it is anticipated that motor coaches could be replaced with a comparable number of trolley coaches. Thus, the trolley coach fleet would increase, while the motor coach fleet would decrease by a similar number of vehicles. The primary constraint on an expansion to the trolley coach fleet is the availability of storage and maintenance space. The two current trolley coach facilities, Presidio and Potrero, are at capacity. Muni would need to build a new trolley coach facility or convert a portion of a motor coach facility to accommodate additional trolley coaches in the fleet. As these proposals develop they will be incorporated into future revisions to the Fleet Plan.

Trolley Coach Procurements/Schedules

Muni has completed the replacement of 295 1976-Flyer coaches with 240 standard and 33 articulated ETI coaches. FTA requires that trolley coaches purchased using federal funds operate in revenue service for a minimum of 18 years. MTC requires that the vehicle be in service for 18 years before replacement funds can be programmed. As with the motor coach replacement projects, this generally adds two years to the effective life of the vehicle to allow for procurement and delivery. This sets the schedule for trolley coach replacement at 20 years.

If future increases in trolley coach service are developed, one strategy would be to reduce the maintenance demand on the fleet. If the current spare ratio of about 26% could be brought down around 20%, then about 12 additional peak vehicles will be available. As future service proposals that increase peak demand are developed, the Fleet Plan will be updated accordingly.

Trolley Coach Spare Ratio

As of January 2007, Muni had 333 trolley coaches with a peak demand of 281 vehicles. This resulted in a 26.1% spare ratio. There are no planned changes to the number of vehicles in the trolley coach fleet before 2020.

Figure 7-20: Trolley Coach Spare Ratio

	As of Apr. 2007
Fleet Size	333
Peak Demand	232
Spares/Float	101
Spare Ratio	43.5%

Light Rail Vehicles (LRVs)

Muni's 147 light rail vehicle (LRV) fleet carries over 236,000 riders each weekday. Light rail vehicles are used in operation of the six Muni Metro Lines (J, K, L, M, N and T), carrying over 41 million riders a year, or about 20% of Muni's total load.

LRV Operating Policies

LRVs operate in conditions which range from exclusive right-of-way in the Muni Metro Subway, to mixed flow operation on city streets. LRVs provide an efficient, high capacity means of transporting large numbers of passengers.

LRV Peak Requirements

Current PM peak vehicle requirements on the J, K, L, M, N, and T lines are 120 LRVs. On baseball game days, peak PM LRV demands increase by 12 vehicles which are often obtained from other regular service trains.

LRV Maintenance/Overhaul Program

Based on industry standards, a regular program of rehabilitation projects should be scheduled for every five years the vehicle is in service. Muni has a \$20 Million LRV overhaul program underway. This is a cost-effective measure, but it is difficult to obtain funding for such a program.

The rehabilitation of major components helps to ensure that the vehicles can operate with reliability and efficiency throughout their life. Each vehicle rehabilitation project would include rehabilitation or replacement of brakes, trucks, couplers, and HVAC system. However, as described earlier for the other modes, the region's federal program does not place a high priority on funding these types of midlife rehabilitation projects.

Although Muni does not typically receive Federal funds for vehicle rehabilitation projects, there are two exceptions that allow Muni to program a limited amount of Federal funds to vehicle overhauls. The first is called the 10% setaside, which is given to each transit operator based on a formula, in FY 2006-FY 2009 to be used on any FTA Section 5307 eligible project. To date, Muni has not used this source for vehicle overhauls, but it could in FY 2009 or beyond if this set aside is extended. The second is known as regional surplus. Due to a lack of bus purchases in the region in FY 2007-FY 2008, there was not the typical demand placed on these Section 5307 funds. After the Score 16 projects were funded, the remaining funds were distributed to transit operators based on a formula to be used for any FTA Section 5307 eligible projects. Muni elected to use about \$20M from this surplus to begin the LRV overhaul program. Although these funds could have been targeted at other vehicle fleet overhauls, since the LRVs must operate for at least 25 years, the priority is placed on the LRVs.

Contract Modifications

Work is still underway on three modifications to the Breda Contract, Modifications numbers 9, 11 and 12. The work under these modifications is currently being performed by Breda at its facility in Pittsburg, California.

Modification No. 9: 3rd Brake control unit/Step extension/Video camera/Primary truck suspension:

Modification No. 11: Video camera installation on LRV fleet:

Most of the work under modification number 9 and 11 are done, except for video camera surveillance system installation and some punch list items which will be done by the time the EBALD installation work of modification no. 12 is done.

Modification No. 12: Mod. 12 to the Breda Contract adds Emergency Brake Limiting Device (EBALD) and brake overhaul and video surveillance equipment to the Breda fleet. This work is estimated to cost about \$14 million, with about \$10 million of this total to be funded using revenues from a Breda lease leaseback transaction. Funding is available to equip 151 cars with EBALD and perform a brake overhaul on 23 older LRVs. The Brake overhaul task for 23 cars is done, EBALD installation will be done by December 2008 at Green Facility.

Maintenance Demand

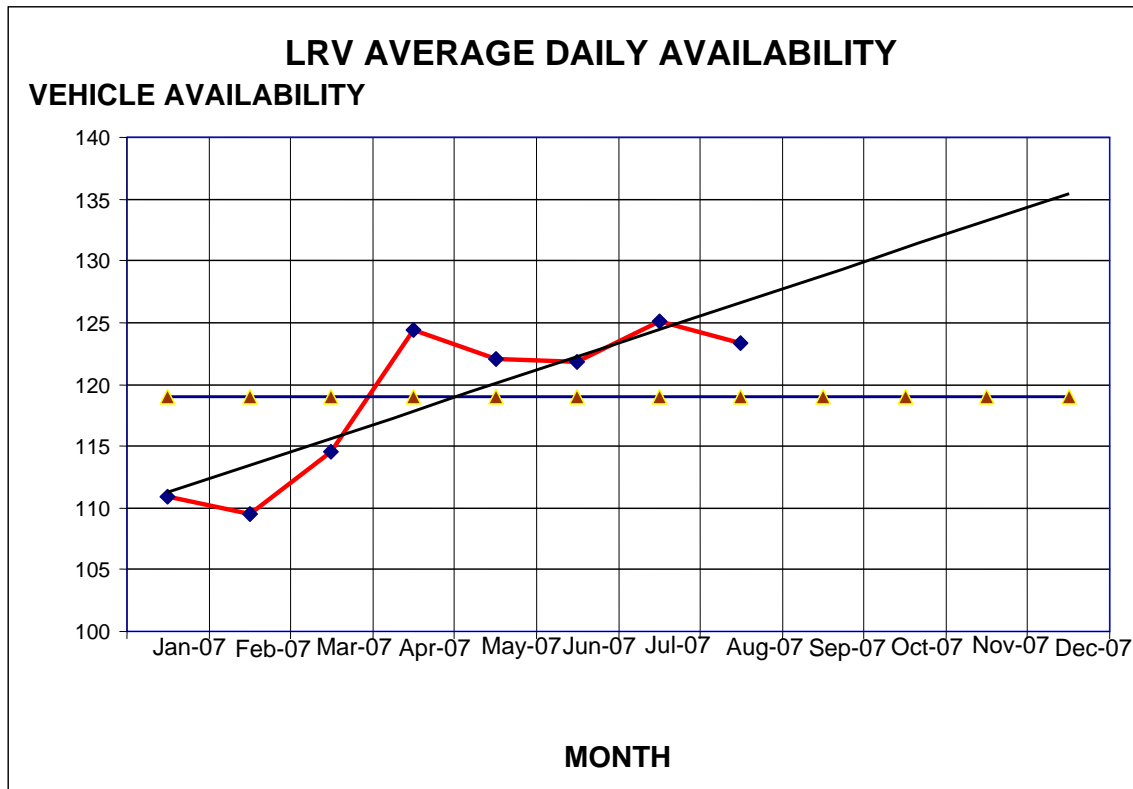
To determine the total vehicles required for the peak period for both maintenance and service requirements, Muni tracked current maintenance demand between December 2004 and March 2005. The source of the data is Muni's SHOPS software (see Maintenance Demand section under Motor Coach discussion). The AM Availability data was used exclusively for this exercise.

Support Shop Services: The Support Shop performs all major component replacements and heavy repairs work. The scope of work includes repairing or replacing trucks, HVAC, couplers, pantographs, pneumatic packages, brakes, and wheel profiling. In addition, the Support Shop is

engaged in vehicle reliability campaigns. There are typically five cars on hold for Support Shops on a daily basis.

Paint and Body Shop Services: The Paint & Body Shops performs ongoing fleet appearance programs and repair accident damage. There are typically two cars in the paint shop and one car in body repairs at all times.

Figure 7-21 LRV Average Daily Availability



Preventive Maintenance: Preventive Maintenance Inspections are scheduled based on vehicle mileage. Inspections ensure the LRV equipment remains in good working order and equipment is inspected, adjusted, serviced and/or repaired to prevent premature failure due to fatigue and aging. Minor defective equipment is replaced during the inspection. There are four cars on inspection hold on average per day.

LRV Midlife Overhaul Plan: A midlife vehicle overhaul is planned to begin in FY 2007. A systematic overhaul of all light rail vehicles is required every five years for the life of the vehicle to maintain reliability. This program will address the following items.

Propulsion: Replace obsolete GE propulsion and transmission system with Ansaldo or Kiepe system.

Filter Intakes: Relocate air intakes to provide clean cooling air to the electronic components.

Brake Systems: Overhaul mechanical components and provide softer suspension mounting to trucks to reduce vibration related wear. Rebuild and repair of existing track brake contactors.

Door and Step System: Convert the existing Ekhard complex door opening mechanism which moves the door in three dimensions to a simpler sliding mechanism. Install additional touch sensors on the edge of fixed door frames and convert existing mechanical limit switches to solid state switches.

This is a systematic overhaul of vehicle equipment that includes HVAC, brakes, couplers, pantograph, propulsion equipment, doors, suspension, wiring, electrical system, car body, cab, seats, and other equipment.

Figure 7-22: LRV Average Daily Maintenance Demand Summary

Maintenance Demand	FY05	FY06	FY07	FY08	FY09
Retrofits & Modifications	7	7	5	0	0
Corrective Maintenance	20	17	16	18	13
Accident Repairs	4	3	2	2	2
Support Shop Services	5	5	5	5	5
Paint & Body Shop Services	3	3	3	3	3
Preventive Maintenance	4	4	4	4	4
10-year Overhaul	0	0	0	4	4
Total	43	39	35	36	31

Recovery Plan

LRV availability has been negatively affected primarily by three factors:

- 1) Breda Retrofit and Modification Programs
- 2) Corrective Maintenance
- 3) Accident Repairs

Figure 7-23: LRV Status (3/22/07)

Maintenance Demand	Number of Vehicles	Repair Cost
Accident Repairs	4	8 Million
Long Term Holds	2	
Short Term Holds	6	
Total	12	

Corrective Maintenance

With the start up of the T-Line, Muni is now scheduling 138 vehicles during PM peak hours on those days with ball games. Muni has several fleet reliability campaigns in progress. Unless otherwise indicated, these campaigns will continue for the life of the vehicle in five-year cycles, or until a vehicle overhaul program takes place.

V-Tag transponders & Control units: There is an ongoing fleet inspection to ensure V-tag functionality of the fleet. To date we have repaired/replaced 73 failed transponders/control units. This is an ongoing fleet campaign and will continue for the life of the vehicle in five-year cycles, or until a vehicle over haul program takes place.

P1/P2 Train line connectors: There is an ongoing fleet inspection to ensure electrical integrity of the P1/P2 train line connectors, which tend to fail primarily during winter months. This is an

ongoing fleet campaign and will continue for the life of the vehicle in five-year cycles, or until a vehicle over haul program takes place.

Couplers: There is an ongoing coupler/draft gear overhaul and rebuild program in place at Muni to ensure a safe coupling operation, increase reliability and to extend service life of the unit. Support shop personnel remove, rebuild and replace couplers at the rate of four units per month. It is anticipated the fleet will be cycled out by April 2008. This is an ongoing fleet campaign and will continue for the life of the vehicle in five-year cycles, or until a vehicle over haul program takes place.

Pantographs: There is an ongoing weekly inspection and replacement program in place to ensure serviceability of pantograph rocker assembly carbons. Running repair replaces approximately 20 rocker assemblies per week. In addition, there is an ongoing pantograph assembly overhaul program in the Support Shop. Support Shop personnel replace worn or defective assemblies on the car at the rate of four pantograph assemblies per month. It is anticipated the pantograph assemblies on the fleet will be replaced by September 2008. This is an ongoing fleet campaign and will continue for the life of the vehicle in five-year cycles, or until a vehicle over haul program takes place.

HVAC: There is an ongoing HVAC unit repair and replacement program in the Metro Support Shop. The Support Shop repairs two defective units per month. In addition, Muni has completed a program with Complete Coach Works who overhauled and upgraded 150 air conditioning units at the rate of four units per month. Upgrades included installing a scroll compressor, soldering all joints and installing a redesigned fresh air box. The upgrades improved reliability, reduced maintenance and are expected to prolong service life. To date all 150 units have been returned and installed on Muni LRVs. Muni currently has a contract with the same company to overhaul and upgrade the remaining 160 HVAC units in the inventory. It is anticipated the fleet will be cycled out by September 2009. This is an ongoing fleet campaign and will continue for the life of the vehicle in five-year cycles, or until a vehicle overhaul program takes place.

Articulation Wiring Harnesses: There is an ongoing articulation harness repair/replacement program of the seven articulation cables on the roof of the LRV. The articulation harness failures are identified and we are installing an interim fix as prescribed by Fleet Engineering to return cars to revenue service. The scope of work for the interim fix requires 40 to 60 man-hours per car. To date the interim fix has been installed on 20 cars on an as failed basis. At the current rate of repair it is anticipated the fleet will be completed by December 2007. This is an ongoing fleet campaign and will continue until a vehicle over haul program takes place, at which time a permanent fix will be installed.

Unscheduled/Running Repairs: This is unscheduled or running maintenance for breakdowns and defects reported while the vehicle is in service. The Running Repair unit performs defect repairs that typically include propulsion, brakes, doors/steps, ATCS, train line issues, and couplers. In addition, Running Repair performs weekly inspections of specific car borne equipment, fleet preparation (includes functionality checks of safety critical elements), yard set-up for service pull-outs, train movements in the yard, vehicle modification installations, ongoing reliability campaigns and support to Fleet Engineering.

Accident Repairs

There are currently four vehicles on long-term hold due to accidents. The cost to repair two of these vehicles may be fiscally prohibitive and it is recommended they be removed from the fleet and used for spare parts.

Figure 7-24: LRV Maintenance Recovery Plan

Year	FY05	FY06	FY07	FY08	FY09
Maintenance Demand	43	39	35	36	31
Peak Demand	107	115	115	115	115
Revenue Fleet	151	151	151	151	151
Vehicle Surplus/Deficit	1	-3	1	0	5

LRV System and Service Expansion

There are currently three anticipated expansions to the LRV fleet. The first would require 10 additional vehicles to serve the developing Mission Bay Area as a short line operation on the northern end of the Third Street line. Second, the Central Subway will require 4-5 additional vehicles. Finally, it is anticipated that an additional 10 vehicles will be needed to meet future service demand on existing Muni Metro lines (J, K, L, M, N, T and S (Shuttle)). These increases are included in the LRV Inventory in Figure 7-25.

In addition to these planned expansions to the LRV fleet, Muni has considered a number of light rail transit expansion projects, such as the Geary Corridor and Chinatown/North Beach. The additional LRVs required by these projects are not included in the LRV Inventory at this time. However, an estimate of the capital cost to procure the additional vehicles is included in the respective expansion project. As these expansion projects develop, their associated vehicle needs will be added to the LRV Inventory. Also, the expansion of the LRV fleet needed for a major corridor project such as Geary would require a new maintenance and storage facility.

Figure 7-25: LRV Planned Changes in Peak Demand

Service Scenario	Peak LRV
Existing Service (July 2007)	112
	+6 baseball service
Central Subway 2016	141
Chinatown to Sunnydale (1 Car @ 6 min.)	
Mission Bay Shortline (2 Cars @ 6 min.)	
N Line to MME (2 cars @ 12 min.)	
Central Subway 2030	154
Chinatown to Sunnydale (2 Car @ 6 min.)	
Mission Bay Shortline (2 cars @ 6 min.)	
N Line to MME (2 cars @ 12 min.)	

Note: Service scenarios designed to meet future demands based on projections developed for New Starts and EIR by SFCTA Travel Demand Model for 2015 and 2030.

LRV Procurement/Schedules

Muni took delivery of the last of 151 new Breda LRVs in 2003. These vehicles replaced Muni's Boeing SLRVs which had been in service since 1979, and provided additional vehicles for the expansion of Muni Metro Systems including the Muni Metro Turnback, and Muni Metro Extension.

As with the other fleets, MTC allows transit agencies to program federal funds for replacement vehicles when they have reached the end of their useful life, in this case 25 years. Due to the time needed to develop and award the procurement, and to test and receive the vehicles, LRVs must effectively remain in revenue service for 27 years. This sets the schedule for LRV replacement at 27 years. The current LRV fleet consists of 151 Bredas for the existing Muni Metro lines (J, K, L, M, N, and T). Procurement of 10 LRVs will be needed to operate the Mission Bay short line. Finally, the Central Subway project will purchase 4 LRVs. At least 10 LRVs will also be needed to expand service on the J, K, L, M and N lines. These changes are summarized in Figure 7-26.

Figure 7-26: LRV Changes in Fleet Size

2007	Year 2016-2017		
	Mission Bay	Central Subway	J,K,LM,N Expansion (unfunded)
Existing Fleet			
151	+10 =161	+4 =165	+10 =175

LRV Spare Ratio

As of April 2007, Muni had 151 LRVs with a peak demand of 138 vehicles. This resulted in a 9% spare ratio. The spare ratio will remain at this level for the foreseeable future as future service expansions will include the procurement of the required fleet. As part of the Third Street Phase 2 Central Subway Supplemental EIS now underway, Muni will re-examine the need for additional cars.

Figure 7-27: LRV Planned Changes in Fleet Demand with 25% Spare Ratio

Service Scenario	Peak LRV	Total Fleet with 25% Spare	Change from Existing Fleet of 151 LRVs
Existing (April, 2007)	112 (118 with baseball service)	151	
Central Subway 2016 Chinatown to Sunnydale (1 Car @ 6 min.) Mission Bay Shortline (2 Cars @ 6 min.) N Line to MME (2 cars @ 12 min.)	141	176	+25

Service Scenario	Peak LRV	Total Fleet with 25% Spare	Change from Existing Fleet of 151 LRVs
Central Subway 2030 Chinatown to Sunnydale (2 Car @ 6 min.) Mission Bay Shortline (2 cars @ 6 min.) N Line to MME (2 cars @ 12 min.)	154	193	+42

Note: Service scenarios to meet future demands based on projections developed for New Starts and EIR by SFCTA Travel Demand Model for 2015 and 2030.

Historic Light Rail Vehicles (HLRVs)

The historic streetcar fleet is a collection of electric rail vehicles used on the F-Market & Wharves line, carrying nearly 14,000 trips per weekday. These include 16 Presidents' Conference Committee Cars (PCCs), 10 cars with a Peter Witt design from Milan, Italy, and other historic streetcars from the U.S. and around the world as shown in Figure 7-36.

HLRV Operating Policies

Muni currently runs 26 Historic Light Rail Vehicles (HLRVs) in regular revenue service. There are an additional 6 vintage vehicles available for special and reserve service. Along with the existing F-line, additional service is planned for the E-Embarcadero line creating demand for additional cars and to accelerating needs to have the existing cars overhauled.

HLRV Peak Requirements

Current peak demand on the F-line is 20 vehicles.

Figure 7-28: Historic Streetcar Peak Demand

Service Plan Alternatives	Peak Demand	Weekday Maintenance Demand	Total Fleet Requirement
F-line (w/ Shuttle)	20	6	26

HLRV Maintenance /Overhaul Program

Due to their historic nature, the HLRV fleet is not replaced on a regular schedule. This makes a program of regular rehabilitation critical to the long-term operation of this fleet. Major overhauls are currently scheduled for every ten years a vehicle is in service. These overhauls extend the useful life of each vehicle, as well as ensuring ongoing reliable operation.

Car # 1 Overhaul

Muni car #1 needs an overhaul before it can be returned to service. The specification has been written and an RFP will be issued once the NPT for the Torpedoes has been issued.

Former SEPTA PCC Overhaul:

The 14 former Southeastern Pennsylvania Transportation Authority (SEPTA) PCCs are due for an overhaul. The planning of this overhaul will be done in 2007 and the overhauls will begin once the NJT PCC fleet is in service.

Overhaul of 11 Former New Jersey Transit (NJT) PCCs

Muni purchased 11 PCCs from New Jersey Transit. These vehicles have been partially overhauled by Brookville Equipment Corp and delivered to Muni. As of April 2007, 1 is in service, 2 are in burn-in and the last 8 will be put into service through out the remainder of the year. While not fully overhauled, the NJT PCCs will provide sufficient service to allow taking the former SEPTA PCCs out of service and into an overhaul program.

Remanufacture of Double Ended PCCs (Torpedoes)

Muni is currently negotiating with Brookville Equipment to remanufacture 4 original Muni Double Ended PCCs which are currently stored at the Marin yard. In addition, 2 more Double Ended PCCs are also available for remanufacture. These 6 Torpedoes will become the backbone of the planned E-line service.

Milan Overhaul and Enhancements

The 10 Milan streetcars will be due for an overhaul in 2009. During the overhaul, the Milan cars will also get a number of enhancements that include: Installing an electro-pneumatic valve to electrically apply brakes, a back-up master controller, a switch to act in a dead-man function, a treadle switch on center door outboard step, a sensitive edge switch to center door panels, a manual override switch, a circuit breaker panel.

Major Overhauls of Other Pre-War Cars

Following car #1 into an overhaul program will be the other pre-war cars, 189, 913, 130, 162, 496, & 578J. These doubled ended cars will provide support and back-up on the E-line for the Torpedoes and on the F-line and be used for special service functions. They will also be upgraded to meet CPUC and ADA requirements.

Muni has received funding through SFMRIC to purchase and rehabilitate a New Orleans streetcar. This will bring the total operational historic streetcar fleet to 53 vehicles.

HLRV System and Service Expansion

This group of procurements and rehabilitation projects will provide additional vehicles so that Muni can relieve pressure on some of the vintage vehicles now in daily use, and provide for future E-line service as described below. These changes are summarized in Figure 7-29.

In addition to providing service to meet current F-line needs, there are plans to operate a separate historic streetcar line between Fisherman's Wharf and the Caltrain terminal at Fourth & King streets. The E-line would require 12 additional vehicles, increasing peak demand by 9 streetcars with three maintenance spares. To allow for this new line, low-level boarding platforms have been added at the stations along the Southern Embarcadero. One issue that is still to be resolved is how the streetcars will turn around when they reach the terminal at Fourth & King. The options are to construct an MMX terminal loop or limit operation to the double-ended vehicles in the historic fleet. Since funding for a terminal loop has not been identified, at this time E-line service would be constrained by the number of double-ended vehicles in the fleet. Currently Muni has nine double-ended HLRVs available for revenue service, although six of these require two operators, adding significantly to the cost of operations. It is anticipated that E-line service could be phased in beginning in 2010 if resources can be identified to cover the projected additional operating expenses.

Finally, an effort is currently underway to explore the possibility of extending the proposed historic streetcar extension from Fisherman's Wharf through National Park Service lands in San Francisco's Maritime National Historic Park (Aquatic Park) and Fort Mason. From Fort Mason, further extension of historic streetcar service to The Presidio is also under consideration. The extension to Fort Mason is being lead by a partnership of non-profit agencies, the National Park Service and Muni. Additional vehicles required by this project and a procurement funding strategy will need to be identified as the study effort progresses.

HLRV Procurements/Schedules

The larger historic fleet and facility needs cannot be known until a comprehensive plan for the historic fleet as a whole is completed.

Figure 7-29: Historic Streetcar Fleet

	Number of Vehicles
PCCs	17
Milan	10
NJT PCCs	11
New Orleans #913	1
Total	39

HLRV Spare Ratio

The current historic streetcar fleet consists of 39 vehicles. With a peak vehicle demand of 21 (not including the proposed E Line), the historic streetcar fleet has a high 1.16% spare ratio. The historic streetcar fleet has a relatively high spare ratio due to the historic nature of the fleet. These vehicles are largely "one-of-a-kind" and often require handcrafting replacement parts. For this reason it can take significantly longer to bring a historic streetcar back into service than a modern LRV. Also due to their historic nature a number of streetcars cannot run continuous 20-hour runs, seven days a week, though the demands of operating the F-line require vehicle assignments like any other trunk line in the system. Thus the fleet has been divided between workhorse streetcars that can run in daily service, and limited service vehicles which can only operate at about a third of a workhorse load.

Cable Cars

Cable cars operate on three lines: Powell/Mason, Powell/Hyde, and California. Weekday ridership on the three cable car lines totals 21,600. The current fleet of cable cars includes 28 Powell type cars and 12 California type cars, for a total of 40 vehicles as shown in Figure 7-30.

Cable Car Rehabilitation

The Cable Car Vehicle Rehabilitation Program provides for the phased overhaul and reconstruction of the cable car fleet. The estimated service life of a cable car falls between 60 and 70 years, with a midlife major overhaul scheduled at 30 to 35 years in service. In addition, minor overhauls are scheduled for 15 years in service. At any given time, up to four cable cars can undergo rehabilitation: two in reconstruction, one major overhaul, and one minor overhaul. The reconstruction process takes approximately 18 months and can include replacement or upgrades to all major vehicle components such as trucks, frame, woodwork, glass, roof, and

floors. A major overhaul takes about 9 months, beginning with a full vehicle inspection to determine the work that needs to be accomplished. This can include upgrades to the frame and supports, woodwork replacement, glass replacement, metal parts refinishing, roof work, floors, electrical wiring, and painting. Finally, the minor overhauls take about 6 months to complete and include replacement of any rotted wood, electrical work, and painting.

Each cable car is unique so parts must often be fabricated for the individual vehicles. The Woods Carpentry Shop and the Special Machine Shop at 700 Pennsylvania carry out this work. While Muni has a goal of standardizing the cable cars across each fleet, currently the vehicle components that need replacement must be used to fabricate the replacement part. This leads to long down time when a car requires maintenance, which explains the relatively high float for this fleet.

Cable Car Expansion

Over the years a number of extensions to the cable car system have been proposed. Currently, none of these proposals are being developed. Nor has Muni identified funding for the proposals. As these proposals are developed, the capital needs associated with their implementation will be added to the capital program.

Cable Car Extension to Fisherman's Wharf. This project would extend the Powell/Mason cable car line one block north to North Point. This project could improve service for the many riders who are heading to Fisherman's Wharf. It may also improve passenger safety and traffic circulation in the area.

Figure 7-30: Cable Car Fleet Inventory

Car No.	Year Built	Manufacturer	Last Rehab	Notes
Powell Cars				
1	1973	SF Muni	1997	
2	1894	Carter Bros.	1984	
3	1894	Carter Bros.	1999	Undergoing Minor Overhaul
4	1994	SF Muni	NA	
5	1894	Carter Bros.	1982	Undergoing Major Overhaul
6	1894	Carter Bros.	2000	Candidate for Reconstruction
7	1894	Carter Bros.	1999	Undergoing Minor Overhaul
8	1894	Carter Bros.	1958	Scheduled Overhaul 2002
9	1998	SF Muni	NA	
10	1894	Carter Bros.	2001	Undergoing Major Overhaul
11	1894	Carter Bros.	1983	
12	1894	Carter Bros.	1983	Undergoing Minor Overhaul
13	1992	SF Muni	2001	
14	1964	SF Muni	1984	
15	1894	Carter Bros.	1984	
16	1894	Carter Bros.	2000	Reconstructed by Muni in 1990
17	1887	Mahoney Bros.	1998	Undergoing Minor Overhaul
18	1962	SF Muni	1984	
19	1986	SF Muni	2000	
20	1894	Carter Bros.	1984	
21	1992	SF Muni	NA	
22	1887	Mahoney Bros.	1982	
23	1890	Ferries & Cliff	1983	
24	????	Mahoney Bros.	NA	Reconstructed by Muni in 1997
25	1890	Ferries & Cliff	1990	
26	1890	Ferries & Cliff	1975	Candidate for Reconstruction
27	1887	Mahoney Bros.	1983	Undergoing Reconstruction
28	1887	Mahoney Bros.	1984	
Total	27			
California Cars				
49	1992	SF Muni	NA	Scheduled Overhaul 2002
50	1910	CA St. Cable	1999	Major Overhaul Completed
51	1906	W.L. Holman	1982	Candidate for Reconstruction
52	1996	SF Muni	NA	Scheduled Overhaul 2002
53	1906	W.L. Holman	1982	
54	1906	John Hammond & Co.	1983	
55	1906	John Hammond & Co.	1983	Candidate for Reconstruction
56	1913	CA St. Cable	1984	
57	1914	CA St. Cable	1982	
58	1914	CA St. Cable	1983	
59	1998	SF Muni	NA	Scheduled Overhaul 2002
60	1906	John Hammond & Co.	2001	Reconstructed in 2003
Total	12			

California Street Cable Car extension to Japantown. The California line currently ends at Van Ness. This proposal would restore the line along westward along California Street to a turnback somewhere in the vicinity of Fillmore Street.

Reserve Fleet

In addition to the fleet of revenue vehicles, Muni maintains a 45-vehicle motor coach reserve fleet. Currently the reserve fleet is housed at the Woods facility. FTA has questioned the advisability of this arrangement as it is difficult to distinguish between revenue and reserve fleets, and it makes it fairly easy for a reserve fleet coach to be used in revenue service. In the long run, Muni would like to be able to better separate the reserve fleet from the revenue fleet, to alleviate these concerns. A leading candidate would be 1399 Marin Street, a leased facility that Muni may seek to purchase. This facility is just across the street from the future Islais Creek facility. Upgrades to the Marin Street facility would probably be needed, and funding has not yet been identified for this purpose. In addition to housing the reserve fleet, Marin may also include a training center, operator parking for Islais Creek, and storage.

Reserve Fleet Operating and Storage Policies

The reserve fleet is an operations tool that allows Muni to accommodate service anomalies which may occur due to civil construction projects, emergency agency actions, natural disasters, sporting events, or fleet warranty retrofit campaigns. These vehicles are not part of the revenue fleet and should not be used in regular service. Their function is to have vehicles available to substitute for fixed guideway services (trolley coach, light rail vehicle, and cable car) in the event of service disruptions and for special services. These service disruptions could be planned, such as a track or overhead rehabilitation project, or unexpected, such as a power outage or track blockage.

FTA Circular 9030.1C mandates that a grantee with more than 50 or more fixed-route buses must have a plan for its contingency (reserve) fleet. FTA defines a contingency fleet as follows:

Buses may be placed in an inactive contingency fleet --stockpiled -- in preparation for emergencies. No bus may be stockpiled before that vehicle has reached the end of its minimum normal service life. Buses held in a contingency fleet must be properly stored, maintained, and documented in a contingency plan, updated as necessary, to support the continuation of a contingency fleet. A contingency plan is not an application requirement, although FTA may request information about the contingency fleet during application review. Contingency plans are subject to review during triennial reviews required for the Urbanized Area Formula Program. Any rolling stock not supported by a contingency plan will be considered part of the active fleet. Since vehicles in the contingency fleet are not part of the active fleet, they do not count in the calculation of spare ratio.

Basically, FTA permits a grantee to use its reserve fleet for local emergencies provided:

- The grantee has a plan for using its reserve fleet;
- The grantee stores and maintains its reserve fleet; and
- All of the vehicles in the contingency fleet have reached the end of their minimum useful life.

Generally, three major events trigger Muni's use of the reserve fleet.

1. Motor Coach substitution – Used for re-railing projects, subway projects, street construction, overhead lines maintenance and overhaul and power outages in order to prevent service interruption.
2. Short-Term Extra Service – If there is an extra demand for service for a short timeframe, the reserve fleet may be used to meet the increased demand. In any given week in San Francisco, special events such as sporting events, marathons, bike races, parades, marches, street festivals, fireworks displays, holiday celebrations, national and international conferences, etc., occur, requiring extra service. One example of extra service is the annual Bay-to-Breakers Run, in which thousands of participants are shuttled to and from the race.
3. Catastrophic fleet defect, fleet recall, or unanticipated warrantable fleet defect - In the event that a widespread fleet defect were to occur suddenly, the reserve fleet would be used to supplement service while the defect is repaired.

This plan supplements the reserve Fleet Plan that was submitted in January 2002. This current plan is consistent with FTA's guidelines for acceptable use of a grantee's reserve fleet.

Reserve Fleet Maintenance/Overhaul Program

The vehicles in Muni's reserve fleet have been in revenue service for a minimum of 12 years before being transferred into the reserve fleet. As such, an end-of-life overhaul is advisable to ensure that the vehicles can operate when called upon. Since these vehicles will not operate in regular revenue service, this type of end of life overhaul is not eligible for federal formula funds from the region, and is not funded through the capital program, but has instead relied on the operating budget to overhaul vehicles and vehicle components as needed.

Fixed Guideway Disruption

Muni's operating model is more diverse than most agencies with a total of five different modes being employed to provide transportation daily. Of these, four modes depend upon fixed guideways (Trolley Coach, Light Rail Vehicle, Historic Streetcar, and Cable Car). When any of these four modes are disrupted by construction projects, fire or police activity or natural disaster, the normal transit service capacity must be made up by pressing motor coaches into service from the reserve fleet. Once the disrupting anomaly has been corrected, the reserve fleet vehicles are then placed back into ready status until such time as they might be required again. Muni fixed guideway construction projects can require the substitution of up to 33 motor coaches from the reserve fleet.

49er Game Day Service

The City of San Francisco is home to the 49ers NFL team which plays its home games at Monster Stadium (Candlestick Park). During any of the home games, both preseason and regular season, as many as 65 to 70 motor coaches are required to provide the necessary additional ridership capacity to transport the game-time crowd. These additional motor coaches are required in addition to the normal daily service demands, so the extra coaches are made available through a combination of reserve fleet coaches and coaches expedited through the normal preventive maintenance cycle by working overtime. These football service requirements are

infrequent and usually predictable, but the reserve fleet of 45 motor coaches is critical to Muni's ability to provide the extra game day service in addition to maintaining normal daily service.

Fleet Retrofit Campaign Support

During the course of fleet replacement procurements it is not uncommon for Muni to declare fleet defects, which are governed by the warranty provisions of the contract with the vehicle manufacturer. The resulting campaign(s) necessary to correct fleet wide defects often result in such large numbers of vehicles out of service as to hinder Muni's ability to provide daily service. Muni has experienced this phenomenon during its diesel fleet replacement procurement on more than one occasion. During these retrofit campaigns the contractor has kept as many as 30 to 50 coaches out of service for weeks or even months at a time. During these extended periods of retrofit campaign work, Muni is only able to maintain its daily service obligations by utilizing the reserve fleet. Once these warranty issues have been corrected, the reserve fleet will be placed back into ready reserve status awaiting the next service call.

If Muni were to change the fleet mix substantially toward a higher percentage of fixed guideway vehicles, for example through route conversions to rail or trolley coach operation, the potential substitution needs would increase, while at the same time the pool of potential substitution vehicles would shrink. This might be an issue on only a few days a year; however it could limit Muni's ability to provide complete system service if a substantial substitution need occurs. Other concerns include the need to provide substitution service for construction activities for DPW, the Water Department, PG&E, and others; impacts on service in case of earthquakes, power outages, or other emergencies; and the impact on useful life of the reserve fleet if it is required to operate more than originally intended.

To address these issues, Muni will have to evaluate its demands upon the current reserve fleet and determine if increases are necessary as a result of increasing the number of fixed guideway vehicles it operates. Changes to the size of the reserve fleet will also need to consider capacity limitations at existing operating facilities and additional ongoing operating and maintenance costs of an expanded reserve fleet. It is worth noting that the Emergency Power Units (EPUs) on the trolley coach fleet have the capability to address some of these situations by allowing the vehicles to operate for a limited time without electricity from overhead wires, potentially reducing the need for motor coach substitution.

Accessible Services Program

The purpose of the Accessible Services Program is to ensure that appropriate, accessible, ADA-compliant transportation services are available to seniors and persons with disabilities. The main components of this program are:

- Assuring that fixed route bus and metro services are accessible to seniors and persons with disabilities;
- Managing the provision of door-to-door paratransit service for disabled persons unable to use Muni's fixed route service; and
- Providing identification cards to disabled persons to allow them to ride Muni's fixed route system, as well as those of other Bay Area operators at a discounted rate.

Muni staff works with two community advisory groups, the Muni Accessibility Advisory Committee (MAAC) and the San Francisco Paratransit Coordinating Council (PCC), on Muni

accessibility and paratransit issues. Muni coordinates fixed route and paratransit services through the MAAC, the PCC, and the paratransit broker staff.

Paratransit Accessible Vans

In the past, Muni purchased paratransit accessible minivans and leased them to the Paratransit Broker for use by San Francisco taxi companies. In return, Muni received a greater number of paratransit trips valued at approximately the value of the lease payments. There were a total of 54 paratransit accessible minivans in service. The first 30 of these vehicles were purchased in 1998. 20 of which have been replaced, and the other 10 and the remaining 24 minivans, will be replaced in 2007.

Accessible Services has moved from purchasing solely minivans to a combination of cutaway van conversions (29) and minivans (5). Cutaway van conversions have a greater capacity, carrying up to 12 passengers plus 2 patrons in wheelchairs, compared to a minivan, which can hold only 2 passengers and 2 patrons in wheelchairs. The ramped minivans, which were solely in taxi service, experienced numerous mechanical failures. The new vans will be used in Muni's paratransit group van service, which will operate fewer trips and thus reduce the wear on the vehicles.

In its Transit Capital Priorities guidelines, MTC allows paratransit vehicles to be “replaced with the next larger vehicle providing the existing vehicle is operated for the useful life period of the vehicle that is being upgraded to”. Under this rule, Muni is allowed to move from minivans to standard van conversions without the transaction being considered an expansion.

Motor and Trolley Bus Service

Accessible bus service is currently provided on all motor coach and trolley coach lines. Most recently the 41 Union trolley coach line was made accessible. This line provides supplemental peak hour service between Union Street and the Financial District. All of Muni's new coaches are accessible and have space inside for two wheelchairs. The new vehicles also feature extra poles and stanchions, and digital voice announcement system (DVAS) signs. Only a few non-accessible trolley coaches remain in service while upgrades and retrofits are completed on the ETI trolley coach fleet.

Muni Metro Service

The Muni Metro system has become increasingly accessible in recent years, through the construction of accessible wayside platforms and lifts, and other ongoing accessibility projects. All Muni Metro subway stations have high-level platforms at car floor height, and are fully accessible by elevator. The new T Line on Third Street light rail line, added 18 fully accessible high-level platform stations to the Muni Metro system, and will connect the southeast portion of San Francisco to downtown with accessible light rail service. In order to make on-street stops accessible, either high level accessible wayside platforms or wayside lifts have been constructed, as part of the ADA-mandated Key Stops program.

All new Muni Metro surface stations incorporate full accessibility features, including wheelchair access, accessible signage, and tactile warning edges. Now that the Key Stops program has been completed, Muni intends to pursue accessibility improvements at stops beyond those mandated by the ADA Key Station requirements.

The Breda LRVs incorporate many accessibility improvements, including four wheelchair securement areas (two on each end), widened aisles, extra stanchions, and a horizontal gap filler between the vehicle door and the platform edge.

Non-revenue Vehicles

In addition to the revenue fleet, Muni also maintains a fleet of non-revenue vehicles (NRVs) that are used to support the revenue fleet and the system infrastructure and facilities. These include specific purpose maintenance vehicles, such as rail grinders, overhead platform trucks, and sanding machines, service vehicles and sedans. The latest count includes a total of 543 NRVs.

As a general rule NRVs should be replaced at 7 years or 70,000 miles. Under these guidelines, 392 NRVs are due for replacement, as they were acquired 7 or more years ago as shown in Figure 7-31 Funding for non-revenue vehicle fleet is not a high priority in the regional funding process, so non-revenue tend to be replaced with operating funds only when the vehicle has completely expired. Vehicles must sometimes be leased when vehicles expire and can not be replaced.

However, the NRV fleet is diverse and many vehicles must be evaluated for replacement on a case-by-case basis. Funding for non-revenue vehicle fleet is not a high priority in the regional funding process, so non-revenue tend to be replaced with operating funds only when the vehicle has completely expired. Vehicles must sometimes be leased when vehicles expire and can not be replaced.

Figure 7-31: Non-revenue Fleet

Year	NRVs
Unknown	53
Through 1980	22
1981-1985	48
1986-1990	143
1991-1996	179
1997-2003	98
Total	543

Fleet Capital Cost and Funds

The Fleet Plan establishes a program of capital needs related to fleet rehabilitation, replacement, enhancements, and expansions. There are a number of changes described in the Fleet Plan that will have a direct impact upon the Capital Improvement Program. This section provides a summary of these major changes.

Replacement Cycles

As discussed previously, there have been clarifications made at the regional level as to the timeline in which fleet replacement projects become eligible for federal funds. The current policy is that fleet replacement projects can be programmed once the vehicles have reached the end of their useful life. For example, a standard motor coach has a useful life of 12 years, so

after the 12th year in revenue service, the project to replace this vehicle can be included in the federal funding program through MTC. However, due to the time needed to develop specifications, award the procurement, and to test and accept the vehicles, the replacement cycle must be extended by about two years. This means that the standard motor coach used in our example has a useful life of 12 years, but must effectively remain in revenue service for 14 years, or two years beyond its useful life. The end result is that the replacement cycles, and thus the funding needs for vehicle replacement projects, are stretched out by two years.

Fleet Definition

The Fleet Plan has been updated to conform to the MTC definition of a revenue fleet as “the same vehicle size, manufacturer, and year.” This clarification has the effect of breaking Muni’s vehicle fleets into a number of subfleets. This will allow Muni to program funds on a schedule that more closely matches the project’s needs. This is an important change as it relates to regional funding caps as discussed below.

Alternative Fuels

Muni is at the initial stages of replacing its diesel coach fleet with alternative fuel vehicles. As a new technology, these vehicles cost considerably more than their diesel counterparts. Therefore the project costs for future procurements are significantly higher than past projects of a similar nature.

MTC maintains a standard bus/van price list which dictates the funding all operators in the region receive towards bus and van replacements. Vehicle replacements are the single largest capital need in the region, so the price list is used to make sure that all bus and van projects in the region are treated equally. MTC is currently undergoing an effort to update and the bus/van price list to account for the range of vehicle types now used, as well as to include many of the new systems that have become standard on transit vehicles in recent years, such as automatic vehicle locators.

Vehicle Rehabilitation

The prior CIP update included projects to perform midlife rehabilitations on all vehicle fleets. At that time only rough cost estimates were available. In the interim, a much closer look at the scope and potential cost for the rehabilitation of each fleet has been taken. Based on these estimates the CIP has been revised. However, these projects are largely unfunded at this time.

Regional Funding Caps

At this time, the region has established project caps for the formula funding programs (Federal Sections 5307 and 5309 funds). The current caps for vehicle replacement projects are as follows:

- Section 5307: \$20 million per project per year.
- Section 5309: \$30 million per project per year. If also using Section 5307 funds, the aggregate of 5307 and 5309 funds cannot exceed \$30 million per project per year.

Due to these fund caps, a number of the larger vehicle replacement projects must be spread out over a greater number of years than the project schedule would dictate. As discussed previously, Muni has revised the Fleet Plan to account for each subfleet as a separate replacement project. This will reduce the number of projects that are subject to these cap restrictions. The other

change that Muni has proposed is for the regional caps to be updated on a periodic basis to account for inflation.

Expansion/Enhancement Projects

A number of expansion and enhancement projects, such as Bus Rapid Transit, Route Electrification, and corridor improvements, among others, have been proposed in the future service plan, with cost estimates included in the CIP. At the preliminary stage of project development the fleet costs associated with these expansion/enhancement proposals are included in the overall project cost. As project specific schedules and funding plans are developed, the fleet changes will be added to the Fleet Plan and vehicle costs can move into a separate but related fleet project.

Fleet Capital Plan

As previously described, the Fleet Capital Plan is composed of a series of replacement, rehabilitation and enhancement/expansion projects. Figure 7-32 shows the Fleet Capital Plan summarized in two ways. The first is by the mode the project serves and the second by the type of activity the project will undertake. Funds for each of the primary modes are fairly evenly split with motor coach receiving 35%, trolley coach 23%, and light rail vehicle 32%. The remaining 10% is shared by historic streetcars, cable cars, paratransit, and projects with system wide scope. When looking at the types of activities that Muni hopes to pursue over the next 20 years, over 87% of replacement needs have planned funds. About 44% of enhancement and expansion needs are planned to be funded. However, only about 1% of rehabilitation needs are planned to be funded by the capital program. In the past rehabilitation needs have been funded primarily through the Operating Budget. The larger recurring rehabilitation projects have been developed into capital projects as a way to capture their costs, although little capital funding is anticipated to cover these needs. The Capital Improvement Program is described in detail in Chapter 9 of the Short Range Transit Plan.

Impact of Fleet Expansion on Muni Facilities

Muni has a total of eight operating facilities as shown in Figure 7-33. In the near future, Muni will construct two new facilities: Islais Creek and Metro East. The condition and future plans for these facilities are described in detail in Chapter 9. This section will describe how Muni fleet expansion impacts current fleet facilities. The growth of Muni's fleet may be constrained by the limited space available at Muni's current maintenance facilities.

To improve operating efficiency, it would be reasonable to assume that Muni will replace some standard coaches with higher capacity articulated coaches. This will allow overall passenger capacity to increase without adding to operating costs. In fact, there may be opportunities to decrease operating costs. The primary constraint on pursuing these strategies is Muni's storage and maintenance capacity for articulated coaches. At present, only the Flynn facility is able to maintain articulated coaches. The Flynn facility was built with a capacity of 100 articulated coaches, although Maintenance has been able to handle 136 vehicles on a temporary basis. To increase the number of articulated coaches, Muni will have to identify another facility to handle vehicles beyond the current 100 vehicle capacity of Flynn. Islais Creek is being built to handle standard size coaches only. The facility is not being constructed to maintain articulated coaches. The Woods facility could accommodate articulated coaches if significant renovations are made. Funds for this project are not identified at this time. A potential option is to convert the Marin

Street facility into an operating and maintenance division. Muni leases the facility at this time, so the types of major improvements necessary to function as an operating division are not being pursued at this time. Muni will need to develop service, facility and fleet plans that address these and other issues if a larger articulated fleet is desired.

The current trolley coach facilities are at or near capacity. Purchasing additional trolley coaches to operate on future electrification projects, such as trolley coach extensions or conversions from motor coaches, will be constrained by the limited space at the existing trolley coach facilities. It could be possible to add trolley coach service by reducing the relatively high spare ratio of this fleet. As the remaining administrative functions are moved from the Presidio Division, it is anticipated that the site will be redeveloped as part of a joint development type venture. The trolley storage and maintenance activities will likely remain below some type of development above. It may be possible to add capacity to the facility when it is redesigned to accommodate the joint development activities. The final option would be to convert an existing Muni facility from motor coach to trolley coach operation, or to construct a new facility. These final two options do not have any funding identified at this time.

Figure 7-32: Fleet Capital Plan Summary

FLEET CAPITAL PLAN SUMMARY										
All figures in 000s	Through FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
SUMMARY BY MODE										
Motor Coach										
Cost	266,327	20,781	10,676	-	42,340	82,992	52,277	7,216	42,327	205,059
Funds	253,944	13,238	-	-	-	27,366	37,782	23,351	-	52,344
+/-	(12,383)	(7,543)	(10,676)	-	(42,340)	(55,627)	(14,495)	16,135	(42,327)	(152,715)
Trolley Coach										
Cost	243,611	8,774	-	12,811	31,582	-	-	75,048	-	16,210
Funds	234,584	1,500	1,500	1,500	-	-	-	37,668	27,341	7,787
+/-	(9,027)	(7,274)	1,500	(11,311)	(31,582)	-	-	(37,380)	27,341	(8,423)
Light Rail Vehicle										
Cost	527,035	10,624	3,315	10,342	10,756	8,389	12,926	4,033	12,583	13,086
Funds	485,050	-	16,869	-	-	-	-	-	-	-
+/-	(41,985)	(10,624)	13,554	(10,342)	(10,756)	(8,389)	(12,926)	(4,033)	(12,583)	(13,086)
Historic Streetcar										
Cost	27,348	-	-	4,679	7,300	17,714	-	-	-	-
Funds	27,446	6,269	11,981	-	7,877	11,388	-	-	-	-
+/-	98	6,269	11,981	(4,679)	578	(6,327)	-	-	-	-
Cable Car										
Cost	9,833	1,678	1,008	1,048	1,090	1,134	1,179	1,226	1,275	1,326
Funds	9,259	1,912	1,008	1,048	1,090	1,134	1,179	1,226	1,275	1,326
+/-	(574)	234	-	-	-	-	-	-	(0)	-
Paratransit										
Cost	8,382	2,708	-	-	1,766	-	3,216	-	-	2,097
Funds	7,814	2,708	-	400	1,383	428	2,772	459	-	2,134
+/-	(569)	-	-	400	(383)	428	(445)	459	-	36
Systemwide										
Cost	44,228	2,007	2,088	2,171	2,258	2,348	2,812	34,810	2,642	2,747
Funds	1,570	-	-	-	-	-	100	32,270	-	-
+/-	(42,658)	(2,007)	(2,088)	(2,171)	(2,258)	(2,348)	(2,712)	(2,540)	(2,642)	(2,747)
Fleet Total										
Cost	1,126,765	46,573	17,087	31,052	97,092	112,578	72,411	122,334	58,827	240,527
Funds	1,019,667	25,627	31,358	2,948	10,351	40,316	41,833	94,975	28,617	63,592
+/-	(107,098)	(20,946)	14,271	(28,104)	(86,742)	(72,263)	(30,578)	(27,360)	(30,210)	(176,935)
SUMMARY BY ACTIVITY										
Replacement										
Cost	558,554	6,394	3,096	7,899	12,414	60,155	59,115	111,085	3,917	211,231
Funds	522,686	23,502	12,989	1,448	10,351	40,316	41,733	94,975	28,617	63,592
+/-	(35,868)	17,108	9,893	(6,451)	(2,064)	(19,840)	(17,382)	(16,111)	24,700	(147,639)
Rehabilitation										
Cost	37,459	39,929	13,991	23,153	84,678	52,423	12,926	11,249	54,910	29,296
Funds	4,146	1,500	1,500	1,500	-	-	-	-	-	-
+/-	(33,314)	(38,429)	(12,491)	(21,653)	(84,678)	(52,423)	(12,926)	(11,249)	(54,910)	(29,296)
Enhancement/Expansion										
Cost	530,751	250	-	-	-	-	370	-	-	-
Funds	492,836	625	16,869	-	-	-	100	-	-	-
+/-	(37,915)	375	16,869	-	-	-	(270)	-	-	-
Fleet Total										
Cost	1,126,765	46,573	17,087	31,052	97,092	112,578	72,411	122,334	58,827	240,527
Funds	1,019,667	25,627	31,358	2,948	10,351	40,316	41,833	94,975	28,617	63,592
+/-	(107,098)	(20,946)	14,271	(28,104)	(86,742)	(72,263)	(30,578)	(27,360)	(30,210)	(176,935)

Fleet Capital Plan Summary (CONTINUED)

FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	Total
249,602	-	15,803	156,957	-	27,652	-	-	101,323	76,252	9,612	1,367,200
147,636	130,369	65,752	103,544	78,240	6,798	-	-	-	13,493	-	953,857
(101,967)	130,369	49,949	(53,414)	78,240	(20,854)	-	-	(101,323)	(62,759)	(9,612)	(413,343)
39,962	-	-	14,047	-	95,993	156,152	-	-	98,566	-	792,758
-	-	-	-	16,846	75,944	77,353	69,152	25,000	25,000	25,000	626,175
(39,962)	-	-	(14,047)	16,846	(20,050)	(78,799)	69,152	25,000	(73,566)	25,000	(166,583)
58,289	21,231	4,907	15,309	15,921	17,018	25,830	70,905	51,093	512,826	71,159	1,477,574
-	-	-	-	-	-	-	27,353	87,377	114,631	138,811	870,091
(58,289)	(21,231)	(4,907)	(15,309)	(15,921)	(17,018)	(25,830)	(43,552)	36,284	(398,194)	67,652	(607,483)
4,618	19,212	4,995	17,317	12,607	26,222	-	-	-	-	6,836	148,849
4,618	19,212	4,995	21,956	10,121	24,068	-	-	-	-	10,239	160,172
-	-	-	4,639	(2,485)	(2,154)	-	-	-	-	3,403	11,322
1,380	1,435	1,492	1,552	1,614	1,678	1,746	1,815	1,888	2,183	2,270	39,852
1,380	1,435	1,492	1,552	1,614	1,678	1,746	1,815	1,888	-	-	35,058
-	0	-	-	-	-	-	-	-	(2,183)	(2,270)	(4,793)
-	3,820	-	-	2,491	-	4,537	-	-	2,959	-	31,976
-	3,851	-	564	1,951	604	3,987	647	-	3,010	-	32,709
-	31	-	564	(540)	604	(550)	647	-	51	-	733
2,857	2,972	3,090	3,214	3,343	3,476	3,615	3,760	3,910	5,605	4,229	138,186
-	-	-	-	-	-	-	-	-	-	-	33,940
(2,857)	(2,972)	(3,090)	(3,214)	(3,343)	(3,476)	(3,615)	(3,760)	(3,910)	(5,605)	(4,229)	(104,245)
356,708	48,669	30,288	208,396	35,975	172,040	191,880	76,480	158,214	698,390	94,107	3,996,395
153,634	154,867	72,239	127,615	108,772	109,092	83,086	98,967	114,265	156,134	174,050	2,712,002
(203,075)	106,198	41,952	(80,781)	72,797	(62,948)	(108,794)	22,487	(43,949)	(542,256)	79,943	(1,284,392)
258,457	27,438	9,578	170,274	20,054	127,370	166,050	70,510	38,266	602,768	63,790	2,588,417
153,634	154,867	72,239	127,615	108,772	109,092	83,086	98,967	114,265	156,134	174,050	2,192,927
(104,824)	127,429	62,661	(42,659)	88,718	(18,278)	(82,964)	28,456	75,999	(446,634)	110,260	(395,490)
50,169	21,231	20,710	38,122	15,921	44,670	25,830	5,970	119,948	95,622	30,317	828,524
-	-	-	-	-	-	-	-	-	-	-	8,646
(50,169)	(21,231)	(20,710)	(38,122)	(15,921)	(44,670)	(25,830)	(5,970)	(119,948)	(95,622)	(30,317)	(819,879)
48,082	-	-	-	-	-	-	-	-	-	-	579,454
-	-	-	-	-	-	-	-	-	-	-	510,429
(48,082)	-	-	-	-	-	-	-	-	-	-	(69,024)
356,708	48,669	30,288	208,396	35,975	172,040	191,880	76,480	158,214	698,390	94,107	3,996,395
153,634	154,867	72,239	127,615	108,772	109,092	83,086	98,967	114,265	156,134	174,050	2,712,002
(203,075)	106,198	41,952	(80,781)	72,797	(62,948)	(108,794)	22,487	(43,949)	(542,256)	79,943	(1,284,392)

Metro East is a new light rail vehicle operating and maintenance facility being built as part of the Third Street Initial Operating Segment project. The facility will accommodate the additional vehicle demand needed to operate the T-Line and the future Central Subway, and will also help relieve crowding at the Green LRV Facility. Once Metro East opens, Muni will have the capacity to store and maintain 210 LRVs at Metro East and Green, and 50 Historic Streetcars at Geneva. This will allow for future expansion of the LRV fleet for additional Mission Bay service on the Third Street line (10 LRVs), vehicle requirements for the Central Subway (4 LRVs), and the possible acquisition of 10 LRVs to relieve future congestion on the current Muni Metro system (J, K, L, M, N and T lines).

Planned Historic Streetcar purchases and rehabilitation projects will expand the fleet from the current 27 streetcars, to a total of 53 vehicles. Vehicles that cannot fit at Geneva could be housed at Metro East. The Upper Yard at Geneva may not be developable, pending future redevelopment plans as part of the Balboa Park Better Neighborhood Plan. The Metro East project included the purchase of 17 acres, although only 13 acres are needed for the initial construction. It had been envisioned that the additional 4 acres could be built out to store 20 more LRVs. To accommodate potential future expansion, the maintenance buildings at Metro East are designed to support 100 LRVs. However, a recent proposal from the Mayor's Office would use the 4 acres for a cogeneration plant, making them unavailable for Metro East expansion. Given the current fleet plan, the loss of this additional land should not have an impact on Muni's ability to store and maintain its LRVs. However, if a future expansion of the LRV system beyond the changes described previously, such as a new Geary LRT line or a North Beach extension to the Third Street/Central Subway line, is pursued, that project will need to reevaluate Muni LRV storage and maintenance capacity, and could result in the need for a third LRV maintenance facility.

Figure 7-33: Fleet Facility Characteristics

Facility	Mode	Major Functions	Year Built	Capacity	Current
Current					
Woods Division	MC	Operating division, maintenance, heavy repair, paint and body, cable car construction.	1975	233 (40')	231 (40')
Flynn Division	MC	Operating division, maintenance, heavy repair.	1989	100 (60')	136 (60')
Kirkland Division	MC	Operating division, running repair.	1950	140 (40')	132 (40')
Presidio Division	TC	Operating division, maintenance, heavy repair.	1912	171 (40')	165 (40')
Potrero Division	TC	Operating division, maintenance, heavy repair, paint shop.	1914	75 (40') 93 (60')	197
Green Division	LRV	Operating division, maintenance, heavy repair, electronic shop, paint shop.	1979	80	151
Geneva Division	HLRV	Operating division, maintenance.	1979	50	27
Cable Car Division	CC	Operating division, maintenance.	1984	40	40
Future					
Islais Creek	MC	Operating division, maintenance, fuel and wash.	Construction deferred	165 (40')	NA
Metro East	LRV/HLRV	Operating division, maintenance.	Construction to begin 2005; Open 2008	80	NA

Figure 7-34: Muni Revenue Vehicle Fleet Characteristics

FLEET CHARACTERISTICS						
Manufacturer	Vehicles	In Service	Retire	Mode of Power	Seats	Wheelchair Positions
MOTOR COACH						
Small MC (30ft/9.1m)						
2007 - Orion Hybrid (8501-8530)	30	2007	2021	Hybrid	27	1
2019 - New (not replaced in 2007)	10	2019	2033	ZEV***	27	1
2021 - New (replaces 2007-New)	30	2021	2035	ZEV***	27	1
Standard MC (40ft/12.2m)						
1988 - New Flyer (8801-8850)	50	1988	2002	Diesel	40	1
1989 - New Flyer (8901-8956)	55	1989	2003	Diesel	40	1
1999 - NABI (8001-8045)	45	1999	2013	Diesel	38	2
1999 - Neoplan/Option (8101-8235; 8301-8304)	139	2002	2016	Diesel	38	2
1999 - Neoplan Option (8305-8371)	67	2003	2017	Diesel	38	2
1993 - AC Transit Gilligs (2801-2845)	45	2005	2007	Diesel	43	2
2006 - Orion Hybrid (8401-8451)*	51	2006	2020	Hybrid	35	2
2006 - Orion Hybrid (8452-8456)**	5	2006	2020	Hybrid	35	2
2013 - New (replaces 1999-NABI)	45	2013	2027	Hybrid	35	2
2016 - New (replaces 1999-Neoplan/Option)	139	2016	2030	Hybrid	35	2
2017 - New (replaces 1999-Neoplan Option)	67	2017	2031	Hybrid	35	2
2020 - New (replaces 2006-New)	51	2020	2034	Hybrid	35	2
2020 - New (replaces 2006-New)	5	2020	2034	Hybrid	35	2
Articulated MC (60ft/18.3m)						
2001 - Neoplan (6200-6225)	26	2002	2016	Diesel	57	2
2001 - Neoplan (6226-6299)	74	2003	2017	Diesel	57	2
2002 - Neoplan Option (6401-6424)	24	2003	2017	Diesel	57	2
2012 - New (replaces 1991-New Flyer)	12	2012	2026	Hybrid	57	2
2016 - New (replaces 2000-Neoplan)	26	2016	2030	Hybrid	57	2
2017 - New (replaces 2000-Neoplan)	74	2017	2031	Hybrid	57	2
2017 - New (replaces 2002-Neoplan Option)	24	2017	2031	Hybrid	57	2
2012 - New (replaces 1991-New Flyer)	12	2019	2033	Hybrid	57	2
TROLLEY COACH						
Standard TC (40ft/12.2m)						
2000 - ETI (5401-5481)	81	2002	2022	Electric	41	2
2000 - ETI (5482-5640)	159	2003	2023	Electric	41	2
2022-New (replaces 2000-ETI)	81	2022	2042	Electric	41	2
2023-New (replaces 2000-ETI)	159	2023	2043	Electric	41	2
Articulated TC (60ft/18.3m)						
1992 - New Flyer (7000-7059)	60	1994	2014	Electric	53	2
2003 - ETI (7101-7133)	33	2003	2023	Electric	54	2
2014-New (replaces 1992-New Flyer)	60	2014	2034	Electric	55	2
2023-New (replaces 2003-ETI)	33	2023	2043	Electric	55	2
RAIL						
Light Rail Vehicle						
1995 - Breda (1400-1424)	25	1997	2024	Electric	60	4
1995 - Breda (1425-1451)	27	1998	2025	Electric	60	4
1995 - Breda (1452-1475)	24	1999	2026	Electric	60	4
1995 - Breda (1476-1481)	6	2000	2027	Electric	60	4
1995 - Breda (1482-1508)	27	2001	2028	Electric	60	4
1995 - Breda (1509-1534)	26	2002	2029	Electric	60	4
1995 - Breda (1535-1550)	16	2003	2030	Electric	60	4
2016 - New - Expansion (CS)	4	2016	2043	Electric	60	4
2016 - New - Expansion (Mission Bay)	10	2016	2043	Electric	60	4
2016 - New - Expansion (JKLMN)	10	2016	2043	Electric	60	4
2022 - New - Replacement	25	2024	2051	Electric	60	4
2022 - New - Replacement	27	2025	2052	Electric	60	4
Historic Streetcar						
1928 - Milan Peter Witt	10	Varies	NA	Electric	29	2
1946 - SEPTA PCC (1050-1063)	14	1995	NA	Electric	47	2
1948 - Muni Dbl End PCC	3	Varies	NA	Electric	60	2
2006 - NJT PCCs (1070-1080)	11	2006	NA	Electric	50	2
2007 - New/Rehab (Seg. 3)	5	Varies	NA	Electric	50	2
2007 - New/Rehab (Seg. 4)	4	Varies	NA	Electric	58	2
2008 - New/Rehab (Car #1)	1	Varies	NA	Electric	48	2
Cable Car						
Powell Cars (1-28)	28	Varies	NA	Electric	30	0
California Cars (49-60)	12	Varies	NA	Electric	34	0

Note: seat count does not represent the capacity for planning purposes.

*Replaces 1989 New Flyers

** Replaces 1990 30' Orions

*** Zero Emission Vehicle

Figure 7-35: 20-year Fleet Plan

FLEET PLAN			Revised: 27-Aug-07						
Fleet	In Service	Retire	2007	2008	2009	2010	2011	2012	2013
MOTOR COACH INVENTORY									
Small MC (30ft/9.1m)									
1990 - Orion (9001-9045)	1990	2004	35						
2007 - New (replaces 1990-Orion) [1]	2007	2021		30	30	30	30	30	30
2019 - New (replaces 1990-Orion)	2019	2033							
2021 - New (replaces 2007-New)	2021	2035							
Revenue Fleet			35	30	30	30	30	30	30
New Vehicles			-	30	-	-	-	-	-
Retired Vehicles			-	35	-	-	-	-	-
Moved to Reserve Fleet			-	-	-	-	-	-	-
Standard MC (40ft/12.2m)									
1989 - New Flyer (8901-8956)	1989	2003	6						
1999 - NABI (8001-8045)	1999	2013	45	45	45	45	45	45	
1999 - Neoplan/Option (8101-8235; 8301-8304)	2002	2016	138	138	138	138	138	138	138
1999 - Neoplan Option (8305-8371)	2003	2017	67	67	67	67	67	67	67
1993 - AC Transit Gilligs (2801-2845)	1993	2007	45						
2006 - Orion Hybrid (8401-8451)	2006	2020		51	51	51	51	51	51
2006 - Orion Hybrid (8452-8456)	2006	2020		5	5	5	5	5	5
2013 - New (replaces 1999-NABI)	2013	2027							45
2016 - New (replaces 1999-Neoplan/Option)	2016	2030							
2017 - New (replaces 1999-Neoplan Option)	2017	2031							
2020 - New (replaces 2006-New)	2020	2034							
2020 - New (replaces 2006-New)	2020	2034							
2020 - Projected Growth (No Ops. Cost Devel.)	2020	2034							
Revenue Fleet			301	306	306	306	306	306	306
New Vehicles			-	56	-	-	-	-	45
Retired Vehicles			1	6	-	-	-	-	-
Moved to Reserve Fleet			-	45	-	-	-	-	45
Articulated MC (60ft/18.3m)									
1991 - New Flyer Rehab (9101-9124) [2]	2005	2012	12						
2001 - Neoplan (6200-6225)	2002	2016	26	26	26	26	26	26	26
2001 - Neoplan (6226-6299)	2003	2017	74	74	74	74	74	74	74
2002 - Neoplan Option (6401-6424)	2003	2017	24	24	24	24	24	24	24
2016 - New (replaces 2000-Neoplan)	2016	2030							
2017 - New (replaces 2000-Neoplan)	2017	2031							
2017 - New (replaces 2002-Neoplan Option)	2017	2031							
2019 - New (replaces 1991-New Flyer)	2019	2033							
2020 - Projected Growth [4]	2020	2034							
Revenue Fleet			136	124	124	124	124	124	124
New Vehicles			-	-	-	-	-	-	-
Retired Vehicles			-	1	-	-	-	-	-
Moved to Reserve Fleet			-	11	-	-	-	-	-
Motor Coach Summary									
Revenue Fleet-Start of FY			473	472	460	460	460	460	460
New Vehicles			-	86	-	-	-	-	45
Retired Vehicles			1	42	-	-	-	-	-
Moved to Reserve Fleet			-	56	-	-	-	-	45
Revenue Fleet-End of FY			472	460	460	460	460	460	460
Peak Demand (With 70 coaches for Mon PM football)			448	448	448	448	448	448	448
Spare Ratio			5.4%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Avg. Vehicle Age			6.8	5.1	6.1	7.1	8.1	9.1	8.8
SCE (Capacity)			540	522	522	522	522	522	522

Notes:

- [1] 10 vehicles traded for preventive maintenance funds in FY06. Vehicles eligible to return to fleet in FY19.
- [2] 12 vehicles traded for preventive maintenance funds in FY06. Vehicles eligible to return to fleet in FY19.
- [3] Vehicle #8173 was formally retired from the fleet.
- [4] The Fleet Plan includes additional vehicles needed to serve Projected New Growth, but the associated operating and capital costs have not yet been developed.

Figure 7-35: Fleet Plan CONTINUED

FLEET PLAN													Revised: 27-Aug-07			
Fleet	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027		
MOTOR COACH INVENTORY																
Small MC (30ft/9.1m)																
1990 - Orion (9001-9045)																
2007 - New (replaces 1990-Orion) [1]	30	30	30	30	30	30	30	10	10	10	10	10	10	10		
2019 - New (replaces 1990-Orion)							10	10								
2021 - New (replaces 2007-New)								30	30	30	30	30	30	30		
Revenue Fleet	30	30	30	30	30	40	40	40	40	40	40	40	40	40		
New Vehicles	-	-	-	-	-	10	-	30	-	-	-	-	-	-		
Retired Vehicles	-	-	-	-	-	-	-	30	-	-	-	-	-	-		
Moved to Reserve Fleet	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Standard MC (40ft/12.2m)																
1989 - New Flyer (8901-8956)																
1999 - NABI (8001-8045)																
1999 - Neoplan/Option (8101-8235; 8301-8304)	138	138														
1999 - Neoplan Option (8305-8371)	67	67														
1993 - AC Transit Gilligs (2801-2845)																
2006 - Orion Hybrid (8401-8451)	51	51	51	51	51	51										
2006 - Orion Hybrid (8452-8456)	5	5	5	5	5	5										
2013 - New (replaces 1999-NABI)	45	45	45	45	45	45	45	45	45	45	45	45	45	45		
2016 - New (replaces 1999-Neoplan/Option)			139	139	139	139	139	139	139	139	139	139	139	139		
2017 - New (replaces 1999-Neoplan Option)				67	67	67	67	67	67	67	67	67	67	67		
2020 - New (replaces 2006-New)							51	51	51	51	51	51	51	51		
2020 - New (replaces 2006-New)							5	5	5	5	5	5	5	5		
2020 - Projected Growth (No Ops. Cost Devel.)							51	102	102	102	102	102	102	102		
Revenue Fleet	306	306	307	307	307	307	358	409	409	409	409	409	409	409		
New Vehicles	-	-	139	67	-	-	107	51	-	-	-	-	-	-		
Retired Vehicles	-	-	114	42	-	-	31	-	-	-	-	-	-	-		
Moved to Reserve Fleet	-	-	25	25	-	-	25	-	-	-	-	-	-	-		
Articulated MC (60ft/18.3m)																
1991 - New Flyer Rehab (9101-9124) [2]																
2001 - Neoplan (6200-6225)	26	26														
2001 - Neoplan (6226-6299)	74	74	74													
2002 - Neoplan Option (6401-6424)	24	24	24													
2016 - New (replaces 2000-Neoplan)			26	26	26	26	26	26	26	26	26	26	26	26		
2017 - New (replaces 2000-Neoplan)				74	74	74	74	74	74	74	74	74	74	74		
2017 - New (replaces 2002-Neoplan Option)				24	24	24	24	24	24	24	24	24	24	24		
2019 - New (replaces 1991-New Flyer)						24	24	24	24	24	24	24	24	24		
2020 - Projected Growth [4]							6	11	11	11	11	11	11	11		
Revenue Fleet	124	124	124	124	124	148	154	159	159	159	159	159	159	159		
New Vehicles	-	-	26	98	-	24	6	5	-	-	-	-	-	-		
Retired Vehicles	-	-	6	78	-	-	-	-	-	-	-	-	-	-		
Moved to Reserve Fleet	-	-	20	20	-	-	-	-	-	-	-	-	-	-		
Motor Coach Summary																
Revenue Fleet-Start of FY	460	460	460	460	460	460	494	551	607	607	607	607	607	607		
New Vehicles	-	-	165	165	-	34	113	86	-	-	-	-	-	-		
Retired Vehicles	-	-	120	120	-	-	31	30	-	-	-	-	-	-		
Moved to Reserve Fleet	-	-	45	45	-	-	25	-	-	-	-	-	-	-		
Revenue Fleet-End of FY	460	460	460	460	460	494	551	607	607	607	607	607	607	607		
Peak Demand	448	448	448	448	448	475	521	566	566	566	566	566	566	566		
Spare Ratio	2.7%	2.7%	2.7%	2.7%	2.7%	4.0%	5.8%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%		
Avg. Vehicle Age	9.8	10.8	6.8	2.7	3.7	4.4	3.4	3.2	3.9	4.7	5.5	6.3	7.0	7.8		
SCE (Capacity)	522	522	523	523	523	569	629	688	688	688	688	688	688	688		

Notes:

- [1] 10 vehicles traded for preventive maintenance funds in FY06. Vehicles eligible to return to fleet in FY19.
- [2] 12 vehicles traded for preventive maintenance funds in FY06. Vehicles eligible to return to fleet in FY19.
- [3] Vehicle #8173 was formally retired from the fleet.
- [4] The Fleet Plan includes additional vehicles needed to serve Projected New Growth, but the associated operating and capital costs have not yet been developed.

Figure 7-35: Fleet Plan CONTINUED

Fleet	In Service	Retire	2007	2008	2009	2010	2011	2012	2013
TROLLEY COACH INVENTORY			Revised: 27-Aug-07						
Standard TC (40ft/12.2m)									
2000 - ETI (5401-5481)	2002	2022	81	81	81	81	81	81	81
2000 - ETI (5482-5640)	2003	2023	159	159	159	159	159	159	159
2020-Projected Growth (No Ops. Cost Devel.)	2020	2040							
2022-New (replaces 2000-ETI)	2022	2042							
2023-New (replaces 2000-ETI)	2023	2043							
Revenue Fleet			240	240	240	240	240	240	240
New Vehicles			-	-	-	-	-	-	-
Retired Vehicles			-	-	-	-	-	-	-
Articulated TC (60ft/18.3m)									
1992 - New Flyer (7000-7059)	1994	2014	60	60	60	60	60	60	60
2003 - ETI (7101-7133)	2003	2023	33	33	33	33	33	33	33
2014-New (replaces 1992-New Flyer)	2014	2034							
2023-New (replaces 2003-ETI)	2023	2043							
Revenue Fleet			93	93	93	93	93	93	93
New Vehicles			-	-	-	-	-	-	-
Retired Vehicles			-	-	-	-	-	-	-
Trolley Coach Summary									
Revenue Fleet-Start of FY			333	333	333	333	333	333	333
New Vehicles			-	-	-	-	-	-	-
Retired Vehicles			-	-	-	-	-	-	-
Revenue Fleet-End of FY			333	333	333	333	333	333	333
Peak Demand			232	232	232	232	232	232	232
Spare Ratio			43.5%	43.5%	43.5%	43.5%	43.5%	43.5%	43.5%
Avg. Vehicle Age			5.9	6.9	7.9	8.9	9.9	10.9	11.9
SCE (Capacity)			380	380	380	380	380	380	380
LIGHT RAIL VEHICLE INVENTORY			Revised: 27-Aug-07						
1995 - Breda (1400-1424)	1997	2024	25	25	25	25	25	25	25
1995 - Breda (1425-1451)	1998	2025	27	27	27	27	27	27	27
1995 - Breda (1452-1475)	1999	2026	24	24	24	24	24	24	24
1995 - Breda (1476-1481)	2000	2027	6	6	6	6	6	6	6
1995 - Breda (1482-1508)	2001	2028	27	27	27	27	27	27	27
1995 - Breda (1509-1534)	2002	2029	26	26	26	26	26	26	26
1995 - Breda (1535-1550)	2003	2030	16	16	16	16	16	16	16
2016 - New - Expansion (CS)	2016	2043							
2016 - New - Expansion (Mission Bay)	2016	2043							
2016 - New - Expansion (JKLMN)	2016	2043							
2020 - Projected Growth	2020	2047							
2022 - New - Replacement	2024	2051							
2022 - New - Replacement	2025	2052							
Revenue Fleet-Start of FY			151	151	151	151	151	151	151
New Vehicles			-	-	-	-	-	-	-
Retired Vehicles			-	-	-	-	-	-	-
Revenue Fleet-End of FY			151	151	151	151	151	151	151
Peak Demand (with Baseball Game)			118	118	118	118	118	118	118
Spare Ratio			28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%
Avg. Vehicle Age			7.2	8.2	9.2	10.2	11.2	12.2	13.2
SCE (Capacity)			151	151	151	151	151	151	151

Figure 7-35: Fleet Plan CONTINUED

Fleet	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
TROLLEY COACH INVENTORY														
Revised: 27-Aug-07														
Standard TC (40ft/12.2m)														
2000 - ETI (5401-5481)	81	81	81	81	81	81	81	81						
2000 - ETI (5482-5640)	159	159	159	159	159	159	159	159	159					
2020-Projected Growth (No Ops. Cost Devel.)							5	5	5	5	5	5	5	5
2022-New (replaces 2000-ETI)									81	81	81	81	81	81
2023-New (replaces 2000-ETI)										159	159	159	159	159
Revenue Fleet	240	240	240	240	240	240	245	245	245	245	245	245	245	245
New Vehicles	-	-	-	-	-	-	5	-	81	159	-	-	-	-
Retired Vehicles	-	-	-	-	-	-	-	-	81	159	-	-	-	-
Articulated TC (60ft/18.3m)														
1992 - New Flyer (7000-7059)														
2003 - ETI (7101-7133)	33	33	33	33	33	33	33	33	33					
2014-New (replaces 1992-New Flyer)	60	60	60	60	60	60	60	60	60	60	60	60	60	60
2023-New (replaces 2003-ETI)										33	33	33	33	33
Revenue Fleet	93	93	93	93	93	93	93	93	93	93	93	93	93	93
New Vehicles	60	-	-	-	-	-	-	-	-	33	-	-	-	-
Retired Vehicles	60	-	-	-	-	-	-	-	-	33	-	-	-	-
Trolley Coach Summary														
Revenue Fleet-Start of FY	333	333	333	333	333	333	333	338	338	338	338	338	338	338
New Vehicles	60	-	-	-	-	-	5	-	81	192	-	-	-	-
Retired Vehicles	60	-	-	-	-	-	-	-	81	192	-	-	-	-
Revenue Fleet-End of FY	333	333	333	333	333	333	338	338	338	338	338	338	338	338
Peak Demand	232	232	232	232	232	232	236	236	236	236	236	236	236	236
Spare Ratio	43.5%	43.5%	43.5%	43.5%	43.5%	43.5%	43.2%	43.2%	43.2%	43.2%	43.2%	43.2%	43.2%	43.2%
Avg. Vehicle Age	9.3	10.3	11.3	12.3	13.3	14.3	15.0	16.0	12.2	1.8	2.8	3.8	4.8	5.8
SCE (Capacity)	380	380	380	380	380	380	385	385	385	385	385	385	385	385
LIGHT RAIL VEHICLE INVENTORY														
Revised: 27-Aug-07														
1995 - Breda (1400-1424)	25	25	25	25	25	25	25	25	25	25				
1995 - Breda (1425-1451)	27	27	27	27	27	27	27	27	27	27	27			
1995 - Breda (1452-1475)	24	24	24	24	24	24	24	24	24	24	24	24	24	24
1995 - Breda (1476-1481)	6	6	6	6	6	6	6	6	6	6	6	6	6	6
1995 - Breda (1482-1508)	27	27	27	27	27	27	27	27	27	27	27	27	27	27
1995 - Breda (1509-1534)	26	26	26	26	26	26	26	26	26	26	26	26	26	26
1995 - Breda (1535-1550)	16	16	16	16	16	16	16	16	16	16	16	16	16	16
2016 - New - Expansion (CS)			4	4	4	4	4	4	4	4	4	4	4	4
2016 - New - Expansion (Mission Bay)			10	10	10	10	10	10	10	10	10	10	10	10
2016 - New - Expansion (JKLMN)			10	10	10	10	10	10	10	10	10	10	10	10
2020 - Projected Growth							24	48	48	48	48	48	48	48
2022 - New - Replacement											25	25	25	25
2022 - New - Replacement												27	27	27
Revenue Fleet-Start of FY	151	151	175	175	175	175	199	223	223	223	223	223	223	223
New Vehicles	-	-	24	-	-	-	24	24	-	-	25	27	27	27
Retired Vehicles	-	-	-	-	-	-	-	-	-	-	25	27	27	27
Revenue Fleet-End of FY	151	161	175	175	175	175	199	223	223	223	223	223	223	223
Peak Demand	118	118	137	137	137	137	156	176	176	176	176	176	176	176
Spare Ratio	28.0%	36.4%	27.6%	27.6%	27.6%	27.6%	27.2%	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%
Avg. Vehicle Age	14.2	14.2	14.0	15.0	16.0	17.0	15.8	15.1	16.1	17.1	15.1	12.8	13.8	14.8
SCE (Capacity)														

Figure 7-35: Fleet Plan CONTINUED

Fleet	In Service	Retire	2007	2008	2009	2010	2011	2012	2013
HISTORIC STREETCAR INVENTORY			Revised: 27-Aug-07						
1946 - PCC (1050-1063)			14	14	14	14	14	14	14
1948 - Muni Double-Ended PCC			3	3	3	3	3	3	3
1928 - Milan Peter Witt			10	10	10	10	10	10	10
2006 - New Jersey Transit PCC (1070-1080)			4	11	11	11	11	11	11
2007 - New/Rehab (Seg. 3)			-	5	5	5	5	5	5
2007 - New/Rehab (Seg. 4)			-	-	2	4	4	4	4
2008 - New/Rehab (Car #1)			-	-	1	1	1	1	1
Revenue Fleet-Start of FY			27	31	43	46	48	48	48
New Vehicles			4	12	3	2	-	-	-
Retired Vehicles			-	-	-	-	-	-	-
Revenue Fleet-End of FY			31	43	46	48	48	48	48
Peak Demand			20	20	20	20	20	20	20
Spare Ratio			55.0%	115.0%	130.0%	140.0%	140.0%	140.0%	140.0%
Avg. Vehicle Age			NA	NA	NA	NA	NA	NA	NA
SCE (Capacity)			46	53	53	53	53	53	53
CABLE CAR INVENTORY			Revised: 27-Aug-07						
Powell Cars (1-28)			28	28	28	28	28	28	28
California Cars (49-60)			12	12	12	12	12	12	12
Revenue Fleet-Start of FY			40	40	40	40	40	40	40
New Vehicles			-	-	-	-	-	-	-
Retired Vehicles			-	-	-	-	-	-	-
Revenue Fleet-End of FY			40	40	40	40	40	40	40
Peak Demand			30	30	30	30	30	30	30
Spare Ratio			33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Avg. Vehicle Age			NA	NA	NA	NA	NA	NA	NA
SCE (Capacity)			40	40	40	40	40	40	40
MOTOR COACH RESERVE INVENTORY			Revised: 27-Aug-07						
Reserve Standard Bus (40ft/12.2m)									
1988 - New Flyer (8801-8850)	1988	2002							
1989 - New Flyer (8901-8956)	1989	2003							
1999 - NABI (8001-8045)	1999	2013	20	20	20	20	20	20	45
1999 - Neoplan/Option (8101-8235; 8301-8304)	2002	2016							
1999 - Neoplan Option (8305-8371)	2003	2017							
1993 - AC Transit Gilligs (2801-2845)	1993	2007	25	25	25	25	25	25	
2006 - Orion Hybrid (8401-8456)	2006	2020							
Reserve Fleet			45	45	45	45	45	45	45
New in Reserve Fleet			31	-	-	-	-	-	20
Retired from Reserve			31	-	-	-	-	-	20
Reserve Articulated Bus (60ft/18.3m)									
1991 - New Flyer (9101-9124)	1991	2005							
1991 - New Flyer Rehab (9101-9124)	2005	2012							
2001 - Neoplan (6200-6225)	2002	2016							
2001 - Neoplan (6226-6299)	2003	2017							
2002 - Neoplan Option (6401-6424)	2003	2017							
Reserve Fleet			-	-	-	-	-	-	-
New in Reserve Fleet			-	-	-	-	-	-	-
Retired from Reserve			-	-	-	-	-	-	-
Reserve Summary									
Reserve Fleet-Start of FY			45	45	45	45	45	45	45
New in Reserve Fleet			31	-	-	-	-	-	20
Retired from Reserve			31	-	-	-	-	-	20
Reserve Fleet-End of FY			45	45	45	45	45	45	45
SCE (Capacity)			45	45	45	45	45	45	45

Figure 7-35: Fleet Plan CONTINUED

Fleet	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
HISTORIC STREETCAR INVENTORY														Revised: 27-Aug-07
1946 - PCC (1050-1063)	14	14	14	14	14	14	14	14	14	14	14	14	14	14
1948 - Muni Double-Ended PCC	3	3	3	3	3	3	3	3	3	3	3	3	3	3
1928 - Milan Peter Witt	10	10	10	10	10	10	10	10	10	10	10	10	10	10
2006 - New Jersey Transit PCC (1070-1080)	11	11	11	11	11	11	11	11	11	11	11	11	11	11
2007 - New/Rehab (Seg. 3)	5	5	5	5	5	5	5	5	5	5	5	5	5	5
2007 - New/Rehab (Seg. 4)	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2008 - New/Rehab (Car #1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Revenue Fleet-Start of FY	48	48	48	48	48	48	48	48	48	48	48	48	48	48
New Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Retired Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Revenue Fleet-End of FY	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Peak Demand	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Spare Ratio	140.0%	140.0%	140.0%	140.0%	140.0%	140.0%	140.0%	140.0%	140.0%	140.0%	140.0%	140.0%	140.0%	140.0%
Avg. Vehicle Age	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SCE (Capacity)	53	53	53	53	53	53	53	53	53	53	53	53	53	53
CABLE CAR INVENTORY														Revised: 27-Aug-07
Powell Cars (1-28)	28	28	28	28	28	28	28	28	28	28	28	28	28	28
California Cars (49-60)	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Revenue Fleet-Start of FY	40	40	40	40	40	40	40	40	40	40	40	40	40	40
New Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Retired Vehicles	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Revenue Fleet-End of FY	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Peak Demand	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Spare Ratio	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Avg. Vehicle Age	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SCE (Capacity)	40	40	40	40	40	40	40	40	40	40	40	40	40	40
MOTOR COACH RESERVE INVENTORY														Revised: 27-Aug-07
Reserve Standard Bus (40ft/12.2m)														
1988 - New Flyer (8801-8850)														
1989 - New Flyer (8901-8956)														
1999 - NABI (8001-8045)	45	45												
1999 - Neoplan/Option (8101-8235; 8301-8304)			25											
1999 - Neoplan Option (8305-8371)				25	25	25								
1993 - AC Transit Gilligs (2801-2845)														
2006 - Orion Hybrid (8401-8456)							25	25	25	25	25	25	25	25
Reserve Fleet	45	45	25	25	25	25	25	25	25	25	25	25	25	25
New in Reserve Fleet	-	-	25	25	-	-	25	-	-	-	-	-	-	-
Retired from Reserve	-	-	45	25	-	-	25	-	-	-	-	-	-	-
Reserve Articulated Bus (60ft/18.3m)														
1991 - New Flyer (9101-9124)														
1991 - New Flyer Rehab (9101-9124)														
2001 - Neoplan (6200-6225)			20											
2001 - Neoplan (6226-6299)														
2002 - Neoplan Option (6401-6424)				20	20	20	20	20	20	20	20	20	20	20
Reserve Fleet	-	-	20	20	20	20	20	20	20	20	20	20	20	20
New in Reserve Fleet	-	-	20	20	-	-	-	-	-	-	-	-	-	-
Retired from Reserve	-	-	-	20	-	-	-	-	-	-	-	-	-	-
Reserve Summary														
Reserve Fleet-Start of FY	45	45	45	45	45	45	45	45	45	45	45	45	45	45
New in Reserve Fleet	-	-	45	45	-	-	25	-	-	-	-	-	-	-
Retired from Reserve	-	-	45	45	-	-	25	-	-	-	-	-	-	-
Reserve Fleet-End of FY	45	45	45	45	45	45	45	45	45	45	45	45	45	45
SCE (Capacity)	45	45	55	55	55	55	55	55	55	55	55	55	55	55

Figure 7-36: Historic Vehicle Fleet Inventory

HISTORIC LIGHT RAIL VEHICLE INVENTORY					
Car No.	Year	Manufacturer	Origin/Description	In Service	Notes
Regular Service Vehicles = 27					
Single Ended (24 cars)					
1050	1946	St. Louis Car	PCC, former SEPTA, Muni wings scheme	1994	
1051	1946	St. Louis Car	PCC, former SEPTA, Muni simplified	1994	
1052	1946	St. Louis Car	PCC, former SEPTA, LA Rwy scheme	1994	
1053	1946	St. Louis Car	PCC, former SEPTA, Brooklyn scheme	1994	
1054	1946	St. Louis Car	PCC, former SEPTA, PTC silver/cream	1994	Wrecked, Out of Service
1055	1946	St. Louis Car	PCC, former SEPTA, PTC green/cream	1994	
1056	1946	St. Louis Car	PCC, former SEPTA, Kansas City scheme	1994	
1057	1946	St. Louis Car	PCC, former SEPTA, Cincinnati scheme	1994	
1058	1946	St. Louis Car	PCC, former SEPTA, CTA scheme	1994	
1059	1946	St. Louis Car	PCC, former SEPTA, Boston Elevated scheme	1994	
1060	1946	St. Louis Car	PCC, former SEPTA, PTC silver/cream	1994	
1061	1946	St. Louis Car	PCC, former SEPTA, PE Rwy scheme	1994	
1062	1946	St. Louis Car	PCC, former SEPTA, Louisville scheme	1994	
1063	1946	St. Louis Car	PCC, former SEPTA, Baltimore scheme	1994	
1807	1928	Accaio	Milan - purchased 1998 (formerly 1507)	2005	
1811	1928	Accaio	Milan - purchased 1998 (formerly 1911)	2000	
1814	1928	Accaio	Milan - purchased 1998	2000	
1815	1928	Accaio	Milan - purchased 1998 (formerly 1515)	2000	
1818	1928	Accaio	Milan - purchased 1998	2000	
1856	1928	Accaio	Milan - purchased 1998 (formerly 1556)	2000	
1859	1928	Accaio	Milan - purchased 1998	2000	
1888	1928	Accaio	Milan - purchased 1998 (formerly 1588)	2000	
1893	1928	Accaio	Milan - purchased 1998 (formerly 1793)	2000	
1895	1928	Accaio	Milan - purchased 1998 (formerly 1795)	2000	
Double-Ended (3 cars)					
1007	1948	St. Louis Car	PCC - double ended, Red Arrow scheme	1994	
1010	1948	St. Louis Car	PCC - double ended, Muni blue/yellow	1994	
1015	1948	St. Louis Car	PCC - double ended, Illinois Term scheme	1994	
Special Service Vehicles = 6					
Double-Ended (6 cars)					
1	1912	W.L. Holman	Muni's first car (2-person operation)		CPUC/ADA needed
130	1914	Jewett Car Co.	Muni (2-person operation)		CPUC/ADA needed
228	1934	English Electric	Blackpool "Boat" - open car (2-person operation)		CPUC/ADA needed
496	1930	Melbourne	Melbourne semi-convertible (2-person operation)		CPUC/ADA needed
578S	1895	John Hammond	Market St Rwy (2-person operation)		CPUC/ADA needed
952	1923	Perley A. Thomas	New Orleans (2-person operation)		CPUC/ADA needed
Cars being Rehabilitated = 11					
New Jersey PCCs (11 cars)					
1070	1946	St. Louis Car	PCC, former NJT , Newark PSCT Scheme	2007	
1071	1946	St. Louis Car	PCC, former NJT , Twin City Rapid Transit	2007	
1072	1946	St. Louis Car	PCC, former NJT , Mexico City Cream Scheme	2007	
1073	1946	St. Louis Car	PCC, former NJT , El Paso Scheme	2007	
1074	1946	St. Louis Car	PCC, former NJT , Toronto TTC Red Rocket	2007	
1075	1946	St. Louis Car	PCC, former NJT Cleveland Orange and Brown	2007	
1076	1946	St. Louis Car	PCC, former NJT , Washinton DC Blue	2007	
1077	1947	St. Louis Car	PCC, former NJT , Birmingham Cream and Green	2007	
1078	1946	St. Louis Car	PCC, former NJT , San Diego "Balboa Park Zoo"	2007	
1079	1946	St. Louis Car	PCC, former NJT Detroit Red and Cream	2007	
1080	1946	St. Louis Car	PCC, former NJT , Los Angeles "Fruit Salad" Scheme	2007	

Fig. 7-36: Historic Vehicle Fleet Inventory CONTINUED

Non-active Vehicles = 41					
Single Ended (21 cars)					
106	1922	Colanna	Moscow/Orel, Russia (2-person operation) (stored Duboce)		
1023	1951	St. Louis Car	PCC (stored outside Marin)		
1025	1951	St. Louis Car	PCC (stored outside Marin)		
1031	1951	St. Louis Car	PCC (stored outside Marin)		
1038	1951	St. Louis Car	PCC (stored outside Marin)		
1040	1952	St. Louis Car	PCC Last PCC Built in US (stored outside Marin)		
1103			PCC (stored outside Marin)		
1105	1946	St. Louis Car	PCC (stored outside Marin)		
1109	1946	St. Louis Car	PCC (stored outside Marin)		
1115	1946	St. Louis Car	PCC (stored outside Marin)		
1125			PCC (stored outside Marin)		
1139	1946	St. Louis Car	PCC (stored outside Marin)		
1155	1946	St. Louis Car	PCC (stored outside Marin)		
1158			PCC (stored outside Marin)		
1168	1946	St. Louis Car	PCC (stored outside Marin)		
1704	1946	St. Louis Car	PCC (formerly 1128) (stored at Geneva)		
1834	1928	Accaio	Milan - purchased 1984 (Training Car)		
1979	1928	Accaio	Milan (Parts Car)		Parts Car
2133	1946	St. Louis Car	PCC, SEPTA (stored outside Marin)		
2147	1946	St. Louis Car	PCC, SEPTA (stored outside Marin)		
3557	1951	LHB	Hamburg (stored outside Marin)		Awaiting restoration
Double-Ended (10 cars)					
151	1927	Kawasaki	Hankei/Osaka (2-person operation) (stored Pier 80)		
189	1912	J.G. Brill Co.	Oporto, Portugal open car (2-person operation) (stored Pier 80)		
351	1926	St. Louis Car	Johnstown PA (2-person operation) (stored Duboce)		
578J	1927	Fuginagata	Kobe/Hiroshima (2-person operation) (stored Duboce Yard)		
586	1930	Melbourne	Melbourne semi-convertible (2-person operation) (stored Pier 80)		
798	1924	Market St Rwy	Muni (2-person operation) (stored Pier 80)		
1006	1948	St. Louis Car	PCC - Muni - double ended (stored outside Marin)		
1009	1948	St. Louis Car	PCC - Muni - double ended (stored outside Marin)		
1011	1948	St. Louis Car	PCC - Muni - double ended (stored outside Marin)		
New (8 cars)					
162			From Orange Empire		Needs ADA/PUC
1026			From S. Lake Tahoe (stored at Marin)		Needs ADA/PUC
1027			From S. Lake Tahoe (stored outside Marin)		Needs ADA/PUC
1028			From S. Lake Tahoe (stored outside Marin)		Needs ADA/PUC
1033			PCC from Orange Empire (stored at Marin)		Needs ADA/PUC
1039			PCC from Orange Empire (stored at Marin)		Needs ADA/PUC
4008			From Pittsburgh, PA (stored at Marin)	1990	Needs ADA/PUC
4009			From Pittsburgh, PA (stored at Marin)	1990	Needs ADA/PUC
Status Unknown (2 cars)					
1130			PCC (stored inside Pier 80)		
TOTAL HISTORIC VEHICLE FLEET = 85					

Fig. 7-36: Historic Vehicle Fleet Inventory CONTINUED

Other Vehicles = 12					
Work Cars (3 cars)					
304	1907	United Railroads of SF	Line Car		Work Car
1008	1948	St. Louis Car	PCC - Muni - double ended		Work Car
C-1	1917	Municipal Railway	Flatbed Work Motor		Work Car
Cars on Loan (9 cars)					
109					Bay Area Electric Ry Museum
1014					Sydney Tramway Museum
1030					CTA
1129					Kansas City RR Museum
1146					Kansas City RR Museum
1150					Merced
1153					Bay Area Electric Ry Museum
1159					Oregon Electric Ry
1164					Transport Museum of St. Louis

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