

TEN-YEAR BUS FLEET MANAGEMENT PLAN

SEPTEMBER 2016



Metro®

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INTRODUCTION

Purpose

This report is an update to the Bus Fleet Management Plan (BFMP) published in June 2015. The major focus is the reduced need for articulated buses. Metro has a total of 389 60-foot CNG articulated buses on property. Based on recent analysis there is a need for only 260 of this bus type. This total includes the conversion of the Silver Line to articulated bus operation, which cannot be done for a few years. In addition, there is a need to replace 66 diesel buses, which are 20 years old and operated by Metro's contract service.

The BFMP details how Metro will acquire, maintain, and operate its bus fleet through Fiscal Year 2026. Its five primary purposes are:

- Describe and evaluate existing bus operations and maintenance facilities.
- Identify new transit projects and other factors that impact bus operations.
- Describe bus fleet management and maintenance practices.
- Provide a framework for vehicle procurement and facility planning.
- Become a source for capital and operating budget preparation.

Los Angeles County Metropolitan Transportation Authority (Metro)

Metro is responsible for the continuous improvement of an efficient and effective transportation system for Los Angeles County. Metro serves as the County's transportation planner, coordinator, designer, builder, and transit operator for one of the country's largest, most populous counties. More than 9.6 million people, nearly one-third of California's residents, live, work, and play within its service area.

Metro is the 3rd largest transit provider in the United States behind MTA New York City Transit and Chicago Transit Authority (CTA) operating over 2,200 buses and 275 rail cars. Metro is governed by a 13-member Board of Directors comprised of:

- Five Los Angeles County Supervisors;
- The Mayor of Los Angeles;
- Three City of Los Angeles mayor-appointed members;
- Four city council members representing the other 87 cities in Los Angeles County; and
- The Governor of California appoints one non-voting member

Service Area

Metro’s service area is over 1,400-square-miles and is divided into five distinct geographical service areas which have their own localized community-based Metro Service Councils (MSC). The five geographic areas are as follows (Figure 1.1):

- Gateway Cities
- San Fernando Valley
- San Gabriel Valley
- South Bay
- Westside/Central

Notes:

- (1) Appendix 1 lists all municipalities located within each Metro Service Area
- (2) Appendix 2 lists all transit operators operating within each Metro Service Area.

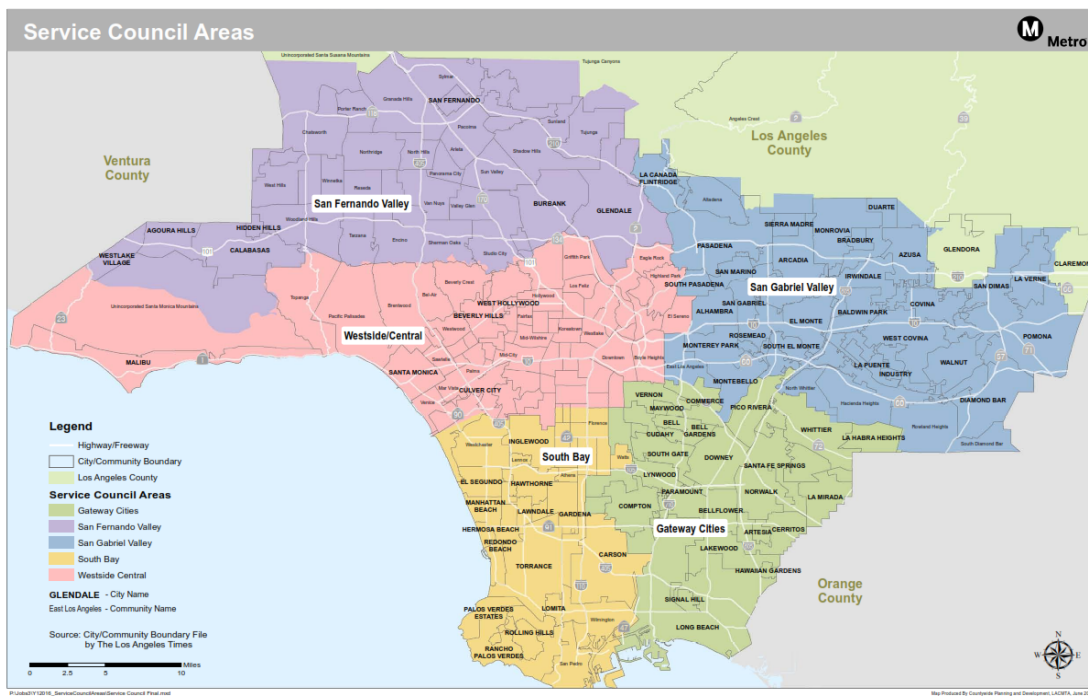


Figure 1.1 Metro’s Five Geographical Service Area

Metro Service Council (MSC)

Each MSC is comprised of nine representatives that live, represent, or work in the communities within the boundaries of a designated region they represent. MSCs primary responsibilities are to:

- Receive community input on staff’s proposed service change modifications
- Approve staff’s final service change modifications related to their respective service, which is then forwarded to Metro’s Board of Directors for full Board approval.

MSCs promote greater community involvement and sub-regional perspectives. The purpose of the MSCs is to help Metro better understand the needs of its customers, and promote efficient service coordination with municipal and local transit providers to provide a seamless transit experience. MSCs work closely with Metro's Service Planning & Scheduling Department.

Metro's service changes generally occur in June and December. Proposed service changes are taken through a public review process and are subsequently considered for approval by the MSCs. MSCs primary responsibilities comprise receipt of community input on proposed service modifications and to render decisions on proposed bus route changes considering staff's recommendations and public comments. In this effort, MSCs are responsible for:

- Conducting public hearings in accordance with Metro's Administrative Codes 2-50-020 (Public Hearings) and 2-50-025 (Public Hearing Procedures); and
- Approving all proposed major service changes as defined in Metro's Administrative Code 2-50-010.

Service Planning & Scheduling Department

Metro's Service Planning & Scheduling Department continuously monitors Metro's bus & rail operations. Service Planners evaluate and analyze system level / line level performance and based on findings develop a set of proposals designed to improve service delivery and cost effectiveness. Guiding this effort is Metro's Transit Service Policy. Schedule Makers develop and modify bus and rail schedules to optimize service levels to address ridership demand and running time changes as required. Service Performance Analysts collect bus & rail service data, process it, validate it, and make it available for reference and specific studies. The data collected is used to develop a number of performance reports as well as develop key system indicators such as boarding per revenue service hours, cost per passenger mile, on-time performance, load ratios, complaints per 100,000, etc.

Bus & Rail Divisions

Metro operates 11 bus divisions and 6 rail divisions. Transit vehicles are housed and maintained within their respective divisions. Each division is staffed with administrators, operators, mechanics, and other support staff. Divisions are responsible for service delivery and ensuring service objectives are achieved such as providing safe, clean, reliable, on-time, courteous service to Metro customers. Metro is in the process of building one additional rail division to support its rail expansion projects.

1.0 TRANSIT OPERATIONS

Metro operates bus, light rail, and heavy rail services. Metro’s bus operations consist of both Directly Operated (DO) and Purchased Transportation (PT) services. Metro operates the largest share of all bus services provided in the region. However, municipal operators provide additional fixed route services in reserved service areas where Metro provides limited service or no service at all. Metro’s FY 2016 projected annual operating cost for the bus is a little over \$1 Billion and for rail is approximately \$400 million.

Metro Bus

Metro currently operates 1,927 scheduled peak buses on any given weekday. As of June 2016, Metro bus system offers 166 routes (Table 1.1) and provides more than 7.02 million annual revenue service hours with an average of 965 thousand daily weekday boarding serving over 14,400 bus stops.

Table 1.1

Metro Bus Route Service Type (Effective June 26, 2016)

Local	Limited	Shuttle	Express	Rapid	Metro Liner
113	11	11	9	19	3*

**Metro implemented a Silver Line Express Route (950X) in December 2015 (P.11).*

Metro Rail

The Metro rail system consists of 305 light and heavy rail cars operating on six lines serving 98 stations across approximately 101.5 route miles in heavily congested travel corridors. Metro’s light rail lines serve 67 stations along 86.7 miles of track and its heavy rail lines serve 16 stations along 14.8 miles of track. Metro rail provides connections to many multi-modal transportation hubs and accounts for approximately 350,000 weekday boardings.

1.1 TRANSIT GOALS AND OBJECTIVES

Metro’s operational goals and objectives are to provide a high quality regionally coordinated transit system that is reliable, fully integrated, convenient, simple to use, and provides maximum benefit to Metro customers in light of scarce resources. In this effort, Metro developed a service concept that defines the roles of Metro bus, rail, and municipal operations, and identifies and prioritizes essential service quality attributes that serve as policy guidelines. The key principles of Metro’s service concept are:

- *Service Priorities:* Service should be focused first in high-density areas and be scaled to fit the overall density and passenger demand in the service area.
- *Service Design:* The network should be coordinated and designed to be simple and user-friendly to increase trip-making by existing riders and attract new

riders.

- Service Attributes: The system should provide high-quality service to better serve existing riders and attract new riders. Service quality priorities include:
 - Reliability
 - Fast travel options
 - Real-time, readily-available information
 - Clean and safe transit vehicles, stops, and all transit facilities (e.g. Transit Centers, Park and Ride, Rail Stations, etc.)

- Governance: Metro should serve as a facilitator to coordinate services among operators in the region.

These service concepts serve as the foundation for the development of policy guidelines reflected in Metro’s Transit Service Policy (TSP). Metro’s TSP provides quantitative tools to evaluate its transit system that are used to identify opportunities for service improvements and ensure the regional transit network is adjusted accordingly to achieve the goals and objectives of the service concept.

1.2 DESCRIPTION OF SERVICE TYPES

Metro operates four (4) light rail lines (Blue, Green, Gold, and Expo), two (2) heavy rail subway lines (Red and Purple), a number of Local, Limited, Shuttle, Express, and nineteen (19) Rapid bus routes, and two (3) Metro Liner bus routes.

Metro Rail

Metro Rail serves as the backbone of public transportation in the greater Los Angeles region, linking many key multi-modal transportation centers and destinations. Metro has a number of rail projects that will be completed or undergoing construction during the life of this plan. Metro’s four light rail lines are powered by overhead wires, operate a maximum three-car consist, and operating on right-of-ways ranging from complete grade separation to at-grade in mixed flow traffic. Metro’s two (2) heavy rail lines are powered by a third rail, operate a maximum six-car consist, and operate underground on an exclusive right-of-way. Rail routes are designated with route numbers between 800 and 899. Figure 1.2 displays Metro’s present rail system.

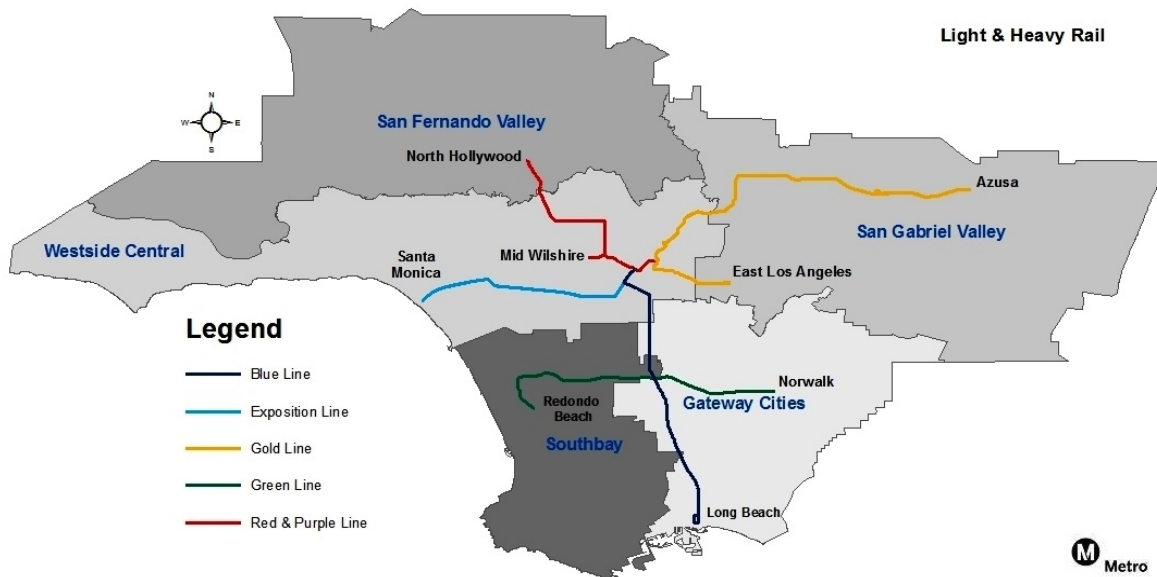


Figure 1.2 Current Metro Rail System Map

Metro Bus

Local & Limited Routes

Local bus routes provide the bulk of Metro’s transit services operating on city streets serving all stops along their routes. These routes create an interconnected regional network throughout Los Angeles. Some local lines are augmented with limited stop routes and operate in corridors with high transit demand providing patrons a faster transit option through wider stop spacing and serving to key transfer points and major activity centers. Local routes are designated with route numbers between 1 and 299. Limited stop routes are designated with route numbers between 300 and 399. Figure 1.3 displays the combination of local, limited, and shuttle routes that operate throughout Metro’s service area.

Shuttle Routes

Shuttle routes operate primarily on secondary streets and serve short-distance trips. Shuttle routes are not an interconnected network but rather serve as local community circulators providing connections to regional bus lines and rail lines. They have route numbers between 600 and 699.

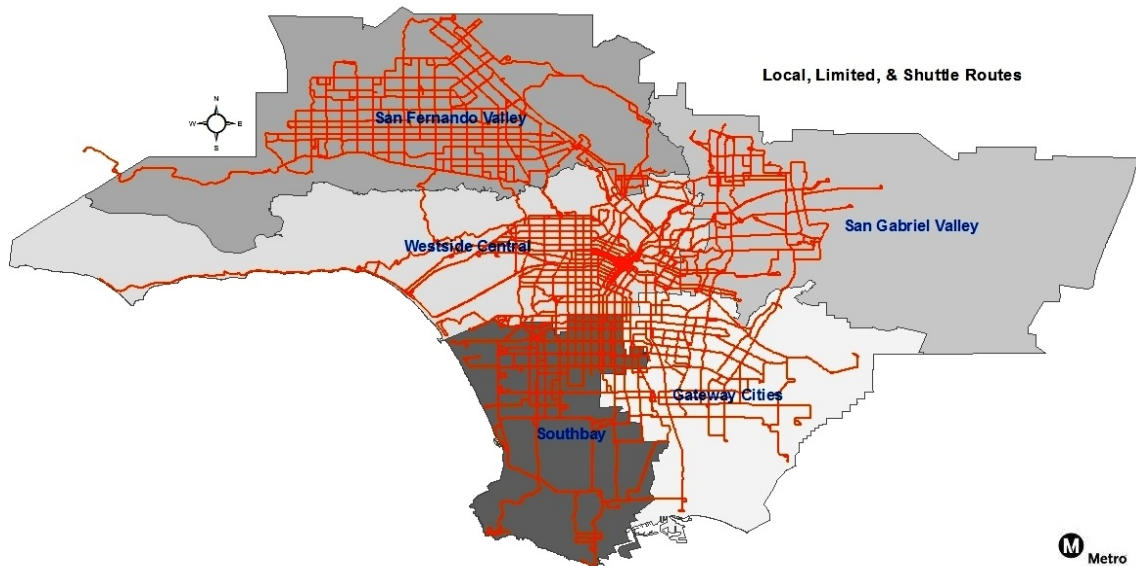


Figure 1.3 Local, Limited, and Shuttle Routes

Express Routes

Express routes are used for longer distance trips, make fewer stops, and offer service that typically becomes more localized near the end of their routes (Figure 1.4). Express services usually originate from a collector area, such as a park and ride location, operating in a particular corridor with stops en-route at major transfer points or activity centers. In addition, these services generally operate a major portion of their routing on freeways either in mixed flow traffic or on HOV/HOT lanes. This service type charges a premium fare and is designated with route numbers between 400 and 599.

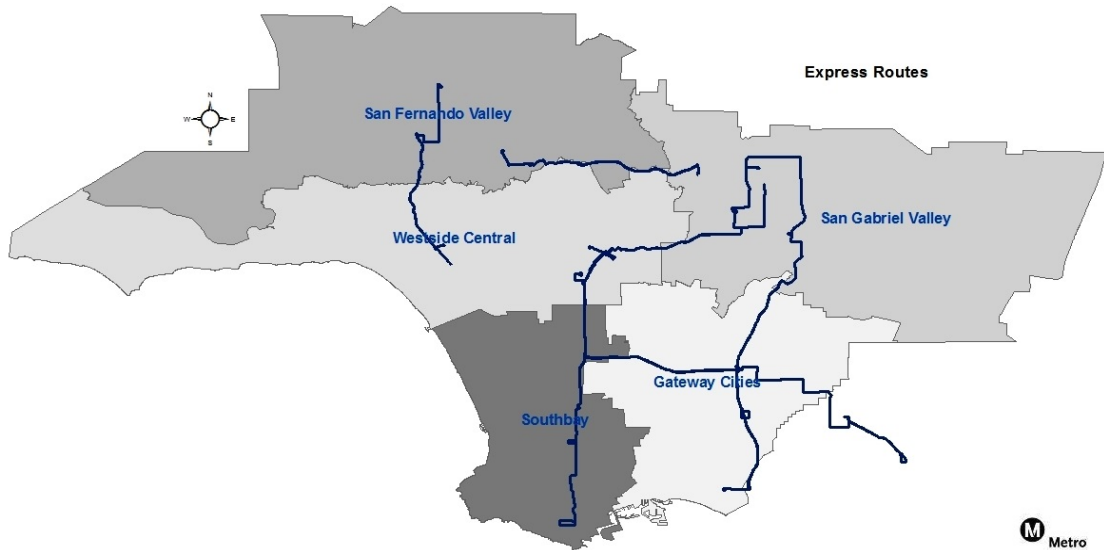


Figure 1.4 Express Routes

Rapid Bus Routes

Metro operates nineteen (19) Rapid Bus Routes (Figure 1.5). Rapid Bus creates an interconnected regional network and is a form of BRT that operates in mixed-flow traffic on heavily traveled corridors. Time reductions are achieved through the use of a number of key BRT attributes such as fewer bus stops and transit signal priority. Rapid bus routes operate specially branded red buses that distinguish them from local buses, which have a California poppy color scheme. Rapid Bus Routes are designated with route numbers between 700 and 799.

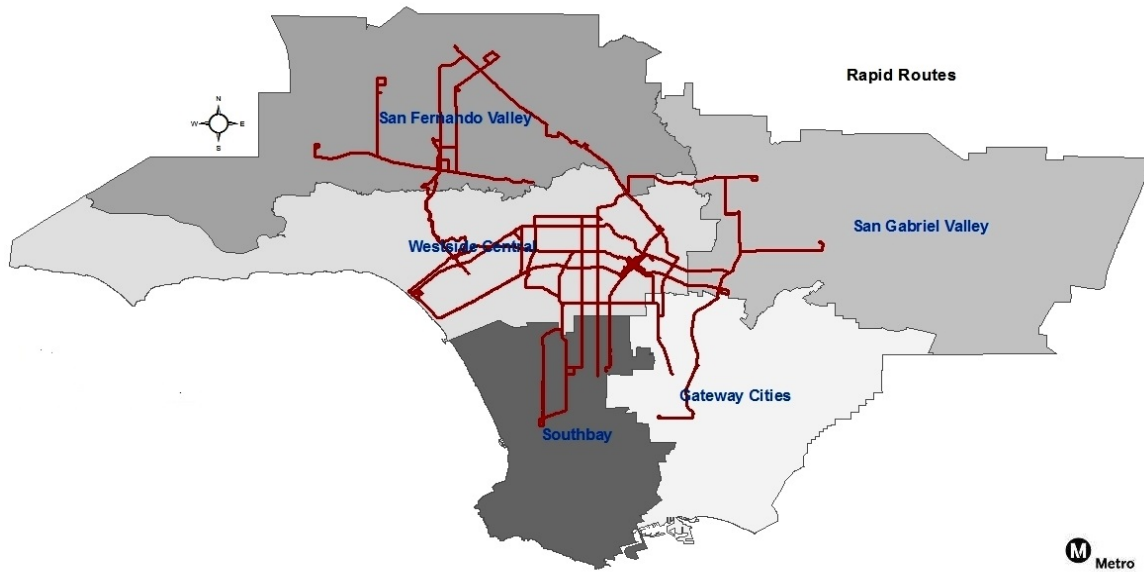


Figure 1.5 Rapid Bus Routes

Metro Liner Routes

Metro operates two Metro Liner Bus Routes (Figure 1.6). Both are unique and distinct from Metro’s other bus services. The Orange Line is Metro’s premier Bus Rapid Transit (BRT) Route and the Silver Line is Metro’s Dual-Corridor Express Line. Metro Liner Routes are designated with route numbers between 900 and 999.

- **Orange Line (901):** The Orange Line is Metro’s premier BRT Line. This service provides many of the features expected of rail services operating on an exclusive right-of-way, station stops with Park & Ride Lots, and Ticket Vending Machines (TVMs) for pre-paid boarding (buses are not equipped with fareboxes). The Orange Line operates in the San Fernando Valley linking the North Hollywood terminus of the Metro Rail Line to Canoga Park and Chatsworth. The Metro Orange Line uses 60-foot articulated buses, painted in a distinctive silver color, and makes 18 station stops along its 18.9 mile route.
- **Silver Line (910/950X):** The Silver Line is a Metro’s Dual-Corridor Express Line. The Silver Line serves two distinct corridors operating predominantly on the I-10 and I-110 high-occupancy toll lanes (Express Lanes) linking El Monte to San Pedro via limited stop service in Downtown Los Angeles. Line 950X operates during the peak period only in which a makes only one station stop along the Harbor Freeway Express Lanes at the Harbor Freeway Green Line Station south of the Harbor Gateway Transit Center. The Silver Line operates 45-foot buses, painted in a distinctive silver color, makes station stops along the Express lanes, and makes limited stops through LA Downtown. This route is approximately 39 miles long.

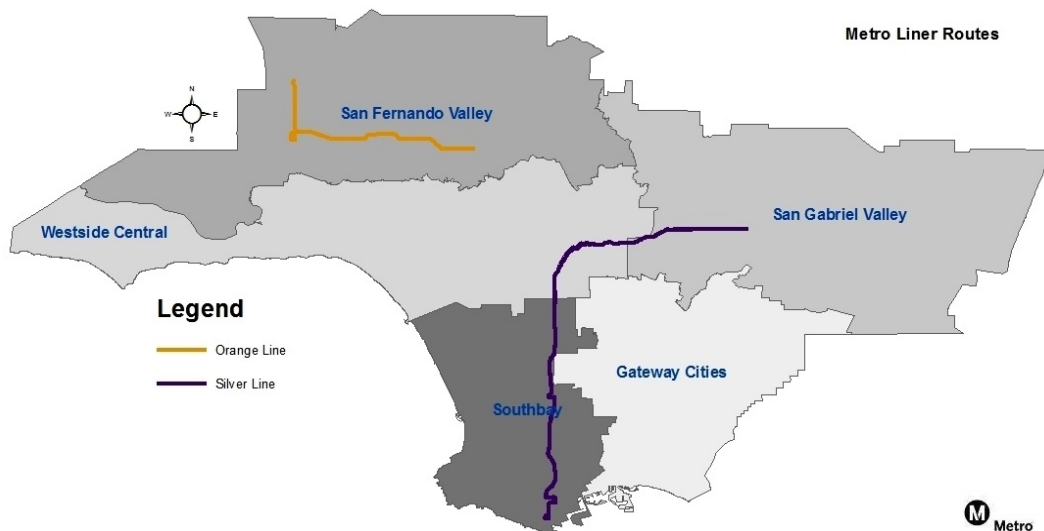


Figure 1.6 Orange Line (BRT) and Silver Lines (Dual-Corridor Express)

24-Hour Routes

Metro recognizes the need to provide travel options for its patrons who don't have other means of transportation after midnight and until morning daytime bus service resumes. Metro is the only transit regional operator that operates a core network of 24-hour bus service seven days a week. These services are commonly referred to as "Owl Service". Metro's owl services are much more limited in geographic coverage than its daytime services (Figure 1.7). A large majority of owl routes operate to and from Downtown Los Angeles where they make hourly timed connections to one another.

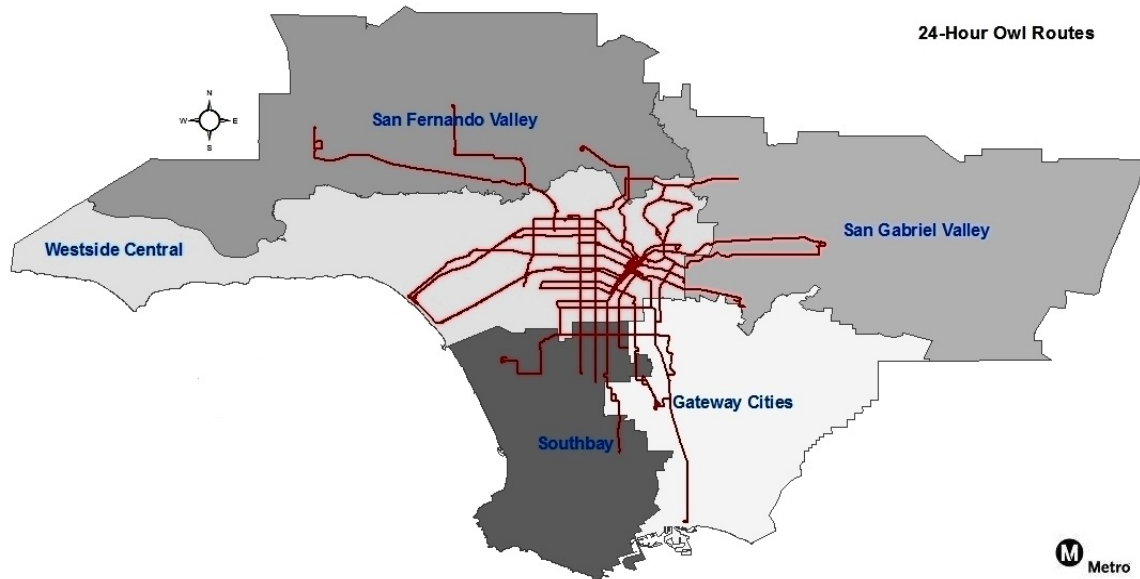


Figure 1.7 24-Hour Bus Routes (Owl Service)

Purchased Transportation

Metro contracts 18 of its 165 bus routes with three private operators (12 local routes, 4 shuttle routes, and 2 express routes). In addition to these 19 bus routes Metro partially funds 5 additional bus lines operated by the Palos Verdes Peninsula Transportation Authority (PVPTA) and the City of Los Angeles Department of Transportation (LADOT).

1.3 BUS SERVICE TYPE & LINE IDENTIFICATION

Each bus service type has a set of features that differentiates them from one another and unique numerical identifiers that indicate their service type and primary route direction. Table 1.2 summarizes each service type’s general characteristics and key features and Table 1.3 summarizes their numerical identifier as well as their color scheme.

Table 1.2

Bus Service Type & Features

Features	Local / Limited	Express	Shuttle	Rapid	Metro Liner
Right of Way	Major Arterials	Major Arterials and Freeways	Local Streets	Major Arterials	Right-of-Way and HOV/HOT Lanes
Maximum Average Stop Spacing	0.25 mile/0.60 mile	1.25 miles	0.25 mile	0.80 mile	1.25 miles
Target Travel Market	Inter-Community	Inter-Community Regional	Neighborhood	Inter-Community	Inter-Community
Vehicle Type	40/45/60-foot buses	40-foot bus	40-foot bus or smaller	40/45/60-foot buses	45/60-foot buses
Color Coded Buses	California Poppy	California Poppy	California Poppy	Red	Silver
Communities Served	Multiple	Multiple	1 - 2	Multiple	Multiple
Signal Priority	No	No	No	Yes	BRT Yes / Express No
Fare Collection	Onboard	Onboard	Onboard	On Board	BRT Pre-Paid /Express On Board
Passenger Amenities	Benches and Shelters	Shelters and Stations	Benches and Shelters	Shelters and Stations	Shelters and Stations
Real-time Passenger Info	Yes	Yes	Yes	Yes	Yes
Route Number Designations	1-399	400-599	600-699	700-799	900-999

Table 1.3

Bus Line Identification, Route Numbering, & Color Schemes

Service Type	Numbering	Primary Route Direction	Color Scheme
Local	1-99	Serves Downtown LA - counterclockwise from NW quadrant.	California Poppy
	100-149	Primarily EW operation in areas S of LACBD	California Poppy
	150-199	Primarily EW operation in areas N of LACBD	California Poppy
	200-249	Primarily NS operation in areas W of LACBD	California Poppy
	250-299	Primarily NS operation in areas E of LACBD	California Poppy
Limited	300-399	Branch of local lines.	California Poppy
Express	400-499	Serves Downtown LA -- numbered counterclockwise from NW quadrant.	California Poppy
	500-599	Does not serve LACBD.	California Poppy
	788	Does not serve LACBD.	California Poppy
Shuttles	601-649	Generally circuitous routing within the service area.	California Poppy
	650-659	Generally scheduled service operating point-to-point.	California Poppy
	660-699	Generally serves a rail line within the service area.	California Poppy
Rapid Bus	*700-799	Usually operates with an underlying local line.	Red
Metro Liner	901	Orange Line (Right-of-Way)	Silver
	910/950	Silver Line (Express Lanes)	Silver

*Express Line 788 is an exception to the Rapid Bus route numbering identification.

Operating different size buses and using various color schemes has a direct impact on bus operations. The rationale for branding buses for different service types is aimed directly at our customer. The color designation visually differentiates local from rapid services in particular. The impacts on operations are: (1) color differentiation limits interline opportunities impeding Metro’s ability to maximize operational efficiencies; (2) it increases operational costs, and (3) increases fleet requirements. Conversion of lines from standard size coaches (forty-foot operation to a longer higher capacity bus) requires lengthening stop zones/layover zones to accommodate the longer bus. Finally, service is scheduled in accordance with Metro’s policy load ratio. Substituting a higher capacity bus with a lower capacity bus on lines scheduled for higher capacity buses may cause overloads.

1.4 PROGRAMMED TRANSIT PROJECTS

Metro has a number of programmed transit projects that when completed and implemented will provide greater mobility, better access, and faster services improving transit service for current customers and attract new riders.

Rail Projects

Metro has a number of rail projects planned to be completed or undergoing construction during the life of this plan as indicated below. Figure 1.8 illustrates Metro’s projected rail network when completed as well as its Metro Liner services.

- Crenshaw Line (FY 2020)
- Regional Connector (FY 2021)
- Westside Subway Extension – Phase 1 (FY 2024)



Figure 1.8 Metro Rail Projected Concept Map

The Service Planning & Scheduling Department develops a detailed bus/rail interface plan one year prior to the implementation of a new rail line or the implementation of a new segment extension of an existing rail line. Per Metro’s Transit Service Policy Metro will restructure its underlying bus grid system to maximize bus/rail connections, optimize transfer opportunities, improve access to rail stations, take advantage of new transfer facilities, and reduce bus and rail service duplication by implementing a number of changes:

- Discontinuing competing limited stop and express service where duplication exists.
- Diverting parallel and intersecting bus lines to serve a rail station.
- Extend terminating bus lines by anchoring it to a rail station when feasible.

- Develop new bus feeder routes if a need is demonstrated.
- Develop coordinating bus and rail schedules to maximize bus/rail connections.

Crenshaw / LAX Light Rail (FY 2020)

The Crenshaw Line is an 8.5-mile light rail line providing service to Crenshaw District, Inglewood, Westchester, and other surrounding areas (Figure 1.9). This project will add eight new stations improving access and regional mobility linking the Green Line and Expo Line and major connections with the Los Angeles International Airport (LAX) as well as the countywide bus network.



Figure 1.9 Crenshaw/LAX Light Rail

New Stations

- Expo/Crenshaw
- Crenshaw/Martin Luther King
- Crenshaw/Vernon (Leimert Park)
- Crenshaw/Slauson
- Florence/West
- Florence/La Brea
- Florence/Hindry
- ***Aviation/96th**
- Aviation/Century

The ***Aviation/96th Station** is an additional station added onto the project by the Metro’s Board on May 28, 2015. It will connect to the planned LAX People Mover and

will also house the new Regional Bus Transit Center replacing the existing one at 96th/Sepulveda. The project is expected to be completed in FY 24. Officially, this is known as the Airport Metro Connector Project.

Several rail scheduling scenarios are being discussed. Current plans call for the Crenshaw Line to operate south of the Aviation/Century Station to provide service to the following Green Line Stations:

- Mariposa
- El Segundo
- Douglas
- Redondo Beach

Every other Green Line trip will be scheduled to terminate at the Redondo Beach Station (current route of the line) and every other trip will be scheduled to terminate at the Aviation/Century Station.

The Crenshaw Line will closely parallel the existing route of Line 740. Initial proposals are to cancel Rapid Line 740 and adjust service levels on Local Line 40 accordingly. A comprehensive bus/rail interface plan will be developed, in accordance with Metro's Transit Service policy and finalized within a one-year time period prior to its implementation. This plan will include restructuring the underlying bus grid system to maximize bus/rail connections and optimize transfer opportunities. The impact to RSH and equipment requirements will be determined at a later date.

Regional Connector Transit Corridor Project (FY 2021)

The Metro Regional Connector Project is a 1.9-mile underground light-rail system connecting the Metro Gold Line to the 7th Street/Metro Center Station. Once completed the Blue Line, Expo Line, and Gold Line operations will be reconfigured from a 3-line operation to a 2-line regional operation (Figure 1.10).



Figure 1.10 Reconfigured Rail Operations

Three new underground stations will be added in downtown Los Angeles: 1st Street/Central Ave., 2nd Street/Broadway, and 2nd Place/Hope St. (Figure 1.11):

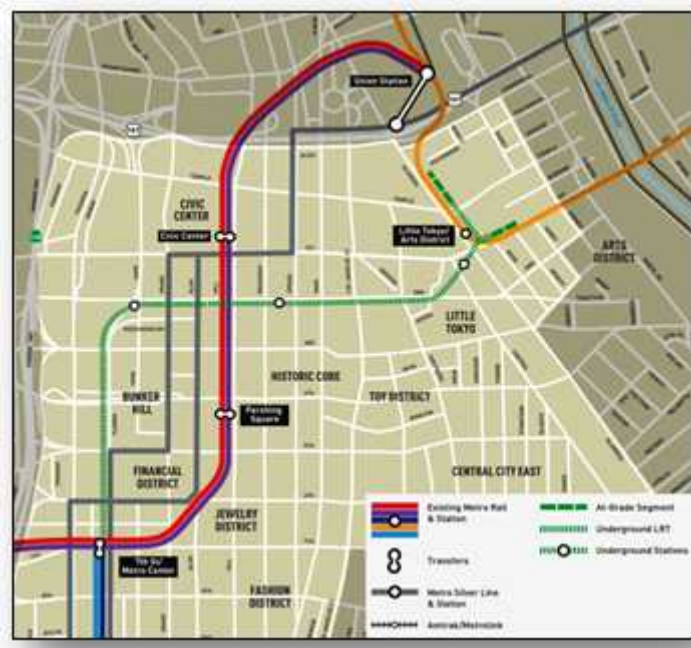


Figure 1.11 Regional Connector Transit Corridor Project

The Regional Connector will improve access to both local and regional destinations by providing continuous thru service between these lines and providing major connectors to other bus and rail lines via the 7th St/Metro Center Station.

Downtown Los Angeles is one of the largest destinations in the County. In addition to serving major activity centers the majority of bus lines operating in Downtown either directly serve or operate within close proximity of a downtown rail station making the bus to rail transfers already convenient. Therefore, Downtown bus operations will not be restructured as a result of this project.

Westside Subway Extension – Purple Line

Metro is one step closer to extending the Purple Line to the Westside. On October 28, 2010, the Metro Board of Directors approved the Draft Environmental Impact Statement/Environmental Impact Report (Draft EIS/EIR) and selected the Locally Preferred Alternative (LPA) for the Westside Subway Extension Metro has plans to extend its Purple Line 9-miles west of Downtown Los Angeles to Westwood (Figure 1.12). The construction for Phase I have already begun.



Figure 1.12 Purple Line Westside Subway Extensions

The Purple Line Westside Subway Extension will provide a high-capacity, high-speed, dependable alternative for riders who currently use Local Line 20 and Rapid Line 720 along Wilshire Blvd. from Downtown Los Angeles to Santa Monica. This extension will make key destination stops such as Miracle Mile, Beverly Hills, Century City, and Westwood/VA near the UCLA campus. Over 300,000 people travel into the Westside every day for work from areas throughout the County.

Based on funding currently dedicated to the project, in the adopted Long Range Transportation Plan for Los Angeles County, the project is being done in three phases:

- *Phase 1* (FY 2024): 3 new stations at Wilshire/La Brea, Wilshire/Fairfax & Wilshire/La Cienega
- *Phase 2* (FY 2026): 2 new stations at Wilshire/Rodeo & Century City
- *Phase 3* (FY 2036): 2 new stations at Westwood/UCLA & Westwood VA Hospital

The Purple Line extension to Westwood provides an opportunity to restructure bus service along the Wilshire Blvd. corridor and the Whittier Blvd. corridor. A comprehensive bus/rail interface plan will be developed, in accordance with Metro’s Transit Service policy and finalized within a one-year time period prior to its implementation. This plan will include restructuring the underlying bus grid system to maximize bus/rail connections, optimize transfer opportunities, and identifying impacts to RSH and equipment. Table 1.4 is a summary list of proposed bus line change considerations.

Table 1.4

Purple Line Westside Extension: Bus/Rail Interface Plan Considerations

Line	Current Route	Under consideration
18	Montebello Metrolink Station to Downtown LA via Whittier Blvd.	<ol style="list-style-type: none"> 1. Continue operating route with 40-foot buses. 2. Consider implementing a NEW Limited 318 route to replace canceled Rapid Line 720 if the decision is made not to implement a new Rapid Line 718. 3. Adjust service levels as required.
20	Downtown LA to Westwood via Wilshire Blvd. Late Night/Owl trips operate to Santa Monica when Line 720 is not in operation.)	<ol style="list-style-type: none"> 1. Consider 60-foot CNG bus operations when Line 720 is canceled (currently operates 40-foot buses). 2. Consider operating to Santa Monica all day. 3. Adjust service levels as required.
718	NEW	<ol style="list-style-type: none"> 1. Consider implementing new Rapid Line 718 to operate along Whittier Blvd. to replace canceled Rapid Line 720. 2. Consider 45-foot CNG bus operations.
720	Operates from the City of Commerce to Downtown LA via Whittier Blvd. and then from Downtown LA to Santa Monica via Wilshire Blvd.	<ol style="list-style-type: none"> 1. Upon completion of Phase 1, Purple Line Extension discontinues service on the Whittier Segment and operate from the new West Terminal of the Purple Line. 2. Upon completion of Phase 2 Purple Line Extension operate from the new West Terminal of the Purple Line. 3. Upon completion of Phase 3 Purple Line Extension CANCEL Rapid Line 720.
Other Local Lines	North/South Intersecting Routes	<ol style="list-style-type: none"> 1. Reroute or restructure bus lines as needed.

Note: Impact to RSH and equipment requirements to be determined at a later date.

New Rail Divisions

In FY 2020 Metro will commission a new light rail division for the Crenshaw Line.

Crenshaw Line Division (Division 16): In FY 2020 Metro will commission a new rail division to support the opening of the Crenshaw Line. New *Division 16* is located adjacent to Los Angeles International Airport (LAX). This division will provide vehicle storage, inspection, cleaning, light and some heavy repair functions and have the storage capacity to support no less than 70 vehicles.

Patsaouras Plaza Busway Station (FY 2018)

For some time now the entrance and exit to the El Monte Busway Express Lanes at the Union Station have been in need of reconfiguration that would allow for the most efficient ingress and egress of pedestrians, buses, and automobiles. Currently, the passengers boarding/alighting areas are not located contiguous with Union Station, but rather are situated at the corner of Alameda St. and the busway entrance located more than a 1/4-mile distance from the Patsaouras Transit Plaza.

There is no direct pedestrian connection to Union Station currently and there are no passenger amenities such as lighting, Closed Circuit Television (CCTV), information displays, or landscaping. This issue became acuter with the implementation of the Silver Line whose ridership has increased by more than 40% since opening in December 2010. Passengers are forced to walk a 1/4-mile to make transit connections with the Gold Line, Red/Purple Lines, Metrolink, Amtrak, and a number of bus lines located on the Patsaouras Transit Plaza.

To resolve these issues and provide a more user-friendly passenger experience, a number of potential configurations were evaluated. The preferred configuration is to relocate the existing passenger boarding/alighting areas to the southeast side of Union Station and Patsaouras Plaza (Figure 1.13). By providing a more convenient connection between the Silver Line, other bus lines, and rail with reduced pedestrian walking distance to encourage mode shift to regional and local bus and rail services.

In addition, this new configuration will also improve the overall operational efficiency of Patsaouras Transit Plaza. The visible changes that would result from the proposed project include the proposed station platform with the addition of benches, shelters, light posts, directory stands, elevators, and stairs connecting the busway station to Union Station and Patsaouras Transit Plaza. These proposed changes would be consistent with surrounding land uses, which are primarily designated for transportation uses.



Figure 1.13 Patsaouras Plaza Busway Station

In an effort to provide funding for the project, the staff has vigorously pursued various options to fund this important and much-needed project. As part of this effort, in October 2011, PPBS was awarded a Sustainable and Livable Communities Grant from the FTA in the amount of \$9,679,000. Originally the total cost of this project was projected at just under \$17M and was scheduled to be opened in FY 2014. For a number of reasons, this project was delayed. But now the project is back on track and construction is expected to begin in Spring 2016. Total projected cost of the project is \$39.7 M and this new station is expected to open in FY 2018.

1.5 TRANSIT ACCESS PASS (TAP)

In April 2008, Metro introduced a new Transit Access Pass (TAP), which is a part of the Universal Fare System (UFS). UFS is a regional effort to integrate transit fares in order to continue efforts for seamless travel and connectivity with other regional transit agencies ease of use and convenience for our customers. The fare medium is a wallet-sized Smart Card (TAP) embedded with a computer chip, which can be programmed to store cash for use on public transit or other goods and services through partnerships with entities near bus and rail stations (e.g., schools, parking lots, retailers). Some of the advantages of this technology are as follows:

- Enables single card access to all LA County participants.
- Grants regional transfers automatically.
- Provides 24-hour regional customer service.
- Incorporates convenient features like balance protection and auto load.
- Harnesses data for countywide service planning, marketing and accounting.

The UFS electronic technology eliminates the need for cash, passes and tokens on Metro buses, participating Municipal buses and Metro Rail. By simplifying the fare collection process, the goal is to reduce dwell time by boarding passengers more quickly, which will result in faster and more efficient service.

In FY 2015, the TAP regional smart card system was completed by adding its twenty-sixth transit operator, ensuring regional connectivity and ease of travel across multiple transit agencies. Innovations were also added, such as new ticket vending machine (TVM) screen-flows that simplify and enhance the TAP customer experience. For FY 2016, mobile phone application planning is underway that will allow users to manage their TAP accounts, register cards, enjoy payment options and purchase a variety of fare products – all from their mobile device. A new state-of-the-art website and new customer relationship management system will also be introduced in FY 2016.

1.6 ADVANCED TRANSPORTATION MANAGEMENT SYSTEM (ATMS)

Installed on Metro's entire bus fleet is the Advanced Transportation Management System (ATMS). Known in the industry as "Smart Bus" technology, ATMS is a high-tech system composed of hardware and software communication and fleet management tools. The ATMS connects every bus in the Metro fleet to an array of radio antenna sites throughout the Metro service area and, in turn, is inter-connected through a Vehicle Area Network (VAN) that links all the various ATMS components together.

- Transit Radio System (TRS) uses three types of radios: data, which is used to transmit real-time fleet management and text-based radio messages; voice, used for all spoken communications; and Wide Area Network (WAN), which is utilized to transfer data files and system updates.
- Computer Aided Dispatch (CAD) is the array of highly advanced hardware and transit-specific software that make the TRS a powerful multi-featured communication and management tool.
- Automatic Vehicle Locator (AVL) system uses the latest in Global Positioning Satellite (GPS) technology to track the routing and immediate location of every ATMS-equipped bus in its fleet.
- Automatic Passenger Counter (APC) is used to quantitatively monitor passenger use of Metro's bus network and provide the agency with a critical component of the information needed to enhance and improve its bus services. Sensors

mounted in bus doorways count passengers boarding and exiting at the same time the corresponding information on bus stop location and time is acquired from the AVL system. At the end of every day, the WAN is used to transfer the accumulated data from each bus to Metro's central computer system for processing and reporting.

- Voice Annunciation System (VAS) is a part of Phase II and soon to be implemented, is designed to provide "Next Bus Stop" announcements for all Metro Bus passengers. This capability is fully ADA-compliant and utilizes both audio (public address system) and visual (electronic message sign) technologies to communicate information to Metro bus riders. The AVA system uses information from the AVL system and the AVA database to determine the appropriate wording and timing of both audio and visual announcements.
- Video Surveillance System (VSS) is also part of the Phase II implementation. The VSS utilizes video camera technology on Metro buses to enhance the safety and well-being of both passengers and Metro employees.

In the very near future ATMS will be transitioning to the next-gen system improving its functionality that will allow dynamic scheduling and provide mobile tools for Metro Operations and customers alike. In addition, the next-gen fare collection system will include real-time payment balancing and possibly mobile payment, etc.

2.0 VEHICLE TECHNOLOGY

Vehicle Technology (VT) provides ongoing support to Metro Maintenance through the bus specification and procurement process. VT is responsible for the inspection, acceptance, and introduction of new buses. These buses are highly diversified, ranging from 40', 45' and 60' articulated buses. These buses are on the "cutting edge" of technology, operating exclusively on compressed natural gas (CNG). With VT's leadership, Metro has become an industry leader in the operation and maintenance of CNG-powered vehicles.

2.1 ARTICULATED BUS NEEDS

Metro first introduced 60-foot articulated CNG buses on Metro's BRT Orange (Line 901), serving the San Fernando Valley on an east-west corridor, in October 2005. Subsequently Metro continued to deploy articulated buses on bus lines that operate on some of the most heavily traveled corridors. Metro procured a total of 391 articulated buses. The first 200 will be eligible for retirement beginning in FY 2017.

Recently, Metro reevaluated the eleven corridors served by articulated buses to determine if these corridors warrant articulated bus operations. Metro's analysis determined that five of the eleven corridors warrant articulated bus service (Table 2.1). In addition, Metro's analysis determined Metro's Silver Line (Line 910), which operates 45-foot CNG buses, would benefit from the use of articulated bus operations especially since Metro is implementing all-door boarding on June 26, 2016.

Recently Metro road tested an articulated bus along the route of the Silver Line. Unfortunately current road conditions on the I-110 Express Lanes are unsafe for the larger sized bus. Metro will work with Caltrans on repaving segments of the I-110 Express Lanes that will support the safe operations of an articulated bus.

Table 2.1

<i>Proposed Articulated Bus Lines</i>	
Lines	Corridor
204	Vermont Blvd.
720	Wilshire / Whittier Blvd.
733	Venice Blvd.
754	Vermont Blvd.
901	Orange Line Right-of-Way (San Fernando Valley)
910	Silver Line (I-10 & I-110 Freeway Express Lanes)

Due to a reduction in corridors warranting articulated bus operation, Metro estimates that only 260 of the existing 391 articulated buses need to be replaced when they are retired. These new articulated buses are projected to be procured between FY 2018

and FY 2020 upon Metro Board approval.

2.2 CONTRACT SERVICE DIESEL BUSES

Prior to 1995, Metro primarily operated diesel buses. In an effort to reduce vehicle emissions, Metro made a decision to convert its diesel fleet to that all future bus procurements would replace diesel buses as these buses were retired. Today 100% of Metro’s directly operated active bus fleet is powered by compressed natural gas (CNG).

Presently Metro’s contract operators operate 66 diesel buses that are over 20 years old. In light of Metro’s goal to reduce vehicle emissions as well as more stringent federal and state regulatory measures there is a need to replace these buses with cleaner fuel burning buses such as CNG.

2.3 GENERAL FLEET STATISTICS

As of June 2016, Metro total fleet size is 2,679 buses. The total number of buses are comprised of both the **active fleet** (buses housed in each bus division and operated in-service) and the **inactive fleet** (buses not housed at a division and not operated in-service) as indicated in Table 2.2. Metro directly operated fleet is comprised of CNG 40-foot, 45-foot, and 60-foot buses. Metro’s contract services fleet is comprised 32-foot and 40-foot buses (Mix of Diesel & CNG buses). As of June 2016, Metro’s average active fleet age is 6.1 years.

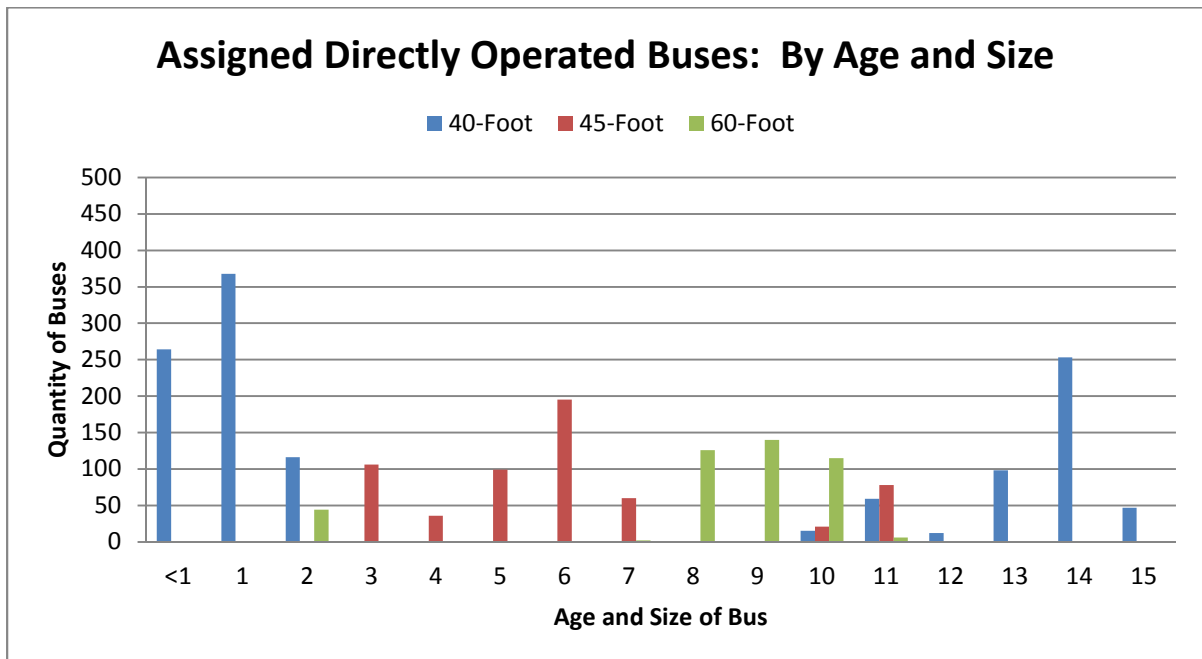


Figure 2.1 Directly Operated Bus Fleet: Buses by Age and Bus size

Table 2.2

Metro Bus Assignments as of June 2016

Category	Alt. Fuel (CNG)	Diesel	Total
<i>Directly Operated (DO)</i>			
Total Scheduled Peak Service	1,800	0	1,800
Spares - Peak Scheduled	319	0	319
Total DO Assigned	2,119	0	2,119
<i>Contract Operated (PT)</i>			
Total Scheduled Peak Service	80	56	136
Spares - Peak Scheduled	39	10	49
Total PT Assigned	119	66	185
<i>Active Fleet Assigned</i>			
Total Scheduled Peak Service	1,880	56	1,936
Spares - Peak Scheduled	358	10	368
Total Active Assigned	2,238	66	2,304
<i>Inactive Fleet</i>			
Museum	0	2	2
Body	9	0	9
Pending Evaluation	25	0	25
Accident	3	0	3
Legal Hold	7	0	7
Engine	14	0	14
Fire	1	0	1
Flooring	2	0	2
Retank	151	0	151
Mid-Life	33	0	33
Paint	16	0	16
Training Buses	37	0	37
Not Yet Assigned	10	*6	16
Approved For Sale	59	0	59
Total Inactive	367	8	375
Total Fleet	2,605	74	2,679

*42-foot hybrid electric/diesel buses, which are programmed to be converted to all electric.

Note: In addition to the regularly scheduled peak bus service Metro operates additional peak buses for long-term transit projects lasting greater than 30 days. These additional peak buses are not reflected in Metro's 4-12 Report above. Metro is currently operating up to 22 additional PM peak buses on the Dodger Stadium Express (**funded through a grant provided by the Mobile Source Review Committee**) on game days only and 18 additional peak buses to operate a bus bridge on the Blue Line due to a rehabilitation rail construction project.

2.4 SPARE RATIO

Spares are the quantity of active fleet buses above and beyond the maximum required number of peak period pull-out buses required. The spare ratio is defined as the number of spare vehicles divided by the maximum number of buses required in-service (excludes occasional special events). The spare ratio is expressed as a percentage (e.g. 100 vehicles required and 20 spare vehicles is a 20 percent spare ratio). The Federal Transit Administration (FTA) allows a maximum spare ratio of 20% for agencies that operate 50 or more revenue vehicles.

Maintaining a proper number of spare buses allows for maintenance activities to be performed (e.g. preventative maintenance or when a bus breaks down in-service, etc.) and ensures the maximum number of buses required in revenue service are operating as scheduled. Metro maintains an average spare ratio of 18.9% at its operating bus divisions.

Metro Orange Line operates higher capacity buses and average 25% more miles per year than the overall fleet average and, as a result, requires additional maintenance time. In addition, due to off-board fare collection Metro's Orange Line (BRT) buses operate without fare boxes making them ineligible for use in the normal street running environment. As a result, Metro maintains a dedicated 30% spare ratio on its Orange Line.

Similar to the Orange Line, on a sub-fleet basis, Metro is in the process of determining whether or not to dedicate a higher than 20% spare on other lines that operate on fixed guideways and dedicated right of ways (e.g. Silver and Rapid Line 720) to meet additional maintenance requirements and increased demands.

2.5 CONTINGENCY FLEET

This section is strictly informational. Metro does not currently maintain a contingency fleet. In the event Metro creates one it will follow FTA guidelines. Buses may be placed in an inactive contingency fleet in preparation for emergencies. No bus may be stockpiled before the vehicle has reached the end of its minimum life requirement. 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. 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.

2.6 FUTURE BUS PROCUREMENT CONSIDERATIONS

There are a number of considerations that the Vehicle Technology Department considers when developing a bus procurement plan:

- Bus Replacement Cycle (Retire Eligible)
- Rebuild Program
- CNG Tank Expiration Dates (CNG Tank Replacement vs. New Bus Procurement)
- Corporate Initiatives (e.g. Fleet Mix)
- California Air Resources Board (CARB) regulations (Alternative Fuel & ZEV requirements)
- Projected Service Requirements (e.g. Reductions vs. Expansion)
- Funding Availability for Bus Replacement

Bus Replacement Cycle

In 1985, the Federal Transit Administration established its minimum life requirements that must be met before a bus can be considered retire eligible. The minimum life for heavy duty buses is 12 years or 500,000 miles (whichever comes first). As of June 2015 Metro operates 575 retire eligible buses in its active fleet.

Rebuild Program

In lieu of retiring a bus Metro's rebuild program is designed to extend a bus's useful life. A bus is eligible for rebuild near the end of its useful life and must be in need of major structural and/or mechanical rebuilding. Once performed the minimum extension of useful life is four years.

CNG Tank Expiration Dates

Metro is operating CNG buses constructed with CNG tanks certified with a maximum life of either 15 years or 20 years. It is not legal to continue operating CNG buses beyond the expiration of their CNG tank certification. Buses with expired CNG fuel tanks must be removed from the active fleet. Metro must make a business decision to either replace the expired CNG tank or procure a replacement bus. Current bus fleet replacement plans are constrained to fit within funding levels currently programmed in Metro's budget and financial plans. Metro will be taking steps in FY 2016 –FY 2017 to replace CNG fuel tanks on some of the fleet's older buses to ensure that current service levels can be maintained.

Corporate Initiatives

The Metro Board of Directors will consider staff recommendations on bus procurements based on a number of considerations (e.g. programmed services, service requirements, corporate goals, etc.). For example:

- In June 2000, Metro began implementing its Metro Rapid Program, which included unique vehicle branding. These buses were procured with a different color scheme (Red & White) to differentiate it from its other bus services (California Poppy Color).
- Prior to FY 2005, Metro primarily operated 40-foot buses. In FY 2005, Metro introduced higher capacity buses (45-foot and 60-foot articulated buses) in an effort to provide the same level of service (based on the number of peak seats) with fewer resources resulting in increased productivity.

California Air Resources Board (CARB) regulations

On December 12, 2008, the California Air Resources Board approved the Truck and Bus regulation to significantly reduce particulate matter, or PM, and oxides of nitrogen emissions from existing diesel vehicles operating in California. The regulation applies to nearly all privately and federally owned diesel fueled trucks and buses as well as privately and publicly owned school buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. The regulation requires diesel trucks and buses that operate in California to be upgraded to reduce emissions. Newer heavier trucks and buses must meet PM filter requirements beginning January 1, 2012. By January 1, 2023, nearly all trucks and buses will need to have 2010 model year engines or equivalent (Table 2.3).

Table 2.3

2010 Engine Model Year Schedule

Engine Model Year	Requirements for Heavier Trucks from January 1
Pre-1994	No requirements until 2015, then 2010 engine
1994-1995	No requirements until 2016, then 2010 engine
1996-1999	PM filter from 2012 to 2020, then 2010 engine
2000-2004	PM filter from 2013 to 2021, then 2010 engine
2005-2006	PM filter from 2014 to 2022, then 2010 engine
*2007-2009	No requirements until 2023, then 2010 engine
*2010	Meets final requirement

* Must have PM filter by January 1, 2014, if not originally equipped.

Projected Service Requirements

Another consideration is to determine the appropriate bus fleet size based on ridership projections and current capacity. Presently, bus boardings account for approximately 75% of all total boardings and rail 25%. Over the next 10-years, as described in Section 1, Metro will have significantly expanded its rail system. As a result, Metro’s forecasted cumulative combined annual rail boardings are expected to increase 42.8% and will account for 30% of all total boardings by FY 2025. While the percentage growth in rail boardings is significant bus boardings are forecasted to increase 5.1% by FY 2025. Overall, bus and rail combined, boardings are expected to increase 14.2% by FY 2025 (Table 2.4).

Although bus boardings will experience a cumulative 5.1% increase by FY 2025, Metro has determined that its current bus fleet has sufficient capacity to absorb this growth. Therefore, Metro projects that RSH and the active bus fleet will remain relatively constant over the next ten years as indicated in Table 2.4. Any RSH savings generated through restructured bus service will be reinvested onto selected bus lines to enhance service (e.g. reallocate resources from less productive lines to more productive bus lines) or in the development of new bus services (e.g. BRTs).

Table 2.4

Annual Boarding forecast (Millions)

	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	%
BUS	359.3	361.1	362.9	364.7	366.5	368.3	370.2	372.0	373.9	375.8	377.6	5.1%
RAIL	114.1	125.0	128.5	130.5	134.4	143.1	144.7	156.2	157.6	159.0	162.9	42.8%
TOTAL	473.4	486.1	491.4	495.2	500.9	511.4	514.9	528.2	531.5	534.8	540.5	14.2%

Funding Availability for Bus Replacement

As buses near their minimum life requirement and as CNG tanks near their expiration date Metro must make one of two budgetary decisions, which is based on funding availability:

- Procure New Buses vs. Rebuild Existing Buses to Extend Useful Life
- Procure New Buses vs. Replace Expiring CNG Tanks

Developing a bus procurement plan ensures a smooth transition from aging vehicles to new technologies and improved performance. Development of a fleet replacement plan allows a procurement process to be initiated and repeated in a timely fashion to meet either expansion of the fleet/services or matching the schedule of retiring existing buses.

2.7 ZERO EMISSION BUSES

The critical role of zero-emission buses is acknowledged in Governor Brown’s 2013 ZEV Action Plan. California requires the introduction of zero emission technology vehicles, including fuel cell electric buses, in order to meet its air quality improvement and emissions reduction goals. There have been significant technological advances in the performance, reliability and durability of zero emission buses and these buses are expected to be suitable for regular review service in the future.

Electric Bus Testing

In December 2014, Metro tested a BYD 60-foot articulated electric vehicle for a one week test on the Metro Orange Line. The overall performance of the vehicle was impressive and the bus was positively received by the operators, maintenance personnel, and passengers. Vehicle performance performed well particularly in areas of acceleration and top speed. In addition, the bus provided a smooth and quiet ride.

In June 2015, Metro put into service five new BYD 40-foot electric buses that were assigned to Metro’s Division 1 in Downtown Los Angeles. These buses failed to meet Metro’s operational requirements and service reliability. Subsequently, BYD has offered to buy back these vehicles and replace them with newer 60-foot articulated vehicles similar to the one tested on the Metro Orange Line. The 5 BYD 40-foot buses were removed from service in April 2016 pending negotiations for the newer 60-foot articulated buses. Metro plans to operate these 60-foot articulated buses on its Orange Line.

In April 2016, Metro was notified of a Federal Low/No Grant award to procure five New Flyer 60-foot battery electric buses and en-route charging systems to be installed on the Metro Orange Line. Metro and New Flyer are negotiating a contract for the installation of the charging infrastructure and delivery these buses in 2018.

In April 2016, the Metro Board passed a motion directing staff to develop an outline for a comprehensive plan to further reduce greenhouse gas emissions by gradually transitioning to a zero-emission bus fleet. This action is in addition to previous direction to include zero-emission buses to openly compete in future bus procurements.

The electric bus purchase is part of Metro’s continuing quest for greener, more sustainable operation methods.

2.8 BUS PROCUREMENT SCHEDULE

As stated earlier there are no plans to expand the fleet size. Future bus procurements can replace retirement eligible buses. In January 2013, Metro Board of Directors approved the procurement of up to 900 CNG 40-foot replacement buses. The base order of 550 buses started delivery in Fall 2013 and all 550 buses were delivered by June 30, 2015. An option for 350 additional 40-foot CNG buses was exercised in February 2015 with delivery beginning in the first part of FY 2016.

Metro first introduced 60-foot articulated CNG buses in FY 2005. Metro’s 60-foot articulated bus fleet are operated in heavily traveled corridors and will be retirement eligible beginning in FY 2017. Between FY 2018 and FY 2021, Metro will begin the process of replacing its aging articulated bus fleet by procuring 260 60-foot articulated CNG buses (Table 2.5).

Ten-Year Bus Fleet Management Plan (FY 2017 – FY 2026)

REVENUE SERVICE HOURS (RSH)	FY16 BASE YEAR	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26
Directly Operated (DO) RSH	6,327,663	6,248,575	6,248,575	6,248,575	6,248,575	6,248,575	6,248,575	6,248,575	6,248,575	6,248,575	6,248,575
Purchased Transportation (PT) Operated RSH	519,176	511,501	511,501	511,501	511,501	511,501	511,501	511,501	511,501	511,501	511,501
Orange Line RSH	130,516	130,516	130,516	130,516	130,516	130,516	130,516	130,516	130,516	130,516	130,516
Silver Line RSH	84,380	115,368	115,368	115,368	115,368	115,368	115,368	115,368	115,368	115,368	115,368
Total RSH	7,061,735	7,005,960	7,005,960	7,005,960	7,005,960	7,005,960	7,005,960	7,005,960	7,005,960	7,005,960	7,005,960
RSH ADJUSTMENTS											
December 2015 & June 2016 Service Changes		(55,775)									
Crenshaw/LAX Light Rail (FY 2020)						TBD					
Regional Rail Connector (FY 2021)							0				
Westside Subway Extension Phase 1 (FY 2023)									TBD		
Total RSH Adjustment	0	0	0	0	0	0	0	0	0	0	0
PEAK BUSES											
40' (40 seats)	1,018	980	1,030	1,068	1,068	1,068	1,068	1,068	1,068	1,068	1,068
45' (46 seats)	519	515	515	515	515	515	515	515	515	515	515
60' (57 seats)	292	305	255	217	217	217	217	217	217	217	217
Total Directly Operated Buses	1,829	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
*Contract Operated Buses	140	136	136	136	136	136	136	136	136	136	136
Total Peak Buses	1,969	1,936	1,936	1,936	1,936	1,936	1,936	1,936	1,936	1,936	1,936
BUS SPARES (20%)											
Directly Operated											
40'	204	196	206	214	214	214	214	214	214	214	214
45'	104	103	103	103	103	103	103	103	103	103	103
60'	58	61	51	43	43	43	43	43	43	43	43
Total DO Spares	366	360	360	360	360	360	360	360	360	360	360
Contract Operated Spares	36	49	49	49	49	49	49	49	49	49	49
Total Spares	402	409	409	409	409	409	409	409	409	409	409
Total Active Fleet	2,371	2,345	2,345	2,345	2,345	2,345	2,345	2,345	2,345	2,345	2,345
SCHEDULED PEAK SEATS											
	85,872	84,777	83,927	83,281	83,281	83,281	83,281	83,281	83,281	83,281	83,281
BUS PROCUREMENT SCHEDULE											
Quantity											
40' CNG	175	175	150	150	50	100	200				
60' CNG			50	50	100	60					
Total	175	175	200	200	150	160	200				
Costs (\$Millions)											
40' CNG	\$109.2	\$109.2	\$86.3	\$86.3	\$29.5	\$60.4	\$123.9				
60' CNG			\$45.0	\$45.0	\$92.3	\$56.7					
Total	\$109.2	\$109.2	\$131.3	\$131.3	\$121.8	\$117.1	\$123.9				
AVERAGE AGE OF ACTIVE FLEET											
	6.1	6.2	6.3	6.4	5.8	5.7	5.7				

Note: Planned bus procurements beyond FY 2022 have yet to be determined

3.0 FLEET MANAGEMENT

Fleet Management (FM) is responsible for the assignment of buses to Metro's operating bus divisions based on the scheduling needs of bus lines operating out of each division. In this effort, FM works with the Planning and Scheduling Department twice a year to execute bi-annual service changes reassigning equipment as required. Following each bi-annual shakeup, FM continues to move and reallocate buses “as needed” to assure service. Fleet Management also coordinates with the CMF and all bus operating divisions to ensure the relocation of vehicles for various mid-life and/or refurbishment projects.

The FM prepares a 4-12 Report (Equipment Assignment) based on the demand schedule set forth in Service Planning & Scheduling Department’s bi-annual Equipment Update Report that identifies bus line assignment and bus type requirements at each operating division. The 4-12 Report directs the operating divisions on bus moves into and out of their respective divisions required to meet the operating schedule.

3.1 FLEET ASSIGNMENT

FM assigns buses to the appropriate divisions, directs the movement of buses between divisions, directs the movement of buses to the Central Maintenance Facility to ensure buses with major mechanical issues or cosmetic defects get repaired, determines to the decommissioning of buses, and reallocates vehicles to assure an adequate number of buses to meet daily “roll out” requirements.

It is a complex task to assign buses given the challenge that Metro operates a variety of services that require the specific use of different size buses and various color schemes. FM must plan for the necessary bus relocations to fully utilize Metro’s limited resources and minimize operating costs. In this effort, FM works to limit the number of bus types to two-to-three bus types per division. This strategy minimizes the number of required parts a bus division maintenance unit must maintain in its inventory.

The FM is also responsible for assigning new buses. When a new bus is delivered, Vehicle Technology inspects the vehicle for potential defects and determines the acceptance or rejection of the equipment. Upon acceptance, the Electronic Communication Technician (ECT) prepares buses for in-service operation. Upon completion, the ECT enters the bus into the Maintenance and Material Management System (M3).

Bus Bridge

In the event of an emergency (i.e. unexpected power outage, accident, etc.) or scheduled single tracking (planned rail repairs, upgrades, etc.) Rail Operations Control (ROC) will coordinate with Bus Operations Control (BOC) to implement a bus bridge and turn-backs. Depending on the location of the emergency the appropriate bus division(s)

will be contacted to supply buses from their spares and extra-board or Voluntary Call Back, (VCB) bus operators to operate the bus bridge. Both Rail Transit Operations Supervisors and Bus Transit Operations Supervisors will be dispatched to coordinate and direct on-street operations. Temporary schedules will be developed for events known ahead of time (i.e. single tracking due to maintenance, special events, etc.).

3.2 ROAD CALLS

Quality Assurance (QA) provides mechanical roadside assistance to buses en-route and at layover zones. The group responsible for this task is known as Field Equipment Technicians (FET). The FET group responds to as many as 2,000 road calls per month. When buses operating in-service breakdown, a FET will attempt to make on-street repairs in an effort to keep the bus in-service rather than pull-out another bus to replace it in-service.

Road calls are tracked and reported annually to the Federal Transit Administration (FTA). Road calls are defined as a bus mechanical failure during revenue service which requires a bus exchange. Certain road calls are excluded from the count to improve the value of the data. Excluded instances are the following:

- Authorized bus change.
- Dirty interior or exterior.
- Passenger caused.
- When another road call is requested for the same problem on the same bus within two hours. For example, a bus stalling @ 14:00 and a bus stalling @ 15:00 would be counted as one road call. However, a bus stalling @ 14:00 and transmission are not shifting @ 15:00 would be counted as two road calls.
- No-response road calls. This is a new category. If a bus has a broken fare box, head sign, bike rack, or camera it is not taken out of service when reported. These types of failures will not put a bus out of service; however the BOCC generates an incident so the problem can be addressed once the bus completes its daily assignment.

Metro measures its performance against its stated system goal of 4,000 or greater Mean Miles Between Mechanical Failures Requiring Bus Exchange (MMBMF). Metro exceeded its system goal in FY 2014, FY 2015, and FY 2016 (Table 3.1).

Table 3.1

D.O. Mean Miles between Mechanical Failures	
Fiscal Year	Systemwide MMBMF
2010	3,222
2011	3,523
2012	3,756
2013	3,827
2014	4,163
2015	4,710
2016	4,808

3.3 MID-LIFE & REBUILD PROGRAMS

Metro prides itself in maintaining a reliable bus fleet that enables all its bus division to make roll-out and operate all bus lines as scheduled. Every bus is monitored. FM and Metro’s maintenance staff consistently reviews and assesses the condition of its bus fleet and develops a plan to ensure all its buses perform to the end of its useful life. Metro’s preventative maintenance program (PMP), normally performed at a division, plays a key role in this effort.

In accordance with MAP-21 and FTA Circular C 5100.1, Bus and Bus Facilities Formula Program: Guidance and Application Instructions, dated May 18, 2015, Metro operates a **Mid-Life Program** and a **Rebuild Program**.

- Metro’s *Mid-Life Program* overhauls buses that have accumulated at least 40% of its useful life and is performed to ensure that bus will perform to the end of its useful life.
- Metro’s *Rebuild Program* is designed to extend a bus’s useful life. A bus is eligible for rebuild near the end of its useful life and must be in need of major structural and/or mechanical rebuilding. Once performed the minimum extension of useful life is four years. This may or may not include replacing expiring CNG Tanks.

4.0 DIVISION MAINTENANCE

Metro owns and operates 11 bus-operating divisions. As discussed in Section 1.5 Metro is building a 12th bus-operating division. Each bus division has a maintenance unit headed by a Maintenance Manager. Collectively all maintenance units are responsible for the upkeep of nearly \$6 billion dollars in facilities, systems, and other equipment used in transit service operation. Each division’s maintenance unit performs routine maintenance, preventive maintenance, running repairs, and minor bus overhauls. All divisions are staffed 24 hours a day seven days a week to ensure buses meet specifications for in-service operation with the exception of Division 6, which is closed after midnight on weekdays, weekends and major holidays. Metro bus-operated divisions are distributed throughout the County as well as other facilities (Figure 4.1).

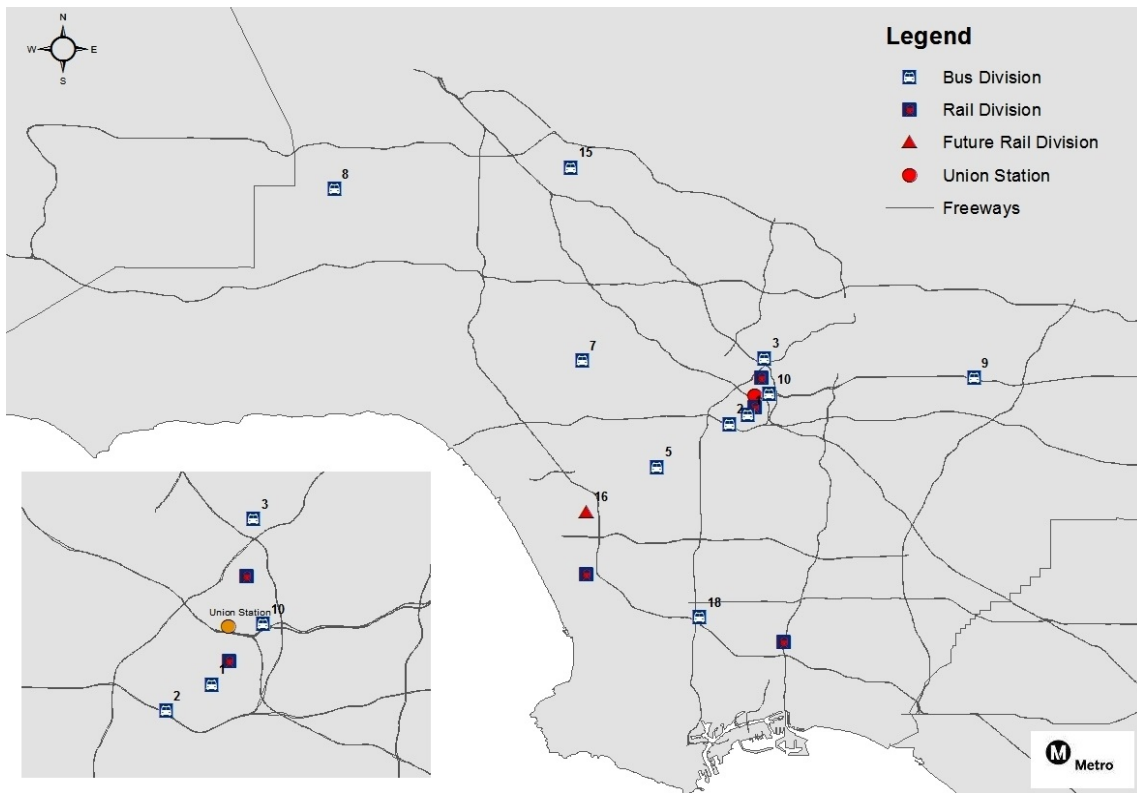


Figure 4.1 Metro Facilities

4.1 MAINTENANCE OPERATIONAL GOALS AND GUIDANCE

Metro has set a number of specific goals for maintenance staff. These goals include maintaining an acceptable level of vehicle life and serviceability, minimizing the number of road failures, and minimizing the cost of the maintenance function through training and improved productivity. Each year Metro staff prepares budgets and Management

Action Plans (MAPs) reflecting, in a measurable way, staff's commitment to performance objectives. The Metro Maintenance Department objectives are to:

- Operate a safe, clean, convenient and efficient mass transportation system for the general public and visitors to the Los Angeles Metropolitan region.
- Develop and maintain an integrated bus and rail system incorporating the strengths of other service providers into the fabric of the Metro system.
- Improve the productivity of the transportation and maintenance staff.
- Protect and enhance the public's investment in the public transportation system.

In order to provide more specific guidance, the maintenance organization has included the following objectives in its MAPs:

- Provide a 100% on-time pullout rate for buses.
- Maintain 4,000 or greater MMBMF.
- Maintain fleet size in accordance with the Board-Adopted Fleet Mix Policy.
- Ensure that all securement devices, doors, radios, and other disabled service items are in good working order at all times.
- Operate and maintain Metro-owned CNG facilities and meet the requirements of the CNG development program.

4.2 REVENUE SERVICE BUS MAINTENANCE PLAN

The Federal Transit Administration (FTA) guidelines require that the grantee (Metro) keep federally funded equipment and facilities in good operating order and that it has a current maintenance plan. This plan is intended to meet the FTA requirements for Rolling Stock as defined in FTA Circular 9030.1E and FTA Circular 5010.1D.

In this effort the Maintenance Department is guided by a Revenue Service Vehicle Maintenance Plan, which was developed to preserve and maintain the agency's capital assets (rolling stock), ensure that all revenue and non-revenue vehicles are operable in a safe and effective condition, and establish reasonable standards and practices necessary to meet these objectives. The Revenue Service Vehicle Maintenance Plan was revised and updated in January 2011 and consists of the following major components.

- Maintenance Plan
- Bus Assignment (Active) and Replacement Plan

- Maintenance Department Organizational Structure
- Bus Procurement/Inspection Policy
- Maintenance Directives
- Preventive Maintenance Program (PMP) Schedule
- Technical Training Courses
- QA Inspection Program
- Bus Warranty Processing Procedures
- Injury and Illness Prevention (IIP) Program
- Personal and Protective Equipment (PPE)

The Revenue Service Vehicle Maintenance Plan is reviewed annually and periodically updated to ensure adequate documentation of current maintenance practices and procedures.

5.0 QUALITY ASSURANCE & MAINTENANCE MONITORING

Quality Assurance (QA) is responsible for the following functions:

- Perform post vehicle inspections on equipment involved in Type 230 (rear-end and Code-2 (passenger injuries requiring transport for medical assistance) accidents.
- Performs vehicle fire investigations, clears vehicle citations and performs simulated California Highway Patrol (CHP) inspections against the North American Out-of-Service Criteria and Title 13 of the California Code of Regulations to determine vehicle conditions.
- Manages goods and services contracts; i.e. revenue tires, bus, and automotive batteries.
- Ensures that the bus operating divisions comply with the DMV Driver License Employer Pull Notice Program and determine if operator logbooks (Operator hours of service) comply with Title 13 of the California Code of Regulations.
- Provides training in the areas of general vehicle and brake and safety inspections as required. Tests new chemical products, bus components and other items that may improve vehicle reliability and cleanliness.
- Responds to complaints from the operating divisions on non-conforming component problems and investigates equipment performance problems. Assists divisions by providing technical support when required.
- Works closely with the CHP Accident Investigation Team when a Metro bus or other Metro vehicle is involved in a major crash. Maintains a working relationship with the CHP Motor Carrier Inspection Team and is present during annual terminal inspections.
- Manages Bus Pest Control contract.

5.1 CHP COMPLIANCE

Quality Assurance also performs ongoing simulated CHP Motor Carrier (bus) Inspections on Metro regulated equipment. Metro has developed more stringent criteria than the CHP for their own quarterly inspections to help ensure compliance. Each facility is inspected for vehicle condition, maintenance records, and driver log books. At the conclusion of each inspection, the facility manager is briefed as to the overall condition of the fleet based on a random sample of the inspected buses.

5.2 QA CONTRACT ADMINISTRATION

QA Contract Administration manages numerous contracts for goods and services and provides contract project management to ensure compliance with related requirements set forth by federal, state and local agencies. Of the 20 contracts managed the two largest are the tire lease contract, with a current annual budget of approximately \$8M and the liquid waste disposal contract amounting to \$700K per year.

5.3 CENTRAL ELECTRONIC MAINTENANCE SHOPS

The Central Electronic Maintenance Shops include Fare Collection, Farebox, Radio, and Headsign Shops as well as Metro's Freeway Service Patrol (FPS). In general these shops are responsible for installing refurbished UFS and radio systems on new buses as well as non-revenue vehicles (i.e. Vehicle Operator, Metro Security, Freeway Service Patrol, CHP, and Field Service Technician Vehicles). In addition, they test new/warranty sub-components of the ATMS radio and processes radio and farebox for warranty. Their Operating Division Technicians (ODT) provides preventative and corrective maintenance support on Metro's total active fleet. Areas of responsibilities are:

- Digital Video Recorder (DVR) with over 1,400 monthly manual downloads.
- Video cameras (average 9 per bus)
- Smart Drive System
- Wireless Router
- On board bus monitors
- Silver Line TAP mobile validators
- Universal Fare System and its subcomponents
- UFS cashboxes, receiver vaults, mobile safes and probing equipment
- ATMS and its subcomponents
- Public Address System
- Driver Control Unit
- Variable Message Sign
- Audible Voice Annunciation
- Automatic Passenger Counter
- Destination signs
- GPS

5.4 ENVIRONMENTAL COMPLIANCE

The Environmental Compliance Section is responsible for the following functions:

- Oversees the proper accumulation and legal disposal of hazardous waste such as used oil, waste antifreeze, waste absorbents, drained used oil filters and waste paint related materials.

- Schedules the servicing of wastewater processing systems that generate hazardous and non-hazardous waste liquid associated with the servicing and maintenance of buses, rail cars, and non-revenue vehicles.
- Oversee the proper accumulation and legal disposal of universal waste such as waste fluorescent light tubes, high-intensity discharge lights, waste light ballasts, waste alkaline batteries, waste aerosol cans and various waste batteries (NiCad, Lithium, and Lead Acid).
- Coordinates the testing of underground storage tank components at Metro facilities as required by the State Water Resources Control Board.
- Coordinates the certification of underground storage tank leak detection monitoring systems as required by the State Water Resources Control Board.
- Schedules the re-verification testing of unleaded fuel dispensing systems in accordance with South Coast Air Quality Management District.
- Responds to hazardous material releases and trauma scene incidents that occur on public highways, Metro rail right-of-ways and Metro vehicles on a 24-hour basis.

5.5 NON-REVENUE EQUIPMENT

Non-Revenue Equipment Section manages the maintenance of non-revenue equipment. This section operates from seventeen locations throughout the greater Los Angeles area and is responsible for the following functions:

- Maintain and service approximately 2,200 different pieces of non-revenue equipment throughout the agency.
- Maintain over 50 emergency generators that support Metro’s telecom repeaters, rail substations, and main facilities.
- Perform all required smog tests.
- Perform all required smoke opacity tests on regulated vehicles,
- Maintains all rail hi-gear equipment.
- Provide non-revenue towing throughout the agency.
- Coordinate and manage the sale of retired vehicles.
- Procure expansion and replacement vehicles.
- Specs new equipment for all MTA departments.

5.6 STOPS & ZONES

Stops & Zones establishes and maintains Over 15,000 bus stops and terminal/layover locations within a 1,433 square mile service area. Efforts are coordinated with the

Metro Clean unit, which manages the court referral work program to deploy adult and juvenile offenders who are eligible for alternative sentencing through community service work. The program accommodates up to 50 adult referrals weekdays and up to 63 adults and 18 juveniles on weekends as part of a character-building component.

– **Stops & Zones Unit:**

- Maintains the bus stop signs that provide line information, such as line number, destinations, and service qualifications of routes.
- Installs and maintains 511 Nextrip plaques or cube inserts with Braille letters for the visually impaired.
- Paints red curbed bus zones for operations safety.
- Participates in local meetings with municipal, business and residential representatives on bus stop-related issues.
- Investigates internal and external complaints concerning bus stop issues, recommends action, and coordinates a response with Customer Relations or requesting party.
- Reviews and advises on proposed municipal street modifications, or internal terminal plans, to ensure plans comply with ADA and Metro operational standards.
- Establish layover locations and negotiate contracts with private businesses to provide restroom facilities for bus operator's use.

– **Metro Clean Unit:**

- Inspects, cleans, and pressure washes bus stops on a daily basis.
- Eliminates debris and blight along segments of Metro's inactive rail right-of-ways and parcel properties.
- Removes trash, debris and any graffiti from Metro buses.
- Provides roving janitorial services to 12 major Metro bus operating terminals and facilities, along with the distribution of supplies to contract restroom sites located throughout the Metro service area.

6.0 FACILITIES MAINTENANCE

Facilities Maintenance develops and delivers quality projects from inception to close-out on time, within scope, and budget. This group is responsible to:

- Manage grants
- Develop project scope of authorized capital projects
- Oversee facility project design
- Manage aspects of engineering and construction projects.
- Review contract documents
- Prepare change notices
- Negotiate change orders
- Ensure operating specifications and requirements are established before making a substantial investment
- Perform all PMP maintenance of facilities
- Provide facilities maintenance support for HVAC, painting, and custodial
- Manages over 40 contracted services

6.1 FACILITIES OVERVIEW

Facilities Maintenance must ensure Metro’s infrastructure continues to support fleet size, fleet type, and new technologies. Included in this responsibility are eleven bus divisions that support and operate an active fleet size of over 2,200 directly operated buses throughout the County of Los Angeles. Table 6.1 identifies where these bus divisions are located, their design parking capacity, and their capabilities.

Table 6.1

Directly Operated Bus Division Profile

Division	Location	Year Built		40-Foot Design Capacity	Service Bays						Bus Lifts			Fuel Capabilities
		Transportation	Maintenance		Maint. Bldg.	Tire Shop	Steam Clean	Fueling Station	Dino Shop	Paint Shop	Maint. Bldg.	Steam Clean	Tire Shop	
1	Central LA (Southwest)	1981	1987	245	16	2	1	3	0	0	12	1	0	CNG
2	Central LA (Southeast)	1987	1930	195	26	1	2	8	0	0	0	0	0	CNG
3	Cypress Park	1984	1977	210	18	1	2	8	1	0	12	0	0	CNG
5	South LA	1979	1984	247	18	2	1	8	1	0	10	1	0	CNG
7	West Hollywood	1977	1977	248	20	2	2	8	1	0	12	0	0	CNG
8	Chatsworth	1982	1982	238	22	2	2	8	1	1	16	1	2	CNG
9	El Monte	1975	1975	235	16	1	2	8	1	0	2	0	0	CNG
10	Central LA (Northeast)	1984	1984	259	18	4	2	4	1	0	12	1	0	CNG
13	Central LA (Northeast)	2015	2015	200	19	1	1	4	0	1	11	1	0	CNG
15	Sun Valley	1982	1982	262	22	2	2	8	1	1	16	1	2	CNG
18	Carson	1984	1984	280	18	2	2	8	0	0	9	1	0	CNG
Total				2619	213	20	19	75	7	3	112	7	4	

In December 2015, Metro retired Division 6 in Venice and opened Division 13 in February 2016. Besides the maintenance divisions, Metro has other facilities located throughout Los Angeles County.

- **Division 4:** Located in the City of Downey, this facility is currently equipped to provide non-revenue vehicle maintenance for Metro automobiles, trucks, and vans. In addition, new vehicles are prepared for service at this facility. This can include the installation of radios, lights, customized racks, equipment, and decals. This facility also houses the auto salvage storage area. Although the facility was formerly a bus maintenance facility, there are currently no fueling or vehicle servicing capabilities.
- **Division 6:** Located in Venice. This former bus division was decommissioned in December 2015. Metro is currently soliciting bids for a joint development project.
- **Division 12:** Located in Long Beach. This division is used to store buses ready for retirement and buses to be sold.
- **Location 29:** The Cash Counting Facility is located at Division 2. Cash and tokens collected through bus and rail revenue operations are counted at this site.
- **Location 30:** CMF is located in the northeast portion of Downtown Los Angeles, one block from Metro headquarters building at Gateway Center. This central maintenance facility is recognized as one of the most advanced and efficient bus repair operations facilities of its kind in the world and contains the following functions:
 - Central Electronics Maintenance Shops
 - Alternate Fuels Testing
 - Bus Painting
 - Heavy Maintenance Bus Support
 - Emissions Testing
 - Body Shop
 - Unit Repair
 - Central Stores

CMF also serves as the primary site for the Transportation and Maintenance Departments' Central Instruction function. All training for new operators, mechanics, and service attendants occur at this facility, as well as refresher training classes for existing operators, mechanics, and service attendants.

- **Location 33:** The San Gabriel Office located at El Monte Station houses Access Services, Sheriff Satellite Station, and Division 9 (Transit Operation).
- **Location 34:** Vernon Yard is located south of Downtown Los Angeles in the City of Vernon. Personnel of the Rail Facilities Maintenance section primarily occupy

this facility. Non-Revenue operates a maintenance shop here in support of MOW and Facilities Maintenance vehicles and equipment. Additionally, the fare box and rail ticket vending machine (TVM) maintenance section is located here.

6.2 DIRECTLY OPERATED BUS DIVISION PARKING CAPACITY

Metro bus operating division’s design capacity is based on the standard 40-foot bus. Because Metro operates different size buses Metro uses a 40-foot equivalency factor to evaluate systemwide storage capacity. For purposes of the parking evaluation, the following factors are used: a 60-foot articulated bus equates to 1.5 40-foot buses and a 45-foot bus equates to 1.125 40-foot buses. Table 6.2 shows Metro’s directly operated bus division parking capacity by its 40-foot equivalence. System wide, Metro is operating at 91% design capacity; however, two bus divisions are operating over design capacity. Divisions operating over design capacity negatively impacts operational flexibility and strains efficient management of bus operations. Current space constraints at these bus operating divisions result in poor circulation of buses and inadequate parking.

Table 6.2

Directly Operated Division Assignments
Effective June 2016

Division	Current 40-Foot Storage Capacity	40'	45'	60'	Actual Number of Buses	40-Foot Bus Equivalence	Capacity Used (Under) / Over	Operating Storage Capacity
1	245	125	34	30	189	208	(37)	85%
2	195	179			179	179	(16)	92%
3	210	75	99		174	186	(24)	89%
5	247	139	8	54	201	229	(18)	93%
7	248	156	62	11	229	242	(6)	98%
8	238	42	118	40	200	235	(3)	99%
9	235	191	39		230	235	(0)	100%
10	259	32	14	33	79	97	(162)	38%
13	200	71	11	89	171	217	17	108%
15	262	80	104	52	236	275	13	105%
18	280	59	111	61	231	275	(5)	98%
Total	2,619	1,149	600	370	2,119	2,379	(240)	91%

60-Foot CNG Articulated Bus Support

Ten out of eleven bus operating divisions support 60-foot articulated bus operations. However, only eight bus divisions operate 60-foot articulated buses. The current configuration of Division 2 does not allow for maintenance and operation of articulated buses. Key features required to support articulated buses at a division are:

- Division reconfiguration to accommodate parking and turning movements
- Maintenance building modifications (drive through bays preferred)
- Extra bus lifts (ground hoists)
- Vacuum, fueling, and washing equipment retrofits
- Extension of maintenance pits where required

Metro’s goal is to support the maintenance ratio of 15 articulated buses per articulated capable bus bay. The current average systemwide ratio is 12 articulated buses per a bus bay; however, this ratio is currently higher at Divisions 8, 13 and 15 as indicated in Table 6.3.

Table 6.3

Articulated Bus Division Assignments
Effective June 2016

Division	60-Foot Buses	60-Foot Maintenance Bays	Avg. Buses Per Maintenance Bay
1	30	2	15
2			
3		1	
5	54	5	11
7	11	1	11
8	40	2	20
9		2	
10	33	6	6
13	89	5	18
15	52	2	26
18	61	4	15
Total	370	30	12

6.3 CAPITAL PROJECT PROGRAMMED LIST

A variety of replacement, rehabilitation, and upgrade capital projects are identified in Metro’s FY 2016 Proposed budget. Table 6.4 is a list of Bus Capital Projects. For a complete comprehensive list refer to Metro’s FY 2016 Proposed budget.

Table 6.4

FY 2017 Proposed Budget: Capital Program Project List (\$ in thousands)

Project Description (\$ in thousands)	Forecasted Expenditures thru FY16	FY17 Proposed	Life of Project	Note
BUS (CAPITAL PROJECTS)				
490 Bauchet Environmental Canopy Structure	-	\$109	\$110	NEW
ADA Equipment Installation	-	\$1,199	\$10,868	NEW
Articulated Bus Replacement	\$197	\$5,311	\$5,507	
Bus Acquisition 550 & 350 40-Foot	\$444,168	\$40,621	\$507,060	
Bus Acquisition 30 Zero Emission/Super Low Emission	\$4,510	\$6,663	\$30,000	
Bus Facilities Lighting Retrofit	\$3,747	\$74	\$4,250	
Bus Facilities Maintenance & Improvement - Phase 3	\$1,425	\$1,970	\$21,650	
Bus Facility Maintenance Improvements & Enhancements Phase 1	\$20,503	\$728	\$21,231	
Bus Facility Maintenance Improvements & Enhancements Phase 2	\$18,675	\$1,254	\$20,896	
Bus Midlife Program	\$10,262	\$19,563	\$68,669	
Central Maintenance Bus Engine Replacement Program	\$3,994	\$5,836	\$24,690	
Central Maintenance Equipment Acquisition	-	\$600	\$3,000	NEW
Central Maintenance Facility Building 5 Vent & Air	\$365	\$211	\$785	
Central Maintenance Shop Engine Replacement Program thru FY14 (Closeout)	\$27,385	-	\$32,112	
Central Maintenance Shop Equipment Replacement	\$2,268	-	\$2,928	
Division 1 Improvements	\$2,933	\$2,260	\$20,866	
Division 3 Master Plan Phases 2-4	\$12,652	\$549	\$13,200	
Division 4 Concrete Pavement	\$125	\$730	\$940	
Division 13 ITS Infrastructure	\$797	\$115	\$974	
Division 13 Tenant Improvement	\$722	\$55	\$784	
DVR Equipment Refurbishment	\$524	\$545	\$3,102	
El Monte Busway Access Road Repair	\$450	\$767	\$1,426	
Emergency Generators for Communications Network	\$294	\$157	\$500	
Facility Equipment & Upgrades	\$2,253	-	\$2,254	
Fuel Storage Tank System Enhancements (FY15 - FY17)	\$3,216	\$2,284	\$6,500	
Metro Art Enhancement	\$503	\$112	\$615	
Metro Silver Line Improvements & Upgrades	\$6,386	\$1,459	\$7,845	
Non-Revenue Vehicles for Bus	\$5,867	-	\$6,923	
Non-Revenue Vehicles & Equipment for Bus (FY17 – FY18)	-	\$1,383	\$4,975	NEW
Patsaouras Bus Plaza Paver Retrofit	\$5,768	\$1,559	\$9,093	
Patsaouras Plaza Bus Station Construction	\$21,929	\$214	\$39,793	
Pavement Repairs at Central Maintenance Facility, Division 7 & 8	\$495	\$1,815	\$4,249	
Replacement 40' Buses	-	\$5,350	\$302,091	NEW
Revenue Collection Equipment Midlife Refurbishment	\$1,521	-	\$1,521	
Sylmar Child Center Rehabilitation	\$967	-	\$987	
Terminals 47 And 48 Corrosion	\$746	\$145	\$965	
TOTAL	\$605,647	\$103,638	\$1,183,358	

APPENDIX 1: METRO SERVICE AREAS - MUNICIPALITIES

Gateway	San Fernando Valley	San Gabriel Valley	Southbay	Westside Central
Avalon	Agoura Hills	Alhambra	Carson	Beverly Hills
Artesia	Burbank	Arcadia	El Segundo	Culver City
Bell	Calabasas	Azusa	Gardena	Los Angeles
Bell Gardens	Glendale	Baldwin Park	Hawthorne	Malibu
Bellflower	Hidden Hills	Bradbury	Hermosa Beach	Santa Monica
Cerritos	La Canada-Flintridge	Claremont	Inglewood	West Hollywood
Commerce	Los Angeles	Covina	Lawndale	
Compton	San Fernando	Diamond Bar	Lomita	
Cudahy	Westlake Village	Duarte	Los Angeles	
Downey		El Monte	Manhattan Beach	
Hawaiian Gardens		Foothill	Palos Verdes Estates	
Huntington Park		Glendora	Ranch Palos Verdes	
Industry		Irwindale	Redondo Beach	
La Habra Heights		La Puente	Rolling Hills	
La Mirada		La Verne	Rolling Hills Estates	
Lakewood		Los Angeles	Torrance	
Long Beach		Monrovia		
Los Angeles		Montebello		
Lynwood		Monterey Park		
Maywood		Pasadena		
Norwalk		Pomona		
Paramount		Rosemead		
Pico Rivera		San Dimas		
Santa Fe Springs		San Gabriel		
Signal Hill		San Marino		
South Gate		Sierra Madre		
Vernon		South El Monte		
Whittier		South Pasadena		
		Temple City		
		Walnut		
		West Covina		

APPENDIX 2: METRO SERVICE AREAS - MUNICIPAL & COMMUNITY TRANSIT OPERATORS

Gateway	San Fernando Valley	San Gabriel Valley	South Bay	Weastside Central
Bell Gardens Town Trolley (562) 806-8777	Agoura Hills Dial-A-Ride (818) 707-2005	City of Arcadia Transit & Dial-A-Ride (626) 445-2211	Carson Circuit & Dial-A-Ride (310) 352-3250	Culver CITYBUS (310) 253-6500
Bellflower Bus & Dial-A-Ride (562) 865-RIDE	Antelope Valley Transit (661) 729-2203	Alhambra Community Transit (626) 289-1220	El Segundo (310) 524-2704	Hahn Trolley/ Shuttle (562) 563-5639 or (626) 458-3968
Cerritos-On-Wheels (COW) & Dial-A-Ride (562) 928-4269	Burbank Local Transit (BLT) (818) 246-4258	Azusa Transit (626) 969-4287	Gardena Municipal Bus Lines (310) 324-1475	LADOT (213) 808-2273
Commerce Municipal Bus Lines (310) 605-5505	Calabasas Dial-A-Ride/ Calabasas Trolley (818) 878-4242	Baldwin Park Transit (626) 813-5215	Inglewood Shopper's Shuttle (310) 412-4378	Santa Monica Big Blue Bus (310) 451-5444
Compton Renaissance Transit System (310) 605-5505	Glendale Bee Line (818) 548-3960	Children's Court Shuttle (626) 458-3956	The Lawndale Beat (310) 973-3270	West Hollywood Cityline (323) 583-6095
Cudahy Area Rapid Transit (323) 772-5143 ext.233	LADOT (213) 808-2273	Claremont Dial-A-Ride (909) 596-7664	LADOT (213) 808-2273	
Downey Link (562) 529-LINK	Metrolink (800) 371-LINK	Duarte Mini Transit System (626) 357-7931 ext. 246	Palos Verdes Peninsula Transit (310) 544-7108	
Huntington Park Dial-A-Ride (323) 583-2163	Santa Clarita Transit (661) 294-1287	El Sol Shuttle (626) 485-3596	Redondo Beach Wave (310) 372-1171 Ext. 2670 or Ext. 2511	
La Mirada Transit & Dial-A-Ride (562) 943-6776 or (714) 521-0330		El Monte Trolley Company (626) 443-7384	Torrance Transit (310) 618-6266	
Long Beach Transit (562) 591-2301		Foothill Transit (800-RIDE-INFO)		
LADOT (213) 808-2273		Glendora Transit (Metrolink Shuttle) (626) 914-8233		
Lynwood Trolley Company (310) 603-0220 ext 287		La Puente Link (626) 855-1500		
Norwalk Transit System (562) 929-5550		LADOT (213) 808-2273		
Paramount Easy Rider Shuttle Dial-A-Ride (562) 220-2121		Metrolink (800) 371-LINK		
Sante Fe Springs Metro Express Shuttle (562) 929-5550		Montebello Bus Lines (323) 558-1625		
Whittier Transit/ Whittier Dial-A-Ride (562) 698-2131		Monrovia Transit (310) 358-3538		
		Monterey Park Spirit (626) 307-7842		
		Pasadena Area Rapid Transit System (ARTS) (626) 740-4055		
		Pomona Valley Transportation Authority (909) 596-7664		
		Rosemead Shopping Express (818) 572-4099		
		Sierra Madre Dial-A-Ride (626) 355-3873		
		Temple City Dial-A-Ride (626) 286-2456		
		West Covina Shuttle & Dial-A-Ride (626) 939-8491		

APPENDIX 3: GLOSSARY OF TERMS

BRT – Bus Rapid Transit (BRT) is a bus service operated on exclusive rights-of-way (busway), HOV, and on short stretches of street lanes.

Bus/Rail Interface Plan –The integration of bus and rail services at rail stations. Generally the integration of a bus lines that travel near or cross a rail corridor, which may require a reroute of the line to connect with a rail station.

Transit-Signal Priority – This is an operational strategy that facilitates the movements of in-service transit vehicles through signalized intersections to improve transit performance by extending the green phase or shortening the red phase of traffic signals.

CARB – The California Air Resources Board (CARB) was established by the California Legislature in 1967 to attain and maintain healthy air quality, conduct research into the causes of and solutions to air pollution, and systematically attack the serious problem caused by motor vehicles, which are the major causes of air pollution in the State. Since its formation, CARB has worked with the public, the business sector, and local governments to protect public health, the economy, and state ecological resources through cost-effective reduction of air pollution.

SCAQMD –The South Coast Air Quality Management District (SCAQMD), formerly called Air Pollution Control District, has authority for control of emissions from stationary sources within the Los Angeles region. The control includes restrictions on the use of paints and solvents by the site. Through the extension of the agency's on-site emission control, the SCAQMD sets extensive requirements on employers for ride sharing encouragement.

CNG – Is Compressed Natural Gas (CNG) fuel that is becoming an alternative to the diesel fuel commonly used in transit buses. The attraction of CNG is due to its ability to meet the low emission regulations being imposed upon the transit industry and the abundant supply of the fuel in the United States. CNG is pressurized to 3600psi and stored in carbon fiber containment vessels aboard the vehicles.

Congestion Pricing – Congestion pricing is the concept of charging for the use of a transportation facility, such as a roadway, based on the level of congestion. The greater the level of congestion, usually occurring during morning and evening rush hours, the higher the cost to use the facility.

Deadhead – The movement of a transit vehicle without customers aboard, often to and from a terminal or from one route to another.

High Capacity Vehicle – Buses providing seating for more than 40 passengers (i.e. 45-foot buses and 60-Foot articulated buses).

HOV Lanes – High-Occupancy Vehicle (HOV) Lanes are lanes in streets and highways set aside for High Occupancy Vehicles (vehicles with multiple occupants). Such lanes are also called, "diamond" or carpool lanes and rules for their use are posted.

HOT Lanes – High-Occupancy Toll (HOT) lanes are designated lanes that motorists driving alone can use if they pay a toll, allowing them to avoid traffic delays in the adjacent regular lanes. HOT lanes are usually combined with high-occupancy-vehicle (HOV or carpool) lanes that have enough capacity to handle more vehicles. Toll-paying drivers and toll-free carpools/vanpools share the lane, increasing the number of total vehicles using the HOV/HOT lane and generating revenues that can be used for transportation improvements.

HVAC – Stand for heating, ventilating, and air conditioning. HVAC is the technology of indoor and vehicular environmental comfort. Its goal is to provide thermal comfort and acceptable indoor air quality.

MSRC – The Mobile Source Air Pollution Reduction Review Committee (MSRC) whose sole mission is to fund projects that reduce air pollution from motor vehicles within the South Coast Air District in Southern California. Grants fund the implementation of programs to reduce air pollution from motor vehicles pursuant to air quality plans and provisions of the California Clean Air Act.

M3 – The Maintenance & Material Management (M3) system is a material, equipment, and facilities management system that automates the control, planning, acquisition and distribution of inventory and tracking of maintenance activities.

NTD – The National Transit Database (NTD) is the mechanism through which the Federal Transit Administration (FTA) collects uniform data needed by the Secretary of Transportation to administer Department programs. The data collected consists of selected financial and operating data that generally describe mass transportation characteristics.

ZEV – Zero Emission Vehicle (ZEV) is a vehicle that emits no tailpipe pollutants from the onboard source of power.

Los Angeles County
Metropolitan Transportation Authority
One Gateway Plaza
Los Angeles, CA 90012-2952

213.922.9200 Tel
213.922.5259 Fax
metro.net

