Los Angeles Congestion Reduction Demonstration (Metro ExpressLanes) Program

National Evaluation: Tolling Data Test Plan

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16. Abstract

This report presents the Tolling Data Test Plan for the national evaluation of the Los Angeles (LA) 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 Tolling Data Test Plan is one of ten test plans being developed. The other nine test plans consist of the following: traffic; exogenous factors; transit systems; surveys, interviews and workshops; ridesharing; safety; environmental; content; and cost-benefit. Each test plan is based on the LA CRD National Evaluation Plan. This test plan describes the sources, availability, and possible risks associated with the data. The methods for analyzing the tolling data are discussed. The schedule and responsibility for collecting, analyzing, and reporting the tolling data are also presented.

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TABLE OF CONTENTS

List of Appendices

List of Tables

List of Figures

LIST OF ABBREVIATIONS

4Ts	Tolling, Transit, Telecommuting, and Technology
ALPR	Automatic license plate reader
Caltrans	California Department of Transportation
CBA	Cost benefit analysis
CHP	California Highway Patrol
CRD	Congestion Reduction Demonstration
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HOT	High occupancy toll
HOV	High occupancy vehicle
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
ITS JPO	Intelligent Transportation Systems Joint Program Office
LA	Los Angeles
LA CRD	Los Angeles Congestion Reduction Demonstration
LADOT	Los Angeles Department of Transportation
LED	Light Emitting Diode
Metro	Los Angeles County Metropolitan Transportation Authority
Metrolink	Southern California Regional Rail Authority
SBCCOG	South Bay Cities Council of Governments
SCAG	Southern California Association of Governments
SGVCOG	San Gabriel Valley Council of Governments
SOV	Single Occupancy Vehicle
TDM	Travel demand management
UPA	Urban Partnership Agreement
U.S. DOT	United States Department of Transportation

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1.0 INTRODUCTION

This report presents the test plan for collecting and analyzing tolling data for the national evaluation of the Los Angeles (LA) Congestion Reduction Demonstration (Metro ExpressLanes) Program) under the United States Department of Transportation (U.S. DOT) Congestion Reduction Demonstration (CRD) program. The LA CRD (Metro ExpressLanes) 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 (Metro ExpressLanes) 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?

Source: "Urban Partnership Agreement Demonstration Evaluation – Statement of Work," United States Department of Transportation, Federal Highway Administration, November 2007.

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,

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

environment, business impacts, non-technical success factors, and cost benefit. Each of these 11 analyses relies upon various evaluation measures of effectiveness.

"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 Tolling Data Test Plan, there are test plans focusing on the following types of data: traffic; transit systems; exogenous factors; ridesharing; safety; environmental; content analysis; surveys, interviews, and workshops; and cost benefit.

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.

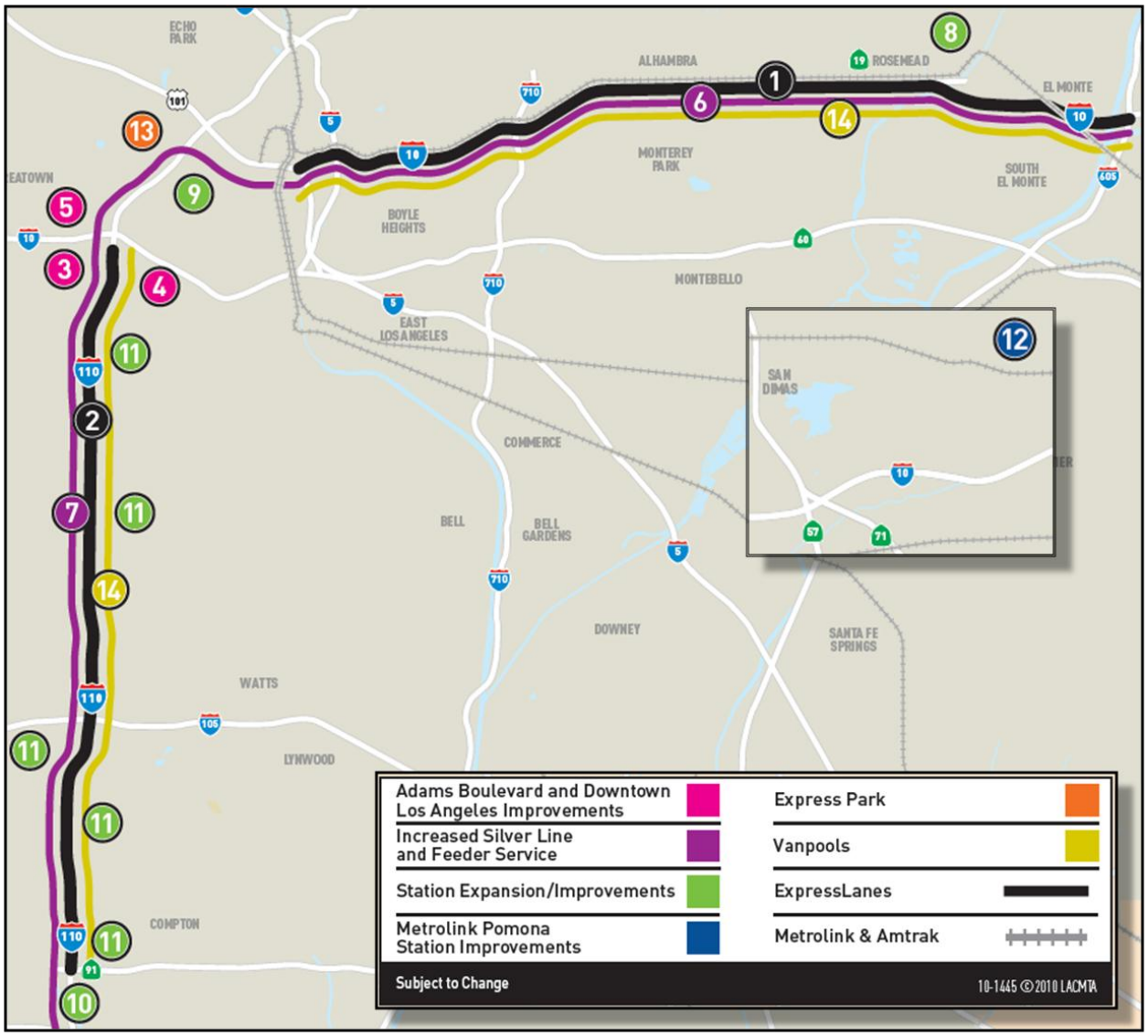
The remainder of this introduction chapter describes the LA CRD (Metro ExpressLanes) Program deployments and elaborates on the relationship between test plans and evaluation analyses. The remainder of the report is divided into three sections. Chapter 2.0 presents the data sources, data availability, and risks associated with the data collected through this test plan. Chapter 3.0 discusses how all of the tolling data will be analyzed and used in the national evaluation. Chapter 4.0 presents the schedule and responsibilities for collecting and analyzing the tolling 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 LA 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.



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.

Derived from Metro ExpressLanes project map.

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

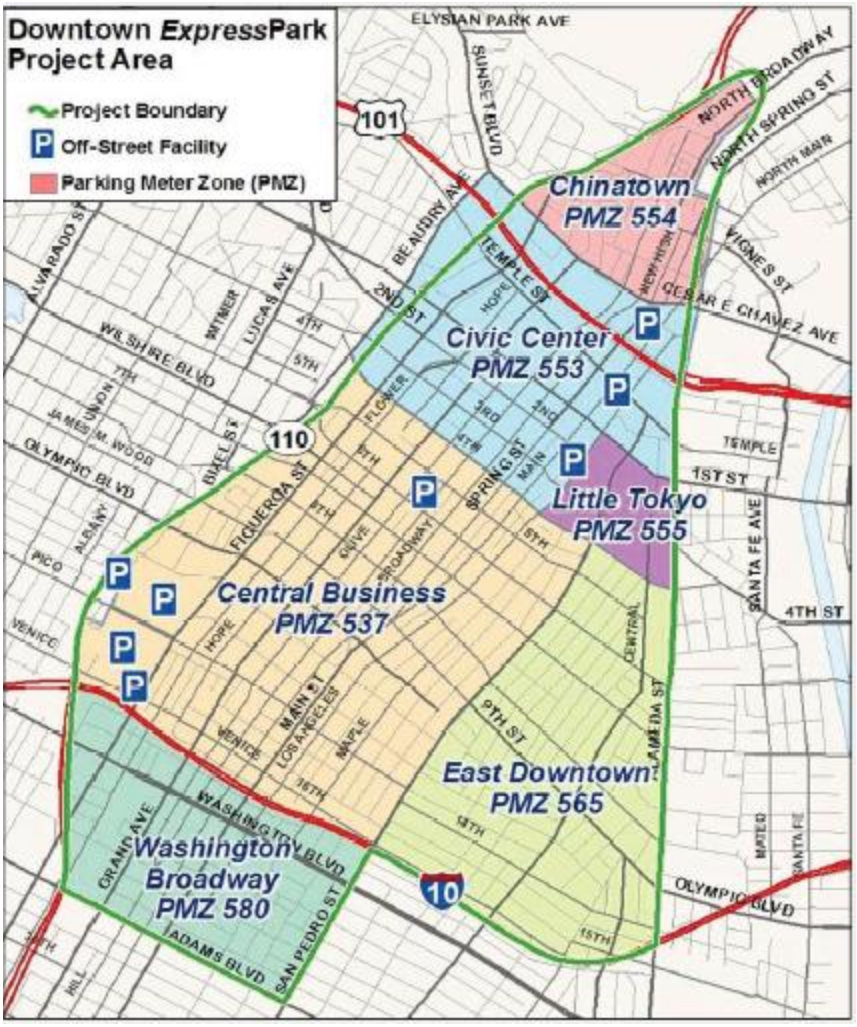
The U.S. DOT is allocating $210.6 million in Federal grant funding for the LA CRD projects, drawn from the Federal Transit Administration (FTA) 5309 Bus and Bus Facilities Program. The LA CRD projects consist of the following:

- **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.



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 Projects. As shown in Figure 1-4, the LA CRD (Metro ExpressLanes) 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 (Metro ExpressLanes) Program projects will be coming on line in advance of I-110 and I-10 tolling. One project will come on line after tolling begins on the I-10.

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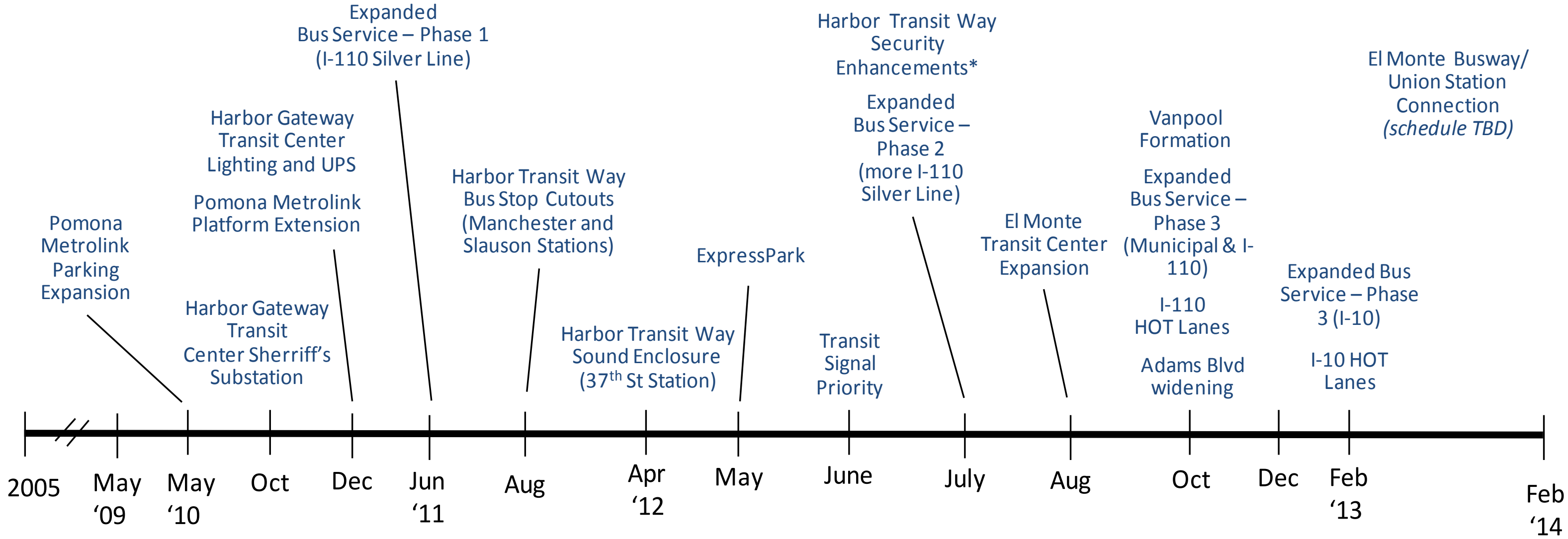
Based on information provided by Metro; March 2012.



**Stations: Slauson, Manchester, Harbor Green Line, Rosecrans, Harbor Gateway*

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

1.2 Los Angeles National Evaluation Plan and the Use of Tolling Data

Table 1-2 shows which of the various LA CRD (Metro ExpressLanes) 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 Tolling Data Test Plan provides major input to the tolling, technology, and cost benefit analyses and supports the congestion, equity, and business impacts analyses. Table 1-3 includes a summary of the tolling data elements, the measures of effectiveness and the hypotheses/questions the tolling data will be used to evaluate.

Table 1-2. Relationships 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	○	○	○	○	○	○	○	○	○	○	

Source: Battelle, June 2012.

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

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

* The only Travel Demand Management (TDM) element included in the LA CRD are those related to ridesharing and therefore what is called the TDM Analysis in the evaluation plan documents for some of the other UPA and CRD sites is referred to as the Ridesharing Analysis in the LA CRD evaluation documents.

Table 1-3. Tolling Test Plan Data Elements Used in Testing Evaluation Hypotheses/Questions

Los Angeles Tolling Data Element	Los Angeles CRD Measure of Effectiveness	Los Angeles CRD Hypothesis/Questions*
1. Number of Express Lane Transponders Sold and Activated	▪ Account activity by month	LATolling-1
2. Number of Express Lane Accounts by Type (Personal or Business Type)	▪ Account activity by month	LATolling-1
3. Number of HOT Lane Transactions by Account Type	▪ Account activity by account type	LATolling-1
4. Express Lane Transactions by Time-of-Day	▪ Increase in vehicle throughput on I-10 and I-110	LATolling-1 LACong-4
5. Express Lane Violation Rate by Type	▪ Change in vehicle-occupancy violation rate	LATolling-6
6. Average and Maximum Toll Price	▪ Average and maximum toll price by time of day on I-10 and I-110	LATolling-1
7. Amount of Time that single occupancy vehicle (SOV) Access is Closed	▪ Amount of time that SOV access is closed by the operators of the lanes.	LATolling-1
8. HOT lane Transactions by Zip Code	▪ Socio-economic and spatial distribution of tolls, parking fees, and adaption costs ▪ Socio-economic and spatial distribution of changes in total transportation costs	LAEquity-1
9. Gross Revenue of HOT System	▪ Spatial and modal distribution of revenue reinvestment ▪ Gross monthly revenue receipts	LA-Equity-3 LACBA-1
10. Occupancy status, as indicated from toll transponders	▪ Increase in person throughout on I-10 and I-110 ▪ Increase average vehicle occupancy in HOT lanes vs. general-purpose lanes	LATolling-1 LACong-4
11. ExpressPark payment methods by type (on-street parking spaces)	▪ Change in parking revenues generated in the parking zone ▪ Percentage of on-street parking session paid by payment type	LATolling-5 LAEquity-1
12. Functional Status of Parking Meters and Sensors	▪ Daily amount of time per space that meters and sensors are operational ▪ Percent of meters and sensors operational	LATech-2 LATech-3
13. Average Parking Session Duration and Turnover by Time of Day	▪ Number of parking sessions by on-street Average length of parking session ▪ Change in the number of parking sessions over a daily or hourly period of time	LATolling-4

Table 1-3. Tolling Test Plan Data Elements Used in Testing Evaluation Hypotheses/Questions (Continued)

Los Angeles Tolling Data Element	Los Angeles CRD Measure of Effectiveness	Los Angeles CRD Hypothesis/Questions*
14. ExpressPark Revenue Reports	▪ Change in parking revenues generated in the targeted zones ▪ Gross monthly revenue receipts	LATolling-5 LAEquity-3 LACostBenefit-1
15. Occupancy Status, Number of Parking Spaces Vacant and Occupied	▪ Change in the percentage of time that parking occupancy is between 70% and 90% of total on-street spaces ▪ Change in on- and off-street parking occupancy by time-of-day and zone ▪ Change in parking turnover by time of day	LATolling-4
16. Meter Payment Status, Paid or Unpaid	▪ Number of meters that have a paid account and unpaid status ▪ Duration of time for meters with a paid account and unpaid status	LATolling-5 LACostBenefit-1
17. Date and Time of Parking Transaction	▪ Change in on-street parking occupancy by time-of-day and zone	LATolling-4
18. Start and End Time of Parking Sessions	▪ Change in on-street parking occupancy by time-of-day and zone	LATolling-4
19. Amount of Time Added to Existing Parking Transactions	▪ Change in on-street parking occupancy by time-of-day and zone	LATolling-4
20. Amount Paid by Driver per Transaction	▪ Change in parking rates in the targeted zone ▪ Change in parking revenues generated in the parking zone	LATolling-5
21. Number of Parking Citations by Type and Amount of Fines Charged	▪ Change in parking revenues generated in the parking zone ▪ Number of parking citations issued ▪ Amount of fines charged	LATolling-5 LATech-3 LACostBenefit-1
22. Occupancy of Spaces with an Unpaid Status (with number of spaces and duration of time)	▪ Change in parking revenues generated in the parking zone	LATolling-5
23. Traveler information system logs (website and phone; showing phone calls and website user sessions)	▪ Number of page views of parking websites ▪ Number of telephone requests for parking information	LATech-1

Source: Battelle, June 2012.

*Listed are acronyms corresponding to hypotheses/questions to be addressed with data from this test plan. An explanation of these acronyms can be found in Appendix A, which contains a compilation of the hypotheses/questions for all the analysis areas from the LA CRD (Metro ExpressLanes) Program National Evaluation Plan.

2.0 DATA SOURCES, AVAILABILITY, AND RISKS

This chapter identifies the sources for the tolling data and discusses the availability of those data and any potential risks associated with collecting and processing them for use in the evaluation. Table 2-2 summarizes the data requirements for the tolling test plan. The details associated with source, timing and other particulars are discussed in the sections that follow.

2.1 Data Sources

The tolling test plan identifies, obtains, and analyzes data on the HOT lanes on I-10 and I-110 and the downtown IPM program for use in the tolling, technology, congestion, equity, business impact, and cost benefit analyses. Based on the LA CRD (Metro ExpressLanes) Program project schedule, the HOT lanes on I-10 and I-110 and the downtown IPM program will be operational by February 2013. The two primary data sources for the tolling evaluation are the HOT lane tolling system and the downtown IPM program Central Management System. In addition, the evaluation will collect data related to the enforcement of the HOT lane tolling policies, downtown parking regulations, and estimated violation rates. These data will be obtained from the CHP for the HOT lanes and from the LADOT for downtown parking.

HOT Transaction Data. All motorists using the HOT lanes will be required to register for a transponder-based account. The transponder is required for toll-free access in the Express Lanes or to pay the toll if the motorist does not meet the minimum occupancy requirement. On both the I-10 and the I-110 ExpressLane corridors, single occupancy vehicles will be required to pay a toll at all times. On the I-10 ExpressLane corridor, HOV-3+ will be permitted to use the lane toll-free at all times. HOV-2 users will be required to pay a toll during peak hours (5 – 9 AM and 4 – 7 PM) and will be permitted to use the lane toll-free at all other times. On the I-110 ExpressLane corridor, HOV-2 users are permitted to use the lane toll-free at all times. Passenger vehicle drivers will be able to declare themselves as carpools with a switchable transponder that will indicate occupancy status. In addition, motorcycles also travel toll-free and are required to set their transponder to the HOV-3+ carpool setting.

The tolling system installed on the HOT lanes will acquire data on the date, time, and amount of toll charges during a one-year period after implementation. Transponder identification numbers from vehicles incurring toll charges will be recorded into a dataset. The evaluation will be seeking summary data from Metro on a quarterly basis (in an electronic format) for use in the toll analysis and other analyses. The data sought include (but may not be limited to):

- The quantity of transponders sold and activated in the I-10 and I-110 catchment areas
- User counts by home zip code and frequency of transponder use
- Number of registered transponders
- The number of tolled trips by hour
- The number of tolled trips by day of the week
- Number and dollar amount of transactions by hour and day of the week
- The average toll rate
- The highest toll rate
- Estimated non-payment violation rate

- Average vehicle occupancy for non-tolled permitted HOV users, based on switchable transponder setting (constrained to a categorical maximum of three or more persons, limits the ability to measure vanpools)
- Amount of time that tolled access will not permitted for SOVs (measure already required to be reported by Metro as pertaining to Title 23 U.S.C. 166 regulations)
- The total revenue generated.

The evaluation will not be seeking any data that personally identify specific HOT lane users.

Metro will be using tolling segments to assess toll prices for system users. The designated segments by corridor, and their respective locations, are shown in Table 2-1. Segments that are listed as "skips" are not incorporated into the pricing algorithm (in other words, not tolled) because Metro determined that placing tolling equipment in these locations was impractical. Some highway segments may overlap one another due to how the pricing algorithm was established, but each segment will be assessed individually.

Table 2-1. Location of Toll Segments

Facility	Direction	Tolled Segment or Gap	Description	Distance (mi.)
I-10	EB	Tolled	Alameda St. to I-710	4.50
		Skip	I-710 to Atlantic Blvd.	1.07
		Tolled	Atlantic Blvd to Del Mar Ave.	2.40
		Skip	Del Mar Ave. to Baldwin Ave.	2.18
		Tolled	Baldwin Ave. and Peck Rd. to I-605	3.05
	WB	Tolled	I-605 to Atlantic Blvd.	5.60
		Tolled	Del Mar Ave. to Atlantic Blvd.	2.85
		Tolled	Atlantic Blvd. to I-710	0.90
		Tolled	I-710 to Alameda St.	5.40
I-110	NB	Tolled	Harbor Gateway Transit Center to West Rosecrans Ave.	1.50
		Tolled	West Rosecrans Ave. to I-105	1.60
		Skip	El Segundo to I-105 Entrance	0.40
		Tolled	I-105 Entrance to Slauson Ave.	3.55
		Tolled	Slauson Ave. to West 39th St.	2.90
		Tolled	West 39th St. to Adams Blvd.	1.15
	SB	Tolled	Adams Blvd. to West Jefferson Blvd.	0.65
		Tolled	West Jefferson Blvd. to Manchester Ave.	3.15
		Tolled	West 39th Street to Manchester Ave.	2.80
		Tolled	Manchester Ave. to Century Blvd.	1.50
		Tolled	Century Blvd. to I-105	2.25
		Skip	I-105 Exit to El Segundo Ramps	0.40
		Tolled	El Segundo to Harbor Gateway Transit Center	3.15

Source: Derived from schematics developed by Metro during October 2011.

HOT Toll Violation Data. CHP will be the primary agency monitoring and issuing vehicle occupancy citations along the HOT lane corridor on I-10 and I-110. An enforcement system with roadside indicators will be used to assist CHP in monitoring the occupancy requirements of the facility. The HOT lanes will have designated enforcement areas nearby and CHP officers will have visual access to a device with light emitting diodes (LEDs) that will indicate whether the driver is in violation. The citation types that will be monitored will be for (1) vehicles without a transponder and (2) vehicles that do not meet the occupancy requirement. Currently, the plan is to implement a system of blue and white LEDs in each enforcement vehicle where a flashing blue LED will indicate SOV, a white LED will indicate HOV-2, a solid blue LED will indicate HOV-3+, and all the LEDs will flash if no transponder in the vehicle is detected.

The toll violation system will be implemented and operated by Metro, with violations being handled directly by Metro. Pictures of license plates will be taken of vehicles in violation using an automatic license plate recognition (ALPR) system that will match license plates to registration addresses in the DMV database. Toll violation notices will be sent in the mail to the person who registered the vehicle.

IPM System Data. ExpressPark is the name of a one-year pilot program that will incorporate demand-based pricing into a parking management system in downtown Los Angeles. The goals of ExpressPark are to increase the availability of open parking spaces, reduce traffic congestion and vehicle emissions, encourage different modes of travel, and to improve customer service. Approximately 6,000 on-street and 7,500 off-street spaces located within the area bounded by I-10, I-110, Alameda St. and Adams Blvd. will be included in the pilot program.

LADOT will implement the system through three phases, which will be as follows:

- Phase I – Base Hourly Rate. Using the baseline data collected before implementation, a base hourly rate will be assessed as the parking fee.
- Phase II – Time of Day. Rates will vary by time of day based on the demand from the peak periods.
- Phase III – Adaptive Pricing. In discrete areas, adaptive pricing will be integrated by altering fees in real-time on a per block basis.

ExpressPark is expected to become operational in May 2012 with a base hourly rate to be applied to all of the parking spaces and facilities. Roughly two months later, either in late July or August, the time-of-day pricing scheme will be introduced in select areas where an improvement in demand management is seen from LADOT. Adaptive pricing is expected to be integrated into ExpressPark by October 2012 and will only appear in selective locations dependent upon public acceptance and demand patterns.

Roughly 150 multi-space pay stations will be available alongside 5,500 enhanced single-space meters that enable users to purchase time either with coins or debit and credit cards. An illuminated display on each station will give the user information on parking rates, time limits, and hours of operation. Sensors in each parking space will provide real-time occupancy data to the management system to help optimize rates, assist traffic enforcement officers, and to give users information through web-enabled devices on parking availability and fees. A total of 6,200 wireless vehicle sensors will be deployed as part of the IPM system. About 600 advanced

parking meters and vehicle sensors were installed by September 2010 – forming the source of the baseline data.

Data will be collected from individual parking meters and on and off-street parking sensors. LADOT will report detailed parking records for each space on a monthly basis in an electronic database format. Parking data will be aggregated by hour from LADOT.

IPM Parking Citation Data. Data on parking citations in the project target zones will be used in the tolling analysis as general information that will aid in the interpretation of evaluation findings. LADOT traffic officers issue citations to users who violate parking regulations, including not paying for time spent at a meter or a public lot, parking longer than a time restriction allows, and not obeying special restrictions – such as street cleaning periods. The ExpressPark system will help to guide LADOT parking enforcement by giving officers real-time information on space occupancy and payment status. A special mobile phone application will be used as a means to provide directed parking enforcement within a small area of the IPM system. The application will identify potential violators, track enforcement activity in real-time, and record the number of disabled placards.

Table 2-2. Summary of Data Needs for Los Angeles UPA/CRD Tolling Test Plan

Data Element	Location	Data Granularity	Data Collection Timing				Data Reporting Frequency	Responsible Agency (Data Source)
			Baseline		Post-Deployment			
			Begin	End	Begin	End		
1. HOT: Number of Transponders Sold and Activated	I-10 and I-110	Monthly	NA	NA	Oct. 2012	Feb. 2014	Quarterly	Metro
2. HOT: Number of Accounts by Type	I-10 and I-110	Monthly	NA	NA	Oct. 2012	Feb. 2014	Quarterly	Metro
3. HOT: Number of Transactions by Account Type	I-10 and I-110	Individual transactions with date/time stamp	NA	NA	Oct. 2012	Feb. 2014	Quarterly	Metro
4. HOT: Express Lane Transactions by Time-of-Day	I-10 and I-110	Transactions by Time Period (AM Peak, PM Peak, Off-Peak, Daily, Weekday, Weekend)	NA	NA	Oct. 2012	Feb. 2014	Quarterly	Metro
5. HOT: Violation Rates by Type	I-10 and I-110	Monthly	NA	NA	Oct. 2012	Feb. 2014	Quarterly	Metro
6. HOT: Average and Maximum Toll Price	I-10 and I-110	AM Peak, PM Peak, Off-Peak, Daily, Weekday, Weekend	NA	NA	Oct. 2012	Feb. 2014	Quarterly	Metro
7. HOT: Amount of Time that SOV Access is not Permitted	I-10 and I-110	Monthly	NA	NA	Oct. 2012	Feb. 2014	Quarterly	Metro
8. HOT: Number of Toll Transactions by Zip Code	I-10 and I-110	Individual transactions with date/time stamp	NA	NA	Oct. 2012	Feb. 2014	Quarterly	Metro
9. HOT: Gross Toll Revenues	I-10 and I-110	Monthly	NA	NA	Oct. 2012	Feb. 2014	Quarterly	Metro

Table 2-2. Summary of Data Needs for Los Angeles UPA/CRD Tolling Test Plan (Continued)

Data Element	Location	Data Granularity	Data Collection Timing				Data Reporting Frequency	Responsible Agency (Data Source)
			Baseline		Post-Deployment			
			Begin	End	Begin	End		
10. HOT: Occupancy status, as indicated from toll transponders (SOV, HOV-2, HOV-3+)	I-10 and I-110	Individual transactions with date/time stamp	NA	NA	Oct. 2012	Feb. 2014	Quarterly	Metro
11. IPM: Payment Method	Meters	Zone	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT
12. IPM: Functional Status of Meters and Sensors	Meters	Space by Day	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT
13. IPM: Average Length of Stay and Turnover by Time of Day	On-Street Sensors	Zone	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT
14. IPM: ExpressPark Revenue Reports	Meters	Zone by Month	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT
15. IPM: Occupancy Status, Number of Parking Spaces Vacant and Occupied	Meters, On-Street Sensors and Off-Street Occupancy Data	Space	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT
16. IPM: Payment Status, Paid or Unpaid	Meters	Space	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT
17. IPM: Date and Time of Transaction	Meters	Individual transactions by parking space	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT
18. IPM: Start and End Time of Session	Meters, On-Street Sensors	Individual transactions by parking space	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT

Table 2-2. Summary of Data Needs for Los Angeles UPA/CRD Tolling Test Plan (Continued)

Data Element	Location	Data Granularity	Data Collection Timing				Data Reporting Frequency	Responsible Agency (Data Source)
			Baseline		Post-Deployment			
			Begin	End	Begin	End		
19. IPM: Amount of Time Added to an Existing Transaction	Meters	Individual transactions by parking space	May 2012	May 2013	May 2012	May 2013	Monthly	LADOT
20. IPM: Amount Paid by Driver per Transaction	Meters	Individual transactions by parking space	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT
21. IPM: Number and Type of Citations and Amount Fined	Downtown LA	Block	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT
22. Occupancy of Spaces with an Unpaid Status (with number of spaces and duration of time)	Meters, On-Street Sensors	Spaces	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT
23. IPM: Number of Website Hits and Phone Calls to Guidance System	Guidance System	Monthly	May 2011	May 2012	May 2012	May 2013	Monthly	LADOT

Source: Battelle, June 2012.

2.2 Data Availability

As noted, the toll data will be obtained from Metro. There is no pre-deployment toll data for I-110 and I-10. Post-deployment data collection will be initiated after the implementation of tolling on both I-110 and I-10 in 2012 and 2013, respectively. It is anticipated that daily toll system data and a separate transponder account dataset will be batched and transmitted to the national evaluator on a quarterly basis. Information on new accounts will be provided on a monthly basis to the national evaluation team. Metro will also provide transaction data that includes the zip codes of account holders and frequency of use on a monthly basis.

2.3 Potential Risks

There do not appear to be any significant risks associated with obtaining tolling data from Metro. The accuracy of toll transaction data is not expected to be a problem. Radio-frequency identification technology used for tolling purposes is typically 99%+ accurate, unlike other forms of fixed-point sensors used for traffic data collection. Although there are no significant risks anticipated, there are a few, more minor risks associated with tolling data as identified in Table 2-3. No major risks are apparent with the collection of data from the IPM system.

Table 2-3. Potential Risks and Mitigation for Tolling Data Collection

Risk	Mitigation
Potential inaccuracy of loop detector data, associating toll prices with traffic volumes	Toll transaction data will be used as a surrogate
Potential atypical conditions, exogenous factors	A multivariate analysis will be used to control for infrequent events, school and holiday schedules, weather, major regional economic changes, construction activity
Use of zip codes to infer demographic characteristics of users may lead to inaccurate conclusions	Comparison with household survey results
The system acceptance test period occurs during the first 60 days of operation, and if the a fatal flaw occurs during this period – the test period starts again for another 60 days as part of a process to normalize operations. Bugs and anomalies in tolling data may occur during the ramp-up phase that may affect data quality.	Data collected during the ramp-up period will be scrutinized, and if it is questionable, will be set aside in the analysis from the rest of the post-deployment data.

Source: Battelle, June 2012.

3.0 DATA ANALYSIS

This chapter discusses the approach for analyzing the pricing data. The data generated by the tolling system are expected to be highly accurate based on similar systems implemented for other regions. Data from the IPM system is fairly new, from the context that not many dynamic paid parking schemes have been implemented nationwide. Nevertheless, as a first step in the data analysis, the national evaluation team will conduct a visual inspection of the data and will use automated range checks to identify any outliers or suspect data. Any data concerns identified will be checked with representatives from Metro and LADOT.

For the I-10 and I-110 HOT lanes, one month of data directly proceeding after the start of tolling will be defined as occurring within the ramp-up period, when the tolling operator will attempt to manage traffic demand without the benefit of using historical data as a baseline. Due to system unpredictability with starting a tolled facility, a month of data from the ramp-up period will be separated out in the evaluation from the one-year after deployment period.

Using data collected through the Exogenous Factors Test Plan, the analysis will take into consideration a number of factors un-related to tolling that may influence travel in the corridor. Among the items to be reviewed are non-typical travel condition data (incidents, construction, adverse weather), transportation system changes (such as major roadway improvements), and regional economic conditions, including employment and gas prices. It is anticipated that pricing data impacted by exogenous influences will not be eliminated from the analysis, but rather will be examined to understand the influence of those factors on toll usage and parking occupancy.

A variety of analytic techniques will be used. Descriptive analytic tools, such as histograms and graphs, will be produced to identify patterns in the data. Standard statistical measures, such as t-tests, F-tests, and Chi-Square tests, will help identify statistically significant variations in the data. Multivariate techniques, such as regression analysis, will be the primary technique for incorporating exogenous factors into assessing the pricing data.

The data obtained from the toll system database will be used to examine measures of effectiveness needed for the tolling, technology, and cost benefit analyses. Examples of the data analysis conducted using the tolling data are discussed below:

- **Toll transactions on the express lanes.** Examining toll transactions in the I-10 and I-110 express lanes provides a basic indication of use levels. Tolling data will be aggregated by tolling segment, using the same segments identified by Metro in assessing toll prices for users. Toll transaction by time-of-day and by segment will analyze use of the HOT lanes during different times of day, different directions of travel, and to identify those segments with high levels of use and those with lower levels of use. An assessment of the person and vehicle throughput, speed and travel time reliability on the I-10 and I-110 express lanes will be made with the use of tolling data. Data from the Traffic Systems Test Plan, for both the express and general purpose lanes, will be aggregated by tolling zone in an attempt to match tolling price to traffic conditions in specific locations (i.e., compare price to time saved). Preferably, all of the traffic sensors located within a segment would be aggregated for the analysis, but Metro has indicated that many of the

sensors on the I-10 and I-110 corridors are inoperable. An alternative possibility would include the estimation of travel speeds for segments using the limited, functional traffic sensors remaining. Travel time data will be collected by conducting either manual or GPS-based vehicle runs in the corridor, based on timestamps recorded at specific locations. Vehicle occupancy data for both the express and general purpose lanes will be collected from the Traffic System Data Test Plan and used in an assessment to gauge the volumes of single-occupant vehicles and HOVs before-and-after the implementation of pricing (LATolling-1). The amount of time that access is closed to SOVs in the managed lanes will be used to gauge accessibility for the SOV user group, compared to the pre-implementation period when access was prohibited. The traffic conditions in the adjacent general-purpose freeway lanes will be examined based on data from the Traffic System Data Test Plan to explore possible correlations between traffic congestion in the general-purpose freeway lanes and the use of express lanes (LACong-4). The quarterly toll revenue reports will be used as an input for the cost-benefit analysis to assess the net benefits of the project (LACBA-1).

- **Managing downtown parking occupancy.** An objective of the LA CRD (Metro ExpressLanes) Program is to maintain 70-90 percent occupancy of on and off-street parking spaces in Downtown Los Angeles. The tolling analysis will incorporate an investigation of parking occupancy by time-of-day and zone to examine the effectiveness of dynamic pricing to maintain occupancy and any changes in parking availability throughout the day. The payment ratio, defined as the number of parking spaces to the number of spaces with paid sessions, will also be used as a performance measure (LATolling-4). The technology analysis will assess whether the functioning status of the meters and sensors will allow LADOT to properly enforce and manage the ExpressPark system (LATech-2, LATech-3).
- **Potential equity concerns.** For the equity analysis, the geographic distribution of the express lane users will be examined by zip codes with the median household incomes associated with those areas. Data from transactions will be used in the analysis to provide zip codes of records without compromising any privacy concerns. The zip codes will be aggregated as closely as possible to census tracts in the corridor. Census data on income, automobiles per household, households without an automobile available, race and ethnicity, and age will be examined to characterize express lane users and identify potential equity concerns. Frequency of using the express by zip code of transactions will also be examined to the extent possible. This analysis will explore potential differences in frequency of use by individuals residing in areas with different socio-economic characteristics (LAEquity-1). The gross revenues from the HOT lanes will be assessed to evaluate whether the reinvestment income will be applied equitably across geographies and different travel modes (LAEquity-3). Statistics regarding revenue streams will also be used in the cost-benefit evaluation as a part of a net benefit measure for the I-10 and I-110 HOT lanes (LACostBenefit-1).
- **Providing traveler information.** Traveler information logs from the IPM system will be measured to assess the ability of providing data to users of the parking system. Both the number of page views of the parking website and the number of telephone requests will be used as a measure of effectiveness (LATech-1).

- **Parking revenue data.** Data on the parking rates and revenues by time of day, payment methods, and use of the parking revenues will be examined to assess the ability of the IPM program to finance system expansion into other high-demand areas (LATolling-5).
- **Change in express lane violation rates.** Information from the ExpressLane Quarterly Reports will be aggregated and provided by Metro. The citations will be used to assess changes in vehicle-occupancy violation rates on the I-10 and I-110 HOT lanes between the pre- and post-deployment time periods (LATolling-6).
- **Change in exempt vehicle parking rates and placard violators.** The percentage of exempt vehicles using the IPM system will be assessed over time to measure whether a change in rate structure will impact the presence of non-fee paying users. Under California State Law, vehicles with disabled placards or government decals are exempt from any on-street parking fees or time restrictions. However, exempt vehicles are required to be moved when a street sweeping no parking regulation is in effect. The main data element that will be used for the analysis will be the number and duration of time of spaces that are occupied with an unpaid status. Additionally, citations given by parking enforcement officers will be sought to determine if vehicles with an exempt placard were abusing the system by not having proper authority. Exempt vehicle rates will be compared, along with the number of placard abuse citations, before and after the implementation of the ExpressPark program and during each of the three phases of pricing (flat rate, time-of-day, and dynamic). The payment ratio will also be used in conjunction with parking occupancy to assess the number of non-paying users. The amount of the parking fee could potentially increase for specific blocks in the last dynamic stage of the program – potentially prompting an increase in the presence of exempt vehicles and violators that will likely be caused from reluctance to pay higher fees. The SF*park* system for the San Francisco UPA initially had a similar change after the program was introduced (LATolling-5).

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4.0 SCHEDULE AND RESPONSIBILITY

Table 4-1 describes the data collection schedule for HOT and IPM related systems and lists the organization that is expected to provide the corresponding data elements. HOT lane data will start to be collected from the implementation date of October 2012 for I-110 and February 2013 for I-10 and extend for a period of one year each in both corridors. Pre-deployment data will be collected from the IPM system, beginning in May 2011 and ending in May 2012. The IPM post-deployment data collection period will be from May 2012 to May 2013. Metro will be responsible for transaction and violation data (e.g., photo toll enforcement data) on the HOT lanes. CHP issues citations for HOT lane users that do not meet the occupancy requirement. LADOT will provide data on the IPM system and corresponding violations. No historical datasets will be needed for the evaluation.

Table 4-1. Tolling Data Collection Schedule

Data Type	Historical	Pre-Deployment	Post-Deployment	Provider
HOT Transaction Data			✔	Metro
HOT Toll Citation Data			✔	CHP and Metro
IPM Area System Data		✔	✔	LADOT
IPM Area Parking Citation Data		✔	✔	LADOT

Source: Battelle, June 2012.

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APPENDIX A – COMPILATION OF HYPOTHESIS/QUESTIONS FROM THE LOS ANGELES 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 promoting ridesharing?
	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 HOT infrastructure changes affect the time needed to respond to or clear accidents?
	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 lane net revenues be reinvested in an equitable manner?
Environmental	LAEnvironmental-1	Vehicle-related air emissions will decrease in the treatment corridors.
	LAEnvironmental-2	Users of the two corridors will perceive improvements in air quality as a result of the CRD projects.
	LAEnvironmental-3	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 UPA 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?

Source: Battelle, June 2012.

U.S. Department of Transportation
ITS Joint Program Office-HOIT
1200 New Jersey Avenue, SE
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