PERFORMANCE MONITORING SUMMARY

Background & Previous Planning Efforts

In 2002, the City of Albuquerque adopted the *Central Avenue Streetscape Master Plan*, a "blueprint" to guide the redevelopment of West Central Avenue with the vision of a vibrant, higher-density, multi-modal corridor. The plan identified improvement strategies to create a "complete street", with primary objectives to:

1. Reduce speeding and improve mobility and safety of the West Central Avenue Corridor for all users;
2. Designate an area within the roadway for bicycle travel to improve connectivity between downtown and the City's bikeway and trail systems;
3. Improve quality of life and create a sense of neighborhood through the design of safe and attractive streets.

COMPLETE STREETS

Many communities have adopted "complete streets" laws and policies to ensure that streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a complete street.

The Master Plan called for the consideration of a lane reduction from a five-lane configuration to a three-lane cross section for Central Avenue from 8th Street to Rancho Seco Road. The excess roadway width would be used to provide bike lanes, wider sidewalks and other safety and streetscape improvements. In 2008, the *West Central Avenue Corridor Concept Plan* was developed, and included short-term and long-term design concepts for the lane reduction along Central Avenue.

LANE REDUCTION PROJECT

In this case, a lane reduction project describes a roadway modification whereby the number of travel lanes is reduced to reallocate the effective roadway width to provide features such as wider sidewalks, landscaping, medians, bicycle facilities, a two-way left turn lanes or on-street parking.

Demonstration Project & Monitoring Plan

Prior to implementing major infrastructure changes, the near-term improvements outlined in the 2008 Concept Plan were designed to be implemented with simple restriping and minor modifications as a one-year "demonstration", or pilot project in order to test the feasibility of the lane reductions and identify the benefits, and any fatal flaws associated with the modifications. In Spring of 2011, the interim striping plan was implemented to change the lane configuration of the street and add bike lanes without making major infrastructure changes, such as widening sidewalks and relocating curb and gutter. As part of the one-year Demonstration Project, a detailed performance monitoring program was performed to record and evaluate the effectiveness of the Demonstration Project. The performance monitoring study included a variety of data gathering for one period during "Before Study" conditions (prior to restriping) and at quarterly intervals over one year for "After Study" conditions (after restriping). The results of the monitoring plan provide an opportunity to refine the design and inform decision-makers before authorizing the ultimate improvements.

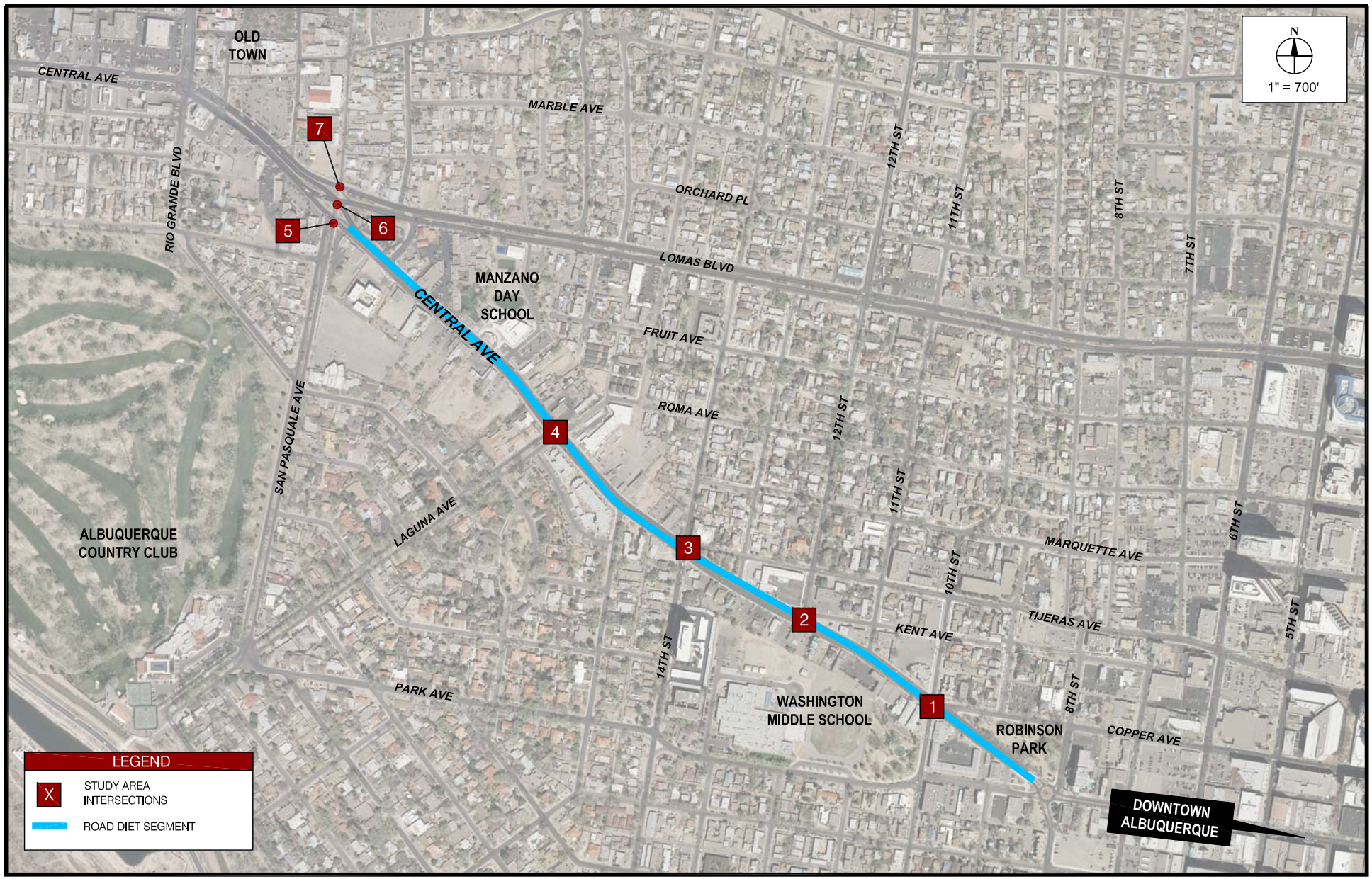

FIGURE 1

WEST CENTRAL AVENUE - LOMAS BOULEVARD TO 8TH STREET

PROJECT VICINITY AND STUDY INTERSECTION LOCATIONS

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Typical Existing Lane Configuation
(Where Left Turn Lanes Exist)

Approximate Cross Section Dimensions

- Roadway Width = 64'-66'
- Inside Travel Lane = 12'
- Outside Travel Lane (narrow shoulder/no parking) = 12'
- Outside Travel Lane (with shoulder/parking) = 16'-18'
- Left Turn Lane = 12'

Typical Existing Lane Configuation
(Without Left Turn Lanes)

Approximate Cross Section Dimensions

- Roadway Width = 64'-66'
- Inside Travel Lane = 12'
- Outside Travel Lane (with shoulder/parking) = 18'-22'

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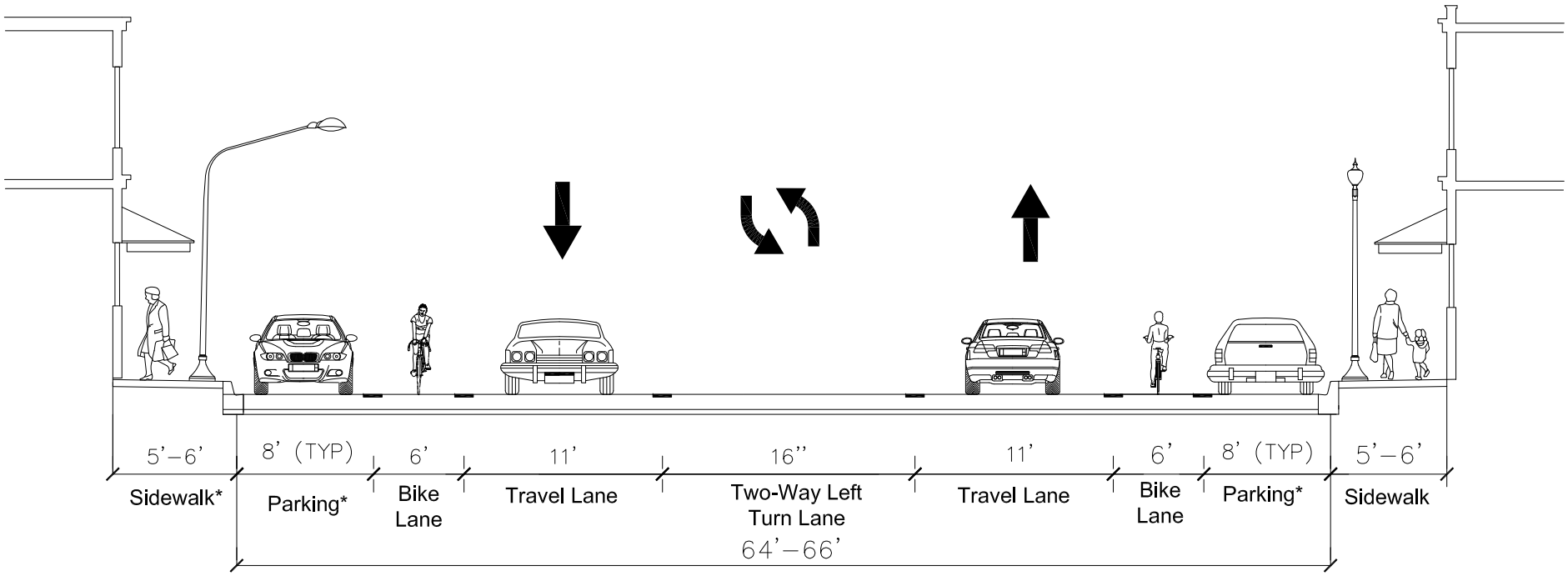
FIGURE 2
BEFORE STUDY TYPICAL STREET CONFIGURATION



*In some locations, wide parking lane/shoulder reserves width for sidewalk widening to accomodate future ground floor activity, streetscape features, and landscaping.

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FIGURE 3
NEAR-TERM DEMONSTRATION PROJECT TYPICAL STREET CROSS SECTION

Demonstration Project Monitoring Plan Components

The monitoring program included extensive data collection and information gathering in order to assess the benefits and potential impacts of the project. The key monitoring plan components are summarized in the table below.

Monitoring Element	Purpose	Frequency
Traffic / Pedestrian / Bicycle Counts	▪ Identify shift in traffic patterns ▪ Identify shift to alternative travel modes ▪ Monitor traffic operations	5 Times (once before; quarterly after restriping)
Parking Occupancy Counts	▪ Monitor change in parking utilization	5 Times (once before; quarterly after restriping)
Travel Time Runs	▪ Monitor operational performance of three-lane configuration ▪ Identify impacts to vehicular circulation/delay	5 Times (once before; quarterly after restriping)
Accident Data Review	▪ Compare vehicular, pedestrian and bicycle accident rates and types before and after implementation of the project	1 Time After one year, collect and review accident data for before and after conditions
Queuing Observations	▪ Monitor operational performance of three-lane configuration ▪ Identify impacts to vehicular circulation ▪ Identify change in traffic congestion	5 Times (once before; quarterly after restriping)
Speed Surveys	▪ Study change in vehicle speeds with implementation of the three-lane configuration	5 Times (once before; quarterly after restriping)
Transit Travel Time Surveys	▪ Monitor performance of transit service with three-lane configuration ▪ Identify impacts to transit service on-time performance and reliability	5 Times (once before; quarterly after restriping)
Stakeholder Interviews / Survey	▪ Record stakeholder perceptions of functionality and safety of three-lane configuration	1 Time After one year, interview and/or survey area stakeholders, such as neighborhood residents, business associations, schools, transit providers/users and bicycle advocates.

Performance Measures

The extensive data and information collected over the one-year monitoring program was used to evaluate the project using a diverse set of performance criteria. The following criteria, as presented in the table below, were established with the intent of evaluating the performance of the Demonstration Project with respect to vehicular, bicycle, transit and pedestrian mobility and safety.

Performance Measures

Measure	Description
Auto Travel Time	The time required for the average automobile to travel a route between two defined points. Travel time includes the running time when a vehicle is in motion, and the stopped delay time, or time in which the vehicle is stopped or moving slowly.
Transit Travel Time	The time required for a transit vehicle to travel a route between two defined points. Travel time includes the running time when a vehicle is in motion, and the stopped delay time, or time in which the vehicle is stopped (including passenger loading) or moving slowly,
Travel Speed	Vehicle speeds are presented in various forms. Average speeds over a defined roadway segment can be determined using the average travel time and the length of the roadway segment. In addition, spot speed data can be collected over time at a specific point along a roadway segment to determine the average vehicle speed, as well as the number of observed vehicles traveling at various speed increments.
Intersection Operations	Intersection operations are evaluated based on several criteria, including level of service (LOS), control delay, and vehicle queuing.
Traffic Pattern Shifts / Neighborhood Cut-Through	Significant fluctuations, or changes to traffic volumes and/or distribution patterns within a defined study area may indicate that drivers are utilizing alternate routes to travel between their origin and destination. Increases to cut-through traffic, or traffic that passes through residential neighborhoods using streets not intended for through traffic, are of particular concern with implementation of significant changes to the roadway network.
On-Street Parking Activity	For this study, on-street parking activity is measured based on the peak on-street parking activity observed throughout the day.
Pedestrian and Bicycle Activity	Bicycle and pedestrian activity is measured based on the observed number of cyclists and pedestrians traveling within a defined study area during given period of time.
Crash Frequency/Severity	Crash assessment for a defined roadway segment includes an analysis of reported accident data over time to determine crash frequency, crash rates, common types of crashes, and severity (i.e. injuries, property damage, etc.).
Community Satisfaction	Community satisfaction with regards to the Central Avenue Demonstration Project is evaluated based on input from selected stakeholders, such as nearby businesses, neighbors, commuters, local schools, and bicycle advocacy groups,

Summary of Performance Monitoring Results

The key results of the performance monitoring program, using the performance monitoring criteria described in the previous table, are summarized as follows:

Auto Travel Times

- Overall peak period travel time increased by an average of 10% from Before Study conditions.
- Average AM peak direction (eastbound) travel time increased by 5 sec. (3%) from Before Study conditions to After Study conditions.
- Average AM non-peak direction (westbound) travel time increased by 45 sec. (21%) from Before Study conditions to After Study conditions.
- Average PM peak direction (westbound) travel time increased by 17 sec. (8%) from Before Study conditions to After Study conditions.
- Average PM non-peak direction (eastbound) travel time increased by 20 sec. (11%) from Before Study conditions to After Study conditions.

Before and After study Vehicle Travel Times

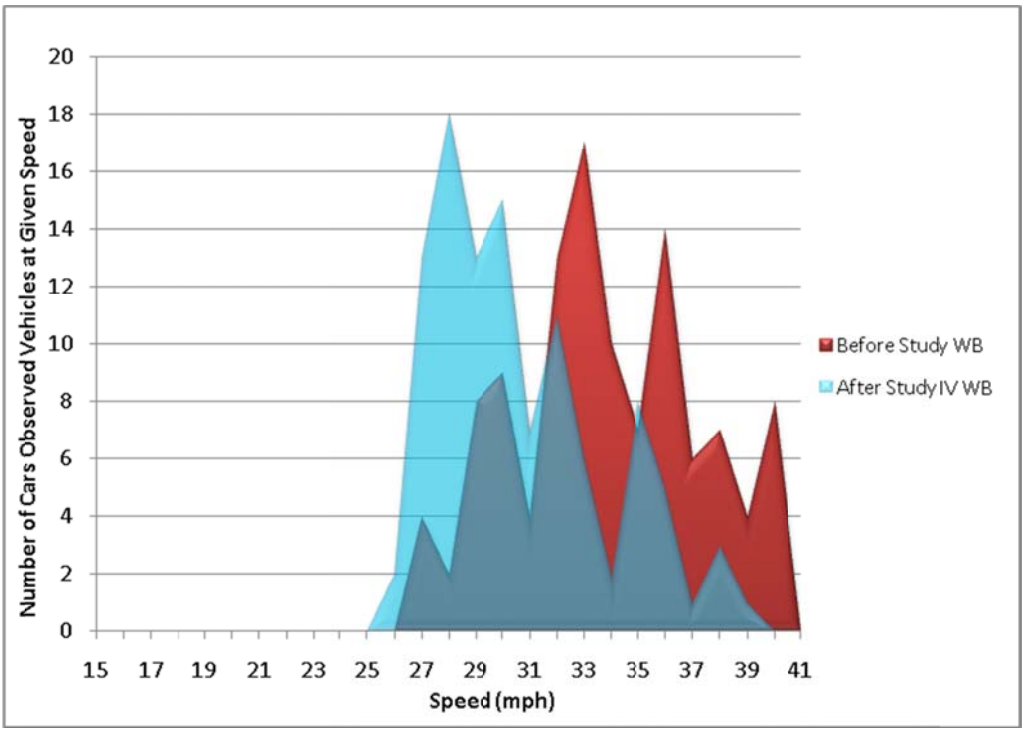
Corridor Summary	Dir.	Before Study (Mar 2011)	After Study I (July 2011)	After Study II (Oct 2011)	After Study III (Feb 2012)	After Study IV (May 2012)
AM PEAK						
Average Travel Time (sec)	EB	198	188	223	212	203
Change from Before Study (sec)		-	*-10*	*25*	*14*	*5*
% Change from Before Study		-	*-4.9%*	*12.8%*	*7.1%*	*2.4%*
Average Travel Time (sec)	WB	219	217	239	237	264
Change from Before Study (sec)		-	*-3*	*19*	*18*	*45*
% Change from Before Study		-	*-1.2%*	*8.8%*	*8.1%*	*20.5%*
PM PEAK						
Average Travel Time (sec)	EB	180	175	176	186	199
Change from Before Study (sec)		-	*-5*	*-4*	*6*	*20*
% Change from Before Study		-	*-2.8%*	*-2.2%*	*3.4%*	*10.9%*
Average Travel Time (sec)	WB	229	240	267	264	247
Change from Before Study (sec)		-	*10*	*37*	*35*	*17*
% Change from Before Study		-	*4.5%*	*16.3%*	*15.3%*	*7.6%*

Note:
Eastbound (EB) Travel Time Study Limits – Rio Grande Boulevard to 7th Street
Westbound (WB) Travel Time Study Limits – 7th Street to Rio Grande Boulevard

Auto Speeds

- Average peak direction running speed decreased by two percent (2%) during the AM peak period and by seven percent (7%) during the PM peak period.
- Average non-peak direction running speed decreased by 17 percent during the AM peak period and 10 percent during the PM peak period.
- Spot speed survey data recorded on Central Avenue showed the following:
    - Before Study (Spring 2011)
        - Average eastbound speed = 34 mph
        - Average westbound speed = 34 mph
        - 85 percent of observed vehicles traveling over speed limit of 30 mph
        - 33 percent of observed vehicles traveling over 35 mph
    - After Study (Spring 2012)
        - Average eastbound speed = 30 mph
        - Average westbound speed = 31 mph
        - 40 percent of observed vehicles traveling over speed limit of 30 mph
        - 7 percent of observed vehicles traveling over 35 mph

Central Avenue Spot Speed Survey (Westbound)



Transit Travel Times

- Average travel time for ABQ Ride Local Route 66 increased by nine percent (9%).
- Average travel time for Rapid Ride Route 766 increased by one percent (1%).

Intersection Levels of Service (LOS)

Study intersections include all signalized intersections on Central Avenue between Lomas Boulevard/San Pasquale and 8th Street.

- Before Study (Spring 2011) – All intersections operate at acceptable LOS D or better for AM and PM peak hour conditions.
- After Study (Spring 2012) – All intersections operate at acceptable LOS D or better for AM and PM peak hour conditions.

Intersection Queuing

- By reducing the number of through travel lanes, vehicles on Central Avenue now queue in a single lane at intersections instead of two lanes.
- Peak period vehicle queues in the eastbound and westbound through lanes along Central Avenue were observed to generally double during AM and PM peak periods after implementation of the Demonstration Project.
- The most significant queues were observed during the PM peak hour at Central Avenue/12th Street and at Central Avenue/14th Street, where peak queues in the westbound through lanes increased from seven vehicles to as high as 15 vehicles during After Study conditions.
- Some moderate increases (1-3 vehicles) to peak queues were observed on side street approaches; however, there were no observed instances where vehicle queues blocked upstream streets or spilled beyond available left turn pockets.

Bike and Pedestrian Activity & On-Street Parking Activity

- Bicycle and pedestrian activity along the Central Avenue Corridor was observed to remain generally consistent during the AM and PM peak periods from Before Study to After Study conditions.
- Peak parking occupancy remained generally consistent from Before Study to After Study conditions.

Traffic Shifting/Neighborhood Cut-Through

- Average Daily Traffic (ADT) volumes decreased by approximately four percent (4%) on Central Avenue and increased by approximately seven percent (7%) on Lomas Boulevard, indicating that there is some likelihood of a moderate traffic shift from Central Avenue to Lomas Boulevard, which has reserve capacity based on current volumes.

- There were no significant changes to traffic volumes along parallel and perpendicular neighborhood streets between Central and Lomas that would serve as likely cut-through routes to bypass Central Avenue.

Crash Analysis

- Based on available crash data for Before Study conditions (five-year history before lane reduction) and After Study conditions (eight and one-half months after lane reduction), crash rates along Central Avenue decreased by 45 percent.
- The percentage of crashes involving injuries remained approximately the same from Before Study to After Study conditions.
- There were six crashes involving bicycles or pedestrians in the five-year period prior to the Demonstration Project, and zero crashes involving bicycles or pedestrians after implementation of the Demonstration Project.

Community Satisfaction/Stakeholder Input

- Community and stakeholder feedback was generally mixed, with many residents and business owners having positive impressions of the Demonstration Project improvements, while commuters and some residents expressed concerns with perceived increases in vehicular congestion and delays, and trouble accessing Central Avenue from side streets or driveways.
- 55 percent of community input survey participants felt that their experience as a driver along Central Avenue was the same, or better, compared to 45 percent who felt their experience was worse after the lane reduction.
- 85 percent of survey participants felt that their experience as a pedestrian was the same or improved with the lane reduction, while 83 percent felt that, as a cyclist, their experience traveling Central Avenue was the same or better.
- 77 percent of survey participants felt that the lane reduction improved their experience as a transit user along Central Avenue.

Conclusions and Recommendations

There are no universally accepted performance measures by which to judge the success, or failure, of a lane reduction project like the Demonstration Project. Whereas various data can be collected and used to quantify the impact of a lane reduction, there are no standardized criteria or thresholds. In order to evaluate the overall effectiveness and of the West Central Avenue Demonstration Project and identify potential positive or negative impacts associated with the roadway modifications, various performance measures were developed and monitored over the course of one year. Overall, the Demonstration Project was successful in meeting the following goals:

1. Reduce speeding along the corridor
2. Designate an area within the roadway for bicycle travel

3. Create opportunities for enhanced transit facilities
4. Effectively enhance the environment for all street users while maintaining acceptable traffic operations
5. Reduce the crash frequency, severity, and number along the corridor
6. Further separate vehicles from the sidewalk pedestrian realm
7. Enhance livability and quality of life for adjacent residents and other roadway users

On the other hand, the Demonstration Project generated the following concerns for some stakeholders:

8. Perceived increases in vehicular congestion and delays along the corridor
9. Increased difficulty in finding acceptable gaps in traffic to access Central Avenue from unsignalized side streets and driveways
10. Concern over worsening mobility for drivers in order to improve conditions for bicyclists and pedestrians, who represent a minority proportion of all trips

After a detailed analysis of Before Study conditions and a one-year monitoring program of After Study conditions using a diverse set of performance measures, there were no indicators that the West Central Avenue Demonstration Project modifications resulted in unsafe conditions or deteriorated traffic operations that would be deemed unacceptable by most standards. However, community feedback regarding the Demonstration Project is not universally positive, with some concerns from commuters and other stakeholders about increased traffic congestion and delays along the corridor. Although there has yet to be a significant increase in travel using alternative modes (walking, cycling, transit), the overall response from surveyed stakeholders is that the roadway modifications have improved conditions for pedestrians and cyclists, and transit users.

In moving forward with implementation of the proposed ultimate improvements along the corridor, the following recommendations are provided in order to continue to improve operations along West Central Avenue and to increase community satisfaction with the complete street improvements:

- Continue community outreach efforts to communicate the near-term and long-term benefits of the complete street improvements (i.e. wider sidewalks, improved pedestrian crossings, enhanced landscaping and streetscape elements, improved bus stops, catalyst for redevelopment).
- Pursue the ability to isolate the traffic signal group along the three-lane segment of Central Avenue between San Pasquale Avenue/Lomas Boulevard and 10th Street from the existing synchronized Central Avenue corridor. By isolating this segment of Central Avenue, which carries lower traffic volumes and operates at lower speeds than the stretch of Central Avenue west of San Pasquale Avenue, the signal timings along the three-lane segment can be further optimized to improve traffic operations, reduce control delays and vehicle queues. This will likely require that the proposed reconfiguration of the Central Avenue/San

Pasquale Avenue/Lomas Boulevard intersection be completed prior to implementing further signal timing improvements to the study corridor.

- Continue to monitor traffic conditions along the study corridor and perform signal timing refinements as needed on an annual, or biennial basis.
- Improve signage along study corridor to better identify parking and bike lanes.
- Explore strategies to improve bicycle system connectivity at west end of study area.