RITA Intelligent Transportation Systems Joint Program Office

Los Angeles Congestion Reduction Demonstration (Metro ExpressLanes) Program

National Evaluation:
Transit System Data Test Plan

www.its.dot.gov/index.htm
FINAL – April 16, 2012
Publication Number FHWA-JPO-11-TBD

U.S. Department of Transportation
Research and Innovative Technology Administration

LOS ANGELES CONGESTION REDUCTION DEMONSTRATION (METRO EXPRESSLANES) PROGRAM

NATIONAL EVALUATION: TRANSIT SYSTEM DATA TEST PLAN

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United States Department of Transportation
Federal Highway Administration (FHWA)
Office of Operations
1200 New Jersey Avenue, S.E.
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Contract No. DTFH61-06-D-00007/ORDER 07-T-08002/WO BA07-041

FINAL
April 16, 2012

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1. Report No. FHWA-JPO-11-TBD	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Los Angeles Congestion Reduction Demonstration (Metro ExpressLanes) Program: Transit System Data Test Plan – FINAL		5. Report Date April 16, 2012 6. Performing Organization Code
7. Author(s) Brian Pessaro, Center for Urban Transportation Research, Matt Burt, Battelle		8. Performing Organization Report No.
9. Performing Organization Name and Address Battelle 505 King Avenue Columbus, OH 43201		10. Work Unit No. (TRAIS) 11. Contract or Grant No. DTFH61-06-D-00007/ORDER 07-T-08002/WO BA07-041
12. Sponsoring Agency Name and Address U.S. Department of Transportation Research and Innovative Technology Administration Federal Highway Administration Federal Transit Administration 1200 New Jersey Avenue, S.E. Washington, DC 20590		13. Type of Report and Period Covered 14. Sponsoring Agency Code
15. Supplementary Notes		

16. Abstract

This report presents the Transit System Data Test Plan for the national evaluation of the Los Angeles Congestion Reduction Demonstration (Metro ExpressLanes) under the United States Department of Transportation (U.S. DOT) Congestion Reduction Demonstration (CRD) Program. The Los Angeles CRD projects focus on reducing traffic congestion by employing strategies consisting of combinations of tolling, transit, telecommuting/travel demand management (TDM), and technology, also known as the 4Ts. Tolling (pricing) strategies include converting high occupancy vehicle (HOV) lanes on the two freeway corridors to variably-priced high occupancy toll (HOT) lanes, adding a second HOT lane to portions of one corridor, and implementation of a downtown LA intelligent parking management system featuring demand-based pricing and real-time parking availability information. Transit improvements include increased bus service, transit station security improvements, expansion of two transit stations, creation of an El Monte Busway/Union Station bus service connection, and the expansion of downtown LA transit signal priority. TDM strategies aim to establish 100 new registered vanpools. This Transit System Data Test Plan is one of ten test plans being developed. The other nine test plans consist of the following: traffic; tolling; surveys, interviews and workshops; ridesharing, safety; environmental; content; cost-benefit, and exogenous factors. Each test plan is based on the Los Angeles County Congestion Reduction Demonstration (LA CRD) National Evaluation Plan. This test plan describes transit system data sources, data availability, and data analysis. The schedule and responsibilities for collecting, analyzing, and reporting the transit system data are also presented.

17. Key Word	18. Distribution Statement
Congestion Reduction Demonstration, congestion pricing, tolling, HOT, congestion reduction, transit, bus rapid transit, telecommuting, evaluation, transit signal priority	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
		44	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

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ACKNOWLEDGEMENTS

A number of representatives from Los Angeles County Metropolitan Transportation Authority (Metro), Foothill Transit, Gardena Transit, and Torrance Transit provided information critical to the development of this test plan. In particular, the assistance of Stephanie Wiggins, Conan Cheung, and Stephen Tu at Metro is recognized and appreciated. Also recognized and appreciated is the assistance of Joseph Loh and Paula Faust at Gardena Transit, Jim Mills at Torrance Transit, and Kevin McDonald at Foothill Transit.

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LIST OF ABBREVIATIONS

4Ts	Tolling, Transit, Telecommuting and Technology
APC	Automated Passenger Counter
AVL	Automated Vehicle Location
Blvd.	Boulevard
Caltrans	California Department of Transportation
CHP	California Highway Patrol
CRD	Congestion Reduction Demonstration
ExpressLanes	High Occupancy Toll Lanes
ExpressPark	Intelligent Parking Management
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HOV	High Occupancy Vehicle
HOT	High Occupancy Toll
I-10	Interstate 10 (El Monte Busway between Alameda St and I-605)
I-110	Interstate 110 (Harbor Transitway between Adams Blvd and Harbor Gateway Transit Center)
IPM	Intelligent Parking Management
L.A.	Los Angeles
LA CRD	Los Angeles County Congestion Reduction Demonstration
LADOT	Los Angeles Department of Transportation
Metro	Los Angeles County Metropolitan Transportation Authority
Metrolink	Southern California Regional Rail Authority
MOE	Measure of Effectiveness
SBCCOG	South Bay Cities Council of Governments
SCAG	Southern California Association of Governments
SGVCOG	San Gabriel Valley Council of Governments
TSP	Transit Signal Priority
TDM	Travel Demand Management
UPA	Urban Partnership Agreement
U.S. DOT	U.S. Department of Transportation

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1.0 INTRODUCTION

This report presents the test plan for collecting and analyzing transit system data for the national evaluation of the Los Angeles Congestion Reduction Demonstration (Metro ExpressLanes) Program under the United States Department of Transportation (U.S. DOT) Congestion Reduction Demonstration (CRD) program. The LA CRD Program is one of several large field deployments around the United States that are receiving U.S. DOT funding and which are intended to demonstrate congestion pricing and supporting strategies. The LA CRD Program national evaluation will address the four primary U.S. DOT evaluation questions shown in Table 1-1.

Table 1-1. U.S. DOT National Evaluation "Objective Questions"

Objective Question #1	How much was congestion reduced in the area impacted by the implementation of the tolling, transit, technology, and telecommuting strategies? It is anticipated that congestion reduction could be measured by one of the following measures, and will vary by site and implementation strategy: • reductions in vehicle trips made during peak/congested periods; • reductions in travel times during peak/congested periods; • reductions in congestion delay during peak/congested periods; and • reductions in the duration of congested periods.
Objective Question #2	What are the associated impacts of implementing the congestion reduction strategies? It is anticipated that impacts will vary by site and that the following measures may be used: • increases in facility throughput during peak/congested periods; • increases in transit ridership during peak/congested periods; • modal shifts to transit and carpools/vanpools; • traveler behavior change (e.g., shifts in time of travel, mode, route, destination, or forgoing trips); • operational impacts on parallel systems/routes; • equity impacts; • environmental impacts; • impacts on goods movement; and • effects on businesses.
Objective Question #3	What are the non-technical success factors with respect to the impacts of outreach, political and community support, and institutional arrangements implemented to manage and guide the implementation?
Objective Question #4	What are the overall costs and benefits of the deployed set of strategies?

The questions shown in Table 1-1 will be addressed by carrying out the following 11 "evaluation analyses" described in the LA CRD (Metro ExpressLanes) Program National Evaluation Plan[1]: tolling, technology, transit, travel demand management (TDM), congestion, safety, equity, environment, business impacts, non-technical success factors, and cost benefit. Each of these 11 analyses relies upon various evaluation measures of effectiveness.

[1] Los Angeles County Congestion Reduction Demonstration National Evaluation Plan, January 13, 2010, U.S. DOT.

"Test plans" are the evaluation planning documents that describe how specific data will be collected and processed to yield the evaluation measures of effectiveness required for the various analyses. Whereas evaluation analyses are categorized according to related evaluation questions or types of impacts, for example all equity-related impacts are addressed in the equity analysis, test plans are categorized according to common data types or sources. For example, the "Traffic System Data Test Plan" collects and processes all of the traffic data required for the national evaluation. There are a total of ten test plans for the LA CRD (Metro ExpressLanes) Program national evaluation. In addition to this Content Analysis Test Plan, there are test plans focusing on the following types of data: traffic; tolling; ridesharing; safety; environmental; transit; surveys, interviews, and workshops; cost benefit; and exogenous factors.

The relationship between test plans and evaluation analyses is discussed in Section 1.2. In short, analyses describe the evaluation questions and hypotheses to be investigated and the test plans describe how the data and measures of effectiveness needed to support the evaluation will be collected and processed. Most test plans collect data and provide measures of effectiveness that will be used in multiple analyses and most analyses rely upon data and measures developed through several different test plans.

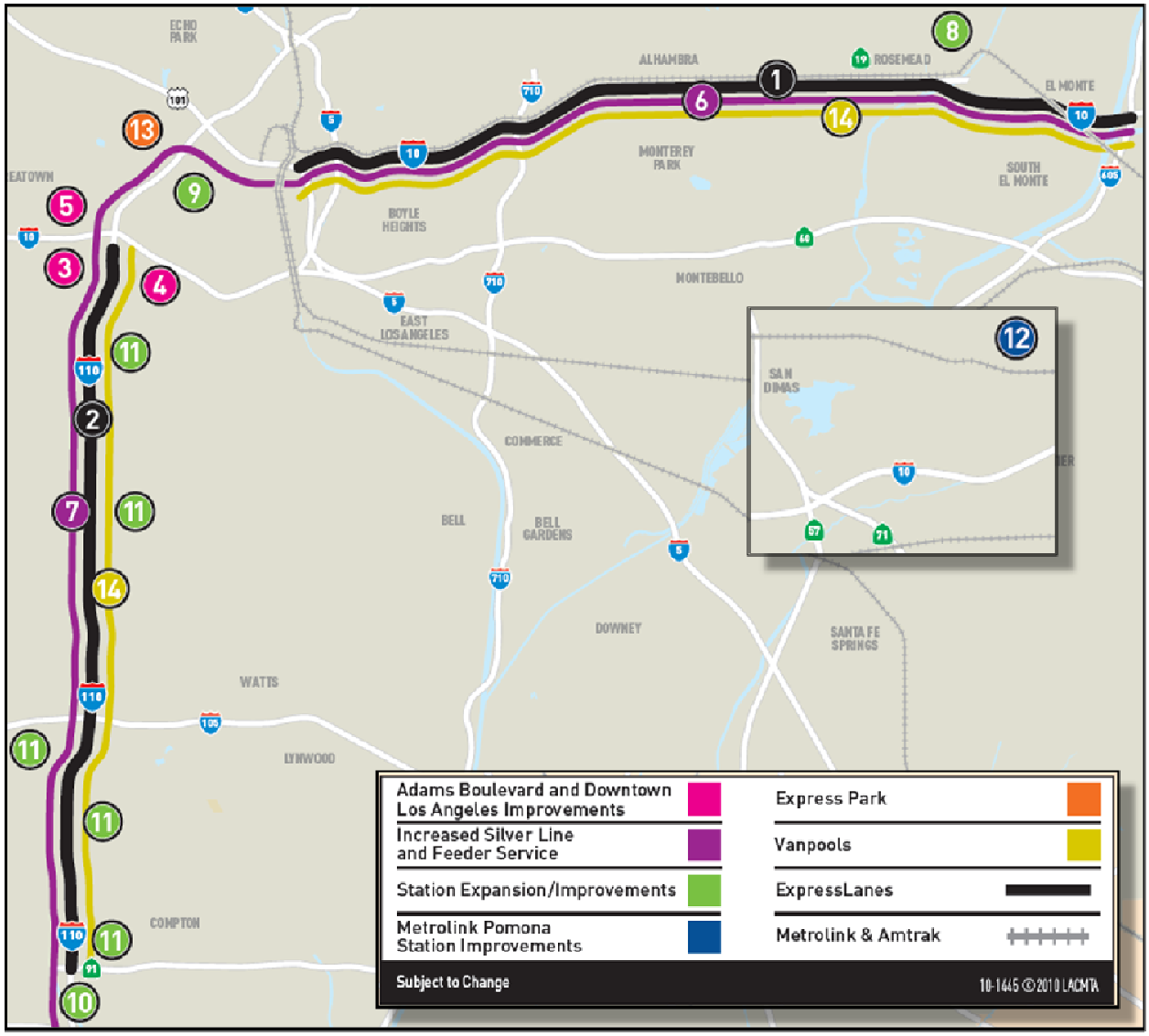
The remainder of this introduction chapter identifies the LA CRD Program deployments and elaborates on the relationship between test plans and evaluation analyses. The remainder of the report is divided into four sections. Chapter 2.0 describes the geographic scope of transit system data collection. Chapter 3.0 presents the data sources, data availability, and risks associated with the data collected through this Transit System Data Test Plan. Chapter 4.0 discusses how the data collected through this test plan will be analyzed and used in the national evaluation. Chapter 5.0 presents the schedule and responsibilities for completing the collection and analysis of the transit system data.

1.1 The LA CRD (Metro ExpressLanes) Program Projects

The LA CRD (Metro ExpressLanes) Program was selected by the U.S. DOT as an Urban Partner to implement projects aimed at reducing congestion based on four complementary strategies known as the 4Ts: Tolling, Transit, Telecommuting/TDM, and Technology. Under contract to the U.S. DOT, a national evaluation team led by Battelle is assessing the impacts of the projects in a comprehensive and systematic manner in Los Angeles (L.A.) County and other sites. The national evaluation will generate information and produce technology transfer materials to support deployment of the strategies in other metropolitan areas. The national evaluation will also generate findings for use in future Federal policy and program development related to mobility, congestion, and facility pricing.

The LA CRD (Metro ExpressLanes) Program effort is led by the Los Angeles County Metropolitan Transportation Authority (Metro). The CRD projects are being implemented with the assistance of a number of supporting agencies especially the California Department of Transportation (Caltrans); and the Los Angeles Department of Transportation (LADOT). Other participating agencies include the Southern California Association of Governments (SCAG); the San Gabriel Valley Council of Governments (SGVCOG); the South Bay Cities Council of Governments (SBCCOG); the Southern California Regional Rail Authority (Metrolink); Foothill Transit; the California Highway Patrol (CHP); and the Los Angeles County Sheriff's

Department. The LA CRD (Metro ExpressLanes) Program projects are intended to reduce congestion, promote throughput, and enhance mobility in the Interstate-10 (I-10) and Interstate-110 (I-110) corridors, and in downtown Los Angeles. Figure 1-1 shows the location of the LA CRD (Metro ExpressLanes) Program projects and Figure 1-2 provides short summaries of the numbered projects on Figure 1-1.



Source: Derived from Metro ExpressLanes project map

Note: See Figure 1-2 for the explanation of each numbered project on this map.

Figure 1-1. LA CRD (Metro ExpressLanes) Program Project Locations

1 **EXPRESSLANES ON I-10**
This project will convert existing HOV lanes on the I-10 from Alameda Street/Union Station to I-605 into ExpressLanes (44 lane miles). The budget will cover the toll technology, toll infrastructure and operational improvements required to complete the conversion. This project will also provide additional ExpressLanes capacity on the El Monte Busway between I-710 and I-605 through re-striping and buffer changes. No general purpose lanes are taken away to create the second ExpressLane between I-710 and I-605.

2 **EXPRESSLANES ON I-110**
This project will convert existing HOV lanes on the I-110 from 182nd Street/Artesia Transit Center to Adams Boulevard into ExpressLanes (38 lane miles). The budget will cover the toll technology, toll infrastructure and operational improvements required to complete the conversion.

ExpressLanes is a one-year demonstration project. Buses, motorcycles, vanpools, and carpools that currently use HOV lanes will not be charged a toll. General purpose lanes will continue to remain toll-free. The following projects will provide additional access and capacity to the I-10 and I-110 ExpressLanes, to encourage movement of more people rather than more vehicles.

ADAMS BOULEVARD AND DOWNTOWN LOS ANGELES IMPROVEMENTS

3 **I-110 ADAMS/FIGUEROA FLYOVER STUDY**
The Adams/Figueroa Flyover Study will investigate how the construction of a new structure – connecting the I-110 northbound HOV lane off-ramp directly to Figueroa Street – could improve traffic flow at the end of the I-110 HOV lane.

4 **ADAMS BOULEVARD STREET WIDENING**
Adams Boulevard will be widened between the Harbor Freeway off-ramp and Flower Street – adding an additional westbound right-turn-only lane to the HOV bypass connecting to Figueroa Street. Re-striping will also add one extra lane to the HOV off-ramp approaching Adams Boulevard to increase capacity.

5 **TRANSIT SIGNAL PRIORITY IN LOS ANGELES**
This project will install bus-signal priority technology on Figueroa Street between Wilshire Boulevard and Adams Boulevard (15 signals), and Flower Street between Wilshire Boulevard and Olympic Boulevard (5 signals) to enhance transit operations. It will also extend the existing AM peak-period northbound bus-only lane on Figueroa Street between 23rd Street and 4th Street to cover the PM peak-period.

INCREASED SILVER LINE AND FEEDER SERVICE

6 **NEW BUSES FOR THE I-10 EL MONTE BUSWAY CORRIDOR**
Before adding ExpressLanes to the corridor, Metro and its transit partner – Foothill Transit – will purchase 30 new buses and increase Silver Line and feeder service on the I-10 El Monte Busway, with a goal of providing service every three to seven minutes during rush hour.

7 **NEW BUSES FOR I-110 HARBOR TRANSITWAY CORRIDOR**
Before adding ExpressLanes to the corridor, Metro and its transit partners – Torrance Transit and Gardena Transit – will purchase 29 new buses to improve Silver Line and feeder service on the I-110 Transitway, with a goal of providing service every three to seven minutes during rush hour.

STATION EXPANSION/IMPROVEMENTS

8 **EL MONTE TRANSIT STATION EXPANSION**
The El Monte Station is the eastern terminus of the El Monte Busway, and is currently the busiest bus terminal west of Chicago. Given that the El Monte Station will now also be the eastern terminus of the ExpressLanes, expansion of the terminal will be required to accommodate additional high-capacity buses, passenger parking and bike lockers.

9 **PATSAOURAS PLAZA/UNION STATION CONNECTION**
A new Union Station stop will be created for the El Monte Busway, allowing direct access to the station's Patsaouras Transit Plaza. This will eliminate the long walks, operational delays and insufficient lighting and information displays passengers currently have to contend with when transferring at Alameda Street to Metro's Red and Gold lines, Metrolink and Amtrak.

10 **IMPROVED ARTESIA TRANSIT CENTER SECURITY**
Improvements at the largest transit center on the I-110 Harbor Transitway include bike lockers to promote non-motorized access and a law enforcement substation to assist with station security.

11 **I-110 HARBOR TRANSITWAY PARK & RIDE AND TRANSIT STATION IMPROVEMENTS**
Improvements to these facilities will include enhanced signage, lighting and security. Other benefits to customers include new bus stops under Slauson and Manchester stations for Lines 108/115, and improved signage and security for existing Harbor Transitway Park and Ride lots at Slauson, Manchester, Harbor Green Line, Rosecrans, Artesia, Carson, PCH and Harbor/Beacon in San Pedro.

METROLINK POMONA STATION IMPROVEMENTS

12 **ADDITIONAL COMMUTER RAIL CAPACITY**
This station on Metrolink's San Bernardino Line will undergo several improvements, including the addition of 143 new parking spaces and the expansion of platforms to accommodate longer eight-car trains.

EXPRESS PARK

13 **DOWNTOWN PARKING MANAGEMENT**
This project will use new parking technology to provide motorists alternative payment options and real-time parking availability information for nearly 13,000 on-street and off-street parking spaces in Downtown Los Angeles. The information will aid motorists in understanding their parking options and will guide them to available parking spaces – eliminating the need to search for parking and reducing traffic congestion.

New parking meters will be installed at approximately 5,500 on-street metered parking spaces in the downtown area. These meters will be capable of charging motorists demand-based parking rates – which change depending on the time of day and traffic congestion levels. They will also provide alternative payments options, allowing motorists to pay for parking using their credit card or cell phone and to receive a text message when their paid parking time is about to expire.

VANPOOLS

14 **I-10/I-110 COMMUNITY-BASED VANPOOL FORMATION**
This program will provide vanpool formation services to any community where ExpressLanes are implemented. This includes a dedicated vanpool representative that will actively train community groups to form vanpools and provide support to ensure that vanpools are created and retained.

In addition to receiving the incentive of free access to the new ExpressLanes, vanpoolers along those corridors will also be eligible for vanpool start-up assistance, which may cover the cost of driver and back-up driver training and exams, as well as special training on how best to keep existing vanpools together.

Source: Derived from Metro ExpressLanes project map.

Figure 1-2. LA CRD (Metro ExpressLanes) Program Project Descriptions

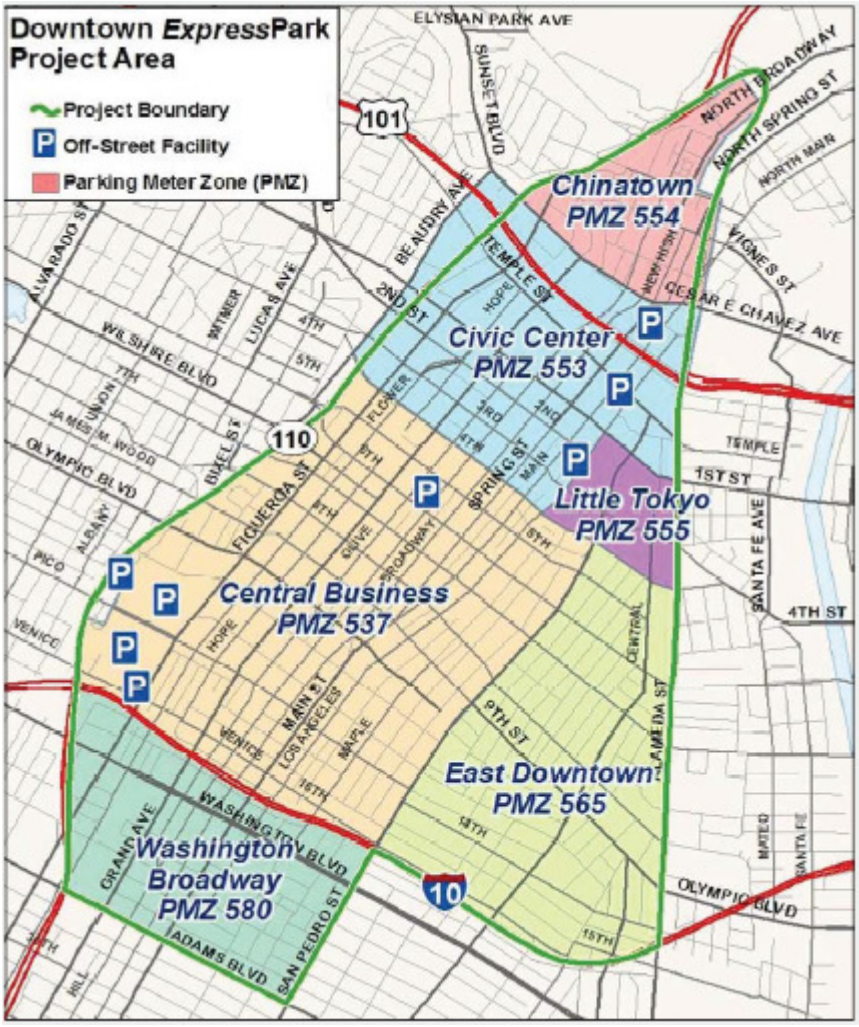
The U.S. DOT is allocating $210.6 million in Federal grant funding for the LA CRD projects, drawn from the Federal Transit Administration (FTA) 5309 Bus and Bus Facilities Program. The LA CRD projects consist of the following:

- **Transit Improvements** to increase the frequency of Metro bus rapid transit service through the acquisition of 59 new clean fuel expansion buses (30 buses in the I-10 El Monte Busway corridor and 29 buses in the I-110 Harbor Transitway corridor) and increased service: to one bus every seven minutes along the I-10 corridor and to one bus every ten minutes along the I-110 corridor. Various security upgrades will be made to the Harbor Gateway Transit Center (better lighting, new security cameras, bicycle lockers and a new L.A. County Sheriff's substation). Expansion of the El Monte Transit Center includes reconstruction of the existing transit passenger terminal, additional surface parking, and a new administration facility. A new El Monte Busway stop will be created at Union Station that will allow for direct pedestrian access to Union Station's Patsaouras Transit Plaza and thus promote transfers to/from the El Monte Busway and other transit services. Expansion of the Pomona (North) Metrolink station includes 143 new parking spaces and extended platforms to accommodate additional rail cars for the San Bernadino Line. Improvements to Harbor Transitway Park-and-Ride lots and Transit Stations include enhanced signage, lighting, and closed-circuit television cameras for existing lots at Slauson, Manchester, Harbor Green Line, Rosecrans, and Harbor Gatway as well as the relocation of bus stops for Lines 108 and 115 to the Slauson and Manchester Transitway stations. The 37th Street Station will also be fitted with translucent and architectural sound attenuation panels to reduce noise levels for waiting customers on the Harbor Transitway. Implementation of transit signal priority technology on Figueroa Street (15 signals between Wilshire Boulevard and Adams Boulevard) and Flower Street (5 signals between Wilshire Boulevard and Olympic Boulevard) in downtown Los Angeles. Lastly, to facilitate HOT traffic movement where the I-110 freeway enters downtown Los Angeles, Adams Boulevard will be widened and the Adams Boulevard off ramp will be restriped, both providing an additional lane of high occupancy vehicle (HOV) capacity.
- **High Occupancy Toll (HOT) Lanes** ("ExpressLanes") to expand freeway capacity by permitting toll-paying, single occupancy vehicles or those that do not meet the carpool occupancy requirement to use slack, HOT lane capacity on the I-10 and I-110 freeways. ExpressLanes will be created by converting existing HOV lanes into HOT lanes along the I-10 (from I-605 to Alameda Street) and along the I-110 (from 182nd Street to Adams Boulevard). In addition, a second HOT lane will be created (via restriping; no loss of general purpose lanes will occur) on I-10 from I-605 to I-710 where there is no slack HOV lane capacity during peak periods. All vehicles will pay to use the HOT lanes with the exception of transit vehicles, motorcycles and multiple-occupant private vehicles (three or more occupants on I-10 during peak hours, two or more all other times; two or more occupants on I-110). All tolls will be collected electronically, requiring all vehicles entering HOT lanes to be equipped with a transponder. Vehicles satisfying the ExpressLane occupancy requirements and therefore eligible to use the lane free of charge will "self declare" by setting a switch on their transponders. ExpressLane enforcement will be carried out manually through on-site law enforcement observation. Tolls will range from a minimum $0.25 per mile to a maximum $1.40 per mile depending on

congestion levels. When travel speeds in the HOT lanes fall below 45 mph for more than ten minutes, the ExpressLanes have reached capacity. At this point, the lanes will revert to HOV lanes and vehicles that do not meet the carpool occupancy requirements will not be permitted to "buy" their way into the lanes. Low income commuters[2] will receive cost reductions through the Equity Account Discount, consisting of a $25 discount for toll account set-up and waiver of the $3 non-usage maintenance fee.

- **Intelligent Parking Management (IPM)** ("ExpressPark") consists of a variable, demand-based parking pricing system coupled with a parking guidance system that will include real-time parking availability information. The IPM is intended to reduce traffic congestion, reduce air pollution, and improve transit efficiency by reducing parking search times by achieving 10 to 30 percent parking availability for on-street parking. The ExpressPark system will cover approximately 13,500 City of Los Angeles-owned or operated parking spaces (about 6,000 on-street, metered spaces and about 7,500 off-street spaces in an area of downtown Los Angeles bounded by the I-10 and I-110 freeways, Alameda Street and Adams Boulevard. The project area is shown in Figure 1-3. ExpressPark meter capabilities include demand-based parking rates based on time of day and length of stay; alternate payment options (coins, credit card, smart phone, cell phone); and increased convenience (text messages when paid parking time is about to expire). Vehicle sensors placed in the on-street metered parking spaces provide real-time occupancy and parking duration information. Parking conditions and availability in off-street parking locations will be determined using vehicle sensors, cordon counting systems and/or advanced revenue control systems. The parking guidance component of the IPM will provide information via a limited number of on-street dynamic message signs when not in use for active traffic management, an Internet web site, mobile phones using Metro's 511 interactive voice response system, smart phones and, pending industry support, in-vehicle navigation systems.
- **Ridesharing Promotion (travel demand management)** to increase the number of registered vanpools (with a goal of 100 new vanpools on the I-10 and I-110 corridors), and major employer-based ridesharing through the use of promotional methods including subsidies to travelers and vanpool operators and promotional outreach to major employers.

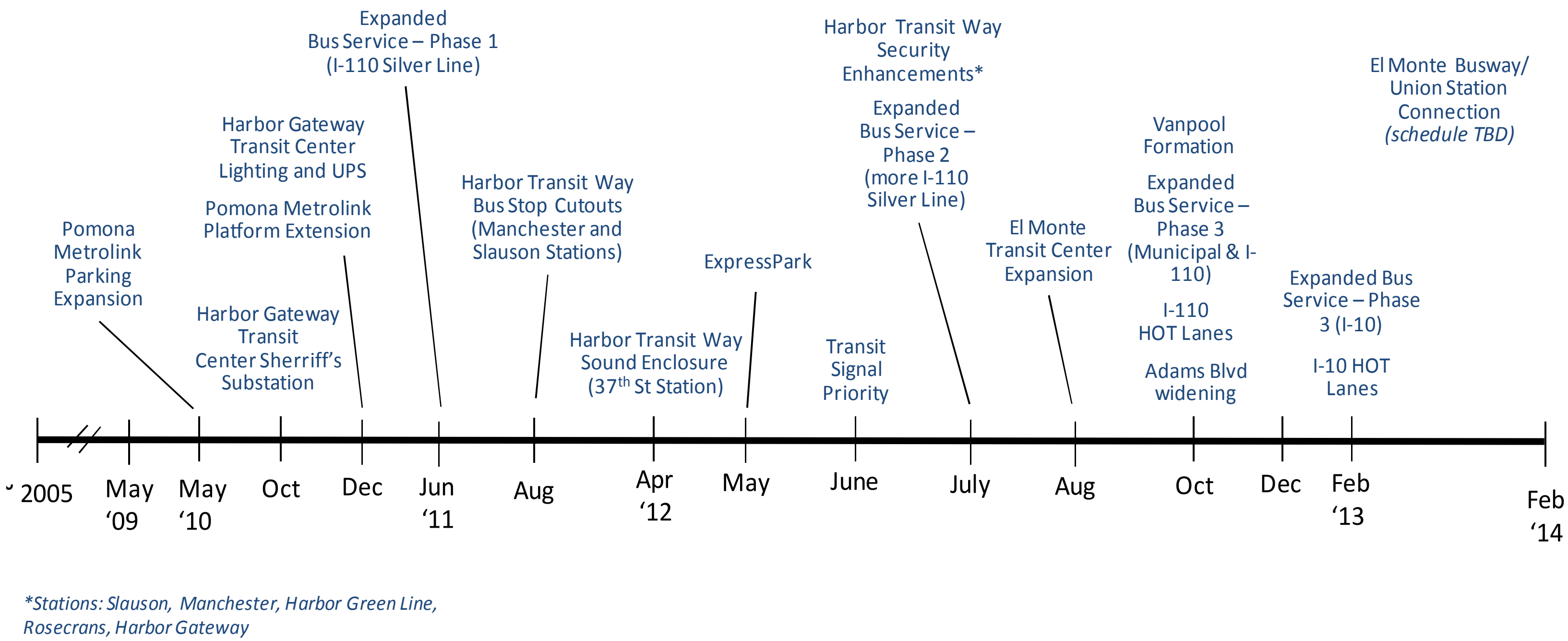
[2] The Equity Account Discount defines low income commuters as Los Angeles residents with an annual household income (family of 3) of $35,000 or less.



Source: Derived from "ExpressPark Intelligent Parking Management: Downtown" Los Angeles Department of Transportation Pamphlet http://ladot.lacity.org/pdf/PDF217.pdf

Figure 1-3. ExpressPark Project Area

Schedule for the LA CRD (Metro ExpressLanes) Program. As shown in Figure 1-4, the LA CRD Program projects will become operational in a phased manner. Tolling on I-110 is scheduled to begin in October 2012, and tolling on I-10—the last project to be completed—is scheduled to begin in February 2013. Most of the LA CRD Program projects will be coming on line in advance of I-110 and I-10 tolling. One project will come online after tolling begins on the I-10.



Source: Based on information provided by Metro; March 2012.

Figure 1-4. LA CRD (Metro ExpressLanes) Program Project Completion ("Go Live") Schedule

1.2 LA CRD (Metro ExpressLanes) Program National Evaluation Plan and the Use of Transit Data

Table 1-2 shows which of the various LA CRD Program test plans will contribute data to each of the evaluation analyses. The "flow" between test plans is "one way" in the sense that test plans feed data and measures to the analyses rather than the reverse. The solid circles show where data from a given test plan constitutes a major input to an analysis; the open circles show where data from a given test plan constitutes a supporting input to an analysis. As shown in Table 1-2, the Transit System Data Test Plan provides major input to the transit and cost benefit analyses and provides supporting input to the congestion, tolling, ridesharing, environmental and equity analyses.

Within a test plan, data are grouped by type into various "data elements." Table 1-3 lists the LA CRD Program transit system data elements and, by associating those elements with the measures of effectiveness and the hypotheses/questions from the related evaluation analyses, summarizes why these data are important.

Table 1-2. Relationship Among Test Plans and Evaluation Analyses

LA CRD (Metro ExpressLanes) Program Test Plans	Evaluation Analyses										
	Tolling	Technology	Transit	Travel Demand Management (TDM)*	Congestion	Safety	Environmental	Equity	Business Impact	Non-Technical Factors	Cost-Benefit
Traffic System Data Test Plan	●		○	○	●	●	●	○			●
Tolling Test Plan	●	●			○		○	○	○		●
Transit System Data Test Plan	○		●	○	○		○	○			●
Ridesharing Test Plan				●				○			○
Safety Test Plan					○	●		○			●
Environmental Data Test Plan							●	○			○
Surveys, Interviews, Workshops Test Plan	●	●	●	●	○	○	○	●	●	●	○
Content Test Plan										●	
Cost Benefit Test Plan											●
Exogenous Factors Test Plan	○	○	○	○	○	○	○	○	○	○	

● — Test Plan Data Constitutes a Major Input to the Evaluation Analysis

○ — Test Plan Data Constitutes a Supporting Input to the Evaluation Analysis

Table 1-3. Transit Data Elements for Testing Evaluation Hypotheses/Questions

L.A. CRD Transit Data Element	L.A. CRD Measure of Effectiveness	L.A. CRD Hypotheses/Questions*
1. Transit Ridership	• Actual and percent change in average weekday ridership • Transit mode share	• LATransit-3: CRD projects will increase ridership and facilitate a mode shift to transit within CRD corridors. • LATransit-4: Increased ridership and mode shift to transit will contribute to increased person throughput, congestion mitigation, and transit cost-effectiveness within CRD corridors. • LACong-4: Deploying the CRD improvements will result in more vehicles and persons served in the I-10 and I-110 corridors during peak periods. • LACostBenefit-1: Will the LAC CRD projects have a net societal benefit?
2. Transit Service Quantity	• Actual and percent change in revenue miles and/or revenue hours	• LATransit-1: CRD projects will enhance transit performance within CRD corridors through reduced travel times, increased service reliability, and increased service capacity.
3. Park-and-Ride Lot Capacity and Utilization	• Actual and percent change in lot utilization	• LATransit-3: CRD projects will increase ridership and facilitate a mode shift to transit within CRD corridors.
4. Transit Travel Times	• Actual and percent change in bus travel times • Observed changes in published schedule information	• LATransit-1: CRD projects will enhance transit performance within CRD corridors through reduced travel times, increased service reliability, and increased service capacity. • LACong-1: Deployment of the CRD improvements will reduce the travel time of users in the I-10 and I-110 corridors. • LACong-9: Relative travel times for HOV/HOT lanes vs. general purpose lanes will either remain the same or (more likely) improve for HOV/HOT travelers as a result of the CRD deployments. • LACong-10: The introduction of tolled SOV traffic into the HOT lanes in the deployment corridors will not negatively impact HOV or transit traffic in terms of average travel times or travel reliability. • LACostBenefit-1: Will the LA CRD projects have a net societal benefit?
5. Transit Service Reliability	• Actual and percent change in on-time performance	• LATransit-1: CRD projects will enhance transit performance within CRD corridors through reduced travel times, increased service reliability, and increased service capacity. • LACostBenefit-1: Will the LA CRD projects have a net societal benefit?

* Appendix A contains a compilation of the hypotheses/questions for all the analysis areas from the L.A. County CRD National Evaluation Plan.

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2.0 GEOGRAPHIC FOCUS OF TRANSIT DATA COLLECTION

The geographic focus of the transit data collection is the I-110 Harbor Transitway and the I-10 El Monte Busway, both of which are being converted into HOT lanes. However, the LA CRD Program is also funding transit projects in several other locations. This chapter identifies all of the transit routes to be included in the CRD evaluation.

Table 2-1 shows the LA CRD Program funded bus routes and the corridors on which they operate. A total of 59 new buses are being purchased. Of that amount, 41 buses will go to the L.A. Metro Silver Line and 12 will go to the Foothill Transit Silver Streak and Route 699 Express. The remaining 6 buses are going to Gardena Transit and Torrance Transit. The Torrance Transit Lines 1 and 2 operate on I-110, and the Gardena Transit Line 1 feeds into the Silver Line at the Harbor Gateway Transit Center on I-110. The LA CRD Program funded bus service will begin in four phases. Phase 1 will begin in June 2011 and will add service to the I-110 portion of the Silver Line. This will decrease average headways from 30 minutes to 10 minutes. Phase 2 will begin in June 2012 and will add extra late night and weekend service to the I-110 portion of the Silver Line. Phase 3 will begin in October 2012 and add service for Gardena and Torrance Transit. Phase 4 will begin in February 2013 and add service for Foothill Transit.

Table 2-1. CRD-Funded Bus Routes

Route	I-10	I-110	New Buses
Metro Silver Line	X	X	41
Foothill Transit Silver Streak	X		12
Foothill Transit Route 699			
Torrance Transit Line 1		X	4
Torrance Transit Line 2			
Gardena Transit Line 1		X	2

In addition to the LA CRD Program funded routes, the evaluation will include some non-CRD funded routes that are likely to be influenced by the HOT conversion. These non-CRD funded routes are listed in Table 2-2. Although they will not have added service, the institution of tolls may lead to a ridership increase on them.

Table 2-2. CRD-Influenced Bus and Commuter Rail Routes

Route	CRD Corridor
Metro Route 450X	I-110
Metro Route 550	I-110
Metrolink San Bernardino Line*	I-10

* The LA CRD is funding extra park-and-ride spaces and extended passenger platforms at Pomona (North) Station.

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3.0 DATA SOURCES, AVAILABILITY, AND RISKS

This chapter discusses each of the transit data elements for the evaluation, defining the required data format, source, timing, and other essential characteristics. Also discussed is the availability of those data and any potential risks associated with collecting and processing them for use in the evaluation. Table 3-1 summarizes all of the data requirements for the transit system data test plan. Metro is responsible for collecting all of the transit data on a monthly basis from the agencies listed below. Metro will submit the data to the national evaluation team on a quarterly basis, except for the pre- and post-TSP data, which will be submitted once.

Table 3-1. Transit Data Elements

Data Element	Data Sub-Element	Time Period /Direction Segmentation	Transit Agencies	Data Collection Frequency	Data Collection Period		Data Reporting Freq.
					Begin	End	
1. Transit Ridership	Average weekday ridership	- 6-9am, 3-7pm - Peak direction	Metro Foothill Gardena Torrance	Monthly	6/10	2/14	Quarterly
	Monthly Ridership	- Monthly total - All directions	Metro Foothill Gardena Torrance Metrolink	Monthly	6/10	2/14	Quarterly
	System-wide Ridership[(1)]	- Monthly total - All directions	Metro Foothill Metrolink	Monthly	6/10	2/14	Quarterly
2. Transit Service Quantity	Revenue miles Revenue hours	- Monthly total - All directions	Metro Foothill Gardena Torrance	Monthly	6/10	2/14	Quarterly
3. Park-and-Ride Lot Capacity and Utilization	Lot capacity Lot occupancy	- Weekday count	Metro	Monthly	6/10	2/14	Quarterly
4. Transit Travel Time	Busway average travel times	- 6-9am, 3-7pm - Peak direction	Metro Foothill	Monthly	6/10	2/14	Quarterly
	TSP average travel times	- 6-9am, 3-7pm - Both directions	Metro	Pre-TSP	7/11	12/11	Once
				Post-TSP	7/12	12/12	
5. Transit Service Reliability	On-time performance	- 6-9am, 3-7pm - Peak direction	Metro Foothill	Monthly	6/10	2/14	Quarterly

[(1)] System-wide bus ridership figures reported by Metro and Foothill Transit should specifically exclude the Silver Line, Silver Streak, and Route 699. System-wide rail ridership for Metrolink should exclude the San Bernardino Line. These exclusions will eliminate any influences caused by the CRD from the system-wide figures.

Average Weekday Ridership. Average weekday ridership will be aggregated into monthly figures for the time periods 6 to 9 a.m. and 3 to 7 p.m. These figures will be reported quarterly by each of the transit agencies to the national evaluation team. Because Metro and Foothill Transit use APCs to collect ridership while Torrance and Gardena Transit use fareboxes, there will be some variation in data collection.

Average Weekday Ridership (Metro and Foothill Transit)

Metro and Foothill Transit buses are equipped with automated passenger counters (APCs) that are able to distinguish between boardings and alightings (i.e., ons and offs). In order to better evaluate peak direction ridership, it was suggested by Metro to measure inbound boardings in the a.m. peak period and outbound alightings in the p.m. peak period. Furthermore, it was recommended dividing the Silver Line ridership into I-10 and I-110 components. The boardings and alightings will be measured from certain start and end points. Table 3-2 shows the parameters for data collection. USC Medical Center is the last stop on I-10 before downtown Los Angeles. The 37th Street Station is the last stop on I-110 before downtown. These locations were chosen as the cut off points, on the recommendation of Metro, because it is unlikely that any peak direction riders would get on the bus past these points.

Table 3-2. Average Weekday Ridership Data Parameters

Route	Corridor	Peak Period	Boardings/ Alightings	Start	End
Silver Line	I-10	a.m.	Boardings	El Monte Station	USC Medical Center
		p.m.	Alightings	USC Med Center	El Monte Station
Silver Line Route 450X Route 550	I-110	a.m.	Boardings	Harbor Gateway Transit Center	37th Street Station
		p.m.	Alightings	37th Street Station	Harbor Gateway Transit Center
Silver Streak	I-10	a.m.	Boardings	Montclair Transit Center	USC Medical Center
		p.m.	Alightings	USC Medical Center	Montclair Transit Center
Route 699	I-10	a.m.	Boardings	Montclair Transit Center	USC Medical Center
		p.m.	Alightings	USC Medical Center	Montclair Transit Center

Metro provided a sample of ridership data for the Silver Line and the Routes 450X, and 550. It is illustrated in Table 3-3.

Table 3-3. Sample of Average Weekday Ridership from Metro

Route	Ons (6-9am)	Offs (3-7pm)
Silver Line (I-10)	1,246.0	1,295.0
Silver Line (I-110)	353.0	487.0
450X	335.0	267.0
550	367.0	494.0

Source: Metro, July 2010

Average Weekday Ridership (Gardena and Foothill Transit)

Because Gardena and Torrance Transit get their ridership from fareboxes instead of APCs, they are not able to distinguish between boardings and alightings. Nor are they able to identify the locations of boardings and alightings. Consequently, it will not be possible to identify what portion of the ridership is using the bus to travel on I-110.

Monthly Transit Ridership. This ridership figure is distinct and separate from the average weekday ridership figures requested in the previous paragraph. This is the total number of passengers carried each month in both directions. The monthly ridership totals will be used in conjunction with monthly service quantity figures (i.e., revenue miles and revenue hours) in order to measure productivity (i.e., passengers per revenue hour and passengers per revenue mile). These figures will be reported quarterly to the national evaluation team.

System-wide Ridership. System-wide ridership will act as the control group in the evaluation. These ridership figures will help to verify that the changes in transit ridership on I-10 and I-110 are due to the CRD projects and are not simply reflections of trends in the L.A. metropolitan area. System-wide ridership figures are only requested for Metro, Foothill Transit, and Metrolink. These figures are not requested from Torrance and Gardena Transit because the number of buses they are receiving from the LA CRD Program is small in comparison to Metro and Foothill Transit. The system-wide ridership figures reported by Metro, Foothill Transit, and Metrolink should exclude the Silver Line, Silver Streak, Route 699, and the San Bernardino Line. Doing so will eliminate any influence caused by the LA CRD Program from the system-wide figures. These figures will be reported quarterly to the national evaluation team.

Transit Service Quantity. This is the number of revenue miles and revenue hours operated each month for the LA CRD Program funded bus routes. This information will be used to measure productivity in the form of boardings per revenue mile and per revenue hour. This data should be provided quarterly to the national evaluation team.

Park-and-Ride Lot Capacity and Utilization. Metro will conduct monthly park-and-ride lot counts at all the lots listed in Table 3-4. Each count will be done for one day. The count should be done at mid-week (Tuesday, Wednesday, Thursday), preferably on a Wednesday, because some transit riders may be working compressed work weeks and be off either Friday or Monday. Preferably, the count should be done after 9 a.m. to maximize the count. The count will include all vehicles in the lot (including those that are illegally parked). This data should be provided quarterly to the national evaluation team.
A copy of the tracking sheet to be used for the park & ride lot counts is included in Appendix B. It shows the capacity of each lot and, where appropriate, the new capacity after expansion.

Table 3-4. Park-and-Ride Lots

Park-and-Ride Lot	Capacity
El Monte Station	1,134
Slauson Station	160
Manchester Station	127
Harbor Freeway Station	253
Rosecrans Station	342
Harbor Gateway Station	980
Pomona (North) Station (Metrolink)	372

Transit Travel Times. Transit travel time data will be derived from the automated vehicle location (AVL) system of the Metro Silver Line and Foothill Transit Silver Streak. Transit travel times will be analyzed for the busways/HOT

lanes on I-10 and I-110. They will also be analyzed for the segments of Figueroa and Flower Streets where the transit signal priority (TSP) is installed. For the TSP analysis, only Silver Line AVL data will be needed as the Silver Streak does not operate on these two streets.

Busway Travel Times

The purpose of this measure of effectiveness (MOE) is to test whether the HOT conversions on the busways have any impact on transit travel times. For this MOE, only the travel times for the Silver Line and Silver Streak will be analyzed. The reason why the Torrance and Gardena Transit routes are not included in this MOE is because they do not have AVL, and also they do not run on the busways. They are feeder routes to the Silver Line. Busway travel times on I-10 for the Silver Line and Silver Streak will be calculated between El Monte Transit Station and Union Station (specifically at intersection at El Monte Busway and Alameda Street). Busway travel times on I-110 for the Silver Line will be calculated between Harbor Gateway Transit Station and the intersection of Adams Boulevard (Blvd.) and Figueroa Street. In both cases, the travel time data will be aggregated into monthly figures for the time periods 6 to 9 a.m. and 3 to 7 p.m.

TSP Travel Times

Transit signal prioritization (TSP) is expected to go operational on Figueroa and Flower Streets in the summer of 2012. On Figueroa Street, TSP has been installed at 15 intersections between Wilshire Blvd. and Adams Blvd. On Flowers Street, TSP has been installed at 5 intersections between Wilshire Blvd. and Olympic Blvd. The average time it takes the buses to traverse these intersections during the a.m. and p.m. peak periods before and after the TSP implementation will be compared. The bus travel time data will be derived from the Silver Line's AVL system and provided by Metro to the national evaluation team. The evaluation will compare six months of post-TSP data to the same six months from the pre-TSP time period.

On-Time Performance. Similar to bus travel times, the purpose of this MOE is to test whether the HOT conversion has any impact on bus on-time performance. Like the bus travel time data, on-time performance data will be derived from the Silver Line and Silver Streak's AVL system. On-Time Performance on I-10 for the Silver Line and Silver Streak will be based on the a.m. arrival times at Union Station (i.e., the intersection of El Monte Busway and Alameda Street) and p.m. arrival times at El Monte Station. On-time performance on I-110 for the Silver Line will be based on a.m. arrival times at the intersection of Adams Blvd. and Figueroa Street and p.m. arrival times at Harbor Gateway Transit Center.

3.1 Data Availability

Table 3-5 summarizes the availability of data from the various transit providers. All of the providers can provide ridership and service quantity data. Only Metro and Foothill Transit have AVL equipped buses capable of providing travel time and reliability data. The municipal operators (Torrance and Gardena Transit) do not have this capability. However, this is not an obstacle to the evaluation. The purpose of collecting bus travel time and reliability data is to test whether converting the busways to HOT lanes leads to changes in these measures. The buses from Gardena Transit do not operate on the busways. Although the buses from Torrance Transit

do operate on the I-110 busway, sufficient travel time data will be collected from the Metro Silver Line.

Table 3-5. Data Sources and Availability

Data Source	Metro	Foothill	Torrance	Gardena	Metrolink
1. Transit Ridership Data	Yes	Yes	Yes	Yes	Yes
2. Transit Service Quantity Data	Yes	Yes	Yes	Yes	n/a
3. Park-and-Ride Lot Utilization Data	Yes	n/a	n/a	n/a	Yes
4. Transit Travel Time Data	Yes	Yes	n/a	n/a	n/a
5. Transit Reliability Data	Yes	Yes	n/a	n/a	n/a

n/a means data not available

3.2 Potential Risks

The greatest potential risk identified thus far is continued slippage in the schedule. Because the LA CRD Program projects are being phased in over time at various intervals, the evaluation team will have to make sure they stay abreast of any schedule changes. If the implementation date of tolling on I-110 and I-10 slips too far, there is a risk that the evaluation may not be able to include a full year of post-deployment data. As of the date of this report, Metro does not foresee any service cuts that could impact the evaluation.

4.0 DATA ANALYSIS

This chapter summarizes how data collected through this test plan and other related data will be used to analyze Urban Partnership Agreement (UPA) transit impacts. The temporal aspects of the analysis are described, followed by a discussion of the specific hypothesis testing that will be performed and the approach for considering the role of exogenous factors.

4.1 Data Analysis Phases

The LA CRD Program funded project elements are being implemented over 33 month period between May 2010 (143 new parking spaces at Pomona North Metrolink Station) and February 2013 (tolling on I-10). To account for this extended deployment period, the transit evaluation data will be partitioned into three phases, as shown below.

Table 4-1. Data Analysis Phases

Phase	Description	Time Period
I	Pre-Deployment (pre CRD transit service and HOT lanes)	6/10 – 5/11
II	Intermediate (some CRD transit service in place but still pre HOT lanes)	6/11 – 9/12
III	Post-Deployment (post CRD transit service and HOT lanes)	10/12 – 2/14

Phase I is intended to cover the time period prior to the initiation of tolls on I-110 and I-10 and prior to the LA CRD funded bus service. According to the local project partners, the first of the CRD funded bus service will begin in June 2011. Therefore, Phase II will commence in June 2011 and cover the intermediate time period before tolls begin. During Phase II, extra service will be added to the I-110 portion of the Silver Line. Phase III will commence in October 2012. That is when tolling begins on I-110 and transit service is enhanced on Torrance Transit's Lines 1 and 2 and Gardena Transit's Line 1. Phase III will continue through February 2013 when tolling begins on I-10 and transit service is enhanced on the Foothill Transit Silverstreak. Phase III will last until February 2014 in order to have an entire year of post-deployment data for I-10.

4.2 Data Analysis Approach

The analysis of transit system data will focus primarily on four of the transit hypotheses specified in Appendix A (and described in detail below). The analysis also supports several other areas of analysis, such as the congestion and equity analyses. Note that evaluation hypotheses related to transit – but which do not include any transit system data (the focus of this test plan) – are not discussed here but are included in the analysis chapters of the test plans that collect such data. For example, the transit evaluation hypothesis related to safety and security uses survey rather than transit system data and is not discussed here.

The data analysis will begin with a quality check of the data received from the transit agencies to determine its completeness and identify any inconsistencies or outliers. Any problems with the data will be resolved in consultation with Metro. Descriptive techniques such as histograms and

graphical trends will be used to characterize the patterns in the data. Standard statistical techniques will be used to assess the significance of observed variations, such as t-tests, F-tests, and chi-square. Where warranted, more sophisticated multivariate techniques such as regression analysis may be applied.

While testing the four transit hypotheses will be the primary focus of the data analysis, some of the same measures used in the transit analysis will also be used in other analyses as noted below. Moreover, since the transit LA CRD Program projects do not occur in isolation, the analysis must take into consideration the effect of influences external to the LA CRD Program in the observed transit data. These exogenous factors include unemployment rates, gasoline prices, atypical travel conditions (weather, incidents, construction), and non-CRD transportation system changes (e.g., roadway improvements or transit fare changes). Thus, this data analysis section includes a discussion of potential exogenous factors and how they will be incorporated in the transit data analysis.

LATransit-1: *CRD projects will enhance transit performance within CRD corridors through reduced travel times, increased service reliability, and increased service capacity.*

This hypothesis is focused on determining how the LA CRD Program project impacts transit performance within the evaluation corridors. Transit capacity measures like aggregate corridor revenue miles and park-and-ride lot capacity will be used to monitor the service capacity provided, while data like average travel time, average travel speed, and on-time performance will be used to assess how the UPA project impacts transit service performance. These different performance measures will be measured over the length of the evaluation corridors. Any transit travel time or reliability change that results from the UPA-funded transit improvements will also be noted in the equity analysis, which looks to assess the social impacts of the UPA project.

LATransit-3: *CRD projects will increase ridership and facilitate a mode shift to transit within CRD corridors.*

The third hypothesis relates to the impact of the LA CRD Program projects on ridership and transit mode share. Monthly average weekday ridership will be tracked. In addition, the transit analysis will use the ridership data to calculate the total person throughput and mode share. To do that, the transit ridership data will be combined with non-transit person trip data taken from the average vehicle occupancy counts in the Traffic System Data Test Plan to derive total person throughput and mode share (i.e., the percentage of person-trips made by each mode). Transit mode share in the LA CRD Program corridor may increase through people switching to transit who previously travelled by private auto, by increased transit usage among existing transit users, or by a reduction in non-transit person throughout. Data from the Survey and Interview Test Plan will play a key role in linking any observed changes in ridership to subsequent transit mode shift that is attributable to the LA CRD Program. This data includes transit on-board surveys. If surveys reveal a large percentage of new transit riders who indicated saving money as their primary reason for switching to transit, then it could be suggested that the LA CRD Program project had a direct impact on transit ridership. Likewise, survey data showing the reasons for any transit usage will help differentiate changes related to the LA CRD Program from changes related to exogenous factors.

LATransit-4: *Increased ridership and mode shift to transit will contribute to increased person throughput, congestion mitigation, and transit cost-effectiveness within CRD corridors.*

The third hypothesis relates to whether any observed changes in transit ridership and transit mode share have any subsequent impact on traffic congestion within the corridor. This will require coordination with the Congestion Analysis portion of the national evaluation. As each transit element of the UPA project is implemented, the measures of effectiveness specified in the Congestion Analysis will be monitored to assess any related impact on congestion. Survey data will also be used to isolate the impact of transit on congestion and assess causality.

LATransit-5: *What was the relative contribution of each CRD project element to increased ridership/ transit mode share/ person throughput?*

The last hypothesis relates to the relative contribution of each of the LA CRD Program project elements to transit mode shift and subsequent congestion reduction. There are a number of CRD-related factors contributing to possible mode shift, including increased vehicle travel cost (the I-10 and I-110 tolls), decreased transit travel time, increased transit reliability, improved transit infrastructure, and increased service quantity. If mode shift to transit does occur, it is important to try to understand why and, to the extent possible, to relate the resultant mode shift to specific project elements. There are two primary mechanisms that the evaluation team will use to try to understand the impact of individual CRD investments. First, the various evaluation surveys (described in the Surveys, Interviews and Workshops Test Plan), including surveys of freeway drivers and transit passengers, will question respondents directly regarding their travel behavior and the specific reasons for their behavior. Second, the phased-in deployment of the CRD investments over several years allows the evaluation team to monitor various transit metrics over time, as the investments are made, and this is also expected to shed some light on the impact of individual projects. Ultimately, it is not certain that any definitive conclusions may be drawn about the impact of individual projects but the evaluation team will endeavor to understand as much as possible using these techniques and any other relevant information that may surface.

Related to the question of the impact of individual CRD investments is the challenge of differentiating CRD-related impacts from non-CRD related factors—that is, "exogenous factors." Exogenous factors included unemployment rates, gasoline prices, atypical travel conditions (construction, special events, extreme weather, etc.), and non-CRD related transportation system changes such as changes in transit fares. Data on these factors will be collected through the Exogenous Factors Data Test Plan and transit impact results will be interpreted in light of this information. It is not assumed that in all, or even most cases, the transit impacts can be quantitatively adjusted to account for exogenous factors but such adjustments will be made where possible. At the least, an understanding of exogenous factors will provide a basis for more informed interpretation of results. In addition to looking at various data collected through the Exogenous Factors Data Test Plan, the evaluation team will consider information to be provided by LACMTA regarding how exogenous factors influence transit ridership. This information will be provided in their quarterly ExpressLanes progress reports. The observed changes in transit usage in the CRD corridors will be analyzed in the light of these exogenous factors.

Finally, the influence of exogenous factors will also be assessed by comparing transit usage in the CRD corridors to general transit trends system-wide. Although not, strictly speaking, a "control corridor" (discussions with the LA CRD partners concluded that no sufficiently comparable corridors exist) such a comparison is expected to provide some insights into how non-CRD factors may influence observed CRD corridor changes.

5.0 SCHEDULE AND RESPONSIBILITIES

Metro and the municipal transit agencies will be responsible for the transit data collection and will submit the data to Metro. Metro is responsible for the transmittal of the transit data to the national evaluation team. The schedule for data collection and reporting frequency are presented in Table 3-1 in Chapter 3. The national evaluation team is responsible for analyzing the transit data and reporting on the findings.

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APPENDIX A – HYPOTHESIS/QUESTIONS FROM THE L.A. COUNTY CRD NATIONAL EVALUATION PLAN

Evaluation Analysis	Hypothesis/ Question Number	Hypothesis/Question
Congestion	LACong-1	Deployment of the CRD improvements will reduce the travel time of users in the I-10 and I-110 corridors.
	LACong-2	Deployment of the CRD improvements will improve the reliability of user trips in the I-10 and I-110 corridors.
	LACong-3	Deployment of the Downtown LA Intelligent Parking Management Project will reduce congestion in the downtown.
	LACong-4	Deploying the CRD improvements will result in more vehicles and persons served in the I-10 and I-110 corridors during peak periods.
	LACong-5	Will surveyed travelers perceive a noticeable reduction in travel times in the treatment corridors?
	LACong-6	Will surveyed travelers perceive a noticeable improvement in trip-time reliability in the treatment corridors?
	LACong-7	Will surveyed travelers perceive a noticeable reduction in the duration of congested periods in the treatment corridors?
	LACong-8	Will surveyed travelers perceive a noticeable reduction in the length of peak congestion periods in the treatment corridors?
	LACong-9	Relative travel times for HOV/HOT lanes vs. general purpose lanes will either remain the same or (more likely) improve for HOV/HOT travelers as a result of the CRD deployments.
	LACong-10	The introduction of tolled SOV traffic into the HOT lanes in the deployment corridors will not negatively impact HOV or transit traffic in terms of average travel times or travel reliability.
	LACong-11	The CRD deployment will not cause traffic congestion to increase in the HOV/HOT lanes.
	LACong-12	Because of latent demand in the deployment corridors, the CRD deployments are not likely to impact in traffic congestion on the general purpose lanes.
	LACong-13	Because of the CRD deployments, congestion on the arterials streets paralleling the corridors will be reduced.

Evaluation Analysis	Hypothesis/ Question Number	Hypothesis/Question
Tolling	LATolling-1	The HOT lanes will regulate vehicular access to the I-10 and I-110 and improve their operation.
	LATolling-2	Some general-purpose lane travelers will shift to the HOT lanes, while HOV lane travelers will continue to use them after they are converted to HOT.
	LATolling-3	After ramp-up, the HOT lanes on I-10 and I-110 pricing maintains operating improvements on I-10 and I-110 after the initial ramp-up period.
	LATolling-4	The downtown IPM project will result in 70-90% of the parking spaces on each block occupied throughout the day.
	LATolling-5	The downtown IPM project may increase parking revenues that can be used to fund system expansion in other high-demand areas.
	LA Tolling-6	Implementing the HOT lanes will reduce the HOV violation rate.
Transit	LATransit-1	CRD projects will enhance transit performance within CRD corridors through reduced travel times, increased service reliability, and increased service capacity.
	LATransit-2	User perceptions of security at transit stations/park-and-ride lots will be improved by CRD projects.
	LATransit-3	CRD projects will increase ridership and facilitate a mode shift to transit within CRD corridors.
	LATransit-4	Increased ridership and mode shift to transit will contribute to increased person throughput, congestion mitigation, and transit cost-effectiveness within CRD corridors.
	LATransit-5	What was the relative contribution of each CRD project element to increased ridership/ transit mode share/person throughput?
Ridesharing	LARideshare-1	CRD vanpool promotion will result in at least 100 new Metro-registered vanpools.
	LARideshare-2	Which factors were most effective in stimulating new vanpool formation?
	LARideshare-3	Will CRD HOT and transit improvements lead to unintended breakups of current carpools/vanpools?
Technology	LATech-1	Travelers will access the IPM website and telephone information system.
	LATech-2	IPM will improve LADOT's ability to reconfigure parking restrictions and rates.
	LATech-3	IPM will improve LADOT's ability to enforce parking regulations.

Evaluation Analysis	Hypothesis/ Question Number	Hypothesis/Question
Safety	LASafety-1	The collective impacts of CRD improvements[3] will be safety neutral or safety positive.
	LASafety-2	The addition of transition zones will not increase incidents.
	LASafety-3	Will boundary jumping cause incidents?
	LASafety-4	Will the additional law enforcement presence (associated with speed and toll enforcement) coupled with enhancement of the dedicated tow truck vehicle removal services associated with the CRD impact incident response and/or clearance time?
	LASafety-5	Will adjusted enforcement procedures affect the number of incidents?
Equity	LAEquity-1	What is the socio-economic and spatial distribution of the direct social effects of the CRD projects?
	LAEquity-2	Are there any differential environmental impacts on certain socio-economic groups?
	LAEquity-3	Will the potential HOT and IPM net revenues be reinvested in an equitable manner?
Environmental	LAEnvironmental-1	Vehicle-related air emissions will decrease in the treatment corridors.
	LAEnvironmental-2	Vehicle-related fuel consumption will decrease in the treatment corridors.
Business Impacts	LABus-Imp-1	How will the downtown IPM project affect retailers and similar businesses that rely on customers' ability to access their stores?

[3] Relevant CRD changes include narrower lanes on portions of the I-10 freeway, new signage, new HOT procedures, new enforcement procedures, and reduced congestion (i.e., faster flowing traffic).

Evaluation Analysis	Hypothesis/ Question Number	Hypothesis/Question
Non-Technical Success	LANon-Tech-1	What role did factors related to these five areas play in the success of the deployment? 1. People: Sponsors, champions, policy entrepreneurs, neutral conveners, legislators 2. Process: Forums (including stakeholder outreach), meetings, alignment of policy ideas with favorable politics and agreement on nature of the problem), legislative and Congressional engagements 3. Structures: Networks, connections and partnerships, concentration of power & decision making authority, conflict mgt. mechanisms, communications strategies, supportive rules and procedures 4. Media: Media coverage, public education 5. Competencies: Cutting across the preceding areas: persuasion, getting grants, doing research, technical/technological competencies; ability to be policy entrepreneurs; knowing how to use markets
	LANon-Tech-2	Does the public support the CRD strategies as effective and appropriate ways to reduce congestion?
Cost Benefit	LACostBenefit-1	Will the LA CRD (Metro ExpressLanes) Program projects have a net societal benefit?

APPENDIX B – PARK-AND-RIDE LOT TRACKING SHEET

Park-and-Ride Lot	Capacity	Jul-10		Aug-10		Sep-10	
		Occupancy	Percent	Occupancy	Percent	Occupancy	Percent
El Monte Station	1,134						
Slauson Station	160						
Manchester Station	127						
Harbor Freeway Station	253						
Rosecrans Station	342						
Harbor Gateway Station	980						
Pomona Station (Metrolink)[1]	372						

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