

Chapter 8: Infrastructure Program

The Infrastructure Program consists of capital projects to build and maintain the guideways and systems necessary to operate transit services. This program is primarily devoted to the modes that operate on fixed guideways, such as light rail, trolley coach and cable car. Projects in this program include rail replacement, communication and signaling, overhead power lines and power distribution systems, subway rehabilitation, station construction and rehabilitation, and cable car system rehabilitation, replacement and modification. Adding and improving ADA-mandated key stops and additional accessibility improvement projects are also included in this program. Major service expansion projects, such as light rail and bus rapid transit projects, were discussed in earlier chapters.

Planned funding for major infrastructure projects and programs such as Rail Replacement and Overhead Rehabilitation falls short of the estimated costs for these programs over the 20-year period. However, these programs generally have sufficient funding for the current fiscal year. In some cases, questions about project eligibility for particular funding sources must be answered.

Current Inventory

Muni maintains a complex network of operational infrastructure. This includes:

- 71.5 revenue track-miles for light rail operation, including Metro and Historic service, as well as the additional 5.4 miles for the Third Street IOS (in Fig.8-1);
- 6.6 miles of subway - Market Street (including MMT and Duboce portal), Twin Peaks Tunnel and Sunset Tunnel;
- 8.8 revenue track-miles for cable car operation;
- 219.8 revenue line-miles of overhead wires for power supply for light rail and trolley coach operation;
- 9 subway stations;
- 24 surface light rail stations;
- 25 substations for electrical power distribution;

Rail Replacement

This program includes the phased design and replacement of the trackways and related systems serving the light rail lines as part of a regular replacement program. The projects included in this program are designed to reduce operational problems, reduce maintenance, increase system reliability, and mitigate excessive noise and vibration. A detailed project listing is included in Figure 8-2.

Figure 8-1: Existing Rail Inventory

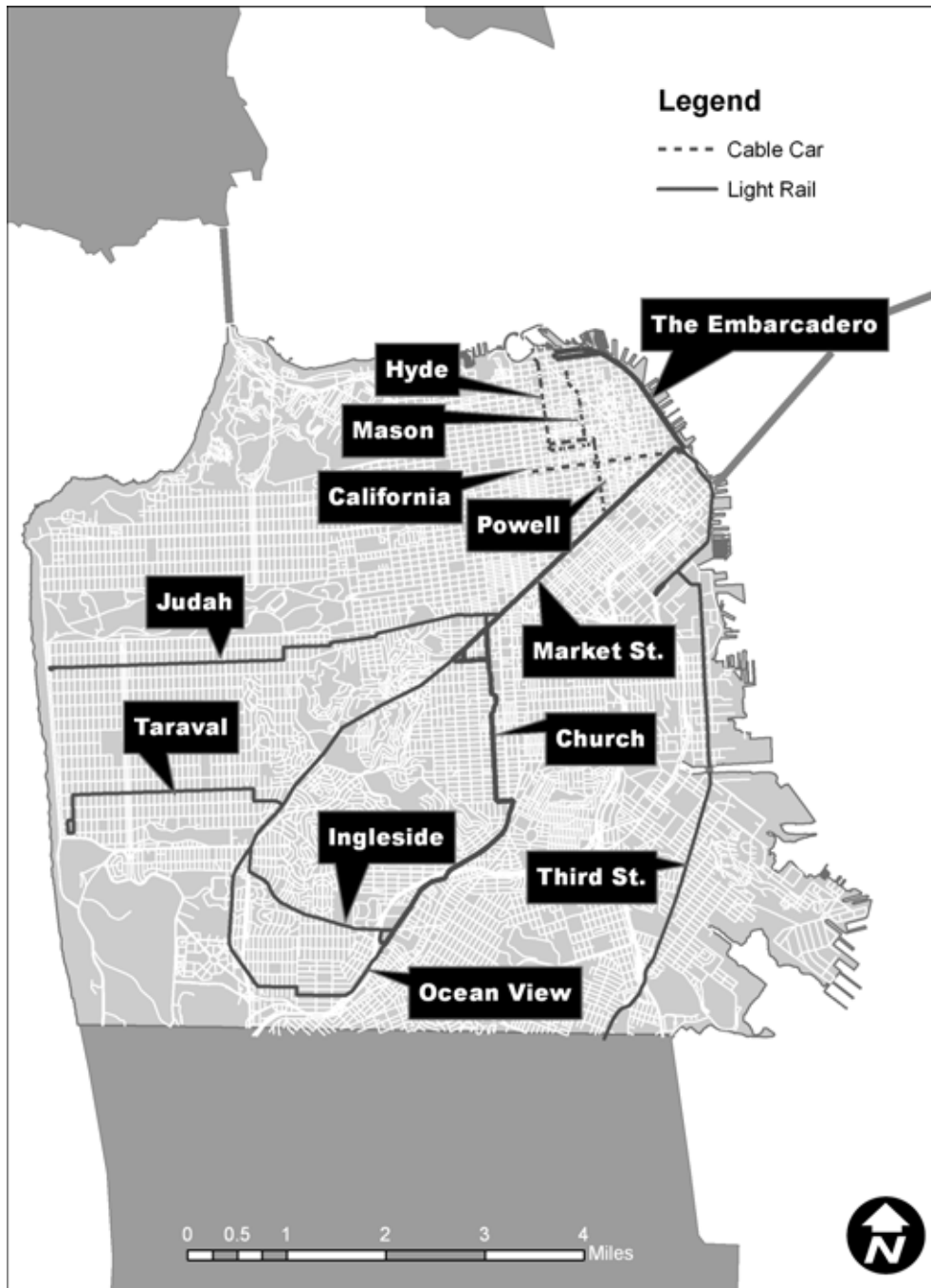


Figure 8-2: Rail Replacement Program

Project	Status	Cost (millions)
19th & Junipero Serra	Complete	\$0.45
Carl/Cole, Broad/Orizaba, 9th/Irving	Complete	\$3.36
M/N: Irving/Arguello	Complete	\$7.79
N: Special Trackwork	Complete	\$14.67
K: Ocean Ave Pullout to Junipero Serra	Complete	\$16.34
L: 15th/Taraval and 15th/Ulloa	Complete	\$1.30
L: 46th/Taraval to Zoo Loop	Complete	\$4.50
Rail Grinding System-wide (N-Line 1st Yr.)	FY09	\$3.84
Ultrasonic Testing	FY05-FY09	\$0.58
Green Switch Procurement	Complete	\$1.50
L/K/M: W. Portal/Ulloa (Track, Switches & Curves)	Construction	\$10.57
Twin Peaks Tunnel	CER	\$25.76
J/N/L: several locations	Design	\$12.91
K/M: St. Francis Circle & Junipero Serra	Design	\$13.50
J/N: Special Trackwork	CER	\$17.00
Green Facility	Design FY08	\$25.85
Subway: Eureka Portal Study	CER	\$0.32
Subway: Ventilation Study	CER FY08	\$0.22
Subway: Waterproofing	CER	\$1.68
N: Carl Street (Cole to Arguello)	CER	\$10.60
Rail Street Design Safety Standards	Start in FY09	\$2.00
L: Ulloa/Forest Side to 48th/Taraval	Start in FY09	\$39.30
J: Special Trackwork	Beyond FY09	\$6.10
M: Special Trackwork	Beyond FY09	\$8.40
N: Arguello to Terminal Loop	Beyond FY09	\$50.90
Sunset Tunnel	Beyond FY09	\$7.88
Subway	Beyond FY09	\$16.03
K/M: W. Portal Avenue	Beyond FY09	\$10.50
M: 19th/Holloway	Beyond FY09	\$0.28
DPT	Complete	\$0.05
Other Projects (FY 1998-2029)	N/A	\$549.85
TOTAL		\$864.03

Overhead Rehabilitation

This program covers the phased design and replacement of the overhead wires, related poles, and traction power systems serving the light rail and trolley coach lines. The projects included in this program are designed to reduce operational problems, reduce maintenance, and increase system reliability. The program includes the replacement of approximately 200 poles per year and replacement of wire and switches as needed. A detailed project listing is included in Figure 8-4.

Figure 8-3: Existing Trolley Overhead Lines



Figure 8-4: Overhead Rehabilitation Program

Project	Status	Cost (millions)
Emergency Feeder Replacement	Complete	\$0.68
Presidio Tower Controls	Complete	\$0.88
LED Lights	Complete	\$0.07
Intersection Signal Improvement	Complete	\$0.08
1-California/4-Sutter	Complete	\$8.84
Fillmore Street Feeders	Complete	\$0.12
6-Parnassus/7-Haight	Complete	\$14.50
K-line Poles & Power	Complete	\$3.72
Mission-Steuart Parts	Complete	\$0.40
Mission Steuart Relocation	Complete	\$0.13
Feeder Upgrade Potrero/Presidio	Complete	\$1.98
Caltrans Fourth Street Overhead	Complete	\$0.03
West Portal Overhead	Construction	\$0.43
Presidio Yard Overhead	Construction	\$4.50
Metro Subway Upgrade	Construction	\$15.48
Traction Power: Feeders	Design	\$8.50
Traction Power: Substations	Design	\$10.50
Potrero Deck Bypass	Design	\$0.52
22-Fillmore/33-Stanyan: 16 th Street: S. Van Ness to Kansas	Design	\$9.99
5-Fulton/21-Hayes	CER	\$19.50
Third/Fourth Rehab	Start CER in FY 08	\$1.50
22-Fillmore/33-Stanyan: 16 th Street: Kansas to Connecticut	Start CER in FY 09	\$5.30
Church - Duboce	Design	\$2.30
St. Francis Circle Overhead	Design	\$.40
Green Yard OH	Start in FY 08	\$4.00
Misc. Poles	Start in FY 08	\$5.00
Misc. Small Projects	As needed	\$0.43
Other Projects (FY 1998-2029)	N/A	\$336.12
TOTAL		\$453.88

Route Electrification

In 2002, Muni completed a Route Electrification Study to provide a plan for trolley coach expansion in San Francisco. It identified opportunities to increase trolley coach service through the extension of existing trolley coach lines, or electrifying current motor coach lines. Projects were ranked based on the frequencies and ridership on the route, percentage of route already under wire, grades, and costs. Based on these criteria, the 47-Van Ness was listed as the highest priority line among these candidates.

Muni has a number of near term commitments involving the trolley coach network which result in adjustments to the program as described in the 2002 report. Most importantly, as part of the City's development agreements for Mission Bay, a high priority was established for the provision of electric trolley coach service on 16th Street between Kansas Street, where the current 22-line turns south, and Mission Bay. It is intended that this line be served by the 22-Fillmore line, which would continue along 16th Street to Third Street, turning north to pass the South Street/UC Mission Bay/Eugene Friend Way light rail station. The initial portion of this new overhead, west of Connecticut Street, may be implemented in 2009 as part of the Overhead Rehabilitation Program. In FY08 and FY09, \$4.5 million is programmed to begin design east of Connecticut to Mission Bay. Full funding for construction has not been identified yet.

Mission Bay is also intended to be served by an extension of the 45-Union-Stockton line south from its current terminal at Caltrain, operating through Mission Bay and continuing south to replace the present 22-line service on Potrero Hill, when that line is rerouted. This extension is dependent on the construction of the streets on which it would operate through the new Mission Bay neighborhood. Additionally, the 10-Townsend was identified in the SOMA Action Plan as a near term candidate for extension through SOMA to Potrero Hill. Due to community concerns, the extension, if implemented, would include electrification of the route.

Beyond the small amount of funding available for the Mission Bay extension, funding needed to realize other projects has not yet been identified. Additional funding will be needed for vehicle procurement, overhead construction, facility conversion, and additional vehicle and overhead maintenance activities. Other issues that will have to be evaluated include: service reliability, operational concerns, service substitutions, and additional maintenance requirements for both vehicles and overhead infrastructure.

A combination of fleet and facility issues makes significant expansion of trolley coach service unlikely in the near term. The major fleet issue is that to compete in the regional funding process, the purchase of additional trolley coaches should be timed to the replacement cycle of a comparable number of motor coaches. The one-for-one replacement of vehicles competes well for federal participation through the regional funding process, whereas the purchase of expansion vehicles must be borne locally. Muni's current fleet size does allow for the conversion of one line to trolley coach operation within the existing trolley coach fleet and still maintain a reasonable spare ratio.

On the facility side, the one-for-one replacement of motor coaches with trolley coaches is also preferred, as a motor coach facility could be converted, all or partially, to trolley coach operations. If such a conversion were not possible, a site would have to be identified for construction of a new trolley coach facility. This combination of fleet and facility issues sets 2014 as the earliest year in which a significant expansion of trolley coach services could occur.

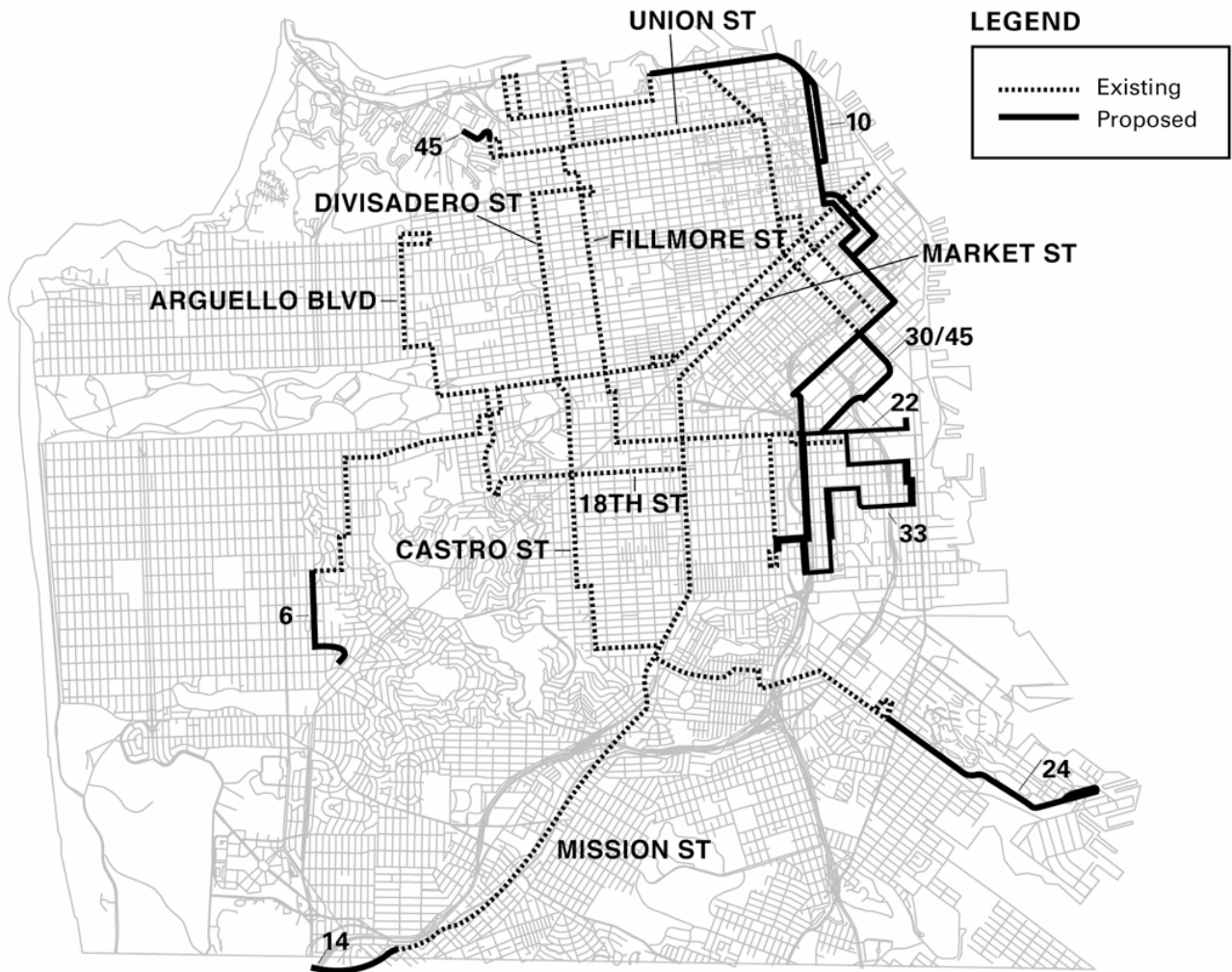
Construction of the necessary overhead infrastructure and facility conversion would need to be completed to coincide with vehicle deliveries.

Figures 8-5 and 8-6 summarize the committed and proposed electrification proposals discussed above.

Figure 8-5: Route Electrification Program

Project/Line	Cost (millions)
COMMITTED PROJECTS	
22-Fillmore: Mission Bay	\$8.6
45-Union/Stockton: Mission Bay	\$17.6
EXTENSIONS	
14-Mission: Daly City BART	\$16.9
45-Union/Stockton: Presidio	\$10.8
24-Divisadero: HPNS	\$13.9
6-Parnassus: West Portal	\$8.9
33-Stanyan: Potrero Hill	\$20.8
PRIMARY CANDIDATES	
47-Van Ness	\$34.1
10-Townsend: Potrero Hill	\$58.3
71-Haight/Noriega	\$42.8
9-San Bruno	\$66.3
2-Clement	\$34.3
27-Bryant	\$51.0
43-Masonic	\$88.8
Other Projects (FY 1998-2029)	\$490.0
TOTAL	\$963.1

Figure 8-6: Map of Electrification Extensions



Wayside/Central Signal Systems and Train Control Rehabilitation

Projects within the Wayside Signal System Rehabilitation Program reconstruct and enhance wayside signaling systems to improve the safety and operation of existing fixed guideway transit service (See Figure 8-7).

Figure 8-7: Wayside/Central Signal Systems and Train Control Rehabilitation

Project	Status	Cost (millions)
-- COMMITTED PROJECTS --		
Metro East ATCS Test Track Equipment	Underway	\$1.00
ATCS subway passenger information upgrades	Underway	\$0.60
St. Francis Circle Interlock Control Circuits	In design	\$2.82
ATCS Final Cutover	In CER	\$5.00
Central Control UPS Replacement	Start FY08	\$0.50
Church & Duboce Rerail, signal component	In design	\$5.00
Green Yard Rail Rehab signal component	Start FY08	\$3.00
ATCS network upgrade to Windows	Start FY09	\$10.00
Van Ness MG replacement	Start FY09	\$0.78
-- CANDIDATE PROJECTS --		
19 th Avenue / Rossmoor resignaling	Start FY08	\$1.50
L-Taraval Rerail, signal component	Start FY10	\$11.00
Mission St trolley signals & priority	Start FY12	\$11.00
Market St F-line signals & priority	Start FY13	\$11.00
Cable Car signals	Start FY14	\$3.00
N-Judah Rerail, signal component	Start FY14	\$11.00
Stockton St trolley signals & priority	Start FY15	\$10.00
Ocean Ave trolley & rail signals & priority	Start FY16	\$15.00
Fillmore St trolley signals & priority	Start FY17	\$7.50
J-Church Rerail signal component	Start FY18	\$11.00
Potrero Ave trolley signals & priority	Start FY19	\$7.50
M-Line Rerail signal component	Start FY20	\$11.00
Van Ness trolley signals & priority	Start FY21	\$11.00
TOTAL		\$150.19

Cable Car Infrastructure Rehabilitation

This program includes various guideway and infrastructure repair and improvement projects on the Cable Car system. It covers all street components of the Cable Car system, such as rail pulleys, switches and turntables. A detailed description of the Cable Car Infrastructure Program is provided in the 1998 Cable Car System Capital Plan. A detailed project listing is included in Figure 8-8.

Figure 8-8: Cable Car Infrastructure Rehabilitation Program

Project	Status	Cost (millions)
Signal Pre-empt California/Grant	Complete	\$0.80
Hyde/Beach Turntable Overhaul	Complete	\$0.63
Powell/Market Turntable Overhaul	Complete	\$0.57
Bay/Taylor Turntable Overhaul	Complete	\$1.30
Propulsion System Controller Replace	Design	\$9.00
Replace Hatch Inspection Covers – Phase 1	CER	\$0.95
California Street Improvements	CER	\$14.00
Hyde Street Improvements	Start in FY08	\$9.30
Powell Street Improvements	Start in FY08	\$13.70
Mason Street Improvements	Start in FY09	\$7.20
Replace Hatch Inspection Covers – Phase 2	Start in FY09	\$3.0
Mason/Washington Curve	Start in FY09	\$7.30
Jackson/Mason Bumper Bar Mod	Start in FY09	\$070
Barn Turntable Rehabilitation	Beyond FY08	\$1.10
Signal Preemptions	Beyond FY08	\$3.60
Inspect Chafing Bars at Pull Curves	Beyond FY08	\$1.10
Relevel Rewinder Machine	Beyond FY09	\$0.08
Overhaul DC Motors and Gear Boxes	Beyond FY09	\$1.80
Additional Projects	Beyond FY09	\$20.00
Other Projects (FY 1998-2029)		\$206.81
TOTAL		\$302.94

Rail Stations

New stations are planned as part of rapid transit projects described earlier, including the Central Subway (Chapter 3) and Bus Rapid Transit (Chapter 5) projects. Major station modification projects for Balboa Park and Glen Park are also undergoing planning analysis and conceptual engineering (as described in Chapter 5). However, the existing stations need to be maintained

and enhanced. Station improvements are especially needed to enhance passenger information, convenience, accessibility and safety.

Selected station improvements in the Capital Investment Plan are listed in the table below. These are not necessarily funded, and therefore schedules are not certain. Details of schedules and funding status are provided in Chapter 11, Figure 11-7.

Figure 8-9: Station Improvements

Project	Status	Estimated Cost (millions)
Electronic Public Information Signs at Metro Subway Station Entrances	Largely Funded. Design FY 07-08	\$2.0
Metro Subway Station General Rehabilitation (including painting and detectable warning)	Unfunded Construction programmed for multiple years, starting FY 09-10	\$13.4
Metro Subway Emergency Telephones	Funded. Construction scheduled for FY 08-09	\$1.8
Metro Subway Public Address System Replacement	Funded. Construction scheduled for FY 08-09	\$24.0
Metro Subway Fare Collection System Replacement	Funded. Design and construction scheduled over 20-year period, starting in FY 07-08	\$177.0
Metro Subway Station Restroom Rehabilitation for ADA Compliance and Safety	Unfunded. Design and construction programmed for FY 10-11	\$1.1
Metro Subway Station Talking Sign Transmitters (for visually impaired wayfinding)	Unfunded. Construction programmed for FY 08-09	\$3.4
Escalator and Elevator Rehabilitation (for code compliance and safety enhancement)	Funded. Primarily scheduled for FY 07-08 through FY 10-11	\$50.1

Project	Status	Estimated Cost (millions)
Third Street LRT Ticket Vending Machines	Funded. Scheduled for FY 07-08 and FY 08-09	\$3.1
Embarcadero & Civic Center Cross Platform Connection	Unfunded. Primarily programmed for design and construction for FY 07-08 and FY 08-09.	\$1.8