FINAL REPORT

Conceptual Design for Central Avenue/Unser Boulevard Intersection and Adjoining Public Right-of-Way

Prepared for:

City of Albuquerque
Planning Department

Submitted by:

LEE ENGINEERING

Dekker/Perich/Sabatini
Fehr & Peers
Gannett Fleming West Inc.

JUNE 2010

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Acknowledgements:

Many participants attended public meetings and provided their inputs and comments.

A special thanks to honorable **Ken Sanchez**, City Council District 1.

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Executive Summary

Building upon the public input, policies, and direction of the Southwest Albuquerque Strategic Action Plan, Albuquerque Comprehensive Plan, and the pending Great Streets Facility Plan, the City of Albuquerque hired a consultant team comprised of Lee Engineering, Fehr and Peers, Dekker/Perich/Sabatini, and Gannett Fleming West Inc., to produce a conceptual design for the Central Avenue/Unser Boulevard intersection. The goal of the project is to address pedestrian and cyclist needs rather than to depend solely on car centric principles for the intersection design in this developing Community Activity Center. The project area is defined as Central Avenue (75th Street to 86th Street) and Unser Boulevard (Bluewater Road to Bridge Boulevard), with most of the concentration on the intersection. Work was divided into six parts:

- Task 1.0: Public Involvement Program.
- Task 2.0: Conceptual Design.
- Task 3.0: Multi-modal Operations Analysis.
- Task 4.0: Constructability and Preliminary Cost Analysis.
- Task 5.0: Decision Matrix.
- Task 6.0: Preferred Alternative Conceptual Design.

A day-long public workshop and walking tour of the intersection in December 2009 allowed community stakeholders to help generate concepts for improving the intersection. A follow-up public meeting was conducted in April 2010 to present the results of the study and a preferred alternative conceptual design.

Preliminary concepts for Central Avenue/Unser Boulevard were brainstormed during the public workshop. These concepts were further refined and analyzed by the Project Team resulting in the following three conceptual design alternatives for Central Avenue/Unser Boulevard intersection:

- Alternative A – 4 Lanes Central; 4 Lanes Unser.
- Alternative B – 4 Lanes Central; 6 Lanes Unser.
- Alternative C – 6 Lanes Central; 6 Lanes Unser.

A list of features for pedestrians and cyclists to improve multi-modal access and safety was recommended for all the developed alternatives. These features are as follows:

1. Right-turn slip lane design.
2. Right-turn speed table with rumble strips on the approach.
3. Pedestrian countdown signals.
4. High visibility crosswalks.
5. 10’ sidewalks with landscape buffer zone.
6. 10’ wide medians to provide pedestrian refuge areas and bull-noses on the intersection side to separate refuges areas from vehicular traffic.
7. 6’ wide bicycle lanes with colored treatment.
8. Extended timing pushbuttons at channelized islands.
9. Reduced Speed Limit on Central Avenue to 40 or 45 MPH.

This study evaluates each alternative design concept with a multi-modal operations analysis for pedestrian, cyclist, and vehicular traffic. The methodology used is in the *Highway Capacity Manual* and the *NCHRP (National Cooperative Highway Research Program) Report 616 – Multimodal Level of Service Analysis for Urban Streets*. A constructability and preliminary cost analysis of alternatives determined that no appreciable right-of-way is needed to construct Alternative A, whereas, approximately one acre of right-of-way is required for the construction of Alternatives B or C. The total cost of the construction of the three alternatives range from $4.9 million to $5.6 million.

The alternatives are compared in a Decision Matrix based on the characteristics of alternatives, the results from multi-modal operations analysis, and the construction cost estimates. Alternative B stands out as a balanced approach that satisfactorily accommodates the needs of multi-modal users. It is recommended as the Preferred Alternative in this report.

Alternative B proposes that Central Avenue be maintained as 4 through lanes and Unser Boulevard to be planned with 6 through lanes to accommodate projected traffic volumes for the year 2030. Based on preliminary estimates, approximately one acre of right-of-way would be needed for this alternative and the construction cost would be approximately $5.2 million. Key components of intersection lane configuration under this alternative are as follows:

- Two (2) through lanes on Central Avenue in each direction.
- Three (3) through lanes on Unser Boulevard in each direction.
- Dual left-turn lanes on Central Avenue in each direction. Existing storage length is adequate for 2030 projected traffic.
- Dual left-turn lanes on Unser Boulevard in each direction with extended storage length to accommodate expected queuing for 2030 projected traffic.
- Exclusive right-turn channelized lanes on all approaches with extended storage length to accommodate expected queuing for 2030 projected traffic.
- All the features listed earlier for pedestrians and cyclists to improve multi-modal access and safety.

Based on the projected traffic growth and intersection capacity analysis, it was determined that a third northbound lane on Unser Boulevard would be needed prior to 2020 and a third southbound lane on Unser Boulevard would be needed prior to 2030. Therefore, it was recommended that an interim stage of preferred Alternative B be considered for construction at present, which would have the flexibility to be expanded to the ultimate intersection configuration of Alternative B. This interim stage of preferred alternative B once built should be re-examined prior to 2020 for expansion based on the traffic demand.

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Introduction

Building upon the public input, policies, and direction of the Southwest Albuquerque Strategic Action Plan, Albuquerque Comprehensive Plan, and the pending Great Streets Facility Plan, the City of Albuquerque hired a consultant team comprised of Lee Engineering, Fehr and Peers, Dekker/Perich/Sabatini, and Gannett Fleming West Inc., to produce a conceptual design for the Central Avenue/Unser Boulevard intersection. The goal of the project is to address pedestrian and cyclist needs rather than to depend solely on car centric principles for the intersection design in this developing Community Activity Center. The project area is defined as Central Avenue (75th Street to 86th Street) and Unser Boulevard (Bluewater Road to Bridge Boulevard), with most of the concentration on the intersection. Work was divided into six parts:

- Task 1.0: Public Involvement Program.
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- Task 6.0: Preferred Alternative Conceptual Design.

This report is organized into chapters that correspond to the tasks undertaken in the process. The report recommends a preferred conceptual design for Central Avenue/Unser Boulevard intersection.

The Central Avenue/Unser Boulevard intersection and lands surrounding it are designated a Community Activity Center. Significant developments are under construction on the northwest and southwest corners.
The purpose of this study is to develop a conceptual intersection design that promotes safe, efficient, and comfortable design for pedestrians and cyclists, while maintaining acceptable levels of mobility for motor vehicles.

Overview of Central Avenue/Unser Boulevard Intersection

The Central Avenue/Unser Boulevard intersection is a critical crossroad for Albuquerque's west side. Significant developments are on the northwest and southwest corners of the intersection. These improvements include a new Southwest Mesa Transit Center and Unser Crossing, a large commercial center. Figure 1 shows existing and developing land uses in the vicinity of Central Avenue and Unser Boulevard intersection. Average daily traffic through this intersection now exceeds 88,500 vehicles, resulting in delays during peak commute times.

In addition to projects built or under construction, a City of Albuquerque public library, multiple commercial uses, and a University of New Mexico Medical Clinic are anticipated for construction within the next five years (Figure 1). A draft site development plan of the northwest corner of the intersection is included in the Appendices. The northeast and southeast corners also have the potential to add to this activity center. The opening of the Southwest Mesa Transit Center makes this area a hub for pedestrian activity and enables transit riders to connect to quality transit, particularly the Rapid Ride RedLine and BlueLine. As the street intersection corners are developed, it will become increasingly important to enable walking from one site to another after arriving by foot, bicycle, transit, or automobile.

Public Policies Impacting Study Area

Several City policies that support safe, efficient, and comfortable walking in and to Activity Centers and Enhanced Transit Corridors are applicable to the Central Avenue and Unser Boulevard intersection: *the Albuquerque/Bernalillo County Comprehensive Plan, the Southwest Albuquerque Strategic Action Plan portion of the West Side Strategic Plan, the West Route 66 Sector Development Plan, and the Environmental Planning Commission recommended version of the Great Street Facility Plan (The Great Street Facility Plan is pending approval by the City Council).*

City of Albuquerque/Bernalillo County Comprehensive Plan

- The Comprehensive Plan designates the Central Avenue/Unser Boulevard intersection a Community Activity Center (Table 22, Policy a. – Types of Activity Centers on page II-37; Figure 30 – Development Areas with Activity Centers and Transportation Corridors on page II-31). This designation implies that the area will be a focal point and destination for the surrounding community, serving a population of 30,000 or more. "The ideal Community Activity Center would have parcels and buildings scaled to pedestrians, small enough to encourage parking once and walking to more than one destination." (p. I-35)

- The Comprehensive Plan designates this portion of Central Avenue an "Enhanced Transit Corridor". The policy implication is that the design of these streets and the corresponding pedestrian realm should be geared towards facilitating transit operations and pedestrian activity.

West Side Strategic Plan and the West Route 66 Sector Development Plan (both as amended in 2009)

The Southwest Albuquerque Strategic Action Plan became part of the West Side Strategic Plan at adoption, prioritizing improvements at Central Avenue/Unser Boulevard intersection to enable walking to and within the Community Activity Center. Section VI of the West Route 66 Sector Development Plan requires that pedestrian and bicycle access to and within Activity Centers and other local destinations use public right-of-way design standards in the "Great Streets Facility Plan". This plan makes arterial and collector streets conducive to facing buildings toward them. It also includes curb ramp designs to improve wheelchair safety and 50-60 degree angle right turn slip lane designs that are intended to reduce vehicle speeds of turning cars and increase pedestrian visibility.

Great Streets Facility Plan

The Great Streets Facility Plan has been recommended for approval by the Environmental Planning Commission and is pending approval at the City Council. The Great Streets Facility Plan proposes street prototypes that enhance the pedestrian realm. The prototypes proposed in the Plan were used to inform concepts for Central Avenue and Unser Boulevard intersection.

Figure 1. Existing and Developing Land Uses near Central Avenue/Unser Boulevard Intersection

Task 1.0 - Public Involvement Program

Public Involvement was an important component of the study. A day-long public workshop and walking tour of the intersection was conducted in December 2009 to allow community stakeholders to help generate concepts for improving the intersection. A follow-up public meeting was conducted in April 2010 to present the results of the study and the preferred alternative conceptual design. A project website was set-up to conduct an online survey and obtain feedback throughout the study. The results of the survey and public comments posted on the website are included in the Appendices.

December 2009 Workshop

The December 9th, 2009 workshop started at 8:00 a.m. Workshop participants convened at the northwest corner of Central and Unser to experience firsthand the volume of rush hour traffic and the challenges of navigating the area on foot. The walking tour was followed by a series of meetings with stakeholders in order to fully understand the land use and transportation issues associated with the area *(see accompanying photos)*. Participants generated four concepts for intersection improvements. Each concept had a particular emphasis - pedestrian safety, capacity for car movement, or transit prioritization. One concept proposed a roundabout; this alternative was eliminated soon after the workshop due to concerns about pedestrian safety and right-of-way acquisition.

Walk-through the Central/Unser intersection during Public Workshop held on December 9, 2009.

Discussion on alternatives with stakeholders during Public Workshop held on December 9, 2009.

After the workshop, the Consultant Team analyzed the concepts in more detail to help determine the preferred alternative. The chapter on 'Task 2.0 – Conceptual Design Development' presents the refined alternatives from this workshop. The Appendices contains the interim report on 'December 9, 2009 Public Workshop Summary', that was submitted to the Planning Department.

April 2010 Public Meeting

On April 21st, 2010, the Consultant Team hosted a meeting to present the analytical results leading to the draft preferred alternative. The study alternatives that would make the intersection safe, efficient, and comfortable for pedestrians, cyclists, and vehicular traffic were presented. All alternatives were compared in a Decision Matrix and the preferred alternative was presented to the public to solicit their input and comments. The chapter in this report on 'Task 5.0 – Decision Matrix' presents the comparison between several alternatives proposed for the intersection.

Public input was taken into consideration in the further refinement of the preferred alternative. The chapter on 'Task 6.0 – Preferred Alternative Conceptual Design for Central Avenue/Unser Boulevard' presents the preferred alternative. Most participants were in agreement with the results of the study and wanted to know when the preferred design would actually be constructed. The presentation made in this public meeting and a summary of this meeting are included in the Appendices.

Task 2.0 - Conceptual Design Development

Existing Intersection Configuration

The Central Avenue/Unser Boulevard intersection is a signalized intersection with Central Avenue running in a northeast-southwest direction and Unser Avenue running perpendicular to Central Avenue. Figure 2 shows the existing intersection configuration. Central Avenue has a posted speed limit of 55 MPH and Unser Boulevard has a 40 MPH posted speed limit. Central Avenue and Unser Boulevard both have two (2) through lanes in each direction. Central Avenue has dual left-turn lanes on each approach, whereas Unser Boulevard has a single left-turn lane on each approach. There are right-turn lanes with channelized islands in southbound and westbound approaches. The southbound right-turn is a shared through-right turn lane whereas westbound right-turn is a dedicated lane with 120' storage. There are no channelized right-turn islands on northbound and eastbound approaches like other approaches, resulting in skewed crosswalks at the intersection.

The southwest corner is being built as a commercial development. The northwest corner is currently under construction as part of the City's planned development. Central Avenue, east of Unser Boulevard, does not have curb and gutter in either direction and has seven (7) feet of paved shoulder on the south side. There are medians on all approaches to the intersection with varying width: six (6) feet on the eastbound approach, twelve (12) feet on the westbound approach, and thirty five (35) feet on northbound and southbound approaches.

The existing traffic signal timing from the Traffic Engineering Division of the City of Albuquerque is included in the Appendices. The traffic signal is operating under Actuated-Coordinated control with a natural cycle length of 100 to 110 seconds. The dual-left turn lanes on Central Avenue are operating under 'protected' phasing whereas left-turn lanes on Unser Boulevard are operating under 'protected+permitted' phasing. 'Protected+permitted' left-turn phasing generally improves operational efficiency of the intersection but is considered potentially dangerous for pedestrians due to the conflicting yield situation between pedestrians and left-turning vehicles.

Existing Multi-Modal Connectivity

The intersection includes six (6) feet wide sidewalks in all directions except on Central Avenue, east of Unser Boulevard. There are four (4) feet wide bike lanes on eastbound Central Avenue and on Unser Boulevard in both directions south of Central Avenue. A multi-use path is present on the southeast corner of the intersection, connecting neighborhoods that are further south on Unser Boulevard. It is apparent that the intersection has some deficiencies in pedestrian and bicycle facilities partly because of the undeveloped area on Central Avenue east of Unser Boulevard.

Transit Service at the Intersection

The City's new Southwest Mesa Transit Center and Park and Ride facility is just west of the northwest corner of the Central Avenue/Unser Boulevard intersection. The Park & Ride facility provides access to the Rapid Route 766 (Red Line) and Route 54 (Bridge-Westgate). Adequate sidewalks on northwest corner are present to provide pedestrians access to the intersection *(see accompanying photo)*.

A bus-stop for the Route 66 (Central) bus is on the westbound Central Avenue approximately 200' from the northeast corner of the intersection. Lack of sidewalks near this bus-stop and on the northeast corner of the intersection pose a challenge to the multimodal access *(see accompanying photo)*.

Park& Ride facility at the northwest corner of Central/Unser intersection.

Lack of sidewalks at the Bus-stop for Route 66 (Central) on Westbound Central Avenue.

Figure 2. Existing Configuration for Central Avenue/Unser Boulevard Intersection

Proposed Features for Pedestrians and Cyclists

The site visits during the data collection process and a walk-through at the intersection during the Public Workshop held in December 2009 revealed the intersection's multi-modal inadequacies. Multimodal access and safety are this project's primary objectives. The following objectives are central to the conceptual design process:

1. Provide safe access for all user groups – pedestrians, cyclists, and vehicular traffic.
2. Increase visibility of pedestrians and cyclists at and near the intersection.
3. Provide safe refuges for pedestrians at the intersection.
4. Reduce pedestrian-vehicle conflict time at the intersection.

The Project Team recommends a list of safety measures and features for pedestrians and cyclists to achieve the above-stated objectives. These features are recommended for all the alternatives discussed in later sections.

The common safety measures and features provided for pedestrians and cyclists in all of the proposed alternatives are as follows:

1. **Right-turn slip lane design**
   Improved right turn slip lane design with tighter curb angle is recommended for all approaches. Tighter curb angle provides improved visibility and yielding to pedestrians. References and guidance on slip lane design from Federal Highway Administration (FHWA), Transportation Research Board (TRB), and Institute of Transportation Engineers (ITE) are included in the Appendices.
2. **Right-turn speed table with rumble strips on the approach**
   Provide a 10' crosswalk at a raised level (height 3") with 6' wide ramps on each end (1V:24H taper). This design improves visibility of pedestrians crossing channelized right-turn lanes. Rumble strips are recommended for the approach to the speed tables to increase alertness of approaching drivers towards the speed table and to provide an auditory cue to visually impaired pedestrians crossing channelized right-turn lanes. The drainage design and other street maintenance challenges related to speed tables should be further examined and addressed during the preliminary design phase of the intersection.
3. **Pedestrian countdown signals**
   Pedestrian countdown signals are recommended at all crosswalks. They should provide seven (7) seconds of WALK time so that pedestrians will have adequate opportunity to leave the curb or shoulder before the pedestrian clearance time begins. Flashing DON'T WALK time or the pedestrian clearance time should be sufficient to allow a pedestrian crossing in the crosswalk, who left the curb at the end of WALK signal indication, to travel at a walking speed of 3.5 feet per second to cross the entire street. The implementation of pedestrian countdown signals and other traffic signal modifications should be coordinated with the Traffic Engineering Division.
4. **High visibility crosswalks**
   10' crosswalks clearly demarcated through the use of non-skid, colored or patterned surface to increase visibility are recommended.

5. **10’ sidewalks with landscape buffer zone**
   Provide 10' wide sidewalks with a minimum of 6’ landscaped buffer zone for pedestrians at all approaches to the intersection. Bollards are also recommended at the crossing to separate the walking zone from the roadway realm and for pedestrian lighting at night.
6. **10’ wide medians to provide pedestrian refuge areas and bull-noses on the intersection side to separate refuges areas from vehicular traffic**
   Medians at least 10’ wide are recommended in all directions at the intersection. Median bull-nose, which is a half-circle raised device at the intersection side of the pedestrian refuge area, is recommended at all crosswalks. This treatment protects the pedestrians waiting in the median refuge area by providing a physical separation from the vehicular traffic at the intersection.
7. **6’ wide bicycle lanes with colored treatment**
   At the intersection approaches, 6’ wide bicycle lanes with colored treatment similar to the crosswalks should be provided. The colored treatment is recommended for the intersection, beginning with the right-turn lane at approach and ending 100' downstream of traffic signal.
8. **Extended timing pushbuttons at channelized islands**
   It is recommended that pedestrian pushbuttons be provided with extended press features to provide additional crossing time to slower pedestrians when requested. When these pushbuttons are pressed for one second or more, additional crossing time is actuated. It is to be supplemented with a PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME (MUTCD Sign Code R10-32P) plaque mounted adjacent to or integral with the pedestrian pushbutton. The implementation of pedestrian pushbuttons and other traffic signal modifications should be coordinated with the Traffic Engineering Division.
9. **Reduce Speed Limit on Central Avenue to 45 MPH**
   The current posted speed limit on Central Avenue is 55 MPH. Consideration should be given to reducing the speed limit to 40 or 45 mph in accordance with the recent and forthcoming developments.

Alternative Conceptual Designs for Central Avenue/Unser Boulevard Intersection

Three alternatives were developed for the Central Avenue/Unser Boulevard intersection. All safety measures and features for pedestrians and cyclists proposed earlier in this report are proposed for all these alternatives. A No-Build Alternative is provided as a benchmark against which proposals are compared to determine expected benefits and estimated costs. All the alternatives are analyzed for projected year 2030 traffic volumes.

No-Build Alternative

The No-Build Alternative keeps the existing intersection configuration without any improvements. None of the proposed features for pedestrians and cyclists are employed. The No-Build Alternative is the same as existing intersection configuration and has been shown in Figure 2. Key components of intersection configuration under No-Build alternative are as follows:

- Two (2) through lanes on Central Avenue in each direction.
- Two (2) through lanes on Unser Boulevard in each direction.
- Dual left-turn lanes on Central Avenue in each direction.
- Single left-turn lane on Unser Boulevard in each direction.

- Exclusive right-turn channelized lane on westbound approach.
- Shared through-right turn channelized lane on southbound approach.

Alternative A – 4 Lanes Central; 4 Lanes Unser

Alternative A includes all recommended features for pedestrians and cyclists that are common to all of the alternatives. This alternative maintains the existing number of through lanes on Central Avenue and Unser Boulevard. Exclusive right-turn channelized lanes are provided at all four intersection corners to make pedestrian crosswalks perpendicular to vehicular lanes. In addition, extended storage lengths are recommended to accommodate expected queuing for the projected year 2030 traffic. Figure 3 shows the intersection under Alternative A with typical sections. Key components of intersection configuration under Alternative A are as follows:

- Two (2) through lanes on Central Avenue in each direction.
- Two (2) through lanes on Unser Boulevard in each direction.
- Dual left-turn lanes on Central Avenue in each direction. Existing storage length is adequate for 2030 projected traffic.
- Single left-turn lanes on Unser Boulevard in each direction with extended storage length to accommodate expected queuing for 2030 projected traffic.
- Exclusive right-turn channelized lanes on all approaches with extended storage length to accommodate expected queuing for 2030 projected traffic.

Figure 3 shows typical sections of Central Avenue and Unser Boulevard at the intersection. Pedestrian crossing distance at the intersection is measured between channelized right-turn islands on either side of the roadway. With this alternative, the pedestrian crossing distance for Central Avenue is 88 feet and 77 feet for Unser Boulevard. Pedestrian safety and convenience can be improved by ensuring that the flashing DON'T WALK time or the pedestrian clearance time occurs in every cycle of the traffic signal timing and that the flashing DON'T WALK is timed to allow pedestrians to complete the pedestrian crossing distance at a recommended walking speed of 3.5 feet/second. This requires a flashing DON'T WALK time of 26 seconds for Central Avenue and 22 seconds for Unser Boulevard. A common flashing DON'T WALK time of 26 seconds is recommended for both Central Avenue and Unser Boulevard under this alternative. The flashing DON'T WALK time of 26 seconds will have countdown display in the Pedestrian Countdown Signals to inform pedestrians of the number of seconds remaining to cross the street.

Alternative B – 4 Lanes Central; 6 Lanes Unser

Alternative B provides all the recommended features for pedestrians and cyclists common to alternatives A and C. This alternative builds upon the intersection configuration of Alternative A and adds a third through lane on Unser Boulevard in each direction. Under this alternative, the intersection is a 6 through lane section on Unser Boulevard and a 4 through lane section on Central Avenue. Figure 4 shows Alternative B with typical sections. Key components of intersection lane configuration under this alternative are as follows:

- Two (2) through lanes on Central Avenue in each direction.
- Three (3) through lanes on Unser Boulevard in each direction.
- Dual left-turn lanes on Central Avenue in each direction. Existing storage length is adequate for 2030 projected traffic.

- Dual left-turn lanes on Unser Boulevard in each direction with extended storage length to accommodate expected queuing for 2030 projected traffic.
- Exclusive right-turn channelized lanes on all approaches with extended storage length to accommodate expected queuing for 2030 projected traffic.

Figure 4 shows typical sections of Central Avenue and Unser Boulevard at the intersection. Pedestrian crossing distance at the intersection is measured between channelized right-turn islands on either side of the roadway. The pedestrian crossing distance for Central Avenue is 88 feet and 110 feet for Unser Boulevard under this alternative. Flashing DON'T WALK time of 26 seconds is provided to cross 88 feet of crossing distance on Central Avenue. Flashing DON'T WALK time of 32 seconds is provided to cross 110 feet of crossing distance on Unser Boulevard. The flashing DON'T WALK times of 26 seconds and 32 seconds will have countdown display in the Pedestrian Countdown Signals to inform pedestrians of the number of seconds remaining to cross the street.

Alternative C – 6 Lanes Central; 6 Lanes Unser

Alternative C provides the same recommended features for pedestrians and cyclists as those recommended for alternatives A and B. This alternative builds upon Alternative B intersection configuration and provides three (3) through lanes on Unser Boulevard and Central Avenue in each direction. Thus, under this alternative, the intersection is a 6 through lane section both on Unser Boulevard and Central Avenue. Figure 6 shows the intersection configuration and typical sections under Alternative C. Key components of intersection lane configuration under this alternative are as follows:

- Three (3) through lanes on Central Avenue in each direction.
- Three (3) through lanes on Unser Boulevard in each direction.
- Dual left-turn lanes on Central Avenue in each direction. Existing storage length is adequate for 2030 projected traffic.
- Dual left-turn lanes on Unser Boulevard in each direction with extended storage length to accommodate expected queuing for 2030 projected traffic.
- Exclusive right-turn channelized lanes on all approaches with extended storage length to accommodate expected queuing for 2030 projected traffic.

Figure 5 shows typical sections of Central Avenue and Unser Boulevard at the intersection for Alternative C. Pedestrian crossing distance at the intersection is measured between channelized right-turn islands on either side of the roadway. The pedestrian crossing distance for both Central Avenue and Unser Boulevard is 110 feet. Flashing DON'T WALK time or the pedestrian clearance time to allow a pedestrian to complete the crossing distance of 110 feet on both Central Avenue and Unser Boulevard is provided as 32 seconds. The flashing DON'T WALK time of 32 seconds will have countdown display in the Pedestrian Countdown Signals to inform pedestrians of the number of seconds remaining to cross the street.

FIGURE 3

ALTERNATIVE A - 4 LANES CENTRAL; 4 LANES UNSER

8220 San Pedro Dr. NE
Suite 150
Albuquerque, NM 87113
505.338.0988 – Fax 505.338.0989
LEE ENGINEERING

FIGURE 4

ALTERNATIVE B - 4 LANES CENTRAL; 6 LANES UNSER

8220 San Pedro Dr. NE
Suite 150
Albuquerque, NM 87113
505.338.0988 – Fax 505.338.0989
LEE ENGINEERING

FIGURE 5

ALTERNATIVE C - 6 LANES CENTRAL; 6 LANES UNSER

8220 San Pedro Dr. NE
Suite 150
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Task 3.0 - Multi-modal Operations Analysis

Traffic Volumes and Projections

The Project Team conducted weekday turning movement counts at the Central Avenue/Unser Boulevard intersection on November 12, 2009 (Thursday). The counts for cars, trucks, pedestrians, and cyclists were collected from 7:00 AM to 6:00 PM and are included in the Appendices. The peak-hours of traffic during day were identified as follows:

- Morning Peak-Hour – 7:00 AM to 8:00 AM.
- Evening Peak-Hour – 4:45 PM to 5:45 PM.

Figure 6 shows these collected intersection turning movement volumes during morning and evening peak-hours of traffic.

Projected traffic volumes for the design year 2030, as shown in Figure 7, were obtained from the Travel Demand Model developed by the Mid Region Council of Governments (MRCOG). The historical average daily traffic volumes were obtained from the *Traffic Flow Maps for the Greater Albuquerque Area* collected by MRCOG. Table 1 shows the compiled historical and projected average daily traffic volumes between 2005 and 2030. A traffic growth of 8% per year between 2008 and 2030 is expected on Unser Boulevard, south of Central Avenue. In all other directions, approximately 1% of traffic growth per year is expected between 2008 and 2030. The traffic growth of 8% on Unser Boulevard, south of Central Avenue can be attributed to the proposed connection to Dennis Chaves Boulevard further south.

Table 1. Average Daily Traffic Growth for Central Avenue/Unser Boulevard Intersection

Intersection Approach	Average Daily Traffic Volumes					Percentage Annual Growth			
	2005	2006	2007	2008	2030	Annual growth % (2005-2006)	Annual growth % (2006-2007)	Annual growth % (2007-2008)	Annual growth % (2008-2030)
Central - East of Unser	18,200	24,300	24,600	24,700	29,700	33.5%	1.2%	0.4%	0.9%
Central - West of Unser	22,700	23,000	23,300	22,600	30,800	1.3%	1.3%	-3.0%	1.6%
Unser - North of Central	19,600	19,900	20,200	31,800	39,900	1.5%	1.5%	57.4%	1.2%
Unser - South of Central	9,100	9,300	9,400	9,400	26,200	2.2%	1.1%	0.0%	8.1%

Figure 6. Existing Turning Movement Volumes in 2009 for Central Avenue/Unser Boulevard Intersection

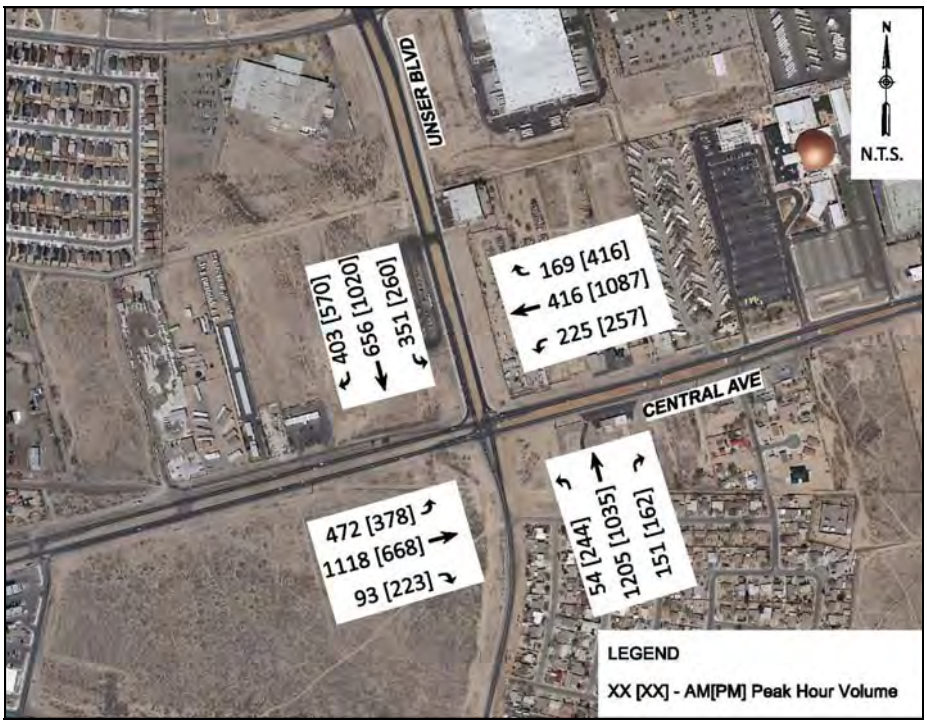


Figure 7. Projected Turning Movement Volumes in 2030 for Central Avenue/Unser Boulevard Intersection

The 2008 average daily traffic volumes in Figure 8 are compiled at a network level for the Central Avenue/Unser Boulevard intersection. Unser Boulevard and 98th Street carry approximately the same amount of traffic from the Southwest area to I-40. However, the Central Avenue/Unser Boulevard intersection carries a higher share of traffic from 86th Street (22,600 vehicles per day) than the traffic carried by Central Avenue/98th Street intersection (14,700 vehicles per day). This pattern can also be seen in figures 6 and 7 presented earlier: there is heavy eastbound left-turn traffic going towards I-40 in the morning and heavy southbound right-turn traffic in the evening coming back from I-40. A portion of the intersection traffic comes from the school traffic to and from surrounding neighborhoods as shown in Figure 9.

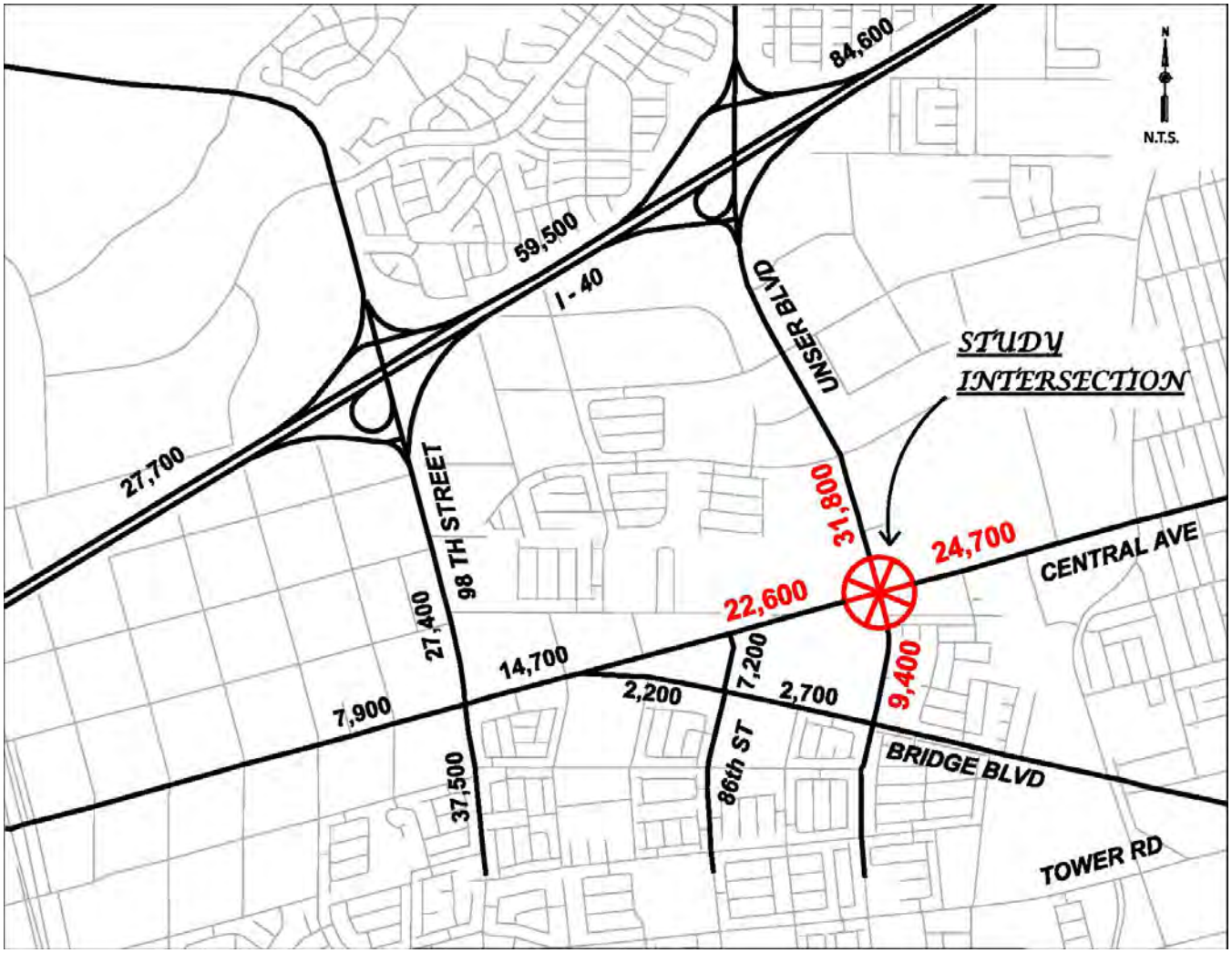


Figure 8. Average Daily Traffic in 2008 in the Vicinity of Central Avenue/Unser Boulevard Intersection

Figure 9. Schools in the Vicinity of Central Avenue/Unser Boulevard Intersection

Methodology for Multi-modal Level of Service Analysis

The Central Avenue/Unser Boulevard intersection was analyzed for three user groups: pedestrians, cyclists, and vehicular traffic. The multi-modal analysis of a signalized intersection provides performance measures such as Level of Service (LOS) to evaluate various alternatives for each of the user groups. This section presents the methodology for level of service analysis for pedestrians, cyclists, and vehicular traffic separately.

Methodology for Level of Service Analysis for Pedestrians

The Level of Service (LOS) analysis for pedestrians was based on the *NCHRP (National Cooperative Highway Research Program) Report 616 – Multimodal Level of Service Analysis for Urban Streets*. The NCHRP Report 616 has been written for potential incorporation into the next edition of the *Highway Capacity Manual*. The 'Pedestrian LOS score for Signalized Intersection' is computed according to the following formula:

*Pedestrian LOS Score for Signalized Intersection = 0.00569(RTOR + PermLefts) + 0.00013(PerpTrafVol * PerpTrafSpeed) + 0.0681(LanesCrossed$^{0.514}$) + 0.0401 ln(PedDelay) − RTCI(0.0027PerpTrafVol − 0.1946) + 1.7806*

where,

RTOR = Number of right turn-on-red vehicles in a 15-minute period,
PermLefts = Number of motorists making a permitted left turn in a 15-minute period,
PerpTrafVol = Traffic in the outside through lane of the street being crossed in a 15-minute period,
PerpTrafSpeed = Midblock 85th percentile speed of traffic on the street being crossed in a 15-minute period,
LanesCrossed = Number of lanes being crossed by the pedestrian,
PedDelay = Average number of seconds the pedestrian is delayed before being able to cross the Intersection, and
RTCI = Number of right turn channelization islands on the crossing.

The LOS score obtained from the above formula is used to determine LOS grade in Table 2. LOS A represents the best operating conditions and LOS F represents the worst. As the LOS score increases, Pedestrian Level of Service goes down. Factors such as right-turn on red volumes, permitted left-turn volumes, traffic volumes and speed in the outside through lane, number of lanes to be crossed and pedestrian delay at intersection have negative effects on the Pedestrian Level of Service. However, presence of the right-turn channelized islands improves the Pedestrian Level of Service.

Table 2. Pedestrians Level of Service (LOS) for Signalized Intersections

Pedestrian Level of Service (LOS)	LOS Score
A	≤ 1.5
B	> 1.5 and ≤ 2.5
C	> 2.5 and ≤ 3.5
D	> 3.5 and ≤ 4.5
E	> 4.5 and ≤ 5.5
F	> 5.5

(Table adapted from the NCHRP Report 616)

Methodology for Level of Service Analysis for Cyclists

The Level of Service (LOS) analysis for cyclists was based on the methodology presented in the *NCHRP (National Cooperative Highway Research Program) Report 616 – Multimodal Level of Service Analysis for Urban Streets*. For signalized intersection, control delay (in seconds per bicycle) is estimated by the following formula:

Bicycle LOS Score for Signalized Intersection = -0.2144W_t + 0.0153 CD + 0.0066 (Vol15/L) +4.3124
where,

W_t =Total width of outside through lane and bike lane (if present),
CD = Crossing distance, the width of the side street (including auxiliary lanes and median),
Vol15 = Volume of directional traffic during a 15-minute period, and
L = Total number of through lanes on the approach to the intersection.

The LOS score obtained from the above formula is used to determine Cyclists LOS grade as per Table 3. LOS A represents the best operating conditions and LOS F represents the worst.

Table 3. Cyclists Level of Service (LOS) for Signalized Intersections

Cyclists Level of Service (LOS)	LOS Score
A	≤ 2.00
B	> 2.00 and ≤ 2.75
C	> 2.75 and ≤ 3.50
D	> 3.50 and ≤ 4.25
E	> 4.25 and ≤ 5.00
F	> 5.00

(Table adapted from the NCHRP Report 616)

Methodology for Level of Service Analysis for Vehicular Traffic

The Level of Service (LOS) analysis for vehicles was performed in accordance with the methodology presented in the *Highway Capacity Manual (HCM), 2000 Edition*. LOS for signalized intersections is evaluated on the basis of control delay (in seconds) per vehicle. As shown in Table 4, LOS is a grade given to an intersection on a scale of A to F, depending upon control delay per vehicle. LOS A represents the best operating conditions and LOS F represents the worst. Generally, LOS of D or better is considered as an acceptable level of performance for a signalized intersection. However, the *Great Streets Facility Plan* accepts LOS E or better for Great Street segments that cater to various user groups.

Table 4. Vehicular Level of Service (LOS) for Signalized Intersections

Vehicular Level of Service (LOS)	Control Delay per Vehicle (seconds/vehicle)
A	≤ 10
B	> 10-20
C	> 20-35
D	> 35-55
E	> 55-80
F	> 80

(Table adapted from HCM, 2000 Ed.)

Synchro™, a macroscopic traffic modeling and analysis software was used for capacity and LOS analysis of various alternatives based on the projected traffic volumes of 2030. Synchro™ uses the HCM methodology and provides performance measures such as queue length, average delay, and LOS for each intersection approach and intersection as a whole.

Multi-modal Level of Service Analysis of Alternatives

The Level of Service calculations were performed separately for pedestrians, cyclists, and vehicular traffic at the Central Avenue/Unser Boulevard intersection according to the methodology presented earlier. The analysis uses the peak-hour projected traffic volumes for the design year 2030. The LOS calculations were performed for all three alternatives as well as for the No-Build alternative.

Level of Service Analysis of Alternatives for Pedestrians

The Level of Service calculations were performed for pedestrians at the intersection according to the methodology presented earlier. Table 5 presents the results for all alternatives and detailed calculations are included in the Appendices. LOS for pedestrians shows an improvement from D to C during AM peak-hour of traffic conditions for all alternatives. Overall, LOS value is D or better for all the alternatives, which is in the acceptable range of performance. It is to be noted that level of performance for all the alternatives including the No-Build alternative is relatively the same based on the NCHRP methodology. In addition to the LOS values presented here, other factors are also used to compare the alternatives for pedestrians. These factors are presented in the later section on *Decision Matrix*.

Table 5. Level of Service Comparison for Pedestrians

Alternatives	No-Build Alternative	Alternative A 4 Lanes Central; 4 Lanes Unser	Alternative B 4 Lanes Central; 6 Lanes Unser	Alternative C 6 Lanes Central; 6 Lanes Unser
2030 Peak-Hour	**AM (PM)**	**AM (PM)**	**AM (PM)**	**AM (PM)**
Level of Service for Pedestrians	D (D)	C (D)	C (D)	C (D)

Level of Service Analysis of Alternatives for Cyclists

Table 6 shows the results from the Level of Service calculations performed for cyclists at the intersection according to the NCHRP Report 616 methodology presented earlier. The detailed calculations are included in the Appendices. Much like the LOS results for pedestrians, the LOS value for all the alternatives and the No-Build alternative is relatively the same based on the NCHRP methodology. In addition to the LOS values presented here, other factors are also used to compare the alternatives for cyclists. These factors are presented in the later section on *Decision Matrix*.

Table 6. Level of Service Comparison for Cyclists

Alternatives	No-Build Alternative	Alternative A 4 Lanes Central; 4 Lanes Unser	Alternative B 4 Lanes Central; 6 Lanes Unser	Alternative C 6 Lanes Central; 6 Lanes Unser
2030 Peak-Hour	**AM (PM)**	**AM (PM)**	**AM (PM)**	**AM (PM)**
Level of Service for Cyclists	D (D)	C (C)	C (C)	C (C)

Level of Service Analysis of Alternatives for Vehicular Traffic

Table 7 shows the results from Level of Service analysis performed for vehicular traffic for the 2030 projected traffic volumes. The LOS output reports from Synchro™ and SimTraffic™ software are provided in the Appendices. The LOS analysis report from Synchro™ provides average delay and LOS value for the intersection. The queue length in feet (95th percentile and average values) is obtained from SimTraffic™ software, which provides more realistic queue lengths estimates for heavily congested conditions. The 95th percentile queue lengths for approaches are averaged to measure queue length of the intersection as a whole. In 2030 the intersection is expected to perform under unacceptable conditions for both the No-Build Alternative and Alternative A with an average delay per vehicle of over 3 minutes. The intersection is expected to experience just over one (1) minute of average delay per vehicle under Alternative B and less than one (1) minute under Alternative C during 2030 peak-hour traffic volumes. Figure 10 shows a queue diagram with average queue lengths (in feet) at the intersection under various alternatives.

Table 7. Level of Service Comparison for Vehicular Traffic

	Alternatives	No-Build Alternative	Alternative A 4 Lanes Central; 4 Lanes Unser	Alternative B 4 Lanes Central; 6 Lanes Unser	Alternative C 6 Lanes Central; 6 Lanes Unser
	2030 Peak-Hour	**AM (PM)**	**AM (PM)**	**AM (PM)**	**AM (PM)**
Performance Measures	Average Delay (seconds/vehicle)	215 (227)	148 (125)	74 (68)	43 (54)
	Queue Length, 95th Percentile (ft)	#2100 (#2100)	#2100 (#2100)	550 (800)	550 (450)
	Level of Service	F (F)	F (F)	E (E)	D (D)

#indicates queue build-up that impacts upstream traffic signal and is expected to extend to around 6000' from the intersection.

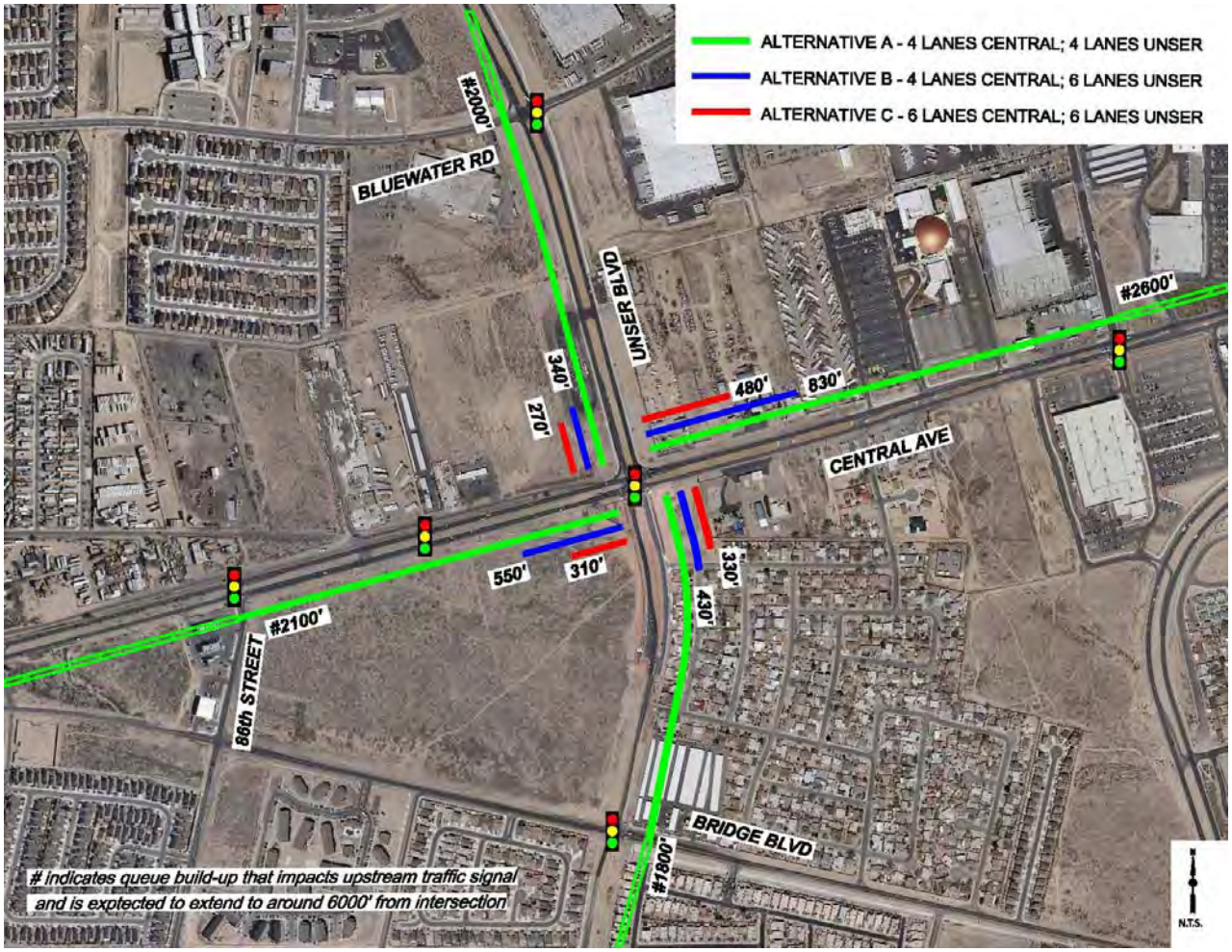


Figure 10. Queue Diagram showing Average Queue Length (in feet) for the Three Proposed Alternatives for 2030 Projected Traffic Volumes

VISSIM 3-D Simulation of Alternatives

VISSIM is a simulation program for multi-modal traffic flow modeling. It is able to simulate urban and highway traffic, including pedestrians, cyclists, and motorized vehicles. Using this software, various alternatives for the Central Avenue/Unser Boulevard intersection were modeled and simulated for presentation in the public meeting. Figure 11A to figure 11C show snapshots of traffic conditions under the three alternatives using VISSIM software. Figure 11D shows snapshots of simulation of pedestrians and cyclists modeled along with the vehicular traffic for all alternatives at the intersection.

Figure 11A. Snapshots of Traffic Simulation for Alternative A Conditions using VISSIM

Figure 11B. Snapshots of Traffic Simulation for Alternative B Conditions using VISSIM

Figure 11C. Snapshots of Traffic Simulation for Alternative C Conditions using VISSIM

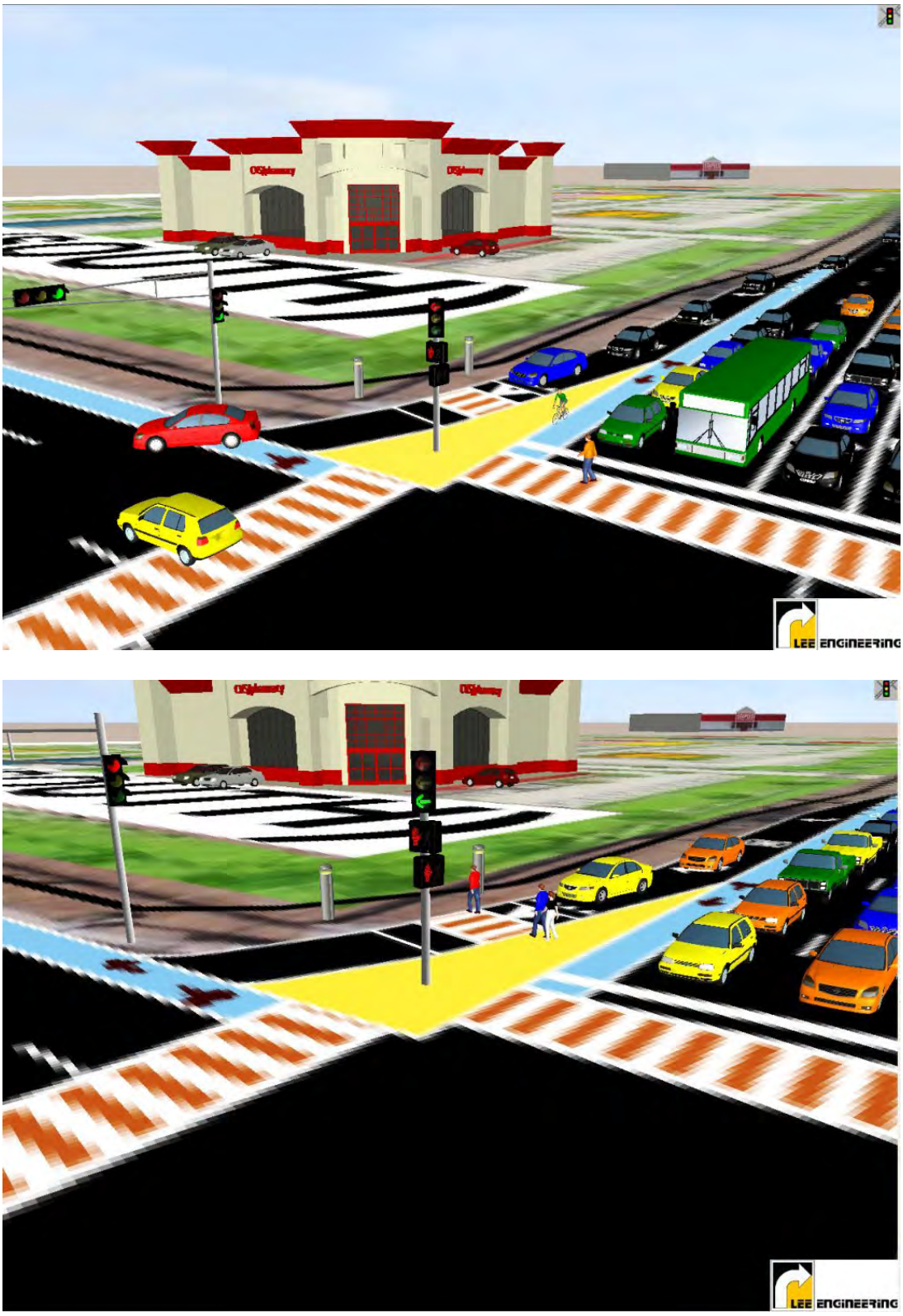


Figure 11D. Snapshots of Simulation of Pedestrians and Cyclists using VISSIM

Task 4.0 - Constructability and Preliminary Cost Estimates

Right of Way

The existing right-of-way (ROW) for the intersection was approximated based on the City of Albuquerque's Geographical Information System (GIS) parcel mapping. The data is accurate for planning purposes; as such, the values provided in this report are approximate and may vary when compared to survey ROW. Table 8 compares existing ROW to the need for additional ROW based on the width requirements of each alternative as established by the Study. Specific ROW needs at the intersection quadrants were not estimated due to the variability of design. The total ROW area was estimated assuming the length impacts would be limited to 800 feet along the impacted leg of the intersection. Although Alternatve C requires more overall ROW than Alternative B, the existing ROW along Central is more than adequate for the proposed improvements. Therefore, ROW will only need to be acquired for the improvements on Unser, which will be the same for both Alternatve B and C.

Table 8. Existing Right-of-way and Additional Right-of-way needs for Alternatives

Intersection Leg		ROW Widths (Feet)						
		Existing	Alternative A	Need	Alternative B	Need	Alternative C	Need
Unser	North	125	128	3	164	39	164	39
	South	160	128	0	164	4	164	4
Central	East	203	140	0	140	0	164	0
	West	208	140	0	140	0	164	0
Alternate Total				0.1 acre		1 acre		1 acre

Utilities

Existing utilities through the intersection were determined by observing visible features and by using as-built data. Observation revealed overhead electrical transmission and distribution lines along the south side of Central Avenue. Communication lines such as cable and telephone were also on the same poles as the overhead electrical distribution. As-built information was requested from the Albuquerque Bernalillo County Water Utility Authority (ABCWUA).

The as-built information revealed several water transmission lines along the south ROW of Central Avenue paralleled by two gas lines. A 42 inch water transmission line follows the centerline of the Central Avenue alignment, while a 6 inch water distribution line is located along the northern ROW. Two sanitary sewer lines were found; an 8 inch line along the south ROW and a 12 inch line along the north ROW. Through the Unser Boulevard a 15 inch sanitary tees into the 12 inch line under Central Avenue. A 12 inch water line runs north and south of Central Avenue but tees into lines along Central Avenue and does not connect through the intersection.

A major storm drain line runs along the centerline and varies from 72 inches to 96 inches, and is at such a depth that it should not be impacted by any improvements. However, several new lateral connections will need to be established with the addition of a curb and gutter collection system. The existing storm drain mainline should accommodate the additional load from the intersection improvements, as the overall area has not changed. An existing 5 barrel 48 inch crossing west of Unser Boulevard could possibly be abandoned or reconfigured, as the contributing area has been redeveloped since its installation. It is not anticipated that any of the major utilities will be impacted by any of the

alternatives. However, some minor adjustment customary with intersect reconfiguration, such as manhole, valve box adjustment, and storm inlets upstream of right turn speed tables will be needed.

Construction Cost Estimate

The construction cost estimate was developed based on the City of Albuquerque's *City Engineer's Estimated Unit Prices for Contract Items 2009*. Area and linear based items were estimated from the conceptual drawings for Alternates A, B and C (refer 'Task 2.0 – Conceptual Design Development'). Other items such as signals and storm drain, which are not shown in conceptual designs, were accounted for based on standard installation practices. A summary of the alternates is provided in table 9 by category. The *Roadway Paving* category is the largest contributing category, and is based on a 9 inch thick superpave asphalt section through the intersection. This is a conservative estimate based on projects with similar approach grades and traffic volumes. Costs associated with additional ROW acquisition are not included with the construction costs because property values tend to fluctuate unpredictably depending on multiple variables. ROW cost is typically determined by the City based on appraisals made at the time of construction.

Table 9. Construction Cost Estimates for Alternatives

Category	Alternative		
	A	B	C
Construction Engineering	$ 584,183.29	$ 615,443.52	$ 671,396.02
Removals	$ 527,648.68	$ 565,418.95	$ 642,104.05
Pedestrian Access Route	$ 312,150.00	$ 316,816.67	$ 316,816.67
Roadway	$ 2,366,139.15	$ 2,525,858.89	$ 2,835,824.73
Signals and Lighting	$ 362,193.00	$ 363,883.00	$ 363,883.00
Signing and Striping	$ 42,264.17	$ 46,002.08	$ 46,002.08
Drainage	$ 150,200.00	$ 160,200.00	$ 160,200.00
Total	**$ 4,858,194.06**	**$ 5,118,695.97**	**$ 5,584,966.82**

Task 5.0 - Decision Matrix

Table 10 compares the three alternatives proposed in this study, A, B, and C with the No-Build Alternative. The comparison is based on safety, operational efficiency, and level of service that the alternatives provide to pedestrians, cyclists, and vehicular traffic.

For pedestrians, intersection safety, convenience, and accessibility are measured in terms of the following five factors:

- Crossing distance (in feet) between right-turn channelized islands on either side of roadway.
- Pedestrian Clearance Time or flashing DON'T WALK time (in seconds) to allow the pedestrians to complete the crossing distance.
- Median refuge width (in feet) that acts as a safe rest area for slower pedestrians crossing the intersection crosswalks.
- Sidewalks present in all directions.
- Intersection Level of Service for the pedestrians during AM and PM peak-hours of projected traffic for the year 2030.

For cyclists, the following factors are considered to evaluate and compare alternatives:

- Bike lanes present in all directions.
- Number of lanes to be crossed for cyclists that want to make left-turn maneuver at the intersection.
- Intersection Level of Service for the cyclists during AM and PM peak-hours of projected traffic for the year 2030.

For motorized vehicles, the comparison of alternatives is made in terms of following factors:

- Average control delay (in seconds per vehicle) that would be experienced by vehicles travelling through the intersection during morning and evening peak-hours of day.
- Queue length (in feet) at the intersection that would be present during morning and evening peak-hours of day. The queue length at the intersection is determined by averaging out the queue lengths at each approach obtained from the analysis.
- Level of Service of the intersection for vehicular traffic during AM and PM peak-hours of projected traffic for the year 2030.

Alternatives are given a qualitative rating of POOR, FAIR, GOOD, or VERY GOOD.

- No-Build alternative gets a POOR rating for all user groups: pedestrians, cyclists, and vehicular traffic due to deficiencies in sidewalk and bike lanes facilities, and expected heavy delays for projected 2030 traffic conditions.
- Alternative A gets GOOD ratings for pedestrians and cyclists but a POOR rating for vehicular traffic.
- Alternative B gets GOOD ratings for all user groups.
- Alternative C gets FAIR ratings for pedestrians and cyclists but VERY GOOD rating for vehicular traffic.
- The preliminary cost estimates for all the three alternatives is between $4.9 million and $ 5.6 million. No-build alternative maintains existing intersection configuration with no improvements, so it does not incur any costs.

Table 10. Decision Matrix for Comparison of Alternatives

		Decision Factors	No Build Alternative	Alternative A 4 Lanes Central; 4 Lanes Unser	Alternative B 4 Lanes Central; 6 Lanes Unser	Alternative c 6 Lanes Central; 6 Lanes Unser
User Group	Pedestrians	Crossing Distance (Island to Island)	124' (Central) 145' (Unser)	88'	88' (Central) 110' (Unser)	110'
		Pedestrian Clearance Time, seconds	18	26	26 (Central) 32 (Unser)	32
		Median Refuge	Varies from 6' to 40'	10'	10'	10'
		Sidewalks in all directions	NO	YES	YES	YES
		Pedestrians Level of Service in Peak-Hour - AM (PM)	D (D)	C (D)	C (D)	C (D)
		Rating for Pedestrians	**POOR**	**GOOD**	**GOOD**	**FAIR**
	Cyclists	Bike lanes in all directions	NO	YES	YES	YES
		Lanes crossed for Left Turning Cyclists	2	2	2 (Central) 3 (Unser)	3
		Cyclists Level of Service in Peak-Hour - AM (PM)	D (D)	C (C)	C (C)	C (C)
		Rating for Cyclists	**POOR**	**GOOD**	**GOOD**	**FAIR**
	Vehicular Traffic	Delay in seconds/vehicle in Peak-Hour AM (PM)	215 (227)	148 (125)	74 (68)	43 (54)
		Queue Length in Peak-Hour, ft - AM (PM)	#2100' (#2100')	#2100' (#2100')	550' (800')	550' (450')
		Vehiclular Traffic Level of Service in Peak Hour - AM (PM)	F (F)	F (F)	E (E)	D (D)
		Rating for Vehicular Traffic	**POOR**	**POOR**	**GOOD**	**VERY GOOD**
Constructabililty		Additional Required Land	No Appreciable Need	No Appreciable Need	Approx **one** acre	Approx **one** acre
		Cost	No Appreciable Cost	$ 4.9M	$ 5.2M	$ 5.6M

# indicates queue build-up that impacts upstream traffic signal and is expected to extend to around 6000’ from intersection.

Task 6.0 – Preferred Alternative Conceptual Design

The Project Team recommends Alternative B as the preferred alternative. It conforms to the objectives of the project. In the decision matrix, Alternative B stands out as a balanced approach to satisfactorily accommodate the needs of pedestrians, cyclists, and drivers.

Alternative B proposes that Central Avenue be maintained as 4 through lanes section and Unser Boulevard to be planned as 6 through lanes section to accommodate projected traffic volumes of year 2030. Key components of intersection lane configuration under this alternative are as follows:

- Two (2) through lanes on Central Avenue in each direction.
- Three (3) through lanes on Unser Boulevard in each direction.
- Dual left-turn lanes on Central Avenue in each direction. Existing storage length is adequate for 2030 projected traffic.
- Dual left-turn lanes on Unser Boulevard in each direction with extended storage length to accommodate expected queuing for 2030 projected traffic.
- Exclusive right-turn channelized lanes on all approaches with extended storage length to accommodate expected queuing for 2030 projected traffic.
- Right-turn slip lane design.
- Right-turn speed table with rumble strips on the approach.
- Pedestrian countdown signals.
- High visibility crosswalks.
- 10’ sidewalks with landscape buffer zone.
- 10’ wide medians to provide pedestrian refuge areas and bull-noses on the intersection side to separate refuges areas from vehicular traffic.
- 6’ wide bicycle lanes with colored treatment.
- Extended timing pushbuttons at channelized islands.
- Reduced Central Avenue Speed Limit to 40 or 45 MPH.

Figure 12 shows conceptual design of the intersection under the preferred Alternative B. The design extends to the intersection approaches where proposed improvements are matched with the existing roadway geometry. A perspective diagram of the proposed design is presented in figure 13.

Interim Conceptual Design for Central Avenue/Unser Boulevard Intersection

Based on the projected traffic growth and intersection capacity analysis, it was determined that an additional northbound third lane on Unser Boulevard is needed prior to 2020 and an additional southbound third lane on Unser Boulevard is needed prior to 2030. Therefore, it is recommended that an interim stage of preferred Alternative B be considered for construction at present, which has the flexibility to be expanded to the ultimate intersection configuration of Alternative B. This interim stage of preferred alternative B once built should be re-examined prior to 2020 for expansion based on the traffic demand.

Figure 14 shows this interim stage. The intersection would be built with ultimate configuration of 2030, i.e. 6 through lane section on Unser Boulevard and 4 through lane section on Central Avenue. However, the third lanes on Unser Boulevard in north and south directions would not be open to vehicular traffic

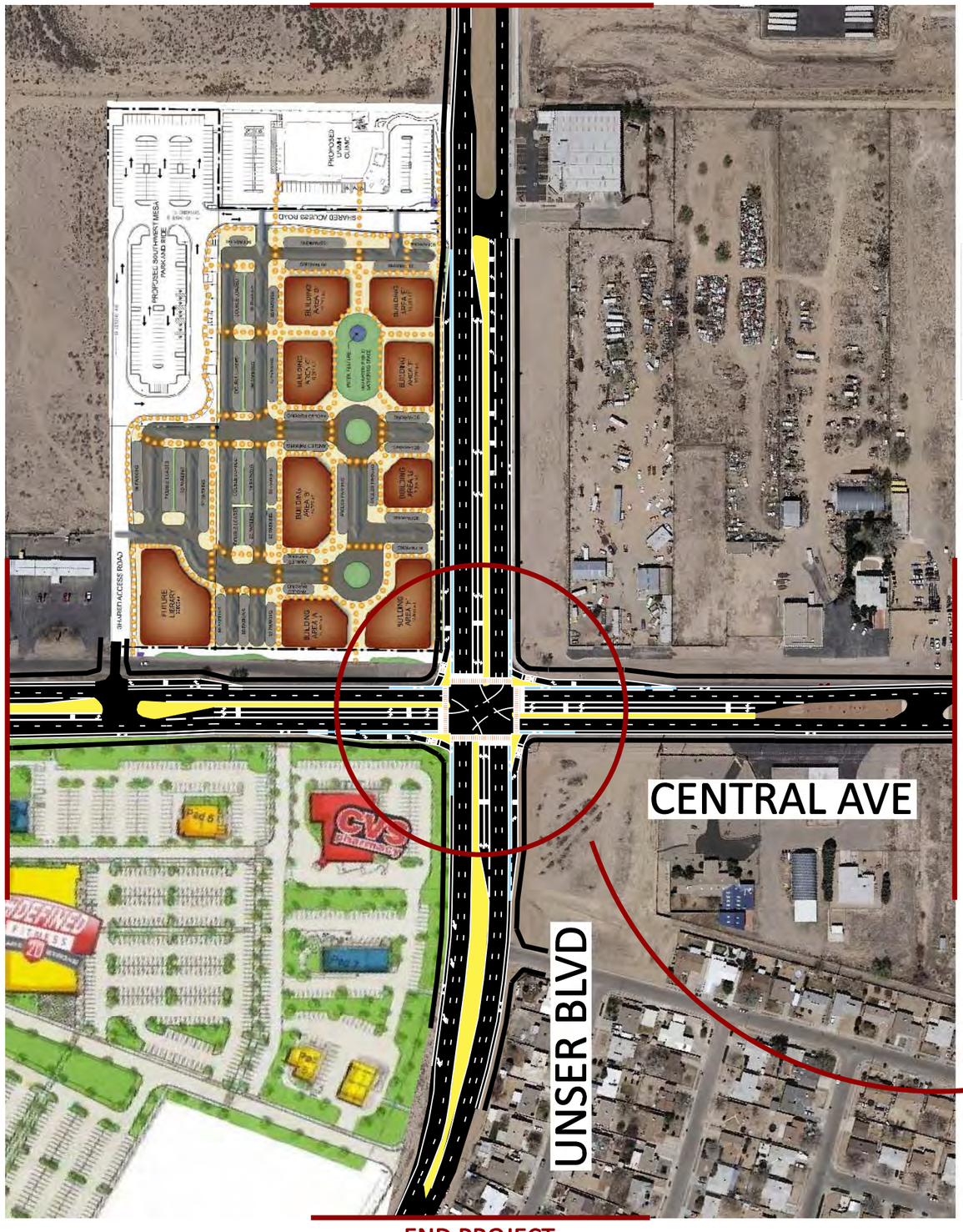
upon construction. One way to do this is to extend the channelized islands to cover third lanes near the crosswalks and stripe the remaining lane with chevron markings, tapering it back to match the existing pavement. The storage lengths under the interim option are also reduced as per interim traffic demand. Prior to 2020, when it is determined that the third lanes on Unser Boulevard in north and south directions are needed to accommodate the traffic demand, islands can be reduced and pavement can be re-striped to match the ultimate configuration of Alternative B.

The proposed interim option, under which a 4 through lane section rather than a 6 through lane section on Unser Boulevard is open upon construction, serves two main purposes:

- The interim option reduces the pedestrian crossing distance between channelized islands on Unser Boulevard from 110 feet to 88 feet. This reduces the pedestrian crosswalk distance improving pedestrian safety and convenience.
- Building the intersection to the interim configuration would secure required right-of-way for expansion to the ultimate configuration of preferred alternative B. Intersection expansion would primarily involve pavement re-striping, reducing impacts to drainage, traffic signal, and other components of construction.

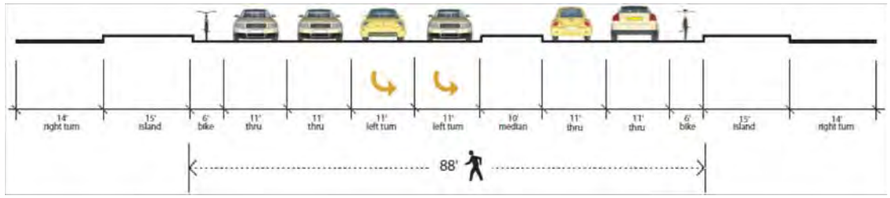
The preliminary cost estimate for the interim stage is $5.2 million, approximately the same as that of preferred Alternative B.

BEGIN PROJECT
MATCH WITH EXISTING AT 1300' FROM INTERSECTION

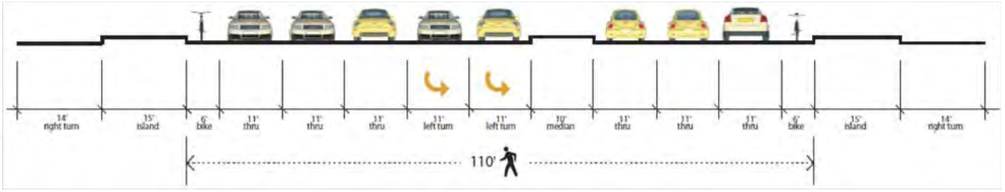


BEGIN PROJECT
MATCH WITH EXISTING AT 900' FROM INTERSECTION

END PROJECT
MATCH WITH EXISTING AT 950' FROM INTERSECTION

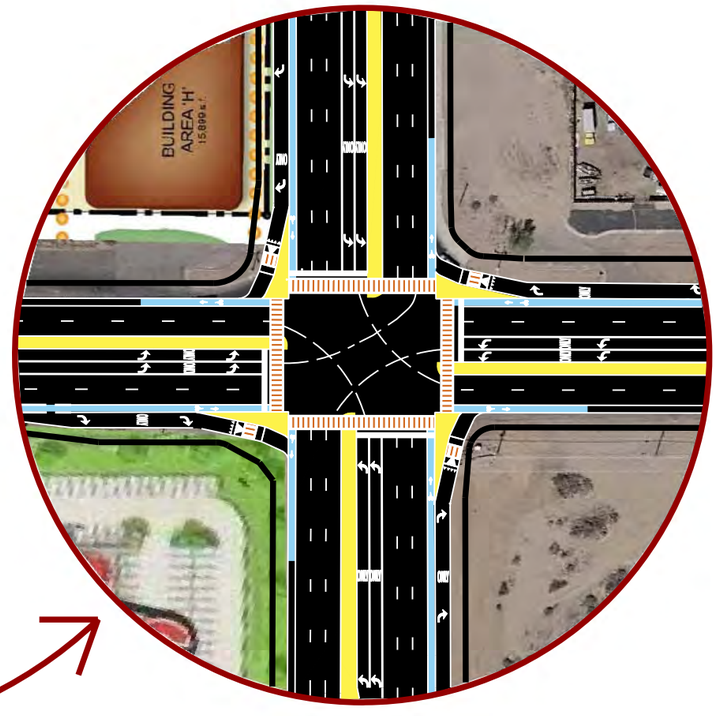


CENTRAL AVENUE PEDESTRIAN CROSSING TYPICAL SECTION



UNSER BOULEVARD PEDESTRIAN CROSSING TYPICAL SECTION

END PROJECT
MATCH WITH EXISTING AT 900' FROM INTERSECTION



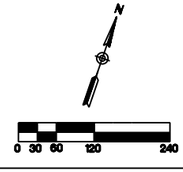


FIGURE 12

PREFERRED ALTERNATIVE B CONCEPTUAL DESIGN

8220 San Pedro Dr. NE
Suite 150
Albuquerque, NM 87113
505.338.0988 – Fax 505.338.0989
LEE ENGINEERING

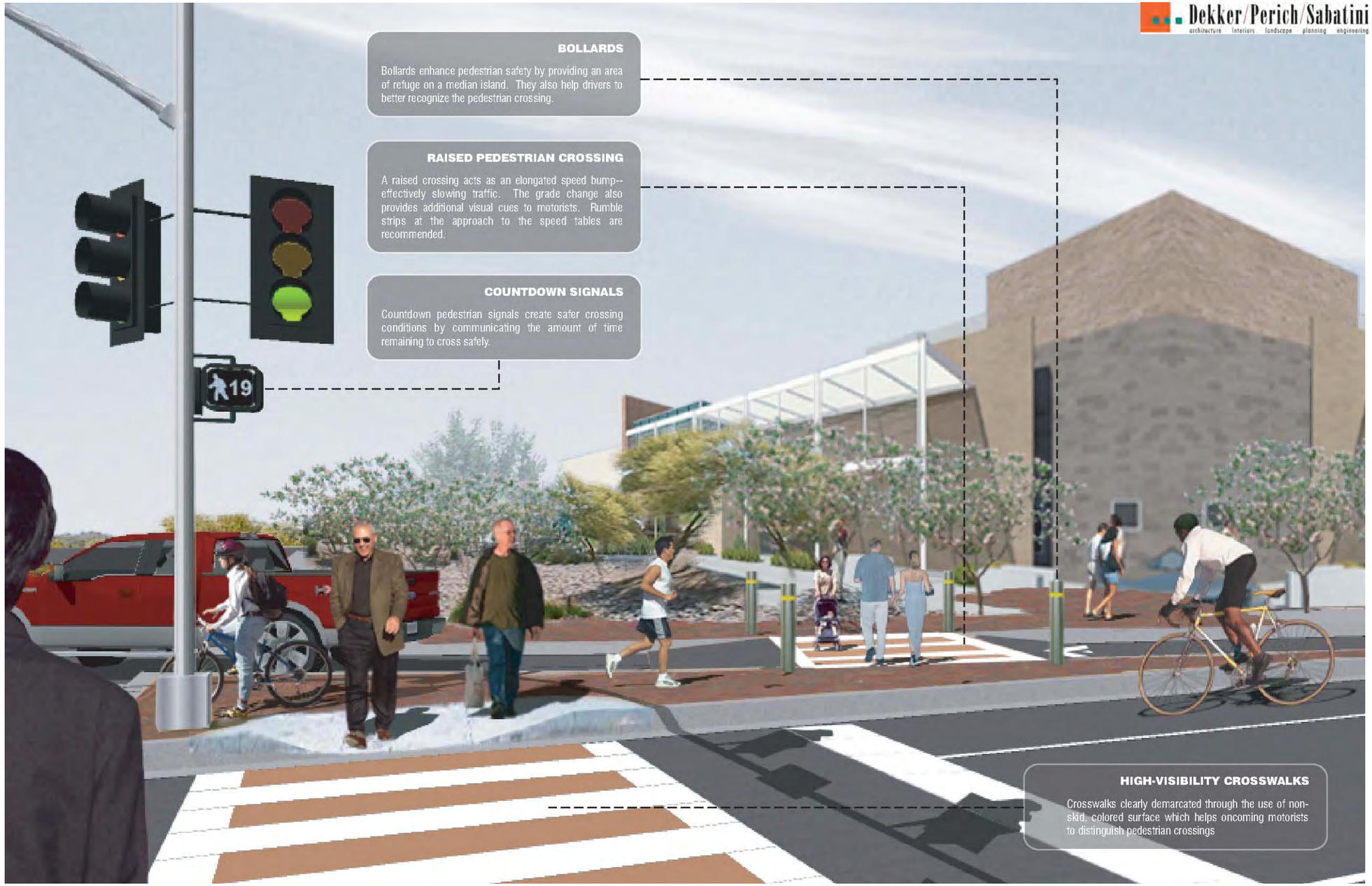


Figure 13. Preferred Alternative B Perspective Diagram

BEGIN PROJECT
MATCH EXISTING AT 550' FROM INTERSECTION

BEGIN PROJECT
MATCH WITH EXISTING AT 900' FROM INTERSECTION

END PROJECT
MATCH WITH EXISTING AT 900' FROM INTERSECTION

END PROJECT
MATCH EXISTING AT 550' FROM INTERSECTION

CENTRAL AVENUE PEDESTRIAN CROSSING TYPICAL SECTION

UNSER BOULEVARD PEDESTRIAN CROSSING TYPICAL SECTION

FIGURE 14

PREFERRED ALTERNATIVE B
INTERIM OPTION CONCEPTUAL DESIGN

LEE ENGINEERING
8220 San Pedro Dr. NE
Suite 150
Albuquerque, NM 87113
505.338.0988 – Fax 505.338.0989

Conceptual Design for Central Avenue/Unser Boulevard Intersection and Adjoining Public Right-of-Way

Final Report: Appendix

Prepared for:

City of Albuquerque
Planning Department

Submitted by:

Dekker/Perich/Sabatini
Fehr & Peers
Gannett Fleming West Inc.

June 2010

Table of Contents

Appendix A: List of Participants and Interested Persons

Name	Organization
Diane Albert	BikeNM
Jim Arrowsmith	DMD
Theresa Baca	DMD
Don Bartlett	DFAS Risk Management
Angela Benson	Darren Sowell Architects
Cynthia Borrego	Planning Dept., Redevelopment Division
Julia Clarke	Library
Stan Cooper	New Mexico AARP
Andrew De Garmo	Transit Department
Doreen De La Cruz	City of Albuquerque Transit Advisory Board and Para Transit Advisory Board
Terry Doyle	MRCOG
S.G. Ellison	Unser Crossing
Andrew J. Gallegos	NMDOT
Roy Gibson	Bohannan Huston
Christine Hall	National Federation of the Blind of NM
John Hartmann	DMD
David Hurley	Library
Jack Lord	MRCOG
Melissa Lozoya	DMD
Claude Morelli	NMDOT
Tom Neale	UNMH
Jose (Jody) Ortiz	NMDOT (ADA)
Keith Perry	Transit Department
Emily Piltch, MPH	Associate Scientist UNM Prevention Research Center
Jane Rael	Planning Department
Gabe Rivera	Planning Dept., Redevelopment Division
Shabih Rizvi	Transit Department
Bruce Rizzieri	Transit Department
Nilo Salgado	Planning Department
Juan Carlos Samuel	DMD
Damian Segura	NMDOT title VI
Jamie Silva Steele	UNMH
Charles Thompson	DMD
Mark Wade	The Design Group
Orlando Vasquez	NMDOT - ADA Coord
Stephen Woodall	Planning Department
Matthew Archuleta	Westgate Heights NA

Name	Organization
Jeanette Baca	Alamosa NA
Patrick Barisione	Stinson Tower NA
R.C. Bayer	Watershed NA
Councilor Isaac Benton	Councilor
Deb Blaser	Laurelwood NA
Jim Carrie	Ladera Heights NA
Kelly Chappelle	Avalon NA
Margaret Chavez	lives near Bridge - Unser
Carina Cozby	Parkway NA
Chris Czyz	Armstrong Development
Becky C. Davis	Westgate Heights NA
Karen Ellingboe	UNMH
Marcia Fernandez	South Valley Coalition of NA
Sabrina Flores	Parkway NA
Jerry Gallegos	Alamosa NA/WCCDG
M. Max Garcia	Los Volcanes NA
Annette Gonzales	S.R.Marmon NA
Art Gonzales	Westgate NA
Alex Grine	Anderson Hills NA
Brian Gutierrez	Villages of Parkwest NA
Waunita Hobart	UNMH
Mohamed Jasser	MJ Hospitality
Cindy Lewis	Encanto Village HOA
Deaun Lewis	S.R.Marmon NA
Brett Lopez	WestSide Coalition of Nas
Senator Linda M. Lopez	NM State Senator District 11
Allan Ludi	Ladera Heights NA
Scott Maier	Developer
Monica Martinez	Global Storage
Effie Marmon	PWCC, Inc
Norm and Belinda Mason	WCCDG and StinsonTower NA
Bob McCannon	Ladera West NA
Jon McCormick	Encanto Village HOA
Joanne McEntire	
Tom Menicucci	Council Analyst
Gerald Parras	Watershed NA
Candelaria Patterson	Laurelwood NA, WestSide Coalition of Nas

Name	Organization
Klarissa Pena	South West Alliance of Neighbors SWAN
Michael Quintana	West Mesa NA
Salih Rahman	Sierra Ranch NA
Joe and Pat Risbeck	Anderson Hills NA
Elaine Romero	Council Asst
Jim Salas	NM Commission for the Blind
Senator Bernadette Sanchez	
Councilor Ken Sanchez	Councilor
Antonio Sandoval	Congressman Martin Heinrich
Ben Sandoval	Los Volcanes NA
D. Anthony Segura	Tres Volcanes NA
Dan Serrano	
Andrea Settle	Villages of Parkwest NA
David Skowran	Las Lomitas NA
Mike and Lisa Stewart	Mike's Car Wash
Jamie Silva Steele	UNMH
Louis Tafoya	South West Alliance of Neighbors SWAN and West Mesa NA
Kurt Thorson	
Roger Velarde	National Federation of the Blind of NM
Celeste Wheeler	Anderson Hills NA
Clyde Wheeler	Anderson Hills NA
Susan White	South Valley Coalition of NA
Kristin Wilde	Las Lomitas NA
Jennifer Witten, MBA	Sr. Director of Health Alliances, American Heart & Stroke Association
Gerald Worrall	Tres Volcanes NA
Victor Wyant	Stinson Tower NA

Appendix B: December 9, 2009 Public Workshop Summary Report

CENTRAL AVENUE & UNSER BOULEVARD INTERSECTION CONCEPTUAL DESIGN PROJECT - REPORT # ONE

improving travel for all modes of transportation

DECEMBER 9, 2009 PUBLIC WORKSHOP SUMMARY

JANUARY 28, 2010

Conceptual Design for Central Avenue /Unser Boulevard Intersection

A CITY OF ALBUQUERQUE PLANNING PROJECT

This report summarizes the results of the first public workshop for this project.

The overall project is expected to be completed by July of 2010.

City Project Manager: Paula Donahue, Senior Planner

Consultants/Team Leaders

LEE ENGINEERING

Paul Barricklow, P.E., PTOE
- Project Lead
- Multi-Modal Operations Analysis

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Carlos Hernandez, AICP
- Conceptual Design Alternatives

Dekker/Perich/Sabatini
architecture interiors landscape planning engineering

Will Gleason, AICP
- Public Outreach/Urban Design

Gannett Fleming

Mike Brazie, P.E.
- Constructability and Cost Estimates

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Conceptual Design for Central Avenue /Unser Boulevard Intersection: Summary of Public Workshop

PROJECT OVERVIEW

The intersection of Unser Boulevard and Central Avenue constitutes a critical crossroad on Albuquerque's west side. Significant developments are already under construction on the northwest and southwest corners. They include a new West Mesa Transit Center and Unser Crossing, a large commercial center. Average daily traffic now exceeds 55,000 vehicles, resulting in noticeable delays during peak commute times.

In addition to the projects already under construction, a City of Albuquerque public library, multiple commercial uses and a University of New Mexico Medical Clinic are anticipated to be constructed within the next five years. The northeast and southeast corners also have the potential to add to this activity center. The opening of the West Mesa Transit Center will make this area a hub for pedestrian activity and enable transit riders to connect to quality transit, particularly the Rapid Ride red and blue lines. As the street intersection corners are developed, it will become increasingly important to be able to walk from one site to another after arriving by foot, bicycle, transit, or automobile.

In 2009, the City of Albuquerque hired the consultant team of Lee Engineering, Fehr and Peers, Dekker/Perich/Sabatini, and Gannett Fleming Engineering to conduct a study that results in a conceptual design for the Central Avenue/ Unser Boulevard intersection. The purpose of the work is to examine ways to make this critical intersection more efficient and safe for pedestrians and bicyclists, while maintaining acceptable levels of mobility for motor vehicles. The work is divided into five parts:

- Task 1.0: Public Involvement Program
- Task 2.0:Conceptual Design
- Task 3.0: Multi-modal Operations Analysis
- Task 4.0: Constructability and Preliminary Cost Analysis
- Task 5.0: Decision Matrix
- Task 6.0: Preferred Alternative Conceptual Design

This report covers Tasks 1.0 and 2.0: Public Involvement Program and Conceptual Design.

TASK 1.0 -2.0: PUBLIC INVOLVEMENT/CONCEPTUAL DESIGN

Task 1.0 focuses on soliciting public input at the outset of the project and Task 2.0 uses the input from the public to generate concepts for the intersection. The consultant team provided multiple ways for the public and stakeholders to provide input into the project. A website was created to provide current information and enable viewers to give input. The website at www.unserandcentralabq.com has a project overview, conceptual designs, videos of the walking tour and workshop, and places to post comments. In addition to the website, the project team also created an on-line survey to assess people's priorities for intersection improvements. The website features a link to the survey.

Neighborhood association and coalition representatives, property owners, advocacy groups, public agencies and elected officials were contacted by email and mail. A complete list of project invitees is included in Appendix A. The team also posted large banners at the intersection one week prior to the workshop. (See photo.)

On December 9th, 2009, the study team conducted a day long public workshop. The workshop allowed community stakeholders to actively participate in the initial planning for the project and help generate concepts for improving the intersection. Starting at 8:00 a.m., the workshop participants convened at the northwest corner of Unser and Central to experience firsthand the volume of rush hour traffic and the challenges of navigating the area on foot. The walking tour was followed by a series of meetings with stakeholders to fully understand the land use and transportation issues associated with the area. Appendix A contains the full agenda for the workshop.

PUBLIC POLICIES IMPACTING STUDY AREA

Several City policies that support safe, efficient and comfortable walking in and to Activity Centers and Enhanced Transit Corridors are applicable to the Central Avenue/Unser Boulevard intersection: the Albuquerque/Bernalillo County Comprehensive Plan, the Southwest Albuquerque Strategic Action Plan portion of the West Side Strategic Plan, the West Route 66 Sector Development Plan, and the Environment Planning Commission recommended version of the Great Street Facility Plan. (The Great Street Facility Plan is pending approval by the City Council.)

City of Albuquerque/Bernalillo County Comprehensive Plan

- The Comprehensive Plan designates the intersection of Central and Unser a Community Activity Center (Table 22, Policy a. – Types of Activity Centers on page II-37 ; Figure 30 – Development Areas with Activity Centers and Transportation Corridors on page II-31). This designation implies that the area will be a focal point and destination for the surrounding community, serving a population of 30,000 or more. "The ideal Community Activity Center would have parcels and buildings scaled to pedestrians, small enough to encourage parking once and walking to more than one destination." (p. I-35)

- The Comprehensive Plan designates this portion of Central Avenue as an "Enhanced Transit Corridor". The policy implication is that the design of these streets and the corresponding pedestrian realm should be geared towards facilitating transit operations and pedestrian activity.

West Side Strategic Plan and the West Route 66 Sector Development Plan (both as amended in 2009)

The Southwest Albuquerque Strategic Action Plan became part of the West Side Strategic Plan at adoption. Both plans prioritize improvements at Central and Unser to enable walking to and within the Community Activity Center. Section VI of the West Route 66 Sector Development Plan requires that pedestrian and bicycle access to and within Activity Centers and other local destinations use public right-of-way design standards in the "Great Streets Facility Plan" that make arterial and collector streets conducive to facing buildings toward them. This plan also includes curb ramp designs to improve wheelchair safety and 50-60 degree angle right turn slip lane designs that are intended to reduce vehicle speeds of turning cars and increase pedestrian visibility.

Banner posted at the West Mesa Transit Center

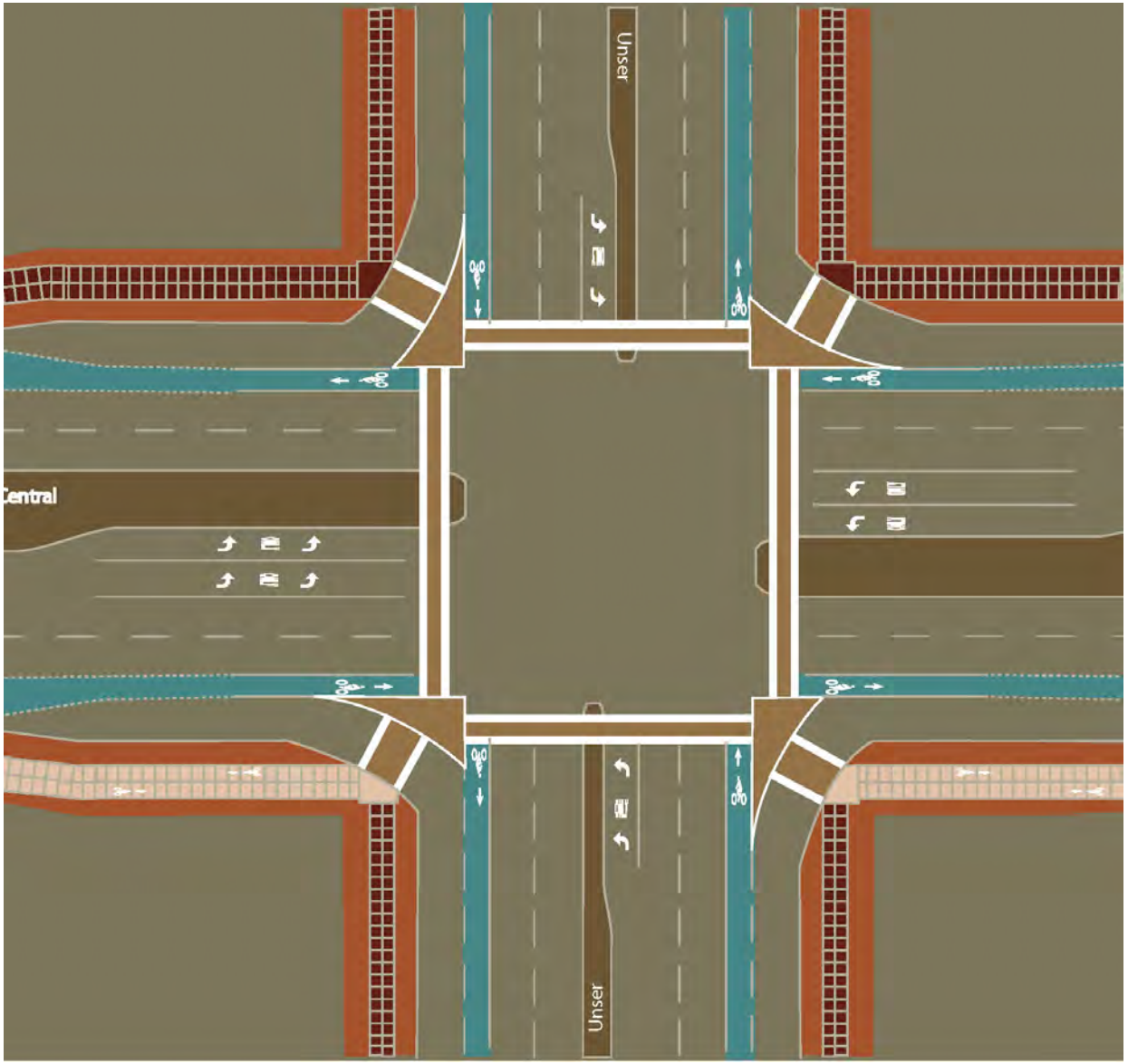
Great Streets Facility Plan

The Great Streets Facility Plan has been recommended for approval by the Environmental Planning Commission and is pending approval at the City Council. The Great Streets Facility Plan proposes street prototypes that enhance the pedestrian realm. The prototypes proposed in the Plan were used to inform concepts for Central and Unser.

Public Workshop Results

The workshop participants generated four options for reconfiguring the existing design of the intersection. These four options are illustrated and summarized on the following pages.

OPTION A: "PRIORITY ON PEDESTRIANS"



Characteristics of Option A: "Priority on Pedestrians"

MOTOR VEHICLES

- Two travel lanes in each direction on Unser Boulevard and Central Avenue

PEDESTRIANS

- Minimum 6' wide bike trail on the east side of Unser north of Central
- Minimum 10' wide sidewalk on west side of Unser, north of Central
- Minimum 10' wide sidewalk on north side of Central, west of Unser
- Redesigned "free right" turn lanes to a more acute angle to create a safer crossing for pedestrians.
- Refuge medians in center of roadway
- Raised crosswalks with rumble strip entrances at turn lanes
- Audible warnings and countdown pedestrian signals

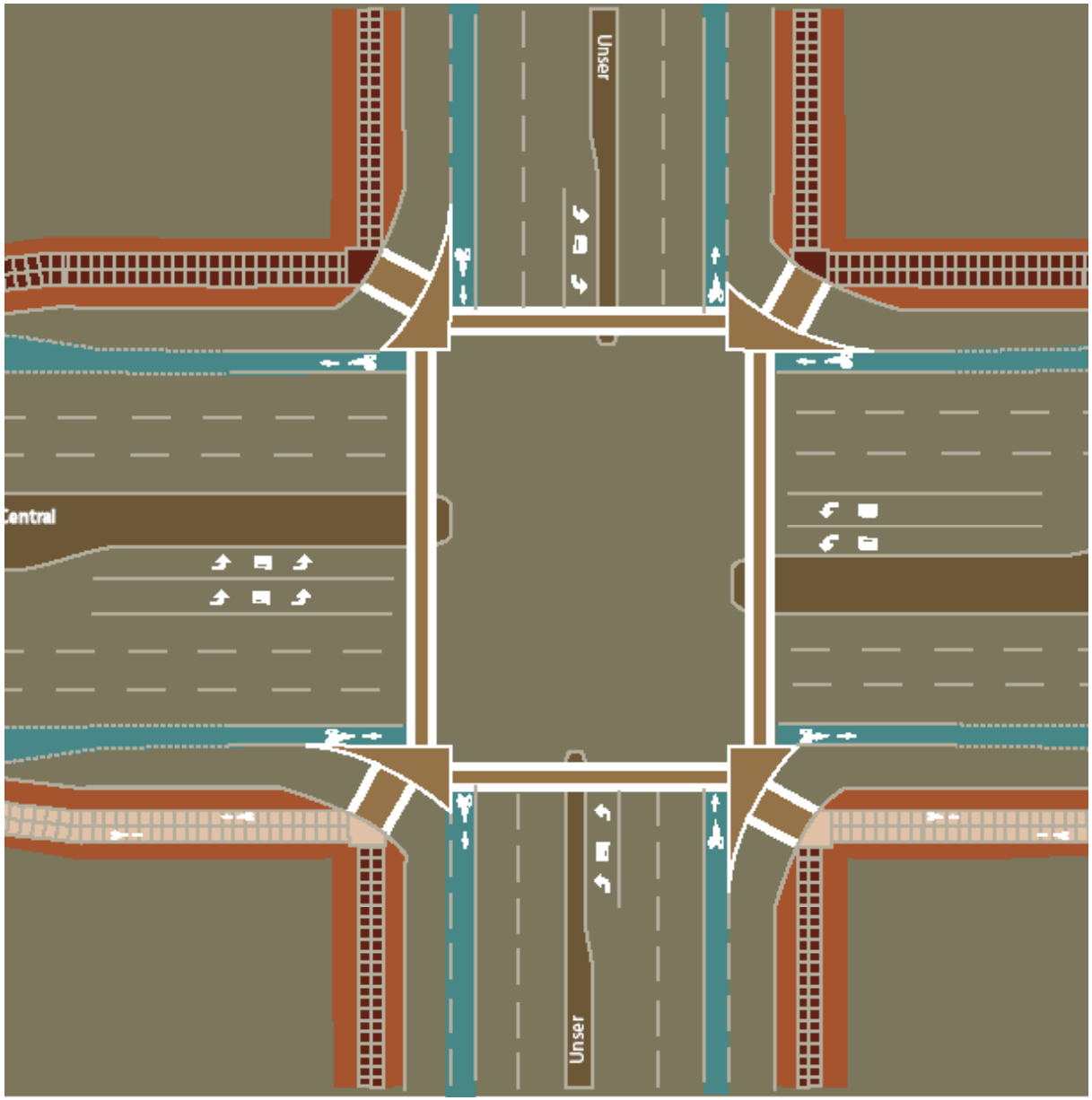
BICYCLES

- Painted and striped bike lanes at intersection
- 12' wide multi-use path on south side of Unser with striping

COMMENTS FROM WORKSHOP PARTICIPANTS

- "Looks best"
- "I like this best for now but think will possibly be a traffic jam in the future" - Mike Stewart
- "D is first choice, but A provides the most pedestrian friendly plan"
- General Comment on all concepts: To accommodate visually impaired pedestrians, some form of rumble strip should be added to the right hand turn lane raised crossings. This would provide an audible warning to those crossing between the sidewalk and the refuge island. This is particularly important for all users given the increased presence of hybrid vehicles.

OPTION B: CAR IS KING



Characteristics of Option B: Car is King

MOTOR VEHICLES

- Two turn lanes on Unser Boulevard
- Three travel lanes in each direction on Unser Boulevard

PEDESTRIANS

- 6' wide sidewalk on east side of Unser north of Central with adjacent crusher fines
- Refuge medians in center of roadway
- Raised crosswalks with rumble strip entrances at turn lanes
- Audible warnings and countdown pedestrian signals

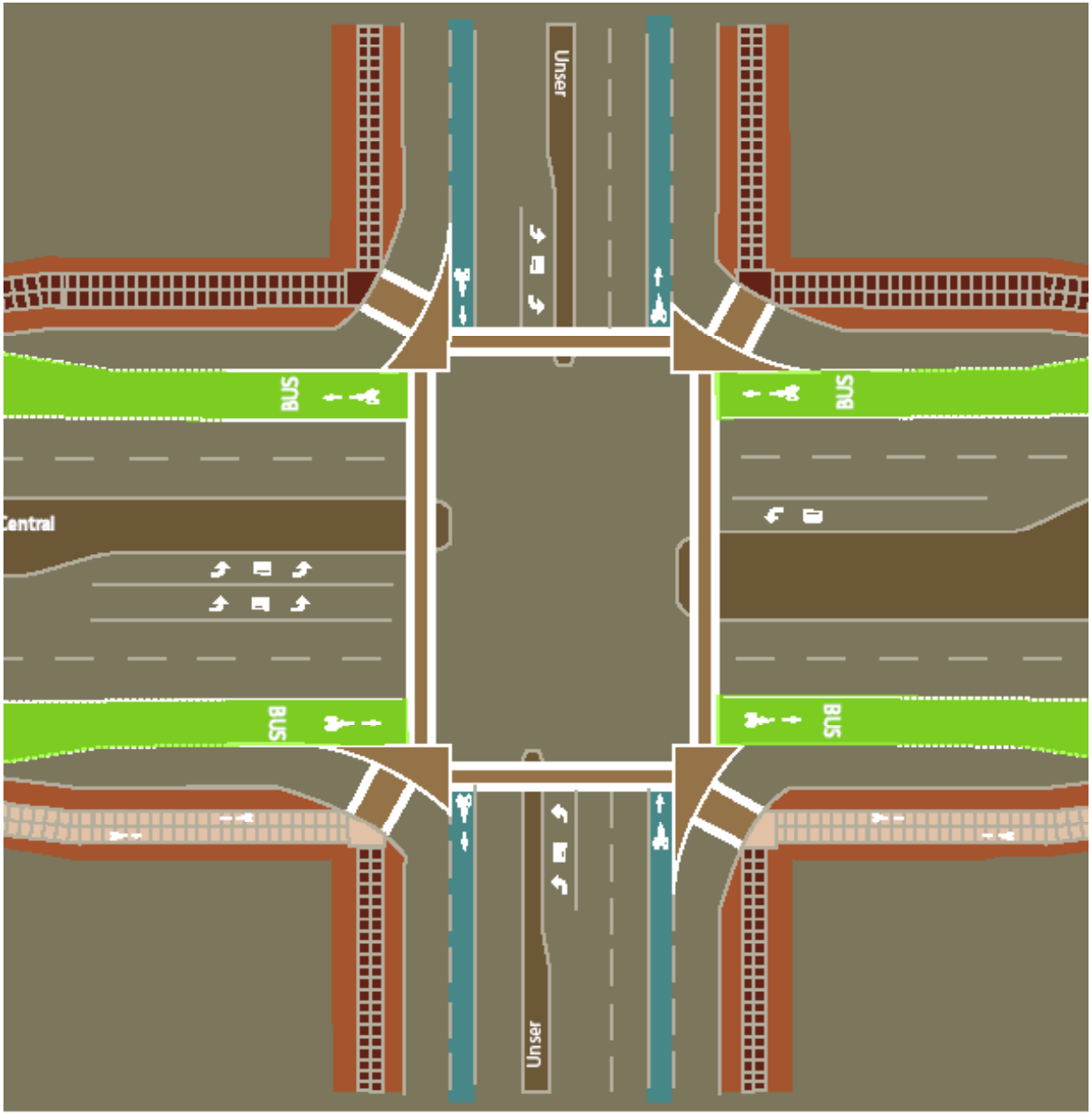
BICYCLES

- Painted and striped bike lanes at intersection
- 12' wide multi-use path with striping on east side of Unser south of Central

COMMENTS FROM WORKSHOP PARTICIPANTS

- "This plan will be self-defeating, Encouraging even more traffic than present while not encouraging pedestrians – too many lanes"
- "Seems to handle future traffic, but I like C better for maybe flexible bus, bike traffic lane" – Mike Stewart
- "Access north side Central – Frontage Road cul de sacs to service existing properties"
- "Possible Frontage St. as 'Main Street' to allow pedestrian connections"
- "Right-in/Right-out access to transit center? Left-out problematic"

OPTION C: TRANSIT AND BIKE FIRST



Characteristics of Option C: Transit and Bike First

MOTOR VEHICLES

- Two turn lanes on Unser Boulevard
- Two travel lanes in each direction on Unser Boulevard

PEDESTRIANS

- Raised crosswalks with rumble strip entrances at turn lanes
- Redesigned “free right” turn lanes to a more acute angle to create a safer crossing for pedestrians.
- Audible warnings and countdown pedestrian signal
- 6' wide multi-use path on east side of Unser with adjacent crusher fines north of Central
- Refuge medians in center of roadway

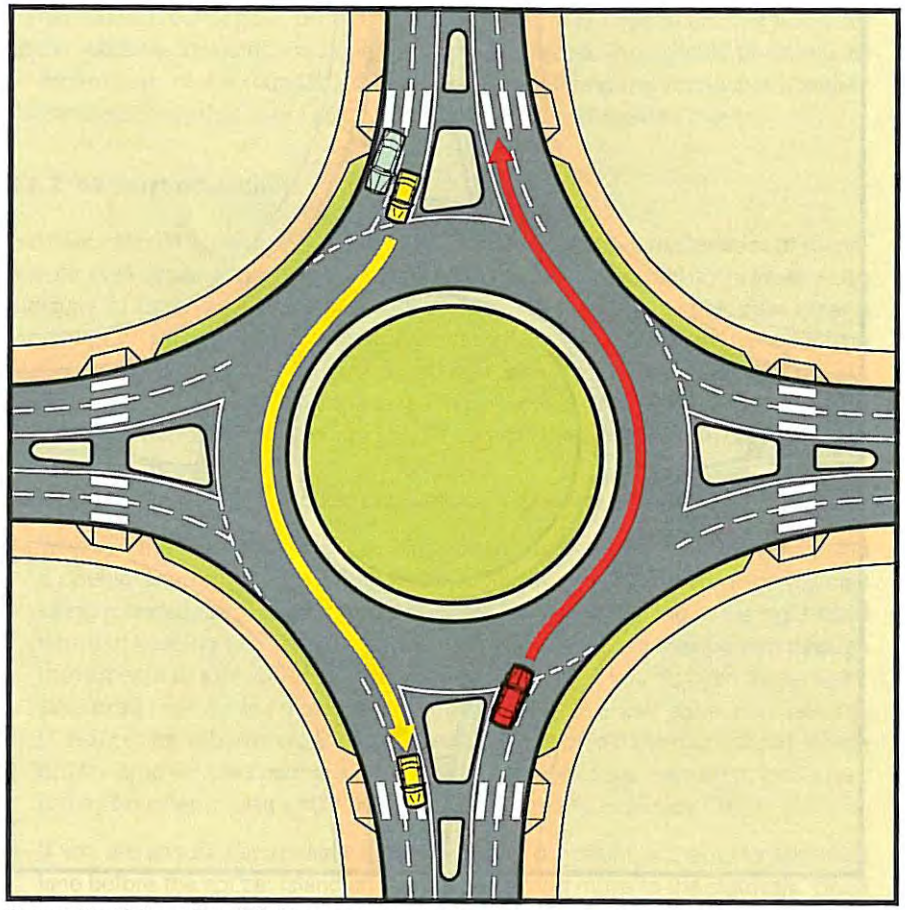
BICYCLES

- Shared bike and bus lanes at intersection
- “Queue jump” for busses
- 12' wide multi-use path on Unser south of Central

COMMENTS FROM WORKSHOP PARTICIPANTS

- “Good for transit, but no pedestrian improvement – too many lanes”
- “This is the best option because of adaptability to future growth of traffic flow. Bus/bike lane can be retrofitted to a third lane in each direction” – Becky Davis
- “My pick would be either C or D. The problem with D – when you reach full capacity, it breaks. With C, it will function at over capacity. C, with minimal cost, can be changed into B for more auto capacity.”
- “Don’t like bus lane”
- “There is a lot of growth at this intersection, and this seems best to handle the future. Share bus lane with traffic?” – Mike Stewart

OPTION D: ROUNDABOUT



Source: *The Highway Code* (UK) (9), converted to right-hand drive

Characteristics of Option D: Roundabout

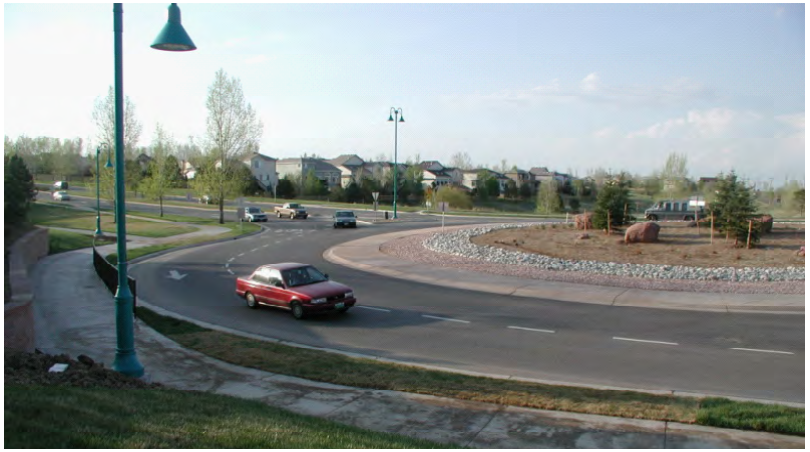
MOTOR VEHICLES
- Turn lanes not required
- Two travel lanes in each direction on Unser Boulevard and Central

PEDESTRIAN
- Refuge medians in center of roadway
- Dedicated pedestrian crossings at approaches
- 30' crossing distance curb to curb

BICYCLE
- Refuge medians in center of roadway
- 6' on-street bicycle lanes Unser and Central
- 10' shared use paths (north on Unser)
- Bicycles are required to merge with traffic or use side paths

OTHER
- Transit can make “u-turns” to access/leave transit facility
- Could require purchase of additional right-of-way

COMMENTS FROM WORKSHOP PARTICIPANTS
- “Shorter Ped, but no signal to cross”
- A roundabout could be a potential issue for those who are visually impaired as they do not have a signal to warn a visually impaired pedestrian when it is safe to cross.
- “Interesting possibilities – seems like it would be complex to sell to all interested parties” – Mike Stewart
- “I like the roundabout concept, but it requires educating motorists to cooperate when merging. The circle needs to be large enough to provide sufficient room???”
- “Roundabout – no – too many peds. Need crossover for peds for it to work. West side of Central.”
- “What is the accident rate compared with A, B and C? What happens when this operates at over capacity?”
- “D is lovely, but it is hardest to re-engineer in case of large changes in traffic flow. It would have real problems with larger volume and traffic stacking.” – Becky Davis
- “Currently not doable due to high traffic flow and negative traffic behavior”



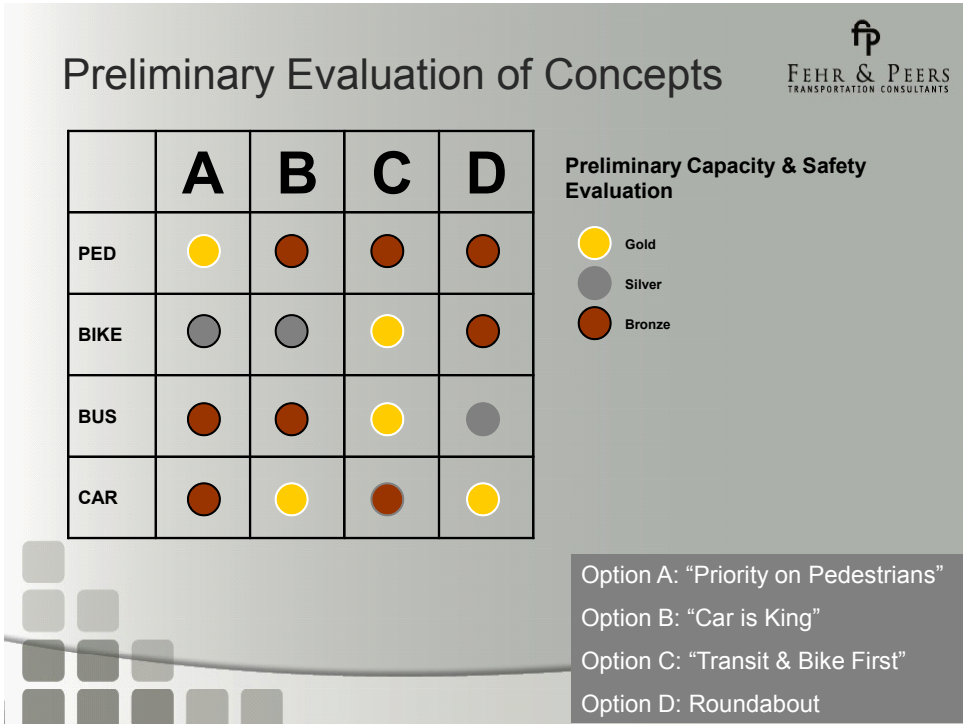
Summary

After discussing the advantages and challenges of each interserction concept, the workshop participants collectively created a preliminary comparative evaluation matrix. The matrix on this page reflects the result of that evaluation process. There was no clear "winner" among the four concepts generated in the workshop. The roundabout concept had the least support, due to right-of way constraints and the challenges for visually impaired pedestrians to cross the street without a signalized intersection. Option C had the most positive evaluations by category. The ranking systems is a qualitative judgement and an indication of intial preferences. Subsequent evaluations and modeling analyses could alter the perceived advantages or disadvantages of the concepts.

In addition to specific intersection configurations, workshop participants also discussed issues related to the larger context of the area. Specifically, the area along Central west of Unser has a good potential for a mid-block pedestrian crossing to connect the Wext Mesa Transit Center to the Unser Crosssing retail area on the south side of Central Avenue. The north side of Central, west of Unser, also has an existing frontage road that presents interesting opportunities and challenges for the overall circulation pattern of the Central/Unser northwest quadrant. Workshop participants explored the possibility of creating an alternative access point on Central that would give busses a more direct access to the transit center on the west side of the intersection. This access point needs further exploration, particularly in relation to the concept of a mid-block crossing in the same general area.

Next Steps

The consultant team will take the results of the workshop and analyze the four concepts. This analysis will include follow-up meetings with City of Albuquerque Department of Municipal Development staff, New Mexico Department of Transportation, and Mid Region Council of Governments. The options will be analyzed for constructability, multi-modal operations, and cost implications. All the relevant information will help create a "decision matrix" that will summarize the relative strengths and weaknesses of the alternatives. This decision matrix will lead to the selection of a preferred alternative that the team will then take back to the stakeholders for more input. The second open house is anticipated to take place sometime in the Spring of 2010. The ultimate goal is to create a conceptual design that the City can use to develop construction documents for modifications to the intersection.



Workshop preliminary evaluation of Intersection Concepts. The results do not reflect a clear preference for any one option. Option C, Transit and Bike First, has the most "gold". Additional development of the concepts will result in a more detailed evaluation matrix.

Contact Information

If you have questions or comments about this project, please contact:

Paula Donahue, Senior Planner, Planning Department
Central/Unser Conceptual Design Project Manager
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505.924.3932

Periodic updates of the project can be found on the project website:

WWW.UNSERANDCENTRALABQ.COM

Appendix A: WORKSHOP AGENDA
CENTRAL/UNSER DESIGN STUDY

PUBLIC OUTREACH AND ALTERNATIVES WORKSHOP
Wednesday, December 9th, 2009
West Mesa Community Center, 5500 Glenrio Rd. NW, Albuquerque

Approx. Time/Participants	Subject	Product(s)
8:00 – 9:00 All invited, including City Councilors, neighborhood reps	1. Walking Tour of Central/Unser intersection. Meet at northwest corner of intersection.	Photos, shared understanding of intersection challenges
9:15-10:15 a.m. Staff from DMD, Transit, MRA	2. Overview of proposed developments impacting the intersection • Transit Center • MRA Plans • UNMH Clinic • City Library • Unser Crossing	Sketch illustrating existing and proposed developments.
10:15 -10:30	BREAK	Food, drinks
10:30 – 11:30 DMD staff, advocacy reps, NMDOT, MRCOG	3. Traffic/Pedestrian/Bike Overview • Existing plans for intersection reconfigurations • Traffic Signalization Priorities • Pedestrian and bicycle improvements	List of issues/ tradeoffs,
11:30 – 1:00 p.m.	LUNCH BREAK	
1:00 - 4:00 Consultants and City	4. Working Session – draft alternatives, outline challenges/options	Sketches/overlays/presentation for evening meeting
5:00 – 7:00 Public, stakeholder, elected reps	Public Presentation and Open House • Outline project and schedule • Discuss challenges/opportunities • Show options from similar configurations • Generate discussion	Comments/Input from public

Appendix B: TRAFFIC COUNTS
CENTRAL/UNSER DESIGN STUDY

PUBLIC OUTREACH AND ALTERNATIVES WORKSHOP
Wednesday, December 9th, 2009
West Mesa Community Center, 5500 Glenrio Rd. NW, Albuquerque

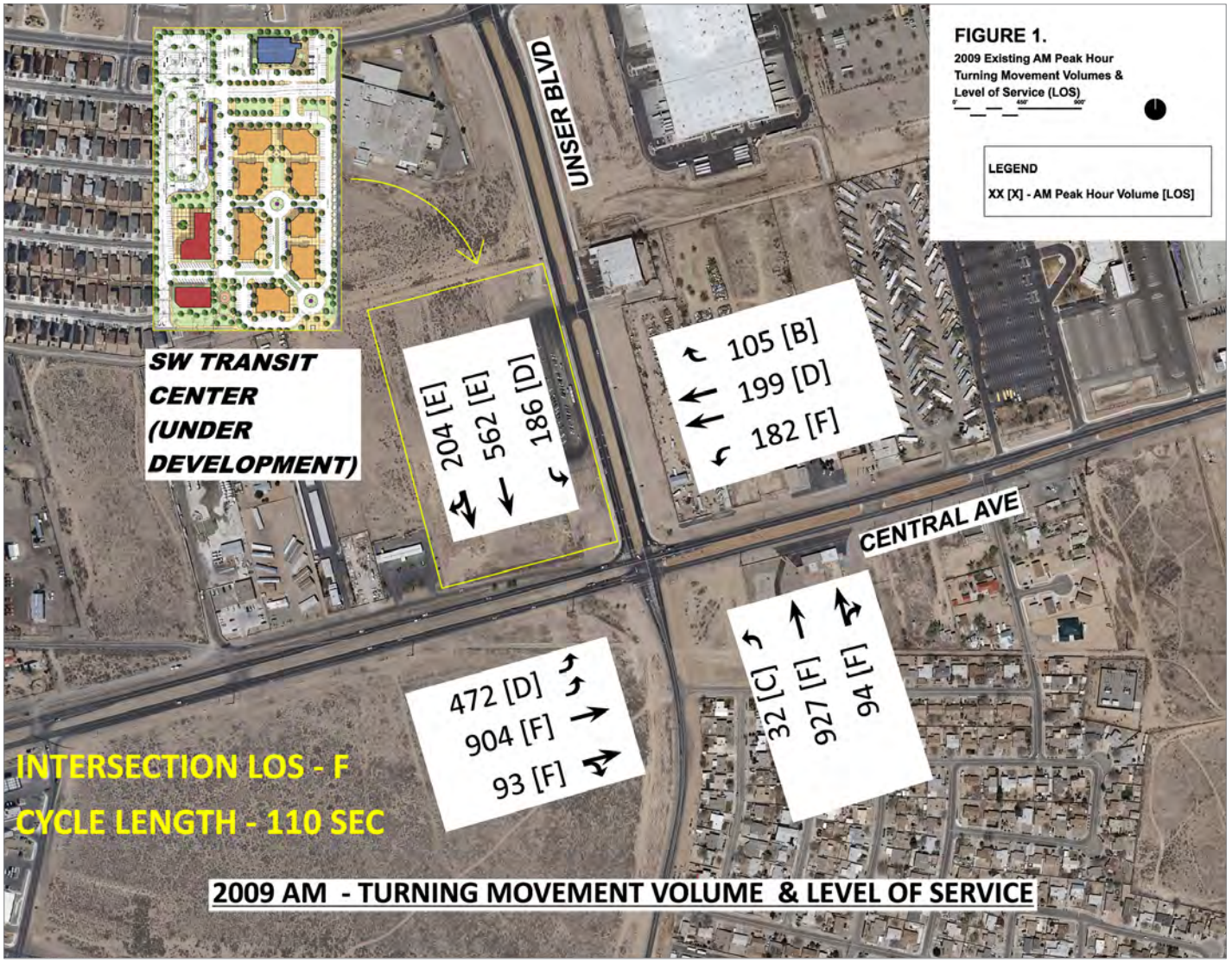


Fig. 1

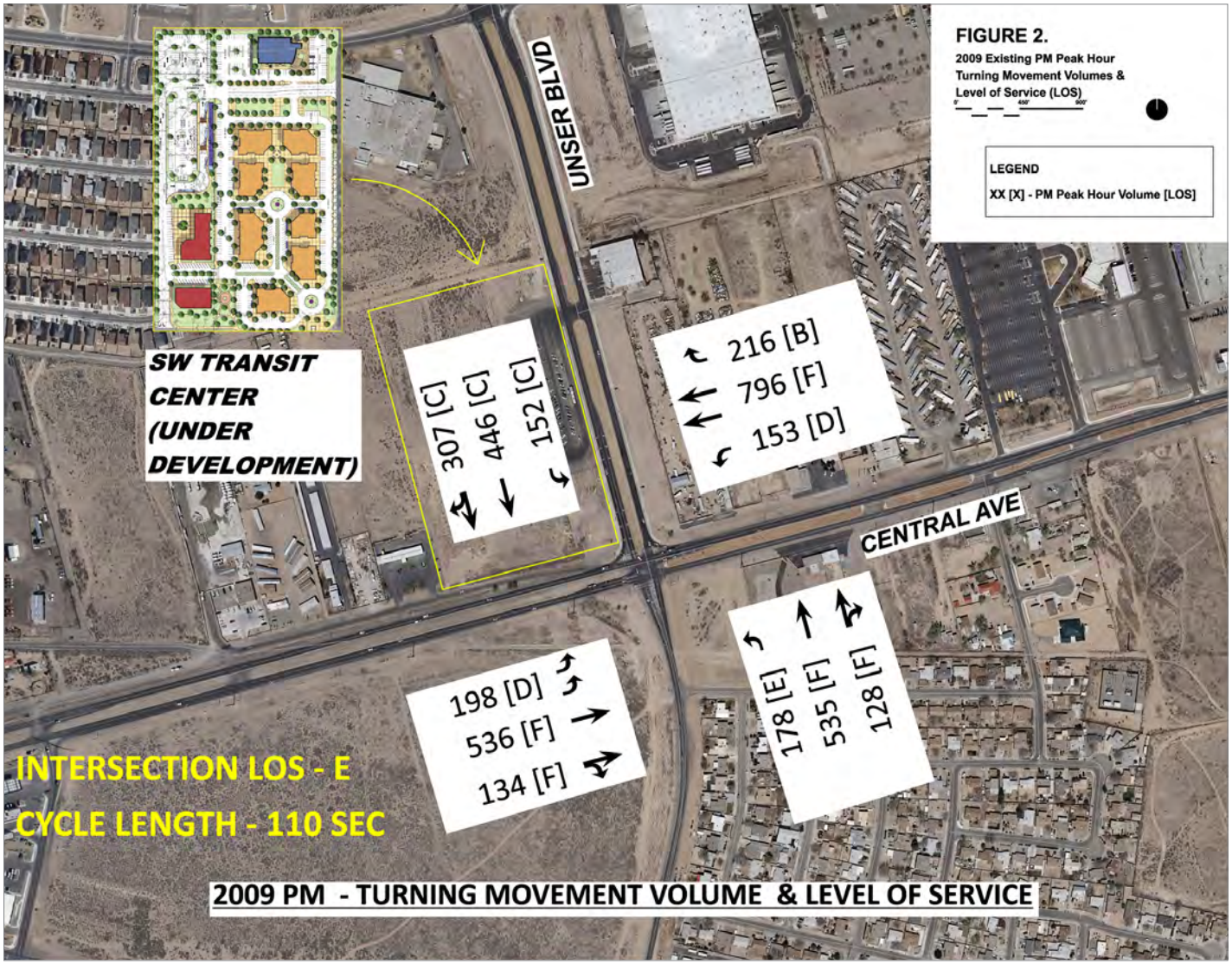


FIGURE 2.
2009 Existing PM Peak Hour Turning Movement Volumes & Level of Service (LOS)
LEGEND
XX [X] - PM Peak Hour Volume [LOS]
UNSER BLVD
CENTRAL AVE
SW TRANSIT CENTER (UNDER DEVELOPMENT)
307 [C]
446 [C]
152 [C]
216 [B]
796 [F]
153 [D]
198 [D]
536 [F]
134 [F]
178 [E]
535 [F]
128 [F]
INTERSECTION LOS - E
CYCLE LENGTH - 110 SEC
2009 PM - TURNING MOVEMENT VOLUME & LEVEL OF SERVICE

Fig. 2

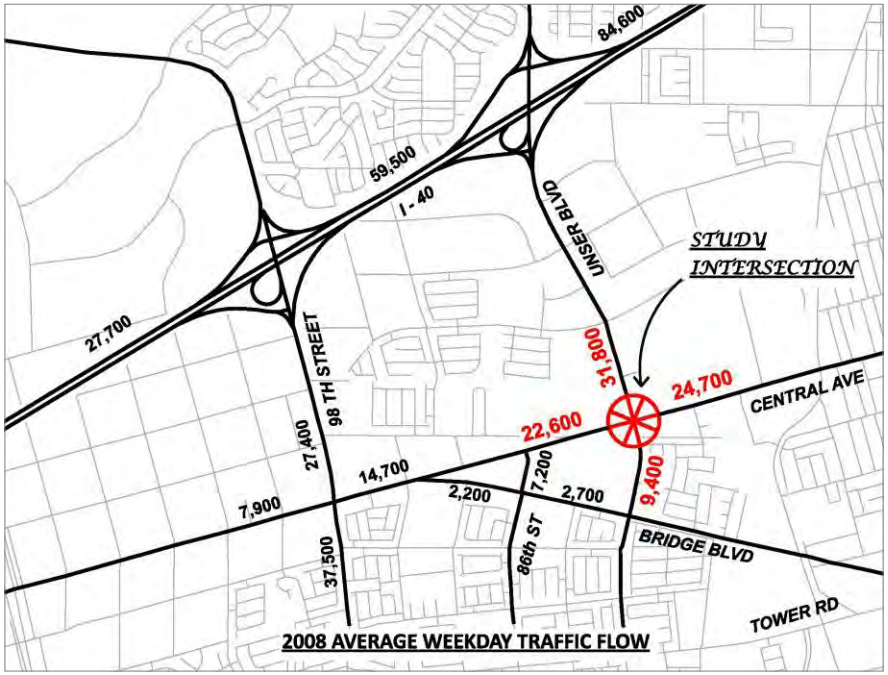

84,600
59,500
I - 40
UNSER BLVD
STUDY INTERSECTION
27,700
98 TH STREET
31,800
24,700
CENTRAL AVE
22,600
27,400
14,700
7,200
2,200
2,700
9,400
7,900
37,500
86th ST
BRIDGE BLVD
TOWER RD
2008 AVERAGE WEEKDAY TRAFFIC FLOW

Fig. 3

Appendix C: April 21, 2010 Public Meeting Summary and Presentation

April 21, 2010 Public Meeting Summary

On April 21st, 2010, the Consultant Team hosted a follow-up meeting to present the results of the analysis that led to the draft preferred alternative. The presentation outlined a series of pedestrian and bicycle safety features that would apply to all the proposed intersection concepts. These included:

- Pedestrian countdown signals.
- High visibility textured crosswalks.
- Raised speed tables.
- 10' wide sidewalks and median refuges at crossings.

Meeting participants generally agreed that these features should be incorporated into any intersection design. There was some disagreement about the use of truncated dome patterning at crosswalks. This feature is meant to provide visually impaired individuals with a clear indication that they are at a street crossing but some participants expressed concern over the ability of wheelchairs and elderly walkers to navigate the textured terrain.

The intersection design alternatives were presented in a decision matrix that summarized the features of each alternative. The most basic differentiating factor was the number of lanes on Central and Unser for each alternative.

- Alternative B, the preferred alternative, proposed four lanes of traffic on Central Avenue and six lanes on Unser Boulevard.
- Participants generally agreed that Alternative B best balanced traffic congestion with pedestrian safety and crossing times. One participant suggested that Unser Boulevard did not need to be expanded to six lanes, as the City had just completed improvements to the intersection and it would be years before there were funds for additional widening.

Overall, participants seemed pleased with the results of the study and wanted to know when the preferred design would actually be constructed.

Public Comments

1. It does not make sense to widen Central to 6 lanes...when your greated future ped connections will be across Central between the two large developments. Alt B seems to be the best.
2. We think Plan "B" is perfect.
3. First, I'd like to say that the images on the slides and the handouts were too small to adequately show the configurations proposed for the intersection. The common feature of all three proposals was the layout of the right turn lanes and the pedestrian crosswalks therein. Since the right turn configuration is said to be the same at all corners on all the proposals, a larger detail would have been advisable to effectively show it.
   That said, I am totally in favor of the pedestrian-friendly configuration presented. The slip lane, as opposed to the typical right turn lane, is a definite plus for pedestrians. The slip lanes, as I view them, allow right turns, while slowing vehicles by use of platformed crosswalks (raised above street level a few inches and identified further by color, material, texture, and/or some other means), rumble strips preceding the crosswalks (serving to alert motorists by sound and vibration and warn pedestrians by sound), and by sharper exit turn angles. Further, the large pedestrian islands and wide center-of-the-street refuges with ballards (approximately 36" high

vertical posts) offer protection not normally seen at intersections. The pedestrian push buttons and the increased standard countdowns help as well. GOOD JOB!

Reviewing the design matrix that compares the factors for each proposal, obviously, the No Build Alternative is unacceptable. It is a dangerous intersection for any kind of foot traffic, even for the most alert and physically capable persons. The only difference I saw between Alternatives A, B, and C is the number of through traffic lanes. Right turn lanes are identical and left turn lanes are essentially the same on all alternatives.

Alternative A provides for keeping the current 2 through traffic lanes in each direction on both Unser and Central. Alternative B provides for 3 through traffic lanes in each direction on Unser only. Alternative C provides for 3 through traffic lanes in each direction on both Unser and Central. The matrix chart shows that Alternatives B and C need approximately an additional acre of land for implementation. However, this is wrong. Since all proposals have the same configuration for right turns, no appreciable additional right-of-way is needed for any of them. Additional through lanes on Unser would be placed in the already expansive median. Right-of-way for additional through lanes on Central already exists north of the westbound lanes. Therefore, only minimal additional land, if any, would be required, something true for all proposals.

Though the favored alternative indicated on the matrix is B (4 lanes Central, 6 lanes Unser). In my opinion, this is wrong and, at least at this time, totally unnecessary. I strongly support Alternative A! My reasoning is this: Currently, Unser is a 4-lane roadway, not yet completed down to Dennis Chavez. It is unlikely that it will be expanded in the near future, almost certainly not in the next 10 years. It may, in fact not be expanded even then. It is foolish to expand this intersection for that expectation. If the intersection were to be so built out now in anticipation of a 6-lane Unser, it will become less pedestrian-friendly and inhibit the desired foot traffic between the Unser Crossing retail center south of Central; the retail center, transportation center, and UNM clinic north of Central; and whatever may develop on prime land on either side of Central east of Unser. It is a safe bet that a wider intersection would encourage faster than desired or posted speeds. The negative effect on Unser traffic where it pinches back to the present 2 lanes on either side on Central should be considered as well. Additionally, The matrix indicates that Alternative B would cost an additional $.4 million with a questionable benefit and that for only the two hour-long peak traffic times. That money would be wasted as, again if Unser is expanded as suggested, the intersection design would inevitably be revisited by a new set of traffic engineers with a new set of ideas.

Within my neighborhood association (Stinson Tower NA) the consensus is that Unser should serve the neighborhood that it passes through. This means that the roadway configuration should not be designed primarily to permit quick passage from fringe areas to the Interstate. This means that whatever retail development on the precious little remaining commercially zoned land on Unser—and Central—should not be inhibited, even jeopardized, by building roadways—and in this particular case, the Alternative B intersection—that would do just that. Speed limits also need to be adjusted around this intersection so as not to intimidate pedestrians, not only to promote the anticipated foot traffic, but for the benefit of retailers that the residents hope will locate there. My suggestion would be to set speed limits to a maximum of 40 mph. Faster limits have not been shown to facilitate vehicular traffic; moderate limits have proven to be more effective.

4. I won't be able to make the meeting this eve, but wanted someone to have my input.

   Since we want people to easily shop Unser Crossing and all the new developments on the NW corner, a crossing bridge may be the safest way to encourage foot traffic back and forth, giving

the feeling of a large shopping center. People can use public transit to get to the entire area and easily cross to the other side without having to worry about traffic.
Thank you.

5. I understand.
   Ok, then, if at street level, there needs to be a safe place mid crossing for people who can't make it all the way across with the light.
   We come from SF. There was such a crossing at 19th Ave near SF State University. Lots of mishaps, even with the center safe place, so the solution was to put bars around the safe place in order to keep people from getting too close to the curb while standing there. It was wheelchair accessible if I remember correctly.
   I would also suggest a longer yellow light and longer pedestrian crossing lights. If it doesn't feel easy and safe, we will loose potential shoppers who might use public transportation, and some of those who may want to take advantage of the lifestyle feel of the 2 shopping areas.

CONCEPTUAL DESIGN FOR CENTRAL AVE. AND UNSER BLVD. INTERSECTION

Prepared for
City of Albuquerque
Planning Department

City Project Manager
Paula Donahue

LEE ENGINEERING

April 21, 2010

Gannett Fleming West, Inc. | Fehr & Peers | Dekker/Perich/Sabatini

INTENT OF PROJECT

- *Safe, efficient, and comfortable* routes for pedestrians and bicyclists integrated with transit and auto traffic
- Multimodal Emphasis
  - Pedestrians
  - Bicyclists
  - Transit
  - Cars

PROGRESS TO DATE

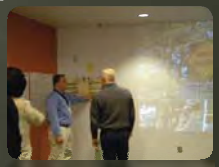
Westside Strategic Plan ('09)

Central & Unser Project Kick-off (Oct '09) → Public Workshop (Dec '09) → Alternatives Development (Oct – April '10)

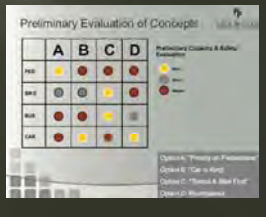
Public Meeting (April '10) → Report & Conceptual Design (May '10) → Final Design

DECEMBER 2009 WORKSHOP AND REPORT

- **Full Day Workshop with Multiple Stakeholders**
- **Four Alternatives Developed**
  - Three Carried on to Analysis
  - One Alternative added later



- **Potential Mid-Block Crossing Discussed**



EXISTING AND DEVELOPING LAND USE

- UNM Health Clinic
- ABQ-Ride Transit Center
- Retail
- Library
- Additional Redevelopment

- Lowe's Hardware
- Staples
- CVS
- Defined Fitness
- Multiple Restaurants
- Mixed Retail

SCHOOLS IN THE AREA

- West Mesa H.S.
- Jimmy Carter Mid.
- Lavaland Elem.
- Edward Gonzales Elem.

EXISTING LANE CONFIGURATION

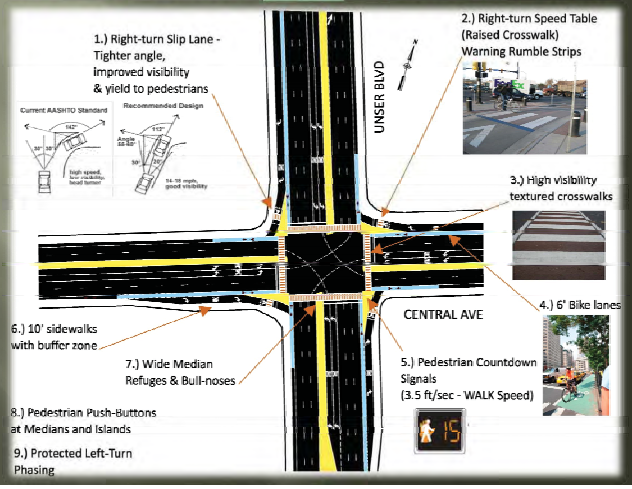
- 4 Lanes on Central and Unser
- Dual Left Turn Lanes on Central
- Single Left Turn Lane on Unser
- Channelized Right on SB and WB
- Median Width varies 6′ to 40′
- Skewed Crosswalks

CROSSING DISTANCE	124 FEET (CENTRAL) 145 FEET (UNSER)
PEDESTRIAN CROSSING TIME PROVIDED AT SIGNAL	18 SECONDS

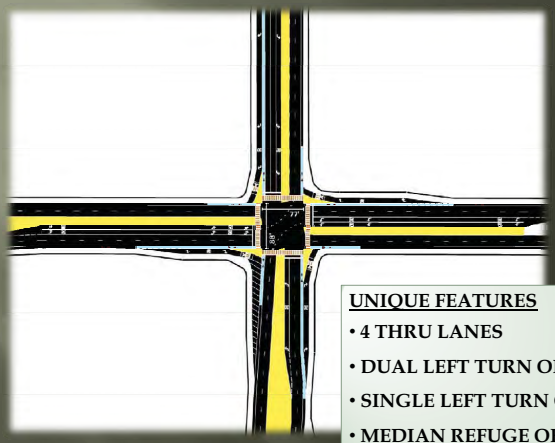
PEDESTRIANS AND BIKES SAFETY STRATEGIES

- PROVIDE SAFE ROUTES FOR ALL USER GROUPS
- INCREASE VISIBILITY OF PEDESTRIANS AND BIKES
- PROVIDE SAFE REFUGE AREAS FOR PEDESTRIANS
- REDUCE PEDESTRIAN-VEHICLE CONFLICT TIME

PROPOSED PEDESTRIANS AND BIKES FEATURES ON ALL ALTERNATIVES



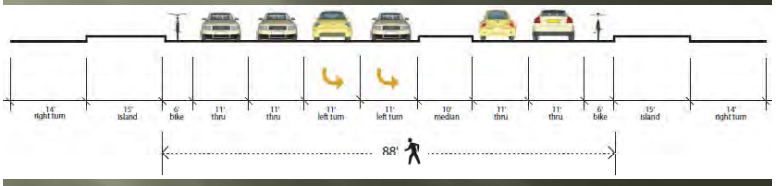
ALTERNATIVE A
4 LANES CENTRAL AND UNSER



UNIQUE FEATURES

- **4 THRU LANES**
- **DUAL LEFT TURN ON CENTRAL**
- **SINGLE LEFT TURN ON UNSER**
- **MEDIAN REFUGE OF 10′**

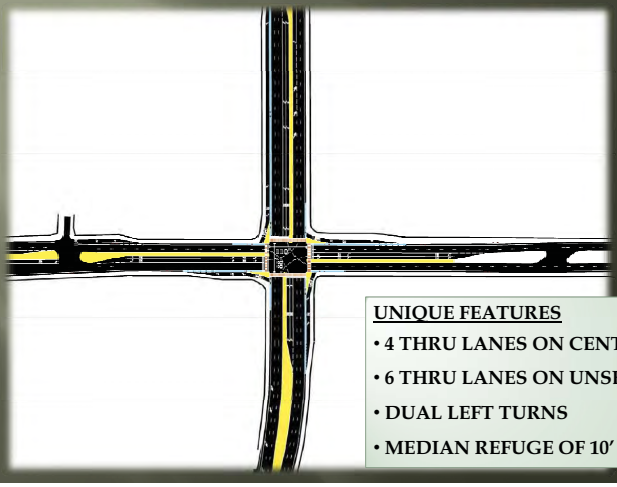
ALTERNATIVE A
4 LANES CENTRAL AND UNSER



CENTRAL AVE PEDESTRIAN CROSSING TYPICAL SECTION

CROSSING DISTANCE	88 FEET
PEDESTRIAN EXPOSURE TIME AT SIGNAL (3.5 FT/SEC)	26 SECONDS

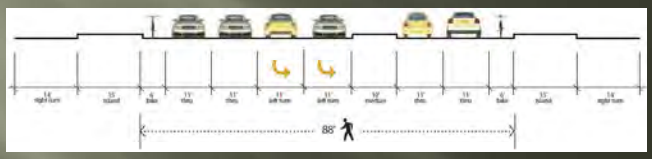
ALTERNATIVE B
4 LANES CENTRAL, 6 LANES UNSER



UNIQUE FEATURES

- **4 THRU LANES ON CENTRAL**
- **6 THRU LANES ON UNSER**
- **DUAL LEFT TURNS**
- **MEDIAN REFUGE OF 10′**

ALTERNATIVE B
4 LANES CENTRAL, 6 LANES UNSER



CENTRAL AVE PEDESTRIAN CROSSING TYPICAL SECTION

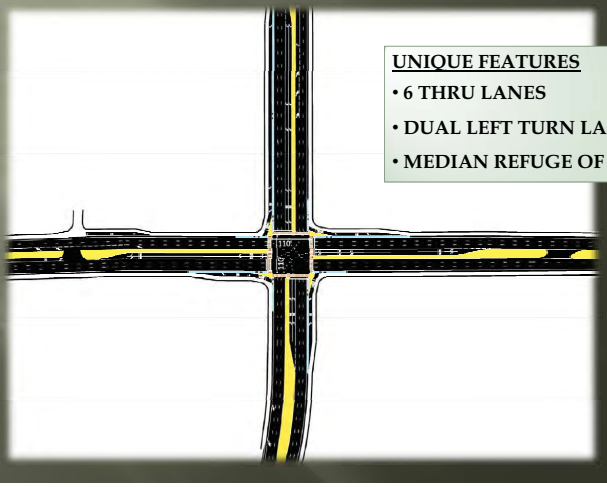
CROSSING DISTANCE	88 FEET
PEDESTRIAN EXPOSURE TIME AT SIGNAL (3.5 FT/SEC)	26 SECONDS

ALTERNATIVE B
4 LANES CENTRAL, 6 LANES UNSER

UNSER BLVD PEDESTRIAN CROSSING TYPICAL SECTION

CROSSING DISTANCE	110 FEET
PEDESTRIAN EXPOSURE TIME AT SIGNAL (3.5 FT/SEC)	32 SECONDS

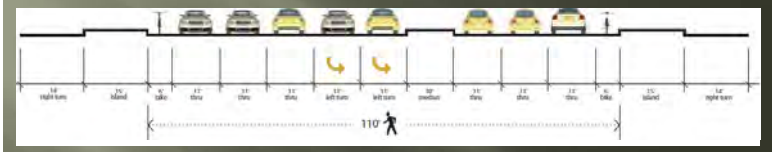
ALTERNATIVE C
6 LANES CENTRAL AND UNSER



UNIQUE FEATURES

- **6 THRU LANES**
- **DUAL LEFT TURN LANES**
- **MEDIAN REFUGE OF 10′**

ALTERNATIVE C
6 LANES CENTRAL AND UNSER



CENTRAL AND UNSER PEDESTRIAN CROSSING TYPICAL SECTION

CROSSING DISTANCE	110 FEET
SIGNALIZED PEDESTRIAN EXPOSURE TIME (3.5 FT/SEC)	32 SECONDS

ANALYSIS SOURCES AND PROCEDURES

- **Pedestrian**
  - National Highway Cooperative Research Program - Pedestrian Intersection LOS; Accessible Pedestrian Signals
- **Bike**
  - Highway Capacity Manual – Bike LOS
- **VISSIM Multimodal Micro-simulation**
  - Uses Travel Demand Model (MRCOG) for 2030 Projected Traffic
  - Provides Average Vehicle Delay, Queue Length

ALTERNATIVE A - SNAPSHOT

ALTERNATIVE A - SNAPSHOT

ALTERNATIVE B - SNAPSHOT

ALTERNATIVE B - SNAPSHOT

ALTERNATIVE C - SNAPSHOT

ALTERNATIVE C - SNAPSHOT

QUEUING DIAGRAM

Decision Matrix

User Group		Decision Factors	No Build Alternative	Alternative A 4 Lane Central and Unser	Alternative B 4 Lane Central 6 Lane Unser	Alternative C 6 Lane Central and Unser
		Crossing Distance (Island to Island)	145' (Central) 124' (Unser)	88'	88' (Central) 110' (Unser)	110'
		Signalized Pedestrian Exposure Time, seconds	18	26	26 (Central) 32 (Unser)	32
	Pedestrians	Median Refuge	Varies from 6' to 40'	10'	10'	10'
		Pedestrian Level of Service in Peak-Hour - AM (PM)	D (D)	C (D)	C (D)	C (D)
		Rating for Pedestrians	**POOR**	**GOOD**	**GOOD**	**FAIR**
	Bikes	Bike Level of Service in Peak-Hour - AM (PM)	D (D)	C (C)	C (C)	C (C)
		Lanes crossed for Left Turning Bikes	2	2	2 (Central) 3 (Unser)	3
		Rating for Bikes	**FAIR**	**GOOD**	**GOOD**	**FAIR**
	Cars	Delay in seconds/vehicle in Peak-Hour AM (PM)	215 (227)	148 (125)	74 (68)	43 (54)
		Queue Length in Peak-Hour, ft - AM (PM)	#2600' (#2600')	#2100' (#2100')	600' (700')	500' (500')
		Car Level of Service in Peak Hour - AM (PM)	F (F)	F (F)	E (E)	D (D)
		Rating for Cars	**POOR**	**POOR**	**GOOD**	**VERY GOOD**
Constructability		Additional Required Land	No Appreciable Need	No Appreciable Need	Approx **one** acre	Approx **one** acre
		Cost	No Appreciable Cost	$ 4.7M	$ 5.1M	$ 5.4M

# indicates queue build-up that impacts upstream traffic signal and is expected to extend to around 6000' from intersection

Preferred Alternative Traffic Simulation

Next Steps

- **Incorporate Public Input into Final Report**
- **Coordination with Department of Municipal Development for City Standards & Policies**
- **Submit Conceptual Designs and Report to Department of Municipal Development for Final Design**

QUESTIONS? COMMENTS?

CONTACT:
Paula Donahue, Senior Planner
City of Albuquerque Planning Department
600 Second St. NW, 3rd Floor
Albuquerque, New Mexico 87102
924-3932

To access the Central - Unser website:
http://www.cabq.gov/planning/long-range/projects.html

Appendix D: Survey Results and Public Comments from Project Website

View Summary

Browse Responses »

PAGE:

1. Over the past 12 months, how often did you travel through this intersection?

	Response Percent	Response Count
At least once a week	50.0%	6
A few times a month	25.0%	3
Several times a year	16.7%	2
Only for special events	8.3%	1
Hide replies Other (please specify)		3

1.	Daily	Thu, Dec 10, 2009 8:30 PM	Find...
2.	Daily Basis	Wed, Dec 9, 2009 9:08 PM	Find...
3.	every day	Wed, Dec 9, 2009 8:01 AM	Find...

answered question	12
skipped question	0

2. How do you commonly travel through this intersection?

	Response Percent	Response Count
Drive automobile	83.3%	10
Drive Scooter/Motorcycle	0.0%	0
Walk	16.7%	2
Bike	0.0%	0
Transit	0.0%	0
Hide replies Other (please specify)		1

1.	Run, bicycle, car -- all three	Fri, Dec 11, 2009 4:30 PM	Find...

answered question	12
skipped question	0

3. What are the most important priorities for this intersection? (Select one or more)

	Response Percent	Response Count
Reduce wait time for drivers during rush hour	50.0%	6
Improve safety for young, old and disabled pedestrians	**75.0%**	**9**
Add new bicycle lanes and signs that remind drivers to "share the road"	25.0%	3
Improve access to transit stops	33.3%	4
Hide replies Other (please specify)		1

1.	I do not believe these need be mutually exclusive, as all are important	Fri, Dec 11, 2009 4:30 PM	Find...

answered question	**12**
skipped question	**0**

4. What are the least important priorities for this intersection? (Select one or more)

	Response Percent	Response Count
Reduce wait time for drivers during rush hour	**50.0%**	**6**
Improve safety for young, old and disabled pedestrians	8.3%	1
Add new bicycle lanes and signs that remind drivers to "share the road"	33.3%	4
Improve access to transit stops	16.7%	2
Hide replies Other (please specify)		2

1.	I do not believe these need be mutually exclusive, as all are important	Fri, Dec 11, 2009 4:30 PM	Find...
2.	n/a	Wed, Dec 9, 2009 8:01 AM	Find...

answered question	**12**
skipped question	**0**

5. Select one that applies as an acceptable trade-off at this intersection

	Response Percent	Response Count
Improve pedestrian safety, but increase wait time for motor vehicles	**66.7%**	**8**
Decrease wait time for motor vehicles, but increase pedestrian crossing distance	33.3%	4
	answered question	**12**
	skipped question	**0**

6. Select one that applies as an acceptable trade-off at this intersection

	Response Percent	Response Count
Adjust traffic signals to minimize wait time for buses, but increase wait time for personal motor vehicles	**75.0%**	**9**
Adjust traffic signals to minimize wait time for personal motor vehicles, but increase wait time for buses	25.0%	3
	answered question	**12**
	skipped question	**0**

7. Select one that applies as an acceptable trade-off at this intersection

	Response Percent	Response Count
Improve safety for bicyclists, but increase wait time for motor vehicles	**83.3%**	**10**
Decrease wait time for motor vehicles, but decrease safety for bicyclists	16.7%	2
	answered question	**12**
	skipped question	**0**

sandra templeton (03:16:15) :

I'm glad something is happing in these area , I have leave on the area for 7 yrs or more. I like walking and just the idea that will be availible for my family is great, i just will like maybe a field to play ball or walk dogs. we have a school by bluewater and unser . i think a park like the one on tower and 86ths street will be great to get kid outdoors. thank you

Norm Mason (06:23:03) :

I attended both the morning tour & meeting as well as the evening meeting. At the evening meeting, I pointed out that option A incorrectly showed 2 westbound lanes west of Central when currently there are 3. The 3rd lane is intended as a dedicated lane allowing a left turn into Unser Crossing just west of the intersection and is not a through lane. Across Unser, 2 lanes are shown as left turn lanes when in fact one was intended to feed into the Unser Crossing dedicated turn lane across the road. Currently, it is crossed out because it has no use as of yet and had been mistakingly used for left turns onto southbound Unser.
Option B incorrectly illustrates 3 westbound Central lanes and 2 left turn lanes ignoring the above mentioned dedicated lane for Unser Crossing entry west of the Unser intersection and the feeder through lane on the east side of the intersection.
These inconsistencies may not affect the concepts in a meaningful way at this stage, but they may generate some confusion by viewers on this website.

Norm Mason (09:04:07) :

First, I'd like to say at the presentation, the images on the slides and the handouts were too small to adequately show the configurations proposed for the intersection. The common feature of all three proposals was the layout of the right turn lanes and the pedestrian crosswalks therein. Since the right turn configuration is said to be the same at all corners on all the proposals, a larger detail would have been advisable to effectively show it. THIS HAS NOW BEEN CORRECTED ON THIS UPDATED WEBSITE. Thanks.

That said, I am totally in favor of the pedestrian-friendly configuration presented. The slip lane, as opposed to the typical right turn lane, is a definite plus for pedestrians. The slip lanes, as I view them, allow right turns, while slowing vehicles by use of platformed crosswalks (raised above street level a few inches and identified further by color, material, texture, and/or some other means), rumble strips preceding the crosswalks (serving to alert motorists by sound and vibration and warn pedestrians by sound), and by sharper exit turn angles. Further, the large pedestrian islands and wide center-of-the-street refuges with ballards (approximately 36" high vertical posts) offer protection not normally seen at intersections. The pedestrian push buttons and the increased standard countdowns help as well. GOOD JOB!

Reviewing the design matrix that compares the factors for each proposal, obviously, the No Build Alternative is unacceptable. It is a dangerous intersection for any kind of foot traffic, even

for the most alert and physically capable persons. The only difference I saw between Alternatives A, B, and C is the number of through traffic lanes. Right turn lanes are identical and left turn lanes are essentially the same on all alternatives.

Alternative A provides for keeping the current 2 through traffic lanes in each direction on both Unser and Central. Alternative B provides for 3 through traffic lanes in each direction on Unser only. Alternative C provides for 3 through traffic lanes in each direction on both Unser and Central. The matrix chart shows that Alternatives B and C need approximately an additional acre of land for implementation. However, this is wrong. Since all proposals have the same configuration for right turns, no appreciable additional right-of-way is needed for any of them. Additional through lanes on Unser would be placed in the already expansive median. Right-of-way for additional through lanes on Central already exists north of the westbound lanes. Therefore, only minimal additional land, if any, would be required, something true for all proposals.

Though the favored alternative indicated on the matrix is B (4 lanes Central, 6 lanes Unser). In my opinion, this is wrong and, at least at this time, totally unnecessary. I strongly support Alternative A! My reasoning is this: Currently, Unser is a 4-lane roadway, not yet completed down to Dennis Chavez. It is unlikely that it will be expanded in the near future, almost certainly not in the next 10 years. It may, in fact not be expanded even then. It is foolish to expand this intersection for that expectation. If the intersection were to be so built out now in anticipation of a 6-lane Unser, it will become less pedestrian-friendly and inhibit the desired foot traffic between the Unser Crossing retail center south of Central; the retail center, transportation center, and UNM clinic north of Central; and whatever may develop on prime land on either side of Central east of Unser. It is a safe bet that a wider intersection would encourage faster than desired or posted speeds. The negative effect on Unser traffic where it pinches back to the present 2 lanes on either side on Central should be considered as well. Additionally, The matrix indicates that Alternative B would cost an additional $.4 million with a questionable benefit and that for only the two hour-long peak traffic times. That money would be wasted as, again if Unser is expanded as suggested, the intersection design would inevitably be revisited by a new set of traffic engineers with a new set of ideas.

Within my neighborhood association (Stinson Tower NA) the consensus is that Unser should serve the neighborhood that it passes through. This means that the roadway configuration should not be designed primarily to permit quick passage from fringe areas to the Interstate. This means that whatever retail development on the precious little remaining commercially zoned land on Unser—and Central—should not be inhibited, even jeopardized, by building roadways—and in this particular case, the Alternative B intersection—that would do just that.

Speed limits also need to be adjusted around this intersection so as not to intimidate pedestrians, not only to promote the anticipated foot traffic, but for the benefit of retailers that the residents hope will locate there. My suggestion would be to set speed limits to a maximum of 40 mph. Faster limits have not been shown to facilitate vehicular traffic; moderate limits have proven to be more effective.

Norm Mason (09:15:39) :

To be perfectly clear, I believe that OPTION A is the best alternative to serve the neighborhood and ensure the success of the retail developments being installed there.

George Perrault (06:53:41) :

Thank you for the opportunity to provide feedback at this point in the planning process!
As someone who lives close to Unser and Central- and uses that intersection probably six days a week- I am thrilled by most aspects of this progressive plan, especially the expanded bus depot (I ride Rapid Ride daily). But, I question the need for another library, as Alamosa is so close by (Bridge and Coors).
George Perrault

Appendix E: References on Right-turn Slip Lane Design

PEDSAFE Pedestrian Safety Guide and Countermeasure Selection System

Improved Right-Turn Slip-Lane Design:

View Other Roadway Design Treatments

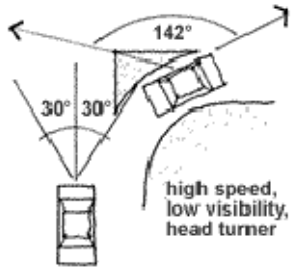
- view purpose
- view considerations
- view estimated cost
- view case studies

Intersections should be designed to accommodate safe pedestrian crossings using tight curb radii, shorter crossing distances, and other tools as described in this application. While right-turn slip lanes are generally a negative facility from the pedestrian perspective due to the emphasis on easy and fast motor vehicle travel, they can be designed to be less problematic. At many arterial street intersections, pedestrians have difficulty crossing due to right-turn movements and wide crossing distances. Well-designed right-turn slip lanes provide pedestrian crossing islands within the intersection and a right-turn lane that is designed to optimize the right-turning motorist's view of the pedestrian and of vehicles to his or her left. Pedestrians are able to cross the right-turn lane and wait on the refuge island for their walk signal.

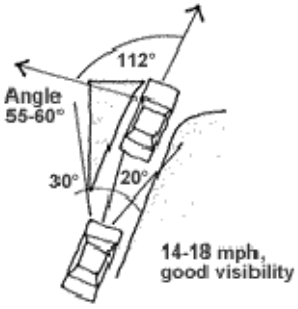
The problem for pedestrians is that many slip lanes are designed for unimpeded vehicular movement. The design of corner islands, lane width, and curb radii of right-turn slip lanes should discourage high-speed turns, while accommodating large trucks and buses. The triangular "porkchop" corner island that results should have the "tail" pointing to approaching traffic. Since the traffic signal is timed based on a shorter crossing, the pedestrian crossing time has a much smaller influence on the timing of the signal. This design has an additional advantage for the pedestrian; the crosswalk is located in an area where the driver is still looking ahead. Older designs place the crosswalk too far down, where the driver is already looking left for a break in the traffic.

Channelized right turn-lanes remain a challenge for visually-impaired pedestrians. First, there are difficulties associated with knowing where the crosswalk is located

Current AASHTO Standard



Recommended Design



Sketches by Michael Kimelberg

or knowing where to cross. Second, it is difficult for a pedestrian who is visually-impaired to know when a vehicle has yielded right-of way. While accessible pedestrian signals can help with these issues, more research is currently underway through the National Cooperative Highway Research Program (NCHRP) to further explore the problem and develop potential solutions. Refer to NCHRP Project 3-78, Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities (at www4.trb.org/trb/crp.nsf/NCHRP+projects) for the latest status report.

Purpose

- Separate right-turning traffic.
- Slow turning-vehicle speeds and improve safety.
- Allow drivers to see approaching cross-street traffic more clearly.
- Reduce the crossing distance for pedestrians.

top of page

Considerations

- Evaluate first whether a slip lane is really necessary.

top of page

Estimated Cost

Approximately $50,000 to $200,000 to reconfigure roadway, add striping and construct an island, assuming additional right-of-way is not required.

top of page

Case Studies

St. Petersburg, FL

top of page

CASE STUDY NO. 19

Large Intersection Solutions

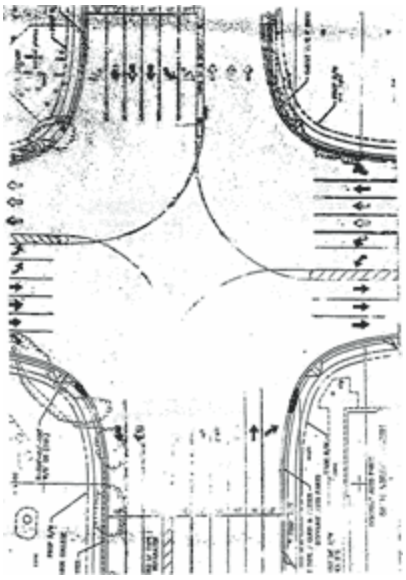
ST. PETERSBURG, FL

Prepared by Jeff Olson, R.A., Trailblazer. Information provided by Michael Wallwork, Alternative Street Design.

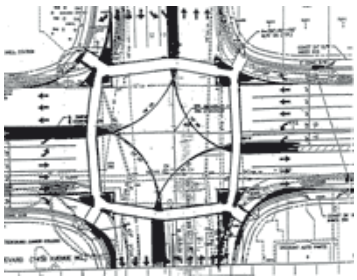
Problem

As roads are made wider, the crossing distances for pedestrians increase, creating a significant exposure of pedestrians to the high volumes of motor vehicles. With a typical pedestrian crossing speed of approximately 1 m (3.2 ft) per second, streets with four or more lanes in each direction can result in crossing times that require more than 30 seconds. In addition, lengthy crossings can make it impossible for pedestrians to see signal indicators on the far side of the crossing. Confusing multiple turning movements (often with protected signal phases) increase the potential for pedestrian crashes.

Background



Provided by Dan Burden of Walkable Communities, Inc. and Jeff Olson, R.A. Initial Conditions, Highway 98 at 74th Avenue, St. Petersburg, Florida.



Provided by Dan Burden of Walkable Communities, Inc. and Jeff Olson, R.A. Design Solution for Highway 98, St. Petersburg, Florida.

In St. Petersburg, Florida, the intersection of Highway 98 at 74th Avenue North presented an extreme version of these conditions in the early 1990's. Widened to nine lanes in each leg of the intersection, this intersection created a serious challenge for engineers to design a solution which could accommodate both pedestrians and motorists. The adjacent land included St. Petersburg Community College, a convenience store, an auto parts store, and a training center for the disabled. Some communities would have tried to build expensive solutions (such as overhead pedestrian bridges, for example) or simply ignored the problem, however, the designers of this project applied a combination of common sense, innovation, and creativity to create a solution that works within the available resources.

Solution

Michael Wallwork, the street's designer, was asked by several community representatives to look at the intersection and explore alternatives to make it more pedestrian friendly. Accessibility was an important issue because a training center for wheelchair users was in the area. Since the designer was Australian, many of the design features came from Australia's best practices.

The important issues included the following:

- Provide median noses that extend beyond the crosswalk to provide refuges for pedestrians.
- Narrow the lanes to minimize speeds, to shorten pedestrian crossing distances, and to widen the median.
- Add Australian standard right turn slip lanes, which are designed to keep pedestrians in the drivers' line-of-sight, slow right turn vehicles to around 29 km/h (18 mi/h), and minimize the angle between turning vehicles and approaching vehicles to increase capacity and to reduce the angle drivers must to turn their heads.
- Add a bend in the middle of the crosswalk to meet the above requirements.
- Meet ADA standards with cut-throughs and ramps.

Results

For a retrofit of existing conditions, the pedestrian features of the Highway 98 intersection provide an excellent balance between pedestrian and motor vehicle needs. By reducing the pedestrian crossing time, providing right turn slip lanes, and reducing the all-red signal phase slightly, the 'green' time made available to motorists was actually increased and pedestrian safety was improved. With reduced lane widths, refuge islands at each corner and median refuges in the middle of each intersection leg, the maximum distance that a pedestrian has to cross is now only five lanes, or approximately 15 m (50 ft). This is a significant improvement over the prior conditions of crossing nine lanes of traffic in one signal phase. Overall crossing distances were reduced from over 55 m (180 ft) to approximately 40 m (130 ft).

Contact

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Alternate Street Design
1516 Plainfield Avenue
Orange Park, FL 32073
Phone: (904) 269-1851
Fax: (904) 278-4996
E-mail: mjwallwork@attbi.com

References

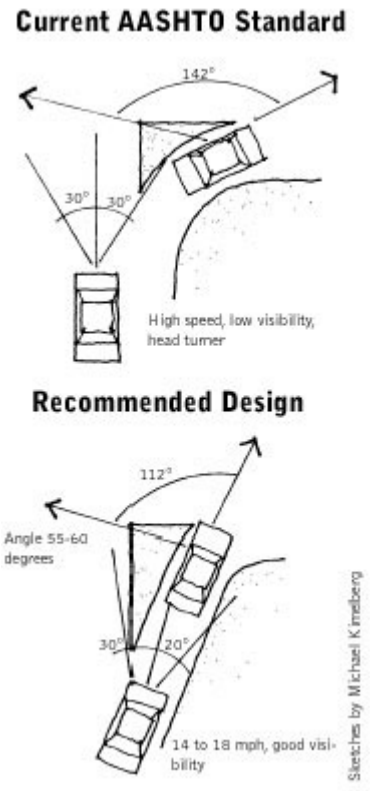
Background provided through e-mail interview with Michael Wallwork of Alternative Street Design. Original graphics provided by Dan Burden of Walkable Communities, Inc. and Jeff Olson, R.A.

Road Design

15. Well Designed Right–Turn Slip Lanes

Intersections should be designed to accommodate safe pedestrian crossings using tight curb radii, shorter crossing distances, and other tools as described in this document. While right-turn slip lanes are generally a negative facility from the pedestrian perspective due to the emphasis on easy and fast vehicle travel, they can be designed to be less problematic. At many arterial street intersections, pedestrians have difficulty crossing due to right turn movements and wide crossing distances. Well designed right-turn slip lanes provide pedestrian crossing islands within the intersection and a right-turn lane that is designed to optimize the right turning motorist's view of the pedestrian and of vehicles to their left. Pedestrians are able to cross the right-turn lane and wait on the refuge island for their walk signal.

The problem for pedestrians is that many slip lanes are designed for unimpeded vehicular movement. Islands for the right-turn slip lanes should be designed instead to discourage high-speed turns, while accommodating large trucks and buses. The triangular "pork chop" island that results should have the "tail" pointing to approaching traffic. Since the traffic signal is timed based on a shorter crossing, the pedestrian crossing time has much smaller influence on the timing of the signal. This design has an additional advantage for the pedestrian; the crosswalk is located in an area where the driver is still looking ahead. Older designs place the crosswalk too far down, where the driver is already looking left for a break in the traffic.



Purpose:

- Separate right–turning traffic
- Recommended design can slow turning vehicle speeds and improve safety.
- Recommended design allows drivers to see approaching cross street traffic more clearly.

Considerations:

- Evaluate first whether a slip lane is really necessary.

Estimated Cost:

Approximately $50,000–

Photo by

Well designed slip lanes at a busy, wide intersection. The crosswalks are located to allow the greatest visibility between the drivers and pedestrians.

$200,000 to reconfigure roadway, add striping and construct an island.

Close Print

NCHRP 03-72 [Active]

Lane Widths, Channelized Right Turns, and Right-Turn Deceleration Lanes in Urba

Project Data	
Funds:	**$450,000**
Staff Responsibility:	**B. Ray Derr**
Research Agency:	**Midwest Research Institute**
Principal Investigator:	**Ingrid Potts**
Effective Date:	**5/20/2003**
Completion Date:	**8/31/2006**

Objective: The objective of this project is to develop design guidance or criteria addressing the safety an and bicyclists for three specific topics: selecting lane widths, channelizing right turns, and using right-turn intersections. This project is intended to address urban and suburban arterials and collectors with speeds of pedestrians should include a full range of ages and visual, as well as other, impairments.

Status: The research is complete and the synthesis will be published in 2010.

Product Availability: The syntheses are available for loan.

Background: Urban and suburban transportation corridors are becoming increasingly congested. At the often results in higher running speeds and increased pedestrian crossing distances, which in turn car communities through which the roadways and streets pass. Further, additional space for roadways and available. Therefore, it is important that the roadway width be optimized in terms of safety and operational the most commonly used in these situations. Traditionally, the wider lane has been thought to maximiz been raised concerning whether narrower lanes may have similar capacity capabilities and perhaps en wider lanes in low-speed applications.

Channelized right turns have become increasingly common in urban areas over the last 20 years, signifi well as enhancing intersection capacity and operations. However, there is concern that conflicts between right turns because the driver's attention is focused on the cross-street traffic.

Right-turn deceleration lanes reduce the incidence of rear-end collisions from vehicles slowing to make ri also improve arterial capacity by removing slower moving vehicles from the main traffic stream. New acce often contribute noticeably to congestion and reduced outside travel lane capacity. Several states have es turn deceleration lanes for driveways and intersections, but the criteria vary widely from state to state. Ir and placement of bicycle lanes and handling of adjacent pedestrian paths at locations with right-tur transportation agencies to use in determining when a deceleration lane is needed and in designing that lan

Tasks: To accomplish the project objective, the following tasks are envisioned: (1) Critically analyze and standards, policies, and practices on the safety and operational tradeoffs of various lane widths, primarily curb offsets) with respect to mode (pedestrians, bicycles, and motorized vehicles). Identify research effor tradeoffs for the various modes. Document the results in a form suitable for publication as a contracto analyze and synthesize current literature and state and local standards, policies, and practices with r channelized right turns. The synthesis and analysis should focus on the interaction between vehicles and the needs of visually impaired pedestrians in crossing from the curb to the island in channelized right-turn s in terms of slowing turning vehicle traffic and permitting emergency-vehicle operations. Identify researcl mitigating conflicts and of determining the effects of the methods on operations. Document the results ir

draft on the NCHRP's web site. (3) Critically analyze and synthesize current literature and state and loca criteria and design guidance for right-turn deceleration lanes at driveways and unsignalized intersections conflicts. Discuss how the information could be applied at signalized intersections where the right-t operational reasons, as opposed to strictly capacity needs. Identify research efforts needed to develop ap the results in a form suitable for publication as a contractor's draft document on the NCHRP's web site. (4 in Tasks 1 through 3. Develop detailed data-collection and analysis plans for addressing high-priority eff and for a limited number of alternates. The plans must include schedules and budgets. (5) Submit an inte through 4. (6) Execute the research plans as approved by the project panel at the interim meeting. (7) Ref based on the results of Task 6 and any comments that have been received on the draft documents. Incorp into each to produce guidelines. (8) Submit a final report that documents the entire research effort and chapters. Where appropriate, the report should include an appendix with recommended language for the *A and Streets;* the *AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities* (forthcor *Bicycle Facilities;* the *Manual on Uniform Traffic Control Devices;* and the *Traffic Control Devices Handboo*

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NCHRP 03-78A [Active]

Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities

Project Data	
Funds:	**$710,000 + $20,000 anticipated from the Access Board**
Staff Responsibility:	**S. A. Parker**
Research Agency:	**North Carolina State University**
Principal Investigator:	**Ron Hughes**
Effective Date:	**1/4/2006**
Completion Date:	**5/31/2010**

BACKGROUND

The Americans with Disabilities Act (ADA) requires that public rights-of way, including sidewalks and crosswalks, be accessible to pedestrians with disabilities. The U.S. Access Board's ADA accessibility guidelines specify the minimum level of accessibility in new construction and alteration projects and serve as the basis for enforceable standards maintained by other agencies. On June 17, 2002, the U.S. Access Board published draft rights-of-way guidelines (Docket No. 02-1) proposing to require pedestrian signals at roundabouts and channelized turn lanes that would create and identify gaps in the vehicle stream adequate for pedestrians who are crossing without vision cues. Many transportation agencies are looking for guidance on working with these proposed provisions.

Modern roundabouts are unsignalized circular intersections that are common in many parts of the world. Although relatively new in the United States, they are being implemented at an increasing rate. Studies conducted in Europe, Australia, and in the United States have generally found that roundabouts result in significantly fewer and less severe vehicular crashes than do more traditional intersection treatments. This safety benefit has been the most compelling reason cited by transportation engineers for the installation of roundabouts.

Roundabouts and channelized turn lanes present challenges different from other intersections for individuals with blindness and visual impairments, because the traffic is most often under yield control as opposed to stop control. Anecdotal evidence indicates that pedestrians with vision impairment sometimes avoid roundabouts and channelized turn lanes by taking a more circuitous route. In addition to determining when to cross the road, pedestrians with vision impairment must identify where to cross, which way to walk during the crossing, and when they have arrived at their destination curb or island. All of these tasks become more difficult for pedestrians with vision impairment at roundabouts and channelized turn lanes.

This effort will build on research being conducted in NCHRP Project 3-65, "Applying Roundabouts in the United States," and the research to be conducted in NCHRP Project 3-72, "Lane Widths, Channelized Right Turns, and Right-Turn Deceleration Lanes in Urban and Suburban Areas." Other relevant resources that should be considered in the performance of this research are results from a National Institutes of Health study and the proceedings from the ITE/FHWA Roundabout Accessibility Summit; specifics are provided in Special Note F.

OBJECTIVE

The objective of this research is to recommend a range of geometric designs, traffic control devices, and other treatments that will make pedestrian crossings at roundabouts and channelized turn lanes useable by pedestrians with vision impairment. These recommendations should be suitable for inclusion in transportation-industry practice and policies, including the *AASHTO Policy on Geometric Design of Highways and Streets* and the FHWA *Manual on Uniform Traffic Control Devices*. Exploration of the proper balance among the needs of passenger cars, trucks, pedestrians (including pedestrians with vision impairments), and bicycles is central to achieving the objectives of the research. Accomplishment of the project objective will include at least the following tasks.

Phase I Tasks (*1.*) Review the existing geometric design, traffic control, and other relevant literature (both domestic and international) to (a) Document the current state of practice with respect to pedestrian and vehicular control at roundabouts and channelized turn lanes and the subsequent impact on pedestrian safety and access, (b) Identify changes in the design or operation of roundabouts and channelized turn lanes as well as new technologies that have potential for improving usability and safety for pedestrians with vision impairment, and (c) Determine engineering policies and practices that may need to be revised as a result of the anticipated recommendations from this research effort.

Augment the literature review by consulting with transportation professionals, orientation and mobility professionals, pedestrians with vision disabilities, and others with experience on this topic.

(*2.*) Define the information needs and functional requirements for pedestrians with vision disabilities at intersections. Two critical aspects are the ability of a visually impaired person to determine (a) where to cross and (b) when it is safe to cross. Based on those needs and requirements, establish a facility-performance specification. Develop draft criteria to be used to evaluate potential solutions. Describe how to apply the facility-performance specifications and the metrics to be used. (*3.*) Identify and examine changes to geometric design elements, traffic control devices, and other physical treatments that could be implemented to meet the facility-performance specification established in Task 2. The identification of potential solutions should attempt to address the full range of operational and geometric types of roundabouts and channelized turn lanes that are now in existence or anticipated to be built in the United States. (*4.*) Examine the application of a range of advanced technology (e.g., Intelligent Transportation Systems devices and wayfinding products) that could be used to meet the facility-performance specification established in Task 2. The immediate focus for this research effort will be on publicly provided infrastructure ITS solutions as opposed, for example, to hand-held products that might be carried by a pedestrian. (*5.*) Based on the results of Tasks 1 through 4, identify the most promising potential solutions. Refine the Phase II work plan to further evaluate potential solutions. At a minimum, the work plan should include the geometric and operational conditions under which each potential solution selected is expected to be appropriate, the number of field sites required for testing, a list of potential sites, the research methodology, and the evaluation criteria. (*6.*) Submit an interim report presenting the results of Tasks 1 through 5 in an accessible format. The interim report shall include the products of Tasks 1 through 4 as separate chapters and the updated work plan developed in Task 5. Document the results of Tasks 1 through 5 in an accessible format suitable for publication on the NCHRP website.

Phase II Tasks (*7.*) Execute the work plan approved for Phase II. (*8.*) Develop cost estimates for the solutions that are recommended based on the Task 7 evaluation. The costs include initial implementation costs as well as operation and maintenance costs over the life-cycle of the solutions. These cost estimates apply only to solutions at newly constructed roundabouts and channelized right turn lanes, not to retrofits. (*9.*) Submit a final report that documents the entire research effort, recommends the most promising solutions, and includes the products of Tasks 1 through 4 as separate chapters. Where appropriate, the report should include appendices with recommended language for the *AASHTO Policy on Geometric Design of Highways and Streets*; the *AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities*; the *AASHTO Guide for the Development of Bicycle Facilities*; the FHWA *Manual on Uniform Traffic Control Devices;* the *Traffic Control Devices Handbook;* and other documents as appropriate.

Status: Research in progress. A preliminary draft final report was received in December 2009. A revised final report is anticipated in May 2010.

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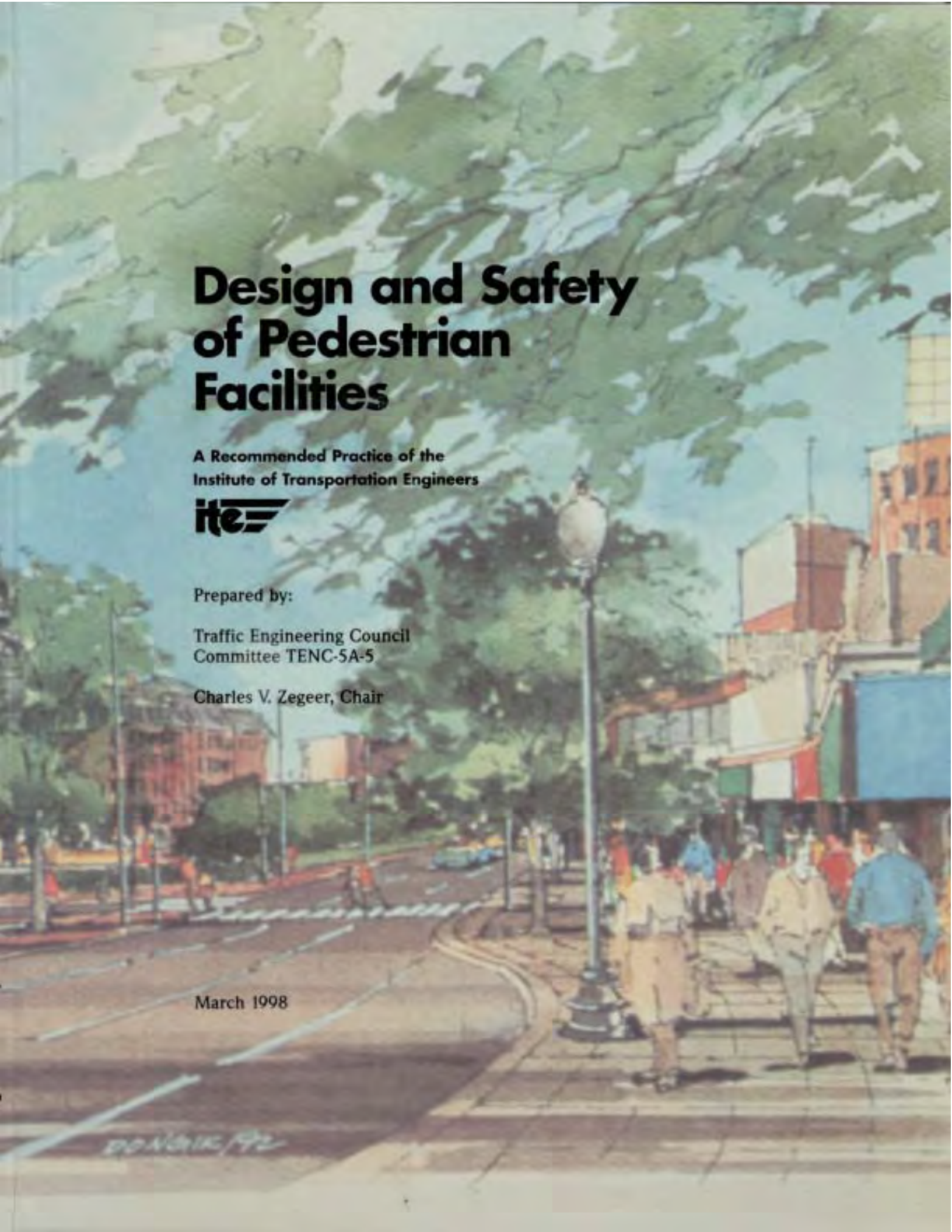


Design and Safety of Pedestrian Facilities

A Recommended Practice of the Institute of Transportation Engineers

ite

Prepared by:

Traffic Engineering Council
Committee TENC-5A-5

Charles V. Zegeer, Chair

March 1998

Turning Radii

The size of corner radii can have a marked effect on pedestrian crossing distance, the distance between the crossing pedestrian and right/left turning vehicles and the speed of turning vehicles. Visually challenged pedestrians prefer small radii to give them better direction indication around the intersection and to reduce the speeds of turning vehicles.

However, a balance must be struck between small radii and the turning paths of large vehicles. Too small a radius can cause large vehicles to round the curb and eventually break it up or hit pedestrians who are standing close to the corner. AASHTO allows two types of design:

1. Where the corner radii are based on vehicles turning from the curbside lane into the adjacent curbside lane. This design criteria requires the use of large radii.
2. A radius where vehicles turning from the curbside lane use all of the receiving loadway width. This design is preferred as the balance between vehicle and pedestrian needs.

A third option is to use channelized right turn slip lanes which can provide motorists with smoother turning maneuvers (compared with a small turning radius). These still help to accommodate pedestrians if a refuge island is provided between the slip lane and the through lane(s) **(figure 1–9)**. Ramp-type intersections (turning roadway terminals) can pose a problem to pedestrians, since they promote faster traffic speeds. Therefore, pedestrian crossings should be at 90 degrees across the ramp. The literature provides little guidance on the optimal location of pedestrian crossings at these locations, although it is generally accepted that right angle crossings are the best.

The use of pedestrian-oriented geometric features, such as flared curbs, at an intersection will have the effect of reducing the radius of the curb return. While passenger cars traveling at low speeds usually do not have a problem with the smaller radii, the geometric design requirements for trucks and buses are much more demanding than those for passenger vehicles. Trucks and buses are wider, and generally have longer wheelbases and greater minimum turning radii.

A common practice is to allow the larger vehicles to off-track and have the rear wheels cross the flared curb area. By allowing these trucks and buses to traverse the flared area, one is defeating the entire purpose of having a flared curb. These vehicles may endanger the pedestrians the flared curb was intended to protect. It also causes some concern regarding the service life of the flared corner, since these larger vehicles have heavier axle loads and higher tire pressures. Allowing a steady stream of heavy vehicles to travel over the flared curb area will no doubt prove to be a maintenance headache.

Problems related to reduced radii at corners may also be a concern in areas with heavy right turn volumes. The reduced radius can have an effect on the capacity of the right turn movement. A better approach in this situation would be to use channelization rather than a flared curb.

FIGURE 1–9. *Properly designed right-turn slip lanes with pedestrian refuge islands can enhance crossings for pedestrians.*

Appendix F: Draft Site Development Plan of Northwest Corner of Central Avenue/Unser Boulevard

City of Albuquerque

Central and Unser Property

PROJECT DATA:

TOTAL ACREAGE:
13.03 acres

BUILDING HEIGHTS:
2 story Maximum
30 feet (with the exception for Tower elements shown on elevations, which shall be 66 feet)

BUILDING SETBACK:
0 feet on Central for 75% of property line frontage
25 feet for remainder on Central
20 feet on Unser

PARKING REQUIRED:
RETAIL
1 parking space per 200 square feet for the first 15,000 square feet
1 parking space per 250 square feet for the next 45,000 square feet
1 parking space per 300 square feet for the net leasable area that exceeds 60,000 square feet

15,000 square feet / 200 square feet = 75 spaces
45,000 square feet / 250 square feet = 180 spaces
49,401 square feet / 300 square feet = 165 spaces

Required parking spaces 420 total
Required parking spaces 20% reduction 336 total
Required parking spaces 25% reduction 315 total
Provided parking spaces 279 total

LIBRARY
1 parking space per 200 square feet for the first 15,000 square feet
1 parking space per 250 square feet for the next 45,000 square feet
1 parking space per 300 square feet for the net leasable area that exceeds 60,000 square feet

15,000 square feet / 200 square feet = 75 spaces
45,000 square feet / 250 square feet = 20 spaces
26,449 square feet / 300 square feet = 0 spaces

Required parking spaces 95 total
Required parking spaces 20% reduction 76 total
Required parking spaces 25% reduction 71 total
Provided parking spaces 69 total

PARK AND RIDE
0 total required parking spaces, 181 provided

TOTAL
438 total required parking spaces, 529 provided

Building Designation	Square Feet
Building Area 'A'	10,461
Building Area 'B'	14,336
Building Area 'C'	10,281
Building Area 'D'	10,281
Building Area 'E'	10,281
Building Area 'F'	10,281
Building Area 'G'	7,581
Building Area 'H'	15,900
Future Library	20,000
Total Building Area	**109,402**

MAXIMUM TOTAL DWELLING UNITS:
0 Dwelling Units

ADDRESS:
North of Central Avenue, West of Unser Boulevard.

LEGAL DESCRIPTION:
Lot 2
Plat of UNM Hospitals Clinc
Situated within Project Section 22
T.10N., R.2E., N.M.P.M.
Town of Atrisco Land Grant
Albuquerque, Bernalillo County, NM
Recorded December 2008
Zone K-10-Z

EXISTING ZONING:
SU-2 for IP

PROPOSED ZONING:
SU-2 for SU-1 for PCA uses and exclusions

PERMISSIVE USES
Retail
Office

EXCLUSIONS

FLOOR AREA RATIO (F.A.R.) FOR NON-RESIDENTIAL USES:
FAR = 109,402 square feet / 567,522 square feet (13.03 acres)
FAR shown on plan= 0.193
Maximum Allowed FAR: 0.3

APPLICABLE PLANS
West Route 66 Sector Development Plan
West Central Metropolitan Redevelopment Area Plan
Westside Strategic Plan
Albuquerque/Bernalillo County Comprehensive Plan
Southwest Area Plan
West Mesa Sector Development Plan

SHEET INDEX:

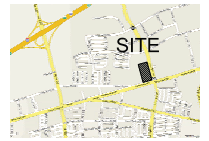
THE HARTMAN • MAJEWSKI DESIGN GROUP
Architects • Engineers • Interior Design
Planners • Urban Designers • LEED®
202 Central Avenue SE, Suite 200
Albuquerque, New Mexico 87102
Tel 505.242.6880 • Fax 505.242.6881

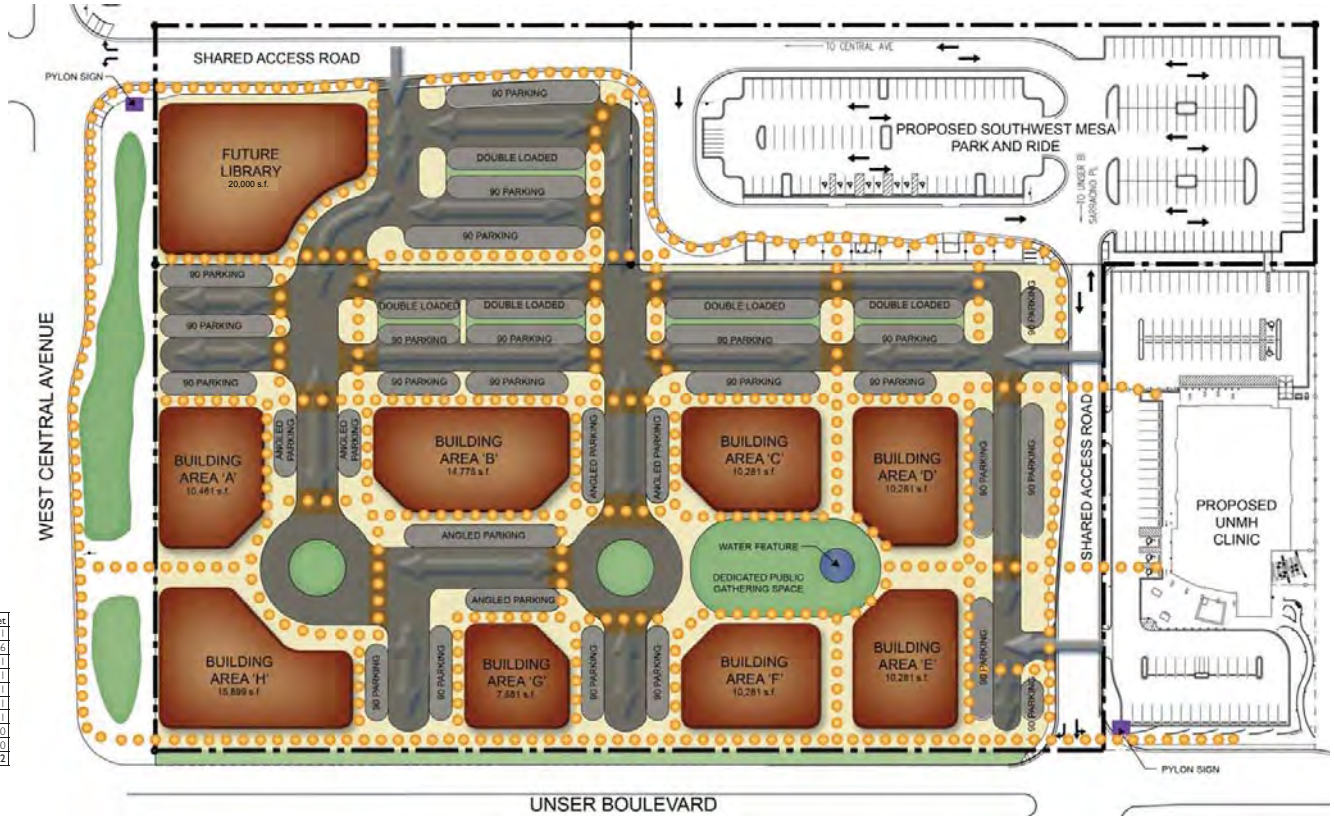
NOTES:

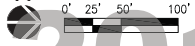
LEGEND:

- PEDESTRIAN ACCESS
- CIRCULATION SPACE
- LANDSCAPIING
- BUILDING AREA
- DEDICATED PARKING AREA
- VEHICULAR ACCESS
- CROSSWALK PATHS

VICINITY MAP:







PROJECT NUMBER: _____

APPLICATION NUMBER: _____

SITE DEVELOPMENT PLAN APPROVAL:

TRANSPORTATION DEVELOPMENT	DATE
UTILITY DEVELOPMENT	DATE
PARKS AND RECREATION	DATE
HYDROLOGY	DATE
SOLID WASTE MANAGEMENT	DATE
PLANNING DEPARTMENT	DATE

☐ Site Development Plan

Sheet 1 of 8

NORTH

Central and Unser Property, Albuquerque, New Mexico — View 1
City of Albuquerque — 06.24.09

Central and Unser Property, Albuquerque, New Mexico — View 2
City of Albuquerque — 06.24.09

Central and Unser Property, Albuquerque, New Mexico — View 3
City of Albuquerque — 06.24.09

Central and Unser Property, Albuquerque, New Mexico — View 4
City of Albuquerque — 06.24.09

Central and Unser Property, Albuquerque, New Mexico — View 5
City of Albuquerque — 06.24.09

Central and Unser Property, Albuquerque, New Mexico — View 6
City of Albuquerque — 06.24.09

Central and Unser Property, Albuquerque, New Mexico — View 7
City of Albuquerque — 06.24.09

Central and Unser Property, Albuquerque, New Mexico — View 8
City of Albuquerque — 06.24.09

☐ Site Photographs

Central and Unser Property, Albuquerque, New Mexico View 9
City of Albuquerque 06.24.09

Central and Unser Property, Albuquerque, New Mexico View 12
City of Albuquerque 06.24.09

Central and Unser Property, Albuquerque, New Mexico View 15
City of Albuquerque 06.24.09

Central and Unser Property, Albuquerque, New Mexico View 10
City of Albuquerque 06.24.09

Central and Unser Property, Albuquerque, New Mexico View 13
City of Albuquerque 06.24.09

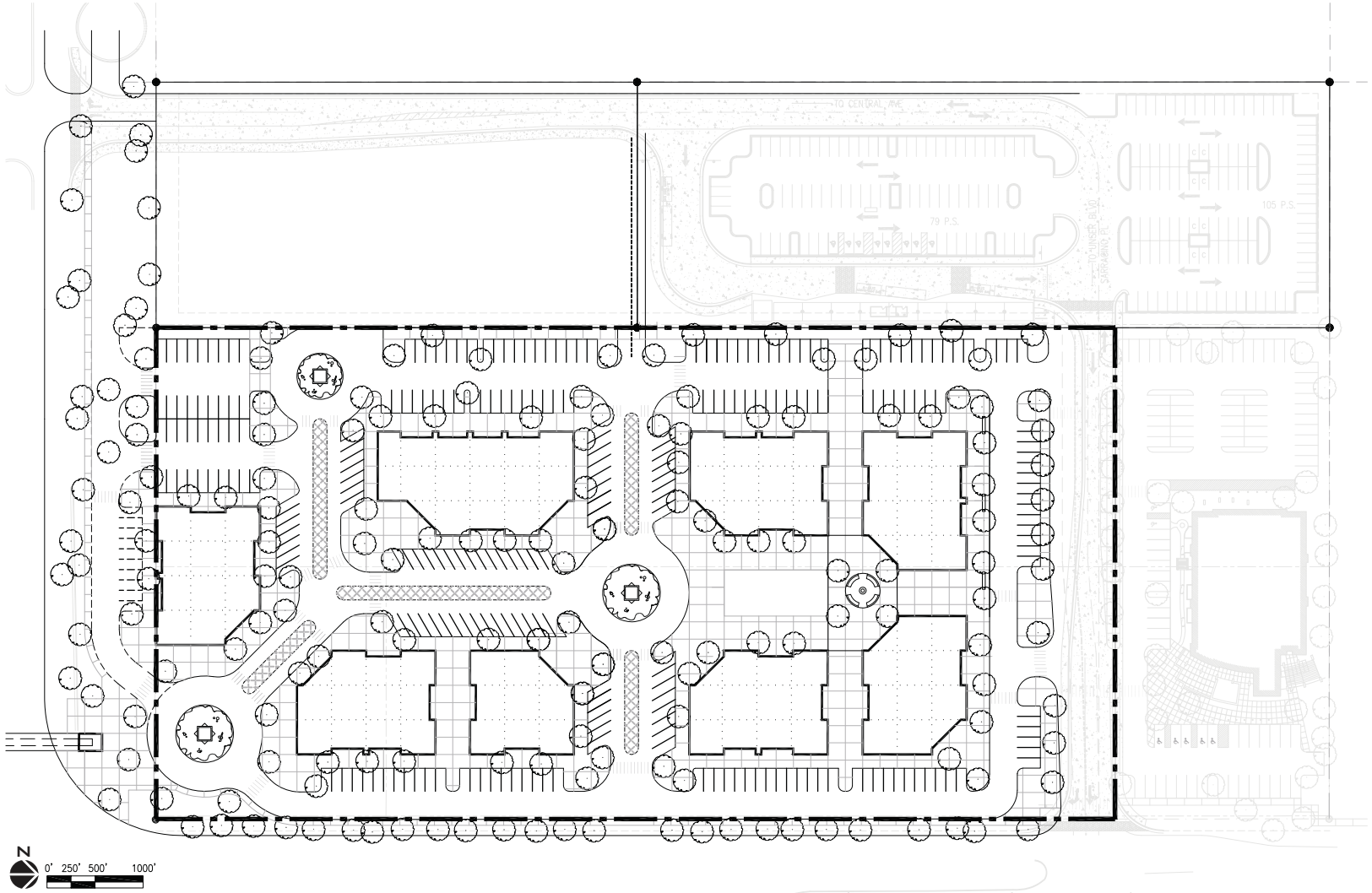
Central and Unser Property, Albuquerque, New Mexico View 16
City of Albuquerque 06.24.09

Central and Unser Property, Albuquerque, New Mexico View 11
City of Albuquerque 06.24.09

Central and Unser Property, Albuquerque, New Mexico View 14
City of Albuquerque 06.24.09

Central and Unser Property, Albuquerque, New Mexico View 17
City of Albuquerque 06.24.09

☐ Site Photographs



- Conceptual Drainage and Utility Plan

All design requirements of the Central and Unser Property are in accordance with the City of Albuquerque. Where a discrepancy exists with the Master Plan Design Guidelines, the requirements below shall govern.

1. OVERALL DESIGN THEME AND LAND USE CONCEPT:

The Northwest quadrant of the Central and Unser intersection has been previously deemed as a "blighted" and "unattractive" area. The design theme aims to enhance the positive aspects of the Atrisco Business Park and the West Central Avenue Corridor. Thus, the redevelopment will help radiate to other areas along Central Avenue.

The plan has been designed to:

A. Improve the appearance and image of this area

B. Enhance the boundaries of the public right-of-way

C. Provide a sense of arrival to the site

D. Provide a sense of place to the development

The project is bounded on the east by Unser Boulevard, on the south by Central Avenue, on the north by a proposed UNM Clinic and on the west by an existing car wash.

The pedestrian environment is an important consideration in the planning of the Central and Unser site. In the West Central Metropolitan Redevelopment Area Plan, the site has bee described as having "good access to I-40," yet pedestrian facilities are incomplete due to large areas of undeveloped land. The project wants to begin to remedy the lack of pedestrian environment by developing the land, as well as support enhanced pedestrian access across Central Avenue and Unser Boulevard at the southwest corner of the site.

2. OFF-STREET PARKING REQUIREMENTS AND DESIGN:

General

The requirements for off street parking in the Central and Unser Property will be as defined in the City of Albuquerque Comprehensive City Zoning Code.

Landscape setback: As specified on Sheet 1 of 7.
Right-of-way: 10ft. min.

Structure Heights:
Commercial: Two story maximum

Parking: As specified on Sheet 1 of 7.
Landscape: 15% of of lot to be landscaped min.
Trees: 1 tree per 10 parking spaces
Max parking spaces: 15 side-by-side maximum



3. STREET DESIGN:

(Text to be developed)


4. TRANSIT FACILITIES:

Transit facilities shall support convenience and safety for all pedestrians. All bus stops shall have amenities such as shade and shelter, seating, trash receptacles and adequate lighting shall be provided. Integral color in the shelter, seating, and pavements shall be provided to assure a substantial contribution to street quality. Informational and directional signage shall be located at or near transit facilities for the convenience of users.

The existing City of Albuquerque Park and Ride at the Northwest of the site supports convenience and safety for pedestrians. The Park and Ride is located to provide walkability to the adjacent uses. The Park and Ride has amenities of shade and shelter, seating, trash receptacles and adequate lighting. The Park and Ride is located to the northwest of the adjacent use, providing adequate accessibility and visibility within the site.

5. PEDESTRIAN AMENITIES:

To reinforce the walkability of the Central and User Property and enhance pedestrian experience throughout the community, pedestrian amenities such as benches, shade structures, enhanced landscape areas, decorative paving, and other visual articulations shall be incorporated as appropriate. Benches and information bollards shall be considered at designated pedestrian crossings.

1. All public right-of-way seating, bus shelters, lamp fixtures and signs shall be similar to those shown in this ordinance and shall be located to provide maximum safety and convenience to pedestrians.

2. Landscaping, street furniture, public information signs, utilities and street lighting shall be combined wherever possible to eliminate visual clutter and to free sidewalk areas of impediments.

3. Benches and trash receptacles shall be provided at appropriate locations.




4. Pedestrian Crossing shall be designated within the Central and Unser property. Decorative paving shall articulate these Crossings. All Crossings shall comply with ADA regulations.

5. Although not a part of this project, proposed enhanced pedestrian crossings at the Central Avenue and Unser Boulevard intersection will giving enhanced pedestrian and bicycle access to the site.

6. BICYCLES AND BICYCLE CIRCULATION

Bicycle circulation will benefit from most pedestrian amenities. Bicycle access shall be provided at all crosswalks on Central Avenue and Unser Boulevard. Decorative paving shall articulate crossing within the Central and Unser property. Decorative urban bike racks shall be available to encourage ridership.

7. LANDSCAPE DESIGN REQUIREMENTS

General

Landscaping shall comply with the design guidelines of the City of Albuquerque, and shall furthermore comply with the requirements specified in this section.

Landscapes are a key element of the Central and Unser strategic plan. They are integral to the goal of providing places that promote the physical and emotional well-being of the community and for the protection of ecological systems of the area.

The landscape network consists of:

1. **Landscape Setbacks**
2. **Streetscapes and Street Trees**
3. **Plant Selection**

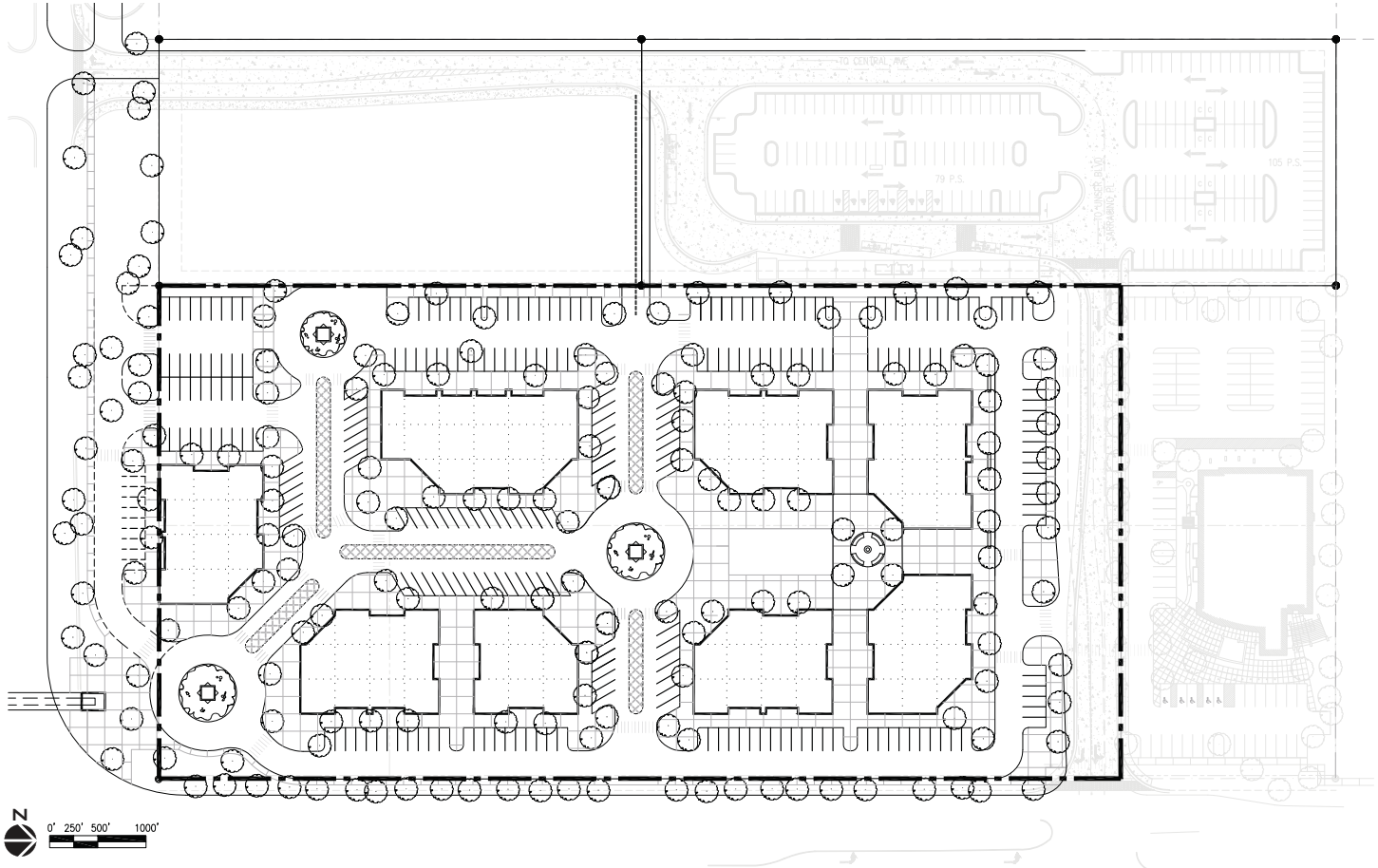
This network will produce a public realm of coherence, interest, continuity, and authenticity. Landscaped areas will minimize glare into the buildings, reduce reflection of glazing, and reduce visual impact of a large number of vehicles. Landscaped areas shall be surrounded by wheel stops and curbs. Natural landscaping shall be encouraged to create a sense of place, safety and harmony throughout the area. Water harvesting should be considered in the design of natural and mechanically enhanced landscape irrigation design.

Landscape Setbacks

Central Avenue minimum 25 feet
Unser Boulevard minimum 10 feet
Minimum of 70% live landscaping

Streetscapes and Street Trees

Street Trees shall be in accordance with the Street Tree Ordinance.



☐ Design Requirements

8. ARCHITECTURAL DESIGN REQUIREMENTS:

Quality architecture is essential in the success of the Central and Unser community and its walkability. Architectural styles should be reflective of the region while at the same time responsive to the contemporary market place. Materials and colors should be appropriate to the region and climatic conditions. Selected architectural styles should be contemporary versions of historic styles, be honest to the styles, and incorporate the "signature" components of the styles selected.

Massing and Articulation

1. Ensure that all structures provide articulated façades incorporating recessed openings, variations in plane and height, and the inclusion of elements such as covered entrance elements, arcades, windows and architectural projections consistent with the architectural style to provide depth and contrast and avoid flat, unarticulated building façades.

2. Incorporate simple one-story and two-story volumes reflective of the selected architectural style.

3. Articulate one-story and two-story forms within the building to reduce the overall mass of the building.

4. Avoid extensive lengths of unbroken, unarticulated horizontal building planes along the street through the use of varied setbacks and arrival courts.

5. Incorporate covered entrances to add visual interest and reduce building mass.

Elevations

1. Elevations shall be well-articulated and detailed to avoid boxy, uninteresting buildings and to create a lively street scene. This shall be accomplished by incorporating two or more of the following techniques:

   - Create recessed alcoves and/or bump out portions of the building.

- Offset the second story from the first level for a portion of the second story.
- Vary the wall plane by providing projections of elements such as display windows and building masses of alternative colors and materials.
- Incorporate second story windows where appropriate to enhance the overall character.
- Utilize other architectural design elements as may be appropriate to the architectural style of the building.
- Provide consistent building "street wall" along Central Avenue and Unser Boulevard to establish an urban edge to the development along these major thoroughfares.

9. BUILDING MATERIALS AND COLORS:

Building Materials and Colors shall comply with the design guidelines of the City of Albuquerque. A uniform appearance shall be encouraged to create a cohesive and attractive development.

1. Uncolored CMU block (standard 8 inches by 16 inches) not allowed.

2. Reflective glass is prohibited unless the applicant graphically demonstrates glare or solar heat gain do not occur during the hours of 7-10a.m. and 3-6p.m.

10. UTILITIES / SCREENING:

Utility equipment shall be screened where possible, and associated screening shall comply with the design guidelines of the City of Albuquerque.

Exterior mechanical and electrical equipment shall be located whenever possible at ground level. All equipment shall be screened.

☐ Design Requirements

11. WALLS AND FENCES:

Wall and fence design shall comply with the design guidelines of the City of Albuquerque, and shall furthermore comply with the requirements specified in this section. Wall and fence design shall be at the discretion of the designer and consistent with the architectural style, and the specific design theme and vernacular shall be approved by the DRB.

1. Required fence materials include brick, stone, wood, stucco over concrete block, textured concrete masonry units, wrought iron or adobe. Fence materials shall also include colored block. Unfinished, smooth-face concrete masonry units are prohibited. Chain link fencing shall be prohibited in residential areas, except its usage is allowed for pet kennels and dog runs.

2. Height of the screen walls and fences shall not exceed 6'0".

3. Retaining walls shall not exceed 4 feet in height. If changes in grade are greater than 4 feet, retaining walls shall be permitted by terracing at a 3:1 slope.

Acceptable materials include but are not limited to brick, stone, wood, stucco over concrete block, texturized concrete masonry units, wrought iron or adobe. Fence materials shall also include colored block. Unfinished, smooth-face concrete masonry units are prohibited. Sheet metal fencing, razor ribbon, barbed wire or similar materials shall not by allowed.

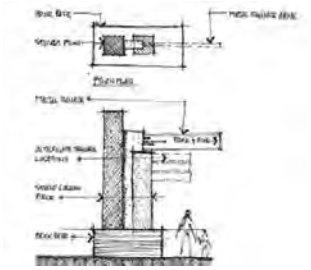
12. SIGNAGE DESIGN REQUIREMENTS:

General

All signage shall conform to the signage regulations found in the City of Albuquerque Zone Code unless modified as part of an approved site development plan.

1. Signs shall be prohibited to dominate the Central Avenue streetscape.

2. Signs shall be limited to low monument and building mounted types except at the primary entrances to the site off of Central and Unser. One pylon sign shall be provided at each of these two locations.



3. All signs shall be integrated with and complementary to the site plan and architecture.

4. One free-standing sign is allowed per premise frontage. Sign shall be no more than 100sq.ft. and no more than 26 feet tall.

5. Directory sign shall be no more than 24sq.ft. and not count as a free-standing sign.

6. Signs shall be illuminated by backlighting. Ground-mounted spot lighting is only allowed when the is no more than 8 feet high.

7. Signs should be of high quality design and should make a definitive positive contribution to the desired visual character of the surrounding area, similar to signage along the east Paseo del Norte corridor.

8. One illuminated LED sign shall be located in the perimeter of the site, and shall be used to identify events and news pertinent to the sites uses and to the surrounding community.

13. LIGHTING DESIGN REQUIREMENTS:

Lighting shall comply with the Night Sky Ordinance and shall furthermore comply with the requirements specified in this section. In addition, the following policies shall be followed in the treatment of lighting design:

1. Light fixtures shall be of a type that throws light downward, and have baffles, hoods, or diffusers so that any light point sources is not directly visible from a distance greater than 1000 feet.

2. The maximum height of parking lot lights shall be 20 feet in height.

3. Pedestrian (walkway) lighting shall not exceed 15 feet in height.

Site lighting shall provide adequate light for safety, but shall not shine onto adjacent properties. City policy requires arterial streets lighted to Illuminating Engineering Society standards. Under these standards lighting is recommended after studying the speed of the roadway, the required height of the light pole and the type of luminaire under construction. Street lights must have cut-off luminaries. Pedestrian (lower scale) lighting shall be incorporated in appropriate locations along streets and trails.

14. ADMINISTRATIVE:

The purpose of this Site Development Plan for Subdivision is to ensure that the Northwest corner of Central and Unser is comprehensively planned with respect to site layout for buildings, parking, ingress/egress points, pedestrian circulation, and linkages to adjacent uses as well as architectural and neighborhood design.

The Site Development Plan for Subdivision may be modified or adjusted by the Planning Director, if necessary, to assure consistency allowing flexibility for the developer. In addition, the Planning Director may approve minor amendments to the design requirements so long as the buildings are of the same general size, the vehicular circulation is similar in its effect on adjacent property and streets, and the approving official finds that neither the city nor any person will be substantially aggrieved by the altered plan.

This Site Development Plan shall satisfy the requirements for site development plans the Northwest corner of Central and Unser. Plans for building permit for individual structures shall be delegated to the City of Albuquerque Building Permit desk. The Development Review Board and the Building Permit desk shall ensure that the proposed plans are consistent with the "Design Requirements for Future Site Development Plans for Building Permit" (Sheets 4-6).

Appendix G: Intersection Turning Movement Counts, Existing Traffic Signal Timings

Lee Engineering, LLC
8500 Menaul Boulevard NE
Suite A-420
Albuquerque, New Mexico, United States 87112
(505) 338-0988 jnorby@lee-eng.com

Count Name: Central - Unser
Site Code:
Start Date: 11/12/2009

Turning Movement Data

Start Time	Unser Blvd Southbound					Central Ave Westbound					Unser Blvd Northbound					Central Ave Eastbound					
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	33	104	46	0	183	33	38	19	1	90	7	226	22	1	255	133	208	18	0	359	887
07:15 AM	42	143	60	0	245	45	40	25	1	110	5	234	20	1	259	125	234	20	0	379	993
07:30 AM	54	169	59	0	282	47	43	26	0	116	11	246	21	0	278	109	264	23	1	396	1072
07:45 AM	57	146	39	0	242	57	78	35	0	170	9	221	31	1	261	105	198	32	0	335	1008
08:00 AM	61	130	25	0	216	58	64	33	0	155	12	178	41	0	231	77	171	37	0	285	887
08:15 AM	38	116	36	0	190	38	66	50	1	154	13	136	19	1	168	62	136	19	0	217	729
08:30 AM	43	99	21	0	163	47	73	40	0	160	15	128	23	0	166	64	125	23	0	212	701
08:45 AM	36	98	30	0	164	33	48	26	0	107	14	133	20	0	167	66	127	21	0	214	652
09:00 AM	40	98	40	0	178	41	58	19	0	118	19	101	12	0	132	38	91	10	0	139	567
09:15 AM	31	98	27	0	156	30	71	20	0	121	8	112	22	0	142	41	102	22	0	165	584
09:30 AM	29	78	28	0	135	29	57	27	0	113	13	95	25	0	133	44	89	25	0	158	539
09:45 AM	32	72	28	0	132	30	72	19	0	121	22	78	21	0	121	42	76	21	0	139	513
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	28	99	45	0	172	29	81	19	0	129	15	77	27	0	119	36	80	19	0	135	555
11:15 AM	17	83	30	0	130	19	92	32	0	143	25	92	20	0	137	37	81	17	0	135	545
11:30 AM	31	91	31	0	153	29	104	32	0	165	22	71	18	0	111	38	69	17	0	124	553
11:45 AM	35	103	29	0	167	39	84	27	0	150	22	79	28	0	129	52	77	28	0	157	603
12:00 PM	38	89	31	0	158	31	103	43	0	177	12	71	21	0	104	43	70	25	0	138	577
12:15 PM	33	102	35	0	170	22	103	40	0	165	13	70	29	0	112	40	74	25	0	139	586
12:30 PM	23	96	37	0	156	24	88	30	0	142	20	86	18	0	124	40	84	21	0	145	567
12:45 PM	34	87	44	0	165	34	99	30	0	163	13	72	29	0	114	46	72	29	0	147	589
01:00 PM	31	82	30	0	143	31	127	14	0	172	23	70	21	0	114	41	76	22	0	139	568
01:15 PM	29	90	47	0	166	29	81	31	0	141	21	72	26	0	119	32	71	26	0	129	555
01:30 PM	33	89	69	0	191	31	122	20	0	173	27	71	23	0	121	39	75	22	0	136	621
01:45 PM	33	94	65	0	192	33	110	28	1	171	25	90	21	1	136	48	81	21	0	150	649
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM	59	121	62	1	242	57	115	58	0	230	37	133	28	0	198	73	121	26	0	220	890
03:15 PM	59	118	75	0	252	59	142	38	1	239	22	124	35	2	181	63	123	35	1	221	893
03:30 PM	45	100	81	0	226	50	186	71	0	307	42	123	28	0	193	65	127	29	1	221	947
03:45 PM	47	93	82	0	222	43	162	44	0	249	43	98	31	0	172	62	109	32	2	203	846
04:00 PM	49	99	76	0	224	48	165	47	0	260	33	122	22	0	177	44	113	22	0	179	840
04:15 PM	46	126	83	0	255	45	154	46	2	245	41	140	27	0	208	49	136	26	0	211	919
04:30 PM	48	118	75	0	241	48	154	57	0	259	35	107	22	0	164	62	107	21	0	190	854
04:45 PM	30	121	71	0	222	33	191	50	1	274	62	118	29	1	209	47	119	31	0	197	902
05:00 PM	45	112	76	0	233	42	203	70	2	315	34	135	39	2	208	43	150	39	0	232	988
05:15 PM	40	108	81	0	229	41	199	50	0	290	41	126	29	1	196	62	123	35	0	220	935
05:30 PM	37	105	79	2	221	37	203	46	0	286	41	156	31	0	228	46	144	29	0	219	954
05:45 PM	27	112	71	0	210	26	193	59	0	278	59	94	27	0	180	62	93	28	0	183	851

Grand Total	1393	3789	1844	3	7026	1368	3969	1321	10	6658	876	4285	906	11	6067	2076	4196	896	5	7168	26919
Approach %	19.8	53.9	26.2	-	-	20.5	59.6	19.8	-	-	14.4	70.6	14.9	-	-	29.0	58.5	12.5	-	-	-
Total %	5.2	14.1	6.9	-	26.1	5.1	14.7	4.9	-	24.7	3.3	15.9	3.4	-	22.5	7.7	15.6	3.3	-	26.6	-
Car	1332	3622	1718	-	6672	1305	3808	1267	-	6380	857	4192	893	-	5942	1972	4104	877	-	6953	25947
% Car	95.6	95.6	93.2	-	95.0	95.4	95.9	95.9	-	95.8	97.8	97.8	98.6	-	97.9	95.0	97.8	97.9	-	97.0	96.4
Truck	50	154	121	-	325	57	144	48	-	249	12	78	7	-	97	100	80	12	-	192	863
% Truck	3.6	4.1	6.6	-	4.6	4.2	3.6	3.6	-	3.7	1.4	1.8	0.8	-	1.6	4.8	1.9	1.3	-	2.7	3.2
Bike	11	13	5	-	29	6	17	6	-	29	7	15	6	-	28	4	12	7	-	23	109
% Bike	0.8	0.3	0.3	-	0.4	0.4	0.4	0.5	-	0.4	0.8	0.4	0.7	-	0.5	0.2	0.3	0.8	-	0.3	0.4
Ped	-	-	-	3	-	-	-	-	10	-	-	-	-	11	-	-	-	-	5	-	-
% Ped	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-

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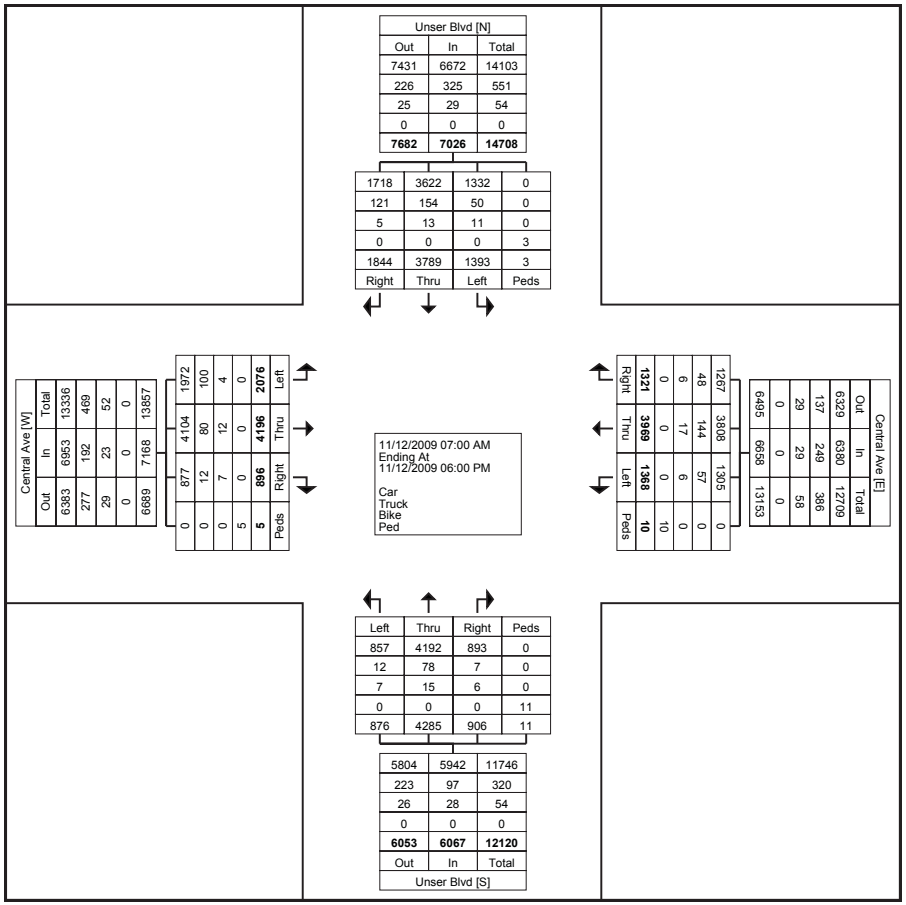
Count Name: Central - Unser
Site Code:
Start Date: 11/12/2009



Turning Movement Data Plot

Lee Engineering, LLC
8500 Menaul Boulevard NE
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Albuquerque, New Mexico, United States 87112
(505) 338-0988 jnorby@lee-eng.com

Count Name: Central - Unser
Site Code:
Start Date: 11/12/2009

Turning Movement Peak Hour Data (7:00 AM)

Start Time	Unser Blvd Southbound					Central Ave Westbound					Unser Blvd Northbound					Central Ave Eastbound					
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	33	104	46	0	183	33	38	19	1	90	7	226	22	1	255	133	208	18	0	359	887
07:15 AM	42	143	60	0	245	45	40	25	1	110	5	234	20	1	259	125	234	20	0	379	993
07:30 AM	54	169	59	0	282	47	43	26	0	116	11	246	21	0	278	109	264	23	1	396	1072
07:45 AM	57	146	39	0	242	57	78	35	0	170	9	221	31	1	261	105	198	32	0	335	1008
Total	186	562	204	0	952	182	199	105	2	486	32	927	94	3	1053	472	904	93	1	1469	3960
Approach %	19.5	59.0	21.4	-	-	37.4	40.9	21.6	-	-	3.0	88.0	8.9	-	-	32.1	61.5	6.3	-	-	-
Total %	4.7	14.2	5.2	-	24.0	4.6	5.0	2.7	-	12.3	0.8	23.4	2.4	-	26.6	11.9	22.8	2.3	-	37.1	-
PHF	0.816	0.831	0.850	-	0.844	0.798	0.638	0.750	-	0.715	0.727	0.942	0.758	-	0.947	0.887	0.856	0.727	-	0.927	0.924
Car	181	537	177	-	895	178	190	100	-	468	31	896	93	-	1020	455	877	92	-	1424	3807
% Car	97.3	95.6	86.8	-	94.0	97.8	95.5	95.2	-	96.3	96.9	96.7	98.9	-	96.9	96.4	97.0	98.9	-	96.9	96.1
Truck	4	24	27	-	55	4	9	5	-	18	1	24	1	-	26	16	24	1	-	41	140
% Truck	2.2	4.3	13.2	-	5.8	2.2	4.5	4.8	-	3.7	3.1	2.6	1.1	-	2.5	3.4	2.7	1.1	-	2.8	3.5
Bike	1	1	0	-	2	0	0	0	-	0	0	7	0	-	7	1	3	0	-	4	13
% Bike	0.5	0.2	0.0	-	0.2	0.0	0.0	0.0	-	0.0	0.0	0.8	0.0	-	0.7	0.2	0.3	0.0	-	0.3	0.3
Ped	-	-	-	0	-	-	-	-	2	-	-	-	-	3	-	-	-	-	1	-	-
% Ped	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-

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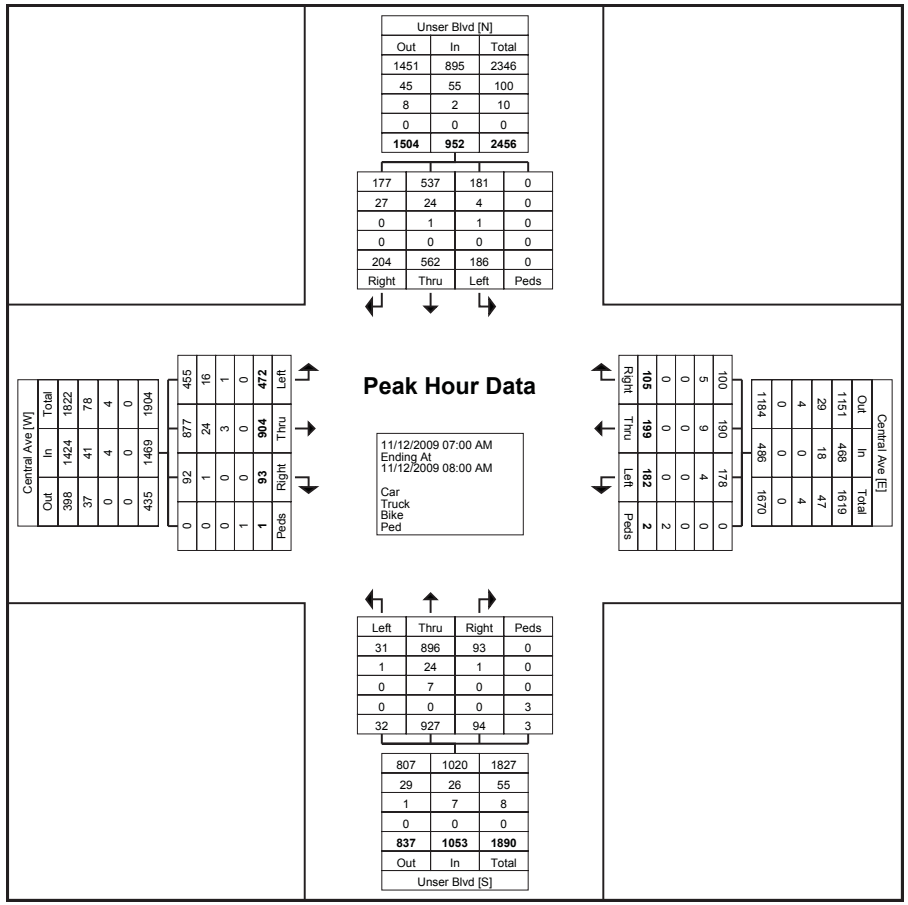

Turning Movement Peak Hour Data Plot (7:00 AM)

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8500 Menaul Boulevard NE
Suite A-420
Albuquerque, New Mexico, United States 87112
(505) 338-0988 jnorby@lee-eng.com

Count Name: Central - Unser
Site Code:
Start Date: 11/12/2009

Turning Movement Peak Hour Data (1:00 PM)

Start Time	Unser Blvd Southbound					Central Ave Westbound					Unser Blvd Northbound					Central Ave Eastbound					
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
01:00 PM	31	82	30	0	143	31	127	14	0	172	23	70	21	0	114	41	76	22	0	139	568
01:15 PM	29	90	47	0	166	29	81	31	0	141	21	72	26	0	119	32	71	26	0	129	555
01:30 PM	33	89	69	0	191	31	122	20	0	173	27	71	23	0	121	39	75	22	0	136	621
01:45 PM	33	94	65	0	192	33	110	28	1	171	25	90	21	1	136	48	81	21	0	150	649
Total	126	355	211	0	692	124	440	93	1	657	96	303	91	1	490	160	303	91	0	554	2393
Approach %	18.2	51.3	30.5	-	-	18.9	67.0	14.2	-	-	19.6	61.8	18.6	-	-	28.9	54.7	16.4	-	-	-
Total %	5.3	14.8	8.8	-	28.9	5.2	18.4	3.9	-	27.5	4.0	12.7	3.8	-	20.5	6.7	12.7	3.8	-	23.2	-
PHF	0.955	0.944	0.764	-	0.901	0.939	0.866	0.750	-	0.949	0.889	0.842	0.875	-	0.901	0.833	0.935	0.875	-	0.923	0.922
Car	117	337	193	-	647	115	419	87	-	621	94	301	86	-	481	140	301	86	-	527	2276
% Car	92.9	94.9	91.5	-	93.5	92.7	95.2	93.5	-	94.5	97.9	99.3	94.5	-	98.2	87.5	99.3	94.5	-	95.1	95.1
Truck	7	18	17	-	42	7	16	5	-	28	2	2	4	-	8	20	2	4	-	26	104
% Truck	5.6	5.1	8.1	-	6.1	5.6	3.6	5.4	-	4.3	2.1	0.7	4.4	-	1.6	12.5	0.7	4.4	-	4.7	4.3
Bike	2	0	1	-	3	2	5	1	-	8	0	0	1	-	1	0	0	1	-	1	13
% Bike	1.6	0.0	0.5	-	0.4	1.6	1.1	1.1	-	1.2	0.0	0.0	1.1	-	0.2	0.0	0.0	1.1	-	0.2	0.5
Ped	-	-	-	0	-	-	-	-	1	-	-	-	-	1	-	-	-	-	0	-	-
% Ped	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	-	-	-

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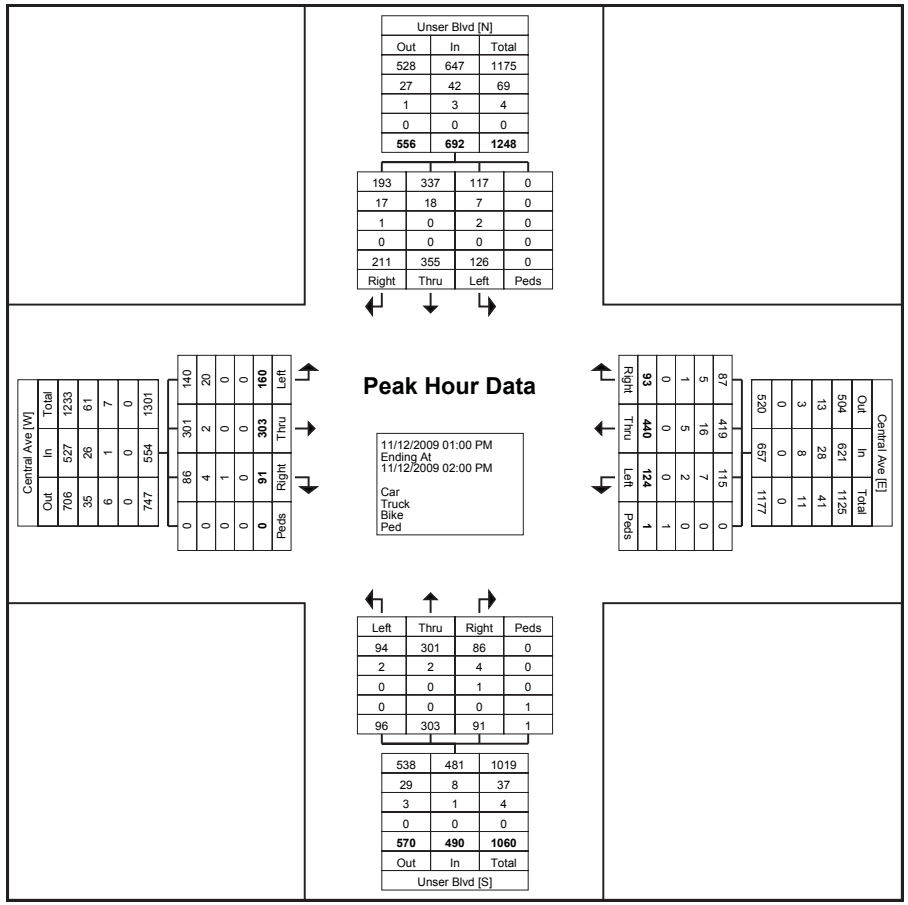

Turning Movement Peak Hour Data Plot (1:00 PM)

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Count Name: Central - Unser
Site Code:
Start Date: 11/12/2009

Turning Movement Peak Hour Data (4:45 PM)

Start Time	Unser Blvd Southbound					Central Ave Westbound					Unser Blvd Northbound					Central Ave Eastbound					
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:45 PM	30	121	71	0	222	33	191	50	1	274	62	118	29	1	209	47	119	31	0	197	902
05:00 PM	45	112	76	0	233	42	203	70	2	315	34	135	39	2	208	43	150	39	0	232	988
05:15 PM	40	108	81	0	229	41	199	50	0	290	41	126	29	1	196	62	123	35	0	220	935
05:30 PM	37	105	79	2	221	37	203	46	0	286	41	156	31	0	228	46	144	29	0	219	954
Total	152	446	307	2	905	153	796	216	3	1165	178	535	128	4	841	198	536	134	0	868	3779
Approach %	16.8	49.3	33.9	-	-	13.1	68.3	18.5	-	-	21.2	63.6	15.2	-	-	22.8	61.8	15.4	-	-	-
Total %	4.0	11.8	8.1	-	23.9	4.0	21.1	5.7	-	30.8	4.7	14.2	3.4	-	22.3	5.2	14.2	3.5	-	23.0	-
PHF	0.844	0.921	0.948	-	0.971	0.911	0.980	0.771	-	0.925	0.718	0.857	0.821	-	0.922	0.798	0.893	0.859	-	0.935	0.956
Car	149	437	304	-	890	149	787	210	-	1146	176	535	127	-	838	197	532	132	-	861	3735
% Car	98.0	98.0	99.0	-	98.3	97.4	98.9	97.2	-	98.4	98.9	100.0	99.2	-	99.6	99.5	99.3	98.5	-	99.2	98.8
Truck	3	8	3	-	14	3	8	4	-	15	0	0	1	-	1	0	3	1	-	4	34
% Truck	2.0	1.8	1.0	-	1.5	2.0	1.0	1.9	-	1.3	0.0	0.0	0.8	-	0.1	0.0	0.6	0.7	-	0.5	0.9
Bike	0	1	0	-	1	1	1	2	-	4	2	0	0	-	2	1	1	1	-	3	10
% Bike	0.0	0.2	0.0	-	0.1	0.7	0.1	0.9	-	0.3	1.1	0.0	0.0	-	0.2	0.5	0.2	0.7	-	0.3	0.3
Ped	-	-	-	2	-	-	-	-	3	-	-	-	-	4	-	-	-	-	0	-	-
% Ped	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	-	-	-

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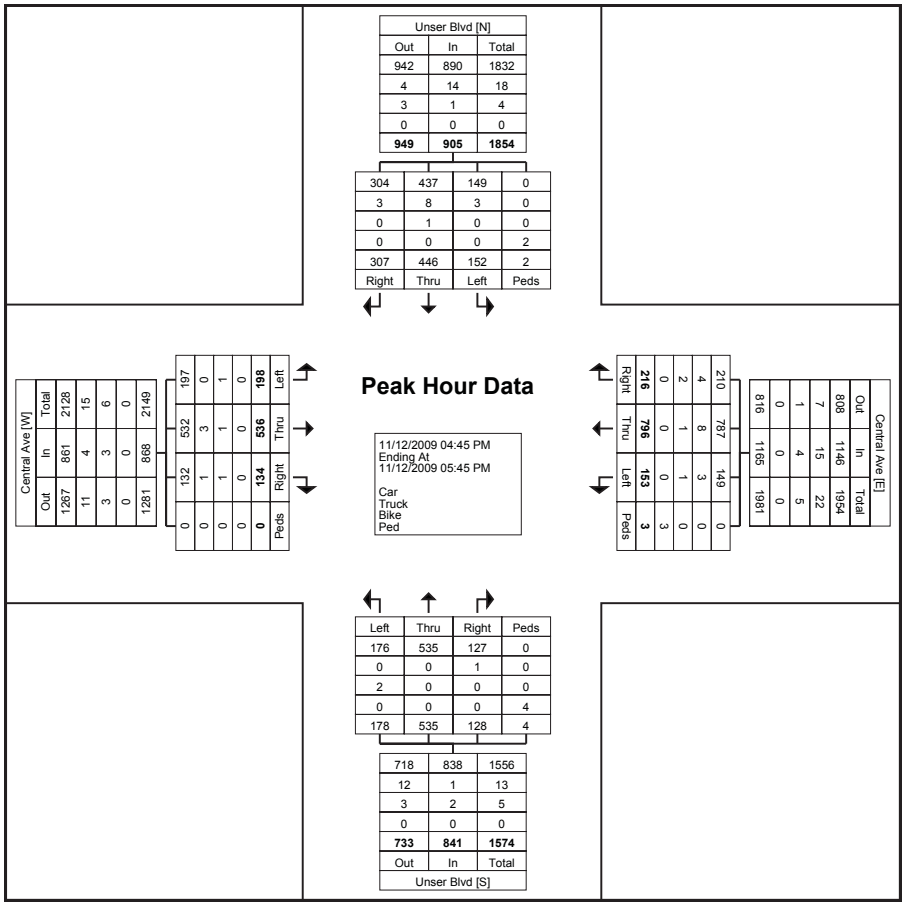


Turning Movement Peak Hour Data Plot (4:45 PM)

Intersection No.:

System: NONE
Address: NONE
RIU: NONE

Intersection Name: CENTRAL - UNSER

Phase I.D.:	1	2	3	4	5	6	7	8
Phase Dir.:	W-S	EB	S-E	NB	E-N	WB	N-W	SB
Recall:	OFF	MAX	OFF	OFF	OFF	MAX	OFF	OFF
Added Initial:	0	0	0	0	0	0	0	0
Initial - Min:	3	20	3	8	3	20	3	8
Initial - Max:	3	20	3	8	3	20	3	8
Ped-Walk:	0	6	0	8	0	6	0	8
Ped-Clear:	0	18	0	18	0	18	0	18
Ext-Preset:	1.5	4.0	1.5	2.5	1.5	4.0	1.5	2.5
Ext-Minimum:	1.5	4.0	1.5	2.5	1.5	4.0	1.5	2.5
Reduce-Before:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduce-To Min:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum-#1:	16	36	16	30	16	36	16	30
Maximum-#2:	16	36	16	30	16	36	16	30
Maximum-#3:								
Clear-Yellow:	3.0	4.3	3.0	4.3	3.0	4.3	3.0	4.3
Clear-Red:	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5
Det Memory:	NL	L	NL	NL	NL	L	NL	NL

Flash Mode: ALL RED

Start Up Mode: ALL RED
Time: 8 SEC.
First Phases: 2 & 6
Start In: GREEN

Approved: RS

Print Date: 10/10/2007

Overlap Phases: NONE

Overlap	Par Ph	Grn	Yel	Red
A				
B				
C				
D				

	E/W xNA	E/W xSA	N/S xEA	N/S xWA	X/Y xZA
Ped Heads:	YES	YES	YES	YES	NONE
Ped Buttons:	NONE	NONE	YES	YES	NONE
Bike Buttons:	NONE	NONE	NONE	NONE	NONE

Vehicle Detection:

Local, presence:	YES
Local, pulse:	NONE
System:	NONE

Direction	Type	Dist Back		Direction	Type	Dist Back	
NB	PRES		ft.	N-W	PRES		ft.
SB	PRES		ft.	S-E	PRES		ft.
EB	NONE		ft.	E-N	PRES		ft.
WB	NONE		ft.	W-S	PRES		ft.

Dual Entry:	YES
Guar Pass Time:	NO
Simul Gap Out:	YES
Max. Ext:	NO
Red Rest 1-4:	NO
Red Rest 5-8:	NO
Min. Red:	2
Cond. Serv:	NO

Turn On Date	2/26/1987
Controller Type	Econo ASC2S-2100
Electronics Level	MICRO
No. of Rings	2
No. of Phases	7
External Logic	N
Cabinet Type	P

Slave No.:	
Multiplex No.:	
Sec. Func. Cir:	
Prom Rev (c/t):	

Timeclock-Cabinet	
Timeclock-Computer	
Flash T-O-D	

NOTES:

1. Intersection in flash, 2/20/87. Intersection in full operation, 2/26/87.
2. Clearance intervals, 7/31/90.
3. New cabinet installed and phasing separated.
4. Timing sheet updated, 8/11/05.
5. Phase 1 W-S added and activated, 9/1/05.
6. Turn arrow for N-W added, 6/14/06.
7. Yellow and Red clearance intervals changed as per new standards given by KB, 10/10/07.

COORDINATION TIMING PLAN DATA

5/25/2010 3:38 PM

Intersection # and Name: **395 - Central & Unser**

COORDINATOR OPTIONS

SPLIT UNITS	%	ACT CRD PHASE	X
OFFSET UNITS	%	ACT WALK/REST	.
INTERCNT FMT	PLAN	INHIBIT MAX	X
INTERCNT SRC	NIC	MAX2 SELECT	.
RESYNC COUNT	0	MULTISYNC	.
TRANSITION	SMOOTH	FLOAT FORCE OFF	X
DEWLL PERIOD	0%		

	A	B	C	D	E	F
FREE ALT SEQUENCE						

COORDINATION PATTERN DATA PATTERN 1

CYCLE LENGTH 110 PLAN 1

OFFSET 92

PHASE	1	2	3	4
DIRECTION	W-S	EB	S-E	NB
SPLITS	16	37	20	27

PHASE	5	6	7	8
DIRECTION	E-N	WB	N-W	SB
SPLITS	25	28	13	34

PHASE	1	2	3	4	5	6	7	8
COORD PHASE		X				X		
VEH RECALL								
MAX RECALL		X				X		

	A	B	C	D	E	F
ALT SEQUENCE						

COORDINATION PATTERN DATA PATTERN 3

CYCLE LENGTH 100 PLAN 3

OFFSET 11

PHASE	1	2	3	4
DIRECTION	W-S	EB	S-E	NB
SPLITS	18	30	22	30

PHASE	5	6	7	8
DIRECTION	E-N	WB	N-W	SB
SPLITS	18	30	15	37

PHASE	1	2	3	4	5	6	7	8
COORD PHASE		X				X		
VEH RECALL								
MAX RECALL		X				X		

	A	B	C	D	E	F
ALT SEQUENCE						

COORDINATION TIMING PLAN DATA

COORDINATION PATTERN DATA PATTERN 5

CYCLE LENGTH	110						PLAN	5
OFFSET	17							

PHASE	1	2	3	4
DIRECTION	W-S	EB	S-E	NB
SPLITS	21	28	23	28

PHASE	5	6	7	8
DIRECTION	E-N	WB	N-W	SB
SPLITS	21	28	13	38

PHASE	1	2	3	4	5	6	7	8
COORD PHASE		X				X		
VEH RECALL								
MAX RECALL		X				X		

	A	B	C	D	E	F
ALT SEQUENCE						

CLOCK / CALENDAR

DATE SET:	CURRENT DATE
TIME SET:	CURRENT TIME
SYNC REFERENCE TIME:	3:30

WEEKLY PROGRAM

WEEK	SUN	MON	TUE	WED	THU	FRI	SAT
1	1	2	2	2	2	2	3
2	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1

NIC PROGRAM STEPS

STEP	PGM	TIME	PATTERN
1	1	10:00	3
2	1	18:00	0
3	2	6:30	1
4	2	9:00	3
5	2	15:00	5
6	2	18:30	3
7	2	22:00	0
8	3	9:00	3
9	3	22:00	0

Appendix H: Level of Service Calculations for Pedestrians

Problem: Calculation of Pedestrian Level of Service for Central and Unser signalized intersection
Reference: NCHRP Report 616 (Multimodal Level of Service Analysis for Urban Streets)
Level of Service Model for Pedestrians at Signalized Intersections by Petritsch et.al. TRR
Highway Capacity Manual, 2000 Edition

2030 AM Peak No-Build Alternative

NCHRP Ped Int LOS (Signal) = 0.00569(RTOR+PermLefts)+0.00013(PerpTrafVol*PerpTrafSpeed)+0.0681(LanesCrossed^0.514) +0.0401ln(PedDelay)-RTCI(0.0027PerpTrafVol-0.1946)+1.7806

	RTOR	Perm Lefts	PerpTrafVOl	PerpTrafSpeed	Lanes Crossed	Ped Delay	RTCI	LOS Value	LOS
			For street being crossed			d_p			
Crossing Unser North Side	229	0	603	40	5	28	2	3.6	C
Crossing Unser South Side	98	0	603	40	5	21	0	5.7	E
Crossing Central East Side	128	70	559	55	6	26	1	5.9	E
Crossing Central West Side	198	11	559	55	6	24	1	6.0	E

$$d_p = \frac{0.5(C-g)^2}{C}$$

5.31 D

TABLE 1 Pedestrian LOS for Signalized Intersection Categories

Ped LOS for Signalized Intersections	Model Score
A	≤1.5
B	>1.5 and ≤2.5
C	>2.5 and ≤3.5
D	>3.5 and ≤4.5
E	>4.5 and ≤5.5
F	>5.5

2030 PM Peak No-Build Alternative

NCHRP Ped Int LOS (Signal) = 0.00569(RTOR+PermLefts)+0.00013(PerpTrafVol*PerpTrafSpeed)+0.0681(LanesCrossed^0.514) +0.0401ln(PedDelay)-RTCI(0.0027PerpTrafVol-0.1946)+1.7806

	RTOR	Perm Lefts	PerpTrafVOl	PerpTrafSpeed	Lanes Crossed	Ped Delay	RTCI	LOS Value	LOS
			For street being crossed			d_p			
Crossing Unser North Side	394	0	518	40	5	21	2	4.6	D
Crossing Unser South Side	154	0	518	40	5	21	0	5.6	D
Crossing Central East Side	231	52	544	55	6	25	1	6.3	E
Crossing Central West Side	317	49	544	55	6	26	1	6.8	E

$$d_p = \frac{0.5(C-g)^2}{C}$$

5.82 D

TABLE 1 Pedestrian LOS for Signalized Intersection Categories

Ped LOS for Signalized Intersections	Model Score
A	≤1.5
B	>1.5 and ≤2.5
C	>2.5 and ≤3.5
D	>3.5 and ≤4.5
E	>4.5 and ≤5.5
F	>5.5

Problem: Calculation of Pedestrian Level of Service for Central and Unser signalized intersection
Reference: NCHRP Report 616 (Multimodal Level of Service Analysis for Urban Streets)
Level of Service Model for Pedestrians at Signalized Intersections by Petritsch et.al. TRR
Highway Capacity Manual, 2000 Edition

2030 AM Peak Alternative A - 4 Lanes Central; 4 Lanes Unser

NCHRP Ped Int LOS (Signal) = 0.00569(RTOR+PermLefts)+0.00013(PerpTrafVol*PerpTrafSpeed)+0.0681(LanesCrossed^0.514) +0.0401ln(PedDelay)-RTCI(0.0027PerpTrafVol-0.1946)+1.7806

	RTOR	Perm Lefts	PerpTrafVOl	PerpTrafSpeed	Lanes Crossed	Ped Delay	RTCI	LOS Value	LOS
			For street being crossed			d_p			
Crossing Unser North Side	229	0	603	40	5	27	2	3.6	D
Crossing Unser South Side	98	0	603	40	5	23	2	2.9	C
Crossing Central East Side	128	0	559	40	6	25	2	3.1	C
Crossing Central West Side	198	0	559	40	6	19	2	3.5	C

$$d_p = \frac{0.5(C-g)^2}{C}$$

3.27 C

TABLE 1 Pedestrian LOS for Signalized Intersection Categories

Ped LOS for Signalized Intersections	Model Score
A	≤1.5
B	>1.5 and ≤2.5
C	>2.5 and ≤3.5
D	>3.5 and ≤4.5
E	>4.5 and ≤5.5
F	>5.5

2030 PM Peak Alternative A - 4 Lanes Central; 4 Lanes Unser

NCHRP Ped Int LOS (Signal) = 0.00569(RTOR+PermLefts)+0.00013(PerpTrafVol*PerpTrafSpeed)+0.0681(LanesCrossed^0.514) +0.0401ln(PedDelay)-RTCI(0.0027PerpTrafVol-0.1946)+1.7806

	RTOR	Perm Lefts	PerpTrafVOl	PerpTrafSpeed	Lanes Crossed	Ped Delay	RTCI	LOS Value	LOS
			For street being crossed			d_p			
Crossing Unser North Side	394	0	518	40	5	25	2	4.6	E
Crossing Unser South Side	154	0	518	40	5	26	2	3.2	C
Crossing Central East Side	231	0	544	40	6	25	2	3.7	D
Crossing Central West Side	317	0	544	40	6	25	2	4.2	D

$$d_p = \frac{0.5(C-g)^2}{C}$$

3.92 D

TABLE 1 Pedestrian LOS for Signalized Intersection Categories

Ped LOS for Signalized Intersections	Model Score
A	≤1.5
B	>1.5 and ≤2.5
C	>2.5 and ≤3.5
D	>3.5 and ≤4.5
E	>4.5 and ≤5.5
F	>5.5

Problem: Calculation of Pedestrian Level of Service for Central and Unser signalized intersection
Reference: NCHRP Report 616 (Multimodal Level of Service Analysis for Urban Streets)
Level of Service Model for Pedestrians at Signalized Intersections by Petritsch et.al. TRR
Highway Capacity Manual, 2000 Edition

2030 AM Peak Alternative B - 4 Lanes Central; 6 Lanes Unser

NCHRP Ped Int LOS (Signal) = 0.00569(RTOR+PermLefts)+0.00013(PerpTrafVol*PerpTrafSpeed)+0.0681(LanesCrossed^0.514) +0.0401ln(PedDelay)-RTCI(0.0027PerpTrafVol-0.1946)+1.7806

	RTOR	Perm Lefts	PerpTrafVOl	PerpTrafSpeed	Lanes Crossed	Ped Delay	RTCI	LOS Value	LOS
			For street being crossed			d_p			
Crossing Unser North Side	229	0	398	40	8	26	2	3.7	D
Crossing Unser South Side	98	0	398	40	8	22	2	3.0	C
Crossing Central East Side	128	0	369	40	6	26	2	3.1	C
Crossing Central West Side	198	0	369	40	6	21	2	3.5	C

$$d_p = \frac{0.5(C-g)^2}{C}$$

3.33 C

TABLE 1 Pedestrian LOS for Signalized Intersection Categories

Ped LOS for Signalized Intersections	Model Score
A	≤1.5
B	>1.5 and ≤2.5
C	>2.5 and ≤3.5
D	>3.5 and ≤4.5
E	>4.5 and ≤5.5
F	>5.5

2030 PM Peak Alternative B - 4 Lanes Central; 6 Lanes Unser

NCHRP

Ped Int LOS (Signal) = 0.00569(RTOR+PermLefts)+0.00013(PerpTrafVol*PerpTrafSpeed)+0.0681(LanesCrossed^0.514) +0.0401ln(PedDelay)-RTCI(0.0027PerpTrafVol-0.1946)+1.7806

	RTOR	Perm Lefts	PerpTrafVOl	PerpTrafSpeed	Lanes Crossed	Ped Delay	RTCI	LOS Value	LOS
			For street being crossed			d_p			
Crossing Unser North Side	394	0	342	40	8	26	2	4.7	E
Crossing Unser South Side	154	0	342	40	8	25	2	3.3	C
Crossing Central East Side	231	0	359	40	6	26	2	3.7	D
Crossing Central West Side	317	0	359	40	6	26	2	4.2	D

$$d_p = \frac{0.5(C-g)^2}{C}$$

3.97 D

TABLE 1 Pedestrian LOS for Signalized Intersection Categories

Ped LOS for Signalized Intersections	Model Score
A	≤1.5
B	>1.5 and ≤2.5
C	>2.5 and ≤3.5
D	>3.5 and ≤4.5
E	>4.5 and ≤5.5
F	>5.5

Problem: Calculation of Pedestrian Level of Service for Central and Unser signalized intersection
Reference: NCHRP Report 616 (Multimodal Level of Service Analysis for Urban Streets)
Level of Service Model for Pedestrians at Signalized Intersections by Petritsch et.al. TRR
Highway Capacity Manual, 2000 Edition

2030 AM Peak Alternative C - 6 Lanes Central; 6 Lanes Unser

NCHRP Ped Int LOS (Signal) = 0.00569(RTOR+PermLefts)+0.00013(PerpTrafVol*PerpTrafSpeed)+0.0681(LanesCrossed^0.514) +0.0401ln(PedDelay)-RTCI(0.0027PerpTrafVol-0.1946)+1.7806

	RTOR	Perm Lefts	PerpTrafVOl	PerpTrafSpeed	Lanes Crossed	Ped Delay	RTCI	LOS Value	LOS
			For street being crossed			d_p			
Crossing Unser North Side	229	0	398	40	8	26	2	3.7	D
Crossing Unser South Side	98	0	398	40	8	22	2	3.0	C
Crossing Central East Side	128	0	369	40	8	26	2	3.2	C
Crossing Central West Side	198	0	369	40	8	21	2	3.5	C

$$d_p = \frac{0.5(C-g)^2}{C}$$

3.35 C

TABLE 1 Pedestrian LOS for Signalized Intersection Categories

Ped LOS for Signalized Intersections	Model Score
A	≤1.5
B	>1.5 and ≤2.5
C	>2.5 and ≤3.5
D	>3.5 and ≤4.5
E	>4.5 and ≤5.5
F	>5.5

2030 PM Peak Alternative C - 6 Lanes Central; 6 Lanes Unser

NCHRP Ped Int LOS (Signal) = 0.00569(RTOR+PermLefts)+0.00013(PerpTrafVol*PerpTrafSpeed)+0.0681(LanesCrossed^0.514) +0.0401ln(PedDelay)-RTCI(0.0027PerpTrafVol-0.1946)+1.7806

	RTOR	Perm Lefts	PerpTrafVOl	PerpTrafSpeed	Lanes Crossed	Ped Delay	RTCI	LOS Value	LOS
			For street being crossed			d_p			
Crossing Unser North Side	394	0	342	40	8	26	2	4.7	E
Crossing Unser South Side	154	0	342	40	8	25	2	3.3	C
Crossing Central East Side	231	0	359	40	8	26	2	3.7	D
Crossing Central West Side	317	0	359	40	8	26	2	4.2	D

$$d_p = \frac{0.5(C-g)^2}{C}$$

3.99 D

TABLE 1 Pedestrian LOS for Signalized Intersection Categories

Ped LOS for Signalized Intersections	Model Score
A	≤1.5
B	>1.5 and ≤2.5
C	>2.5 and ≤3.5
D	>3.5 and ≤4.5
E	>4.5 and ≤5.5
F	>5.5

Appendix I: Level of Service Calculations for Cyclists

Problem: Calculation of Bicyclists Level of Service for Central and Unser signalized intersection
Reference: NCHRP Report 616 (Multimodal Level of Service Analysis for Urban Streets)

2030 AM Peak: No-Build Alternative

NCHRP IntBLOS = -0.2144Wt + 0.0153CD + 0.0066(Vol15/L) + 4.1324

	Wt	CD	Vol15	L		LOS Value	LOS
Crossing Unser North Side		12	100	203	2	3.8	C
Crossing Unser South Side		16	145	421	2	4.3	D
Crossing Central East Side		16	124	353	2	3.8	D
Crossing Central West Side		12	120	353	2	4.6	D
						4.10	D

Exhibit 91. Bicycle LOS Numerical Equivalents.

LOS	Numerical Score
A	≤ 2.00
B	>2.00 and ≤ 2.75
C	>2.75 and ≤ 3.50
D	>3.50 and ≤ 4.25
E	>4.25 and ≤ 5.00
F	> 5.00

2030 PM Peak: No-Build Alternative

NCHRP IntBLOS = -0.2144Wt + 0.0153CD + 0.0066(Vol15/L) + 4.1324

	Wt	CD	Vol15	L		LOS Value	LOS
Crossing Unser North Side		12	100	440	2	4.5	D
Crossing Unser South Side		16	145	317	2	4.0	D
Crossing Central East Side		16	124	360	2	3.8	C
Crossing Central West Side		12	120	463	2	4.9	D
						4.30	D

Exhibit 91. Bicycle LOS Numerical Equivalents.

LOS	Numerical Score
A	≤ 2.00
B	>2.00 and ≤ 2.75
C	>2.75 and ≤ 3.50
D	>3.50 and ≤ 4.25
E	>4.25 and ≤ 5.00
F	> 5.00

Guiding Equation:

$$IntBLOS = -0.2144Wt + 0.0153CD + 0.0066\,(Vol15/L) + 4.1324 \quad \text{(Eq. 32)}$$

Where

IntBLOS = perceived hazard of shared-roadway environment through the intersection

Wt = total width of outside through lane and bike lane (if present)

CD = crossing distance, the width of the side street (including auxiliary lanes and median)

Vol15 = volume of directional traffic during a 15-minute period

L = total number of through lanes on the approach to the intersection

Problem: Calculation of Bicyclists Level of Service for Central and Unser signalized intersection
Reference: NCHRP Report 616 (Multimodal Level of Service Analysis for Urban Streets)

2030 AM Peak: Alternative A - 4 Lanes Central; 4 Lanes Unser

NCHRP IntBLOS = -0.2144Wt + 0.0153CD + 0.0066(Vol15/L) + 4.1324

	Wt	CD	Vol15	L		LOS Value	LOS
Crossing Unser North Side		18	106	203	2	2.6	B
Crossing Unser South Side		18	106	421	2	3.3	C
Crossing Central East Side		18	117	353	2	3.2	C
Crossing Central West Side		18	117	353	2	3.2	C
						3.07	C

Exhibit 91. Bicycle LOS Numerical Equivalents.

LOS	Numerical Score
A	≤ 2.00
B	>2.00 and ≤ 2.75
C	>2.75 and ≤ 3.50
D	>3.50 and ≤ 4.25
E	>4.25 and ≤ 5.00
F	> 5.00

2030 PM Peak: Alternative A - 4 Lanes Central; 4 Lanes Unser

NCHRP IntBLOS = -0.2144Wt + 0.0153CD + 0.0066(Vol15/L) + 4.1324

	Wt	CD	Vol15	L		LOS Value	LOS
Crossing Unser North Side		18	106	440	2	3.3	C
Crossing Unser South Side		18	106	317	2	2.9	B
Crossing Central East Side		18	117	360	2	3.3	C
Crossing Central West Side		18	117	463	2	3.6	C
						3.28	C

Exhibit 91. Bicycle LOS Numerical Equivalents.

LOS	Numerical Score
A	≤ 2.00
B	>2.00 and ≤ 2.75
C	>2.75 and ≤ 3.50
D	>3.50 and ≤ 4.25
E	>4.25 and ≤ 5.00
F	> 5.00

Guiding Equation:

$$IntBLOS = -0.2144Wt + 0.0153CD + 0.0066\,(Vol15/L) + 4.1324 \quad \text{(Eq. 32)}$$

Where

IntBLOS = perceived hazard of shared-roadway environment through the intersection

Wt = total width of outside through lane and bike lane (if present)

CD = crossing distance, the width of the side street (including auxiliary lanes and median)

Vol15 = volume of directional traffic during a 15-minute period

L = total number of through lanes on the approach to the intersection

Problem: Calculation of Bicyclists Level of Service for Central and Unser signalized intersection
Reference: NCHRP Report 616 (Multimodal Level of Service Analysis for Urban Streets)

2030 AM Peak: Alternative B - 4 Lanes Central; 6 Lanes Unser

NCHRP IntBLOS = -0.2144Wt + 0.0153CD + 0.0066(Vol15/L) + 4.1324

	Wt	CD	Vol15	L		LOS Value	LOS
Crossing Unser North Side		18	139	203	2	3.1	B
Crossing Unser South Side		18	139	421	2	3.8	C
Crossing Central East Side		18	117	353	3	2.8	C
Crossing Central West Side		18	117	353	3	2.8	C
						3.13	C

Exhibit 91. Bicycle LOS Numerical Equivalents.

LOS	Numerical Score
A	≤ 2.00
B	>2.00 and ≤ 2.75
C	>2.75 and ≤ 3.50
D	>3.50 and ≤ 4.25
E	>4.25 and ≤ 5.00
F	> 5.00

2030 PM Peak: Alternative B - 4 Lanes Central; 6 Lanes Unser

NCHRP IntBLOS = -0.2144Wt + 0.0153CD + 0.0066(Vol15/L) + 4.1324

	Wt	CD	Vol15	L		LOS Value	LOS
Crossing Unser North Side		18	139	440	2	3.9	C
Crossing Unser South Side		18	139	317	2	3.4	B
Crossing Central East Side		18	117	360	3	2.9	C
Crossing Central West Side		18	117	463	3	3.1	C
						3.31	C

Exhibit 91. Bicycle LOS Numerical Equivalents.

LOS	Numerical Score
A	≤ 2.00
B	>2.00 and ≤ 2.75
C	>2.75 and ≤ 3.50
D	>3.50 and ≤ 4.25
E	>4.25 and ≤ 5.00
F	> 5.00

Guiding Equation:

$$IntBLOS = -0.2144Wt + 0.0153CD + 0.0066\,(Vol15/L) + 4.1324 \quad \text{(Eq. 32)}$$

Where

IntBLOS = perceived hazard of shared-roadway environment through the intersection

Wt = total width of outside through lane and bike lane (if present)

CD = crossing distance, the width of the side street (including auxiliary lanes and median)

Vol15 = volume of directional traffic during a 15-minute period

L = total number of through lanes on the approach to the intersection

Problem: Calculation of Bicyclists Level of Service for Central and Unser signalized intersection
Reference: NCHRP Report 616 (Multimodal Level of Service Analysis for Urban Streets)

2030 AM Peak: Alternative C - 6 Lanes Central; 6 Lanes Unser

NCHRP IntBLOS = -0.2144Wt + 0.0153CD + 0.0066(Vol15/L) + 4.1324

	Wt	CD	Vol15	L		LOS Value	LOS
Crossing Unser North Side		18	139	203	3	2.8	B
Crossing Unser South Side		18	139	421	3	3.3	C
Crossing Central East Side		18	139	353	3	3.2	C
Crossing Central West Side		18	139	353	3	3.2	C
						3.13	C

Exhibit 91. Bicycle LOS Numerical Equivalents.

LOS	Numerical Score
A	≤ 2.00
B	>2.00 and ≤ 2.75
C	>2.75 and ≤ 3.50
D	>3.50 and ≤ 4.25
E	>4.25 and ≤ 5.00
F	> 5.00

2030 PM Peak: Alternative C - 6 Lanes Central; 6 Lanes Unser

NCHRP IntBLOS = -0.2144Wt + 0.0153CD + 0.0066(Vol15/L) + 4.1324

	Wt	CD	Vol15	L		LOS Value	LOS
Crossing Unser North Side		18	139	440	3	3.4	C
Crossing Unser South Side		18	139	317	3	3.1	B
Crossing Central East Side		18	139	360	3	3.2	C
Crossing Central West Side		18	139	463	3	3.4	C
						3.27	C

Exhibit 91. Bicycle LOS Numerical Equivalents.

LOS	Numerical Score
A	≤ 2.00
B	>2.00 and ≤ 2.75
C	>2.75 and ≤ 3.50
D	>3.50 and ≤ 4.25
E	>4.25 and ≤ 5.00
F	> 5.00

Guiding Equation:

$$IntBLOS = -0.2144Wt + 0.0153CD + 0.0066\,(Vol15/L) + 4.1324 \quad \text{(Eq. 32)}$$

Where

IntBLOS = perceived hazard of shared-roadway environment through the intersection

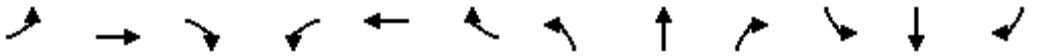
Wt = total width of outside through lane and bike lane (if present)

CD = crossing distance, the width of the side street (including auxiliary lanes and median)

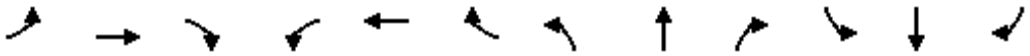
Vol15 = volume of directional traffic during a 15-minute period

L = total number of through lanes on the approach to the intersection

Appendix J: Level of Service Reports for Vehicular Traffic from Synchro™ and Simtraffic™



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	472	1118	93	225	416	169	54	1205	151	351	656	403
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Storage Length (ft)	410		0	440		130	150		0	440		440
Storage Lanes	2		1	2		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.97	1.00		0.99		0.94	1.00	0.99			0.98	
Frt		0.987				0.850		0.980			0.944	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3077	3117	0	3077	3172	1419	1586	3085	0	1586	2931	0
Flt Permitted	0.950			0.950			0.083			0.078		
Satd. Flow (perm)	2983	3117	0	3053	3172	1331	138	3085	0	130	2931	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				142		13			105	
Link Speed (mph)		50			50			40			40	
Link Distance (ft)		1688			1035			1648			1004	
Travel Time (s)		23.0			14.1			28.1			17.1	
Confl. Peds. (#/hr)	40		40	40		40	40		40	40		40
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.89	0.86	0.73	0.80	0.64	0.75	0.73	0.94	0.76	0.82	0.83	0.85
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Adj. Flow (vph)	530	1300	127	281	650	225	74	1282	199	428	790	474
Shared Lane Traffic (%)												
Lane Group Flow (vph)	530	1427	0	281	650	225	74	1481	0	428	1264	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		28			28			28			28	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	5		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot			Prot		Perm	pm+pt			pm+pt		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases						2	4			8		
Detector Phase	1	6		5	2	2	7	4		3	8	
Switch Phase												
Minimum Initial (s)	3.0	20.0		3.0	20.0	20.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	8.0	55.0		8.0	43.0	43.0	8.0	48.0		8.0	48.0	
Total Split (s)	14.0	61.0	0.0	10.0	57.0	57.0	8.0	54.0	0.0	15.0	61.0	0.0
Total Split (%)	10.0%	43.6%	0.0%	7.1%	40.7%	40.7%	5.7%	38.6%	0.0%	10.7%	43.6%	0.0%
Maximum Green (s)	10.5	55.0		6.5	51.0	51.0	4.5	48.0		11.5	55.0	
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5		3.0	4.5	
All-Red Time (s)	0.5	1.5		0.5	1.5	1.5	0.5	1.5		0.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.5	6.0	4.0	3.5	6.0	6.0	3.5	6.0	4.0	3.5	6.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.5	4.0		1.5	4.0	4.0	1.5	2.5		1.5	2.5	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0		7.0			7.0	
Flash Dont Walk (s)		42.0			30.0	30.0		35.0			35.0	
Pedestrian Calls (#/hr)		100			100	100		100			100	
Act Effct Green (s)	10.5	55.0		6.5	51.0	51.0	55.0	48.0		65.5	55.0	
Actuated g/C Ratio	0.08	0.39		0.05	0.36	0.36	0.39	0.34		0.47	0.39	
v/c Ratio	2.29	1.16		1.97	0.56	0.39	0.73	1.39		2.38	1.04	
Control Delay	623.0	119.9		490.8	37.9	14.2	63.5	216.6		657.5	74.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	623.0	119.9		490.8	37.9	14.2	63.5	216.6		657.5	74.9	
LOS	F	F		F	D	B	E	F		F	E	
Approach Delay		256.1			143.4			209.4			222.2	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~403	~807		~204	247	51	37	~944		~596	~621	
Queue Length 95th (ft)	#513	#879		#258	202	80	#59	#1086		#721	#653	
Internal Link Dist (ft)		1608			955			1568			924	
Turn Bay Length (ft)	410			440		130	150			440		
Base Capacity (vph)	231	1230		143	1156	575	101	1066		180	1215	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	2.29	1.16		1.97	0.56	0.39	0.73	1.39		2.38	1.04	

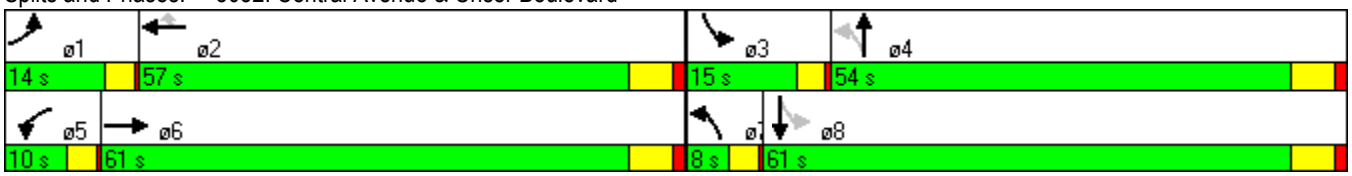
Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 2.38	

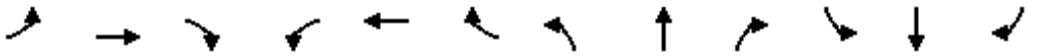
Intersection Signal Delay: 215.2	Intersection LOS: F
Intersection Capacity Utilization 121.9%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

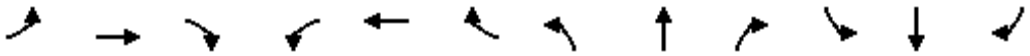
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5052: Central Avenue & Unser Boulevard





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	378	668	223	257	1087	416	244	1035	162	260	1020	570
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Storage Length (ft)	410		0	440		130	150		0	440		440
Storage Lanes	2		1	2		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	0.97	0.95	0.95	0.97	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.98	0.99		0.99		0.94		0.99			0.98	
Frt		0.962				0.850		0.979			0.947	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3077	3012	0	3077	3172	1419	1586	3081	0	1586	2944	0
Flt Permitted	0.950			0.950			0.078			0.078		
Satd. Flow (perm)	3027	3012	0	3034	3172	1331	130	3081	0	130	2944	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		40				147		15			81	
Link Speed (mph)		50			50			40			40	
Link Distance (ft)		19024			14520			12412			14405	
Travel Time (s)		259.4			198.0			211.6			245.5	
Confl. Peds. (#/hr)	40		40	40		40	40		40	40		40
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.80	0.89	0.86	0.91	0.98	0.77	0.72	0.86	0.82	0.84	0.92	0.95
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Adj. Flow (vph)	472	751	259	282	1109	540	339	1203	198	310	1109	600
Shared Lane Traffic (%)												
Lane Group Flow (vph)	472	1010	0	282	1109	540	339	1401	0	310	1709	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		28			28			28			28	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	5		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot			Prot		Perm	pm+pt			pm+pt		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases						2	4			8		
Detector Phase	1	6		5	2	2	7	4		3	8	
Switch Phase												
Minimum Initial (s)	3.0	20.0		3.0	20.0	20.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	8.0	55.0		8.0	55.0	55.0	8.0	48.0		8.0	48.0	
Total Split (s)	13.0	61.0	0.0	10.0	58.0	58.0	12.0	57.0	0.0	12.0	57.0	0.0
Total Split (%)	9.3%	43.6%	0.0%	7.1%	41.4%	41.4%	8.6%	40.7%	0.0%	8.6%	40.7%	0.0%
Maximum Green (s)	9.5	55.0		6.5	52.0	52.0	8.5	51.0		8.5	51.0	
Yellow Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5		3.0	4.5	
All-Red Time (s)	0.5	1.5		0.5	1.5	1.5	0.5	1.5		0.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.5	6.0	4.0	3.5	6.0	6.0	3.5	6.0	4.0	3.5	6.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	2.0		3.0	2.0	2.0	3.0	3.0		2.0	2.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0		7.0			7.0	
Flash Dont Walk (s)		42.0			30.0	30.0		35.0			35.0	
Pedestrian Calls (#/hr)		100			100	100		100			100	
Act Effct Green (s)	9.5	55.0		6.5	52.0	52.0	62.0	51.0		62.0	51.0	
Actuated g/C Ratio	0.07	0.39		0.05	0.37	0.37	0.44	0.36		0.44	0.36	
v/c Ratio	2.26	0.84		1.97	0.94	0.92	2.32	1.24		2.12	1.52	
Control Delay	608.9	44.3		493.8	58.2	52.7	636.0	152.6		549.4	270.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	608.9	44.3		493.8	58.2	52.7	636.0	152.6		549.4	270.2	
LOS	F	D		F	E	D	F	F		F	F	
Approach Delay		224.1			120.3			246.8			313.0	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~358	420		~205	511	366	~460	~829		~404	~1122	
Queue Length 95th (ft)	#406	505		#300	#655	403	#490	#902		#546	#1264	
Internal Link Dist (ft)		18944			14440			12332			14325	
Turn Bay Length (ft)	410			440		130	150			440		
Base Capacity (vph)	209	1208		143	1178	587	146	1132		146	1124	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	2.26	0.84		1.97	0.94	0.92	2.32	1.24		2.12	1.52	

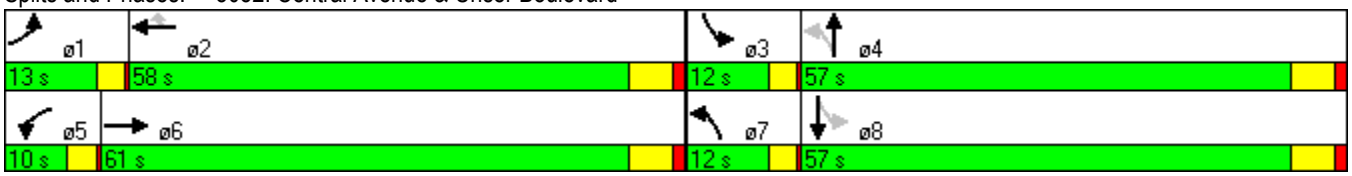
Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 2.32	

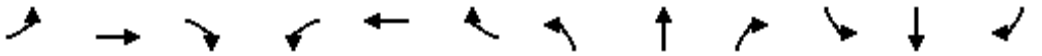
Intersection Signal Delay: 226.7	Intersection LOS: F
Intersection Capacity Utilization 126.0%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

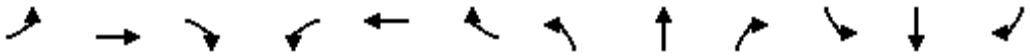
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5052: Central Avenue & Unser Boulevard





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	472	1118	93	225	416	169	54	1205	151	351	656	403
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Storage Length (ft)	410		150	440		130	150		150	440		440
Storage Lanes	2		1	2		1	1		1	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.96		0.93	0.99		0.93	0.98		0.93	0.99		0.94
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3077	3172	1419	3077	3172	1419	1586	3172	1419	1586	3172	1419
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	2968	3172	1320	3033	3172	1319	1561	3172	1326	1573	3172	1328
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			50			147			77			292
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		1688			1035			1648			1004	
Travel Time (s)		28.8			17.6			28.1			17.1	
Confl. Peds. (#/hr)	40		40	40		40	40		40	40		40
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.89	0.86	0.73	0.80	0.64	0.75	0.73	0.94	0.76	0.82	0.83	0.85
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Adj. Flow (vph)	530	1300	127	281	650	225	74	1282	199	428	790	474
Shared Lane Traffic (%)												
Lane Group Flow (vph)	530	1300	127	281	650	225	74	1282	199	428	790	474
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		40			40			26			26	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	5	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			8
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	3.0	20.0	20.0	3.0	20.0	20.0	3.0	8.0	8.0	3.0	8.0	8.0
Minimum Split (s)	8.0	38.0	38.0	8.0	38.0	38.0	8.0	41.0	41.0	8.0	41.0	41.0
Total Split (s)	18.0	52.0	52.0	12.0	46.0	46.0	17.0	50.0	50.0	26.0	59.0	59.0
Total Split (%)	12.9%	37.1%	37.1%	8.6%	32.9%	32.9%	12.1%	35.7%	35.7%	18.6%	42.1%	42.1%
Maximum Green (s)	14.5	46.0	46.0	8.5	40.0	40.0	13.5	44.0	44.0	22.5	53.0	53.0
Yellow Time (s)	3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	0.5	1.5	1.5	0.5	1.5	1.5	0.5	1.5	1.5	0.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.5	6.0	6.0	3.5	6.0	6.0	3.5	6.0	6.0	3.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		28.0	28.0		28.0	28.0
Pedestrian Calls (#/hr)		100	100		100	100		100	100		100	100
Act Effct Green (s)	14.5	46.0	46.0	8.5	40.0	40.0	11.1	44.0	44.0	22.5	57.5	57.5
Actuated g/C Ratio	0.10	0.33	0.33	0.06	0.29	0.29	0.08	0.31	0.31	0.16	0.41	0.41
v/c Ratio	1.66	1.25	0.27	1.50	0.72	0.47	0.59	1.29	0.42	1.68	0.61	0.66
Control Delay	348.3	159.3	22.4	294.4	50.2	17.9	80.2	175.7	25.9	357.2	35.9	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	348.3	159.3	22.4	294.4	50.2	17.9	80.2	175.7	25.9	357.2	35.9	17.9
LOS	F	F	C	F	D	B	F	F	C	F	D	B
Approach Delay		201.6			103.3			152.0			112.1	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~360	~774	50	~182	281	54	66	~779	86	~568	304	137
Queue Length 95th (ft)	#471	#851	75	#237	229	87	96	#919	122	#691	343	237
Internal Link Dist (ft)		1608			955			1568			924	
Turn Bay Length (ft)	410		150	440		130	150		150	440		440
Base Capacity (vph)	319	1042	467	187	906	482	153	997	470	255	1302	717
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.66	1.25	0.27	1.50	0.72	0.47	0.48	1.29	0.42	1.68	0.61	0.66

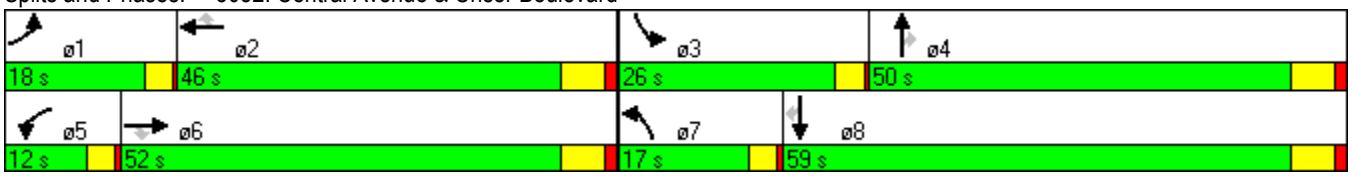
Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.68	

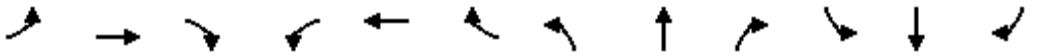
Intersection Signal Delay: 147.8	Intersection LOS: F
Intersection Capacity Utilization 109.6%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

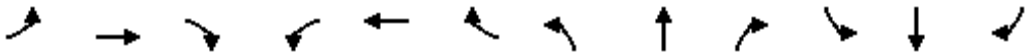
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5052: Central Avenue & Unser Boulevard





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	378	668	223	257	1087	416	244	1035	162	260	1020	570
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Storage Length (ft)	410		150	440		130	150		150	440		440
Storage Lanes	2		1	2		1	1		1	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93	0.97		0.93	0.99		0.93	0.99		0.93
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3077	3172	1419	3077	3172	1419	1586	3172	1419	1586	3172	1419
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3020	3172	1320	2982	3172	1320	1570	3172	1326	1572	3172	1326
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			169			213			82			223
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		1688			1035			1648			1004	
Travel Time (s)		28.8			17.6			28.1			17.1	
Confl. Peds. (#/hr)	40		40	40		40	40		40	40		40
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.80	0.89	0.86	0.91	0.98	0.77	0.72	0.86	0.82	0.84	0.92	0.95
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Adj. Flow (vph)	472	751	259	282	1109	540	339	1203	198	310	1109	600
Shared Lane Traffic (%)												
Lane Group Flow (vph)	472	751	259	282	1109	540	339	1203	198	310	1109	600
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		40			40			28			28	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	5	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			8
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	3.0	20.0	20.0	3.0	20.0	20.0	3.0	8.0	8.0	3.0	8.0	8.0
Minimum Split (s)	8.0	38.0	38.0	8.0	38.0	38.0	8.0	41.0	41.0	8.0	41.0	41.0
Total Split (s)	18.0	48.0	48.0	19.0	49.0	49.0	24.0	50.0	50.0	23.0	49.0	49.0
Total Split (%)	12.9%	34.3%	34.3%	13.6%	35.0%	35.0%	17.1%	35.7%	35.7%	16.4%	35.0%	35.0%
Maximum Green (s)	14.5	42.0	42.0	15.5	43.0	43.0	20.5	44.0	44.0	19.5	43.0	43.0
Yellow Time (s)	3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	0.5	1.5	1.5	0.5	1.5	1.5	0.5	1.5	1.5	0.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.5	6.0	6.0	3.5	6.0	6.0	3.5	6.0	6.0	3.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		25.0	25.0		25.0	25.0		28.0	28.0		28.0	28.0
Pedestrian Calls (#/hr)		100	100		100	100		100	100		100	100
Act Effct Green (s)	14.5	42.4	42.4	15.1	43.0	43.0	20.5	44.0	44.0	19.5	43.0	43.0
Actuated g/C Ratio	0.10	0.30	0.30	0.11	0.31	0.31	0.15	0.31	0.31	0.14	0.31	0.31
v/c Ratio	1.48	0.78	0.50	0.85	1.14	0.98	1.46	1.21	0.42	1.40	1.14	1.07
Control Delay	273.8	51.5	17.5	83.7	118.7	62.0	270.6	144.0	24.7	249.0	118.7	86.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	273.8	51.5	17.5	83.7	118.7	62.0	270.6	144.0	24.7	249.0	118.7	86.4
LOS	F	D	B	F	F	E	F	F	C	F	F	F
Approach Delay		116.4			97.7			155.1			129.1	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	~304	331	63	131	~618	335	~421	~700	81	~377	~618	~454
Queue Length 95th (ft)	#353	404	136	#204	#756	#402	#451	#780	133	#517	#756	#692
Internal Link Dist (ft)		1608			955			1568			924	
Turn Bay Length (ft)	410		150	440		130	150		150	440		440
Base Capacity (vph)	319	960	517	341	974	553	232	997	473	221	974	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.48	0.78	0.50	0.83	1.14	0.98	1.46	1.21	0.42	1.40	1.14	1.07

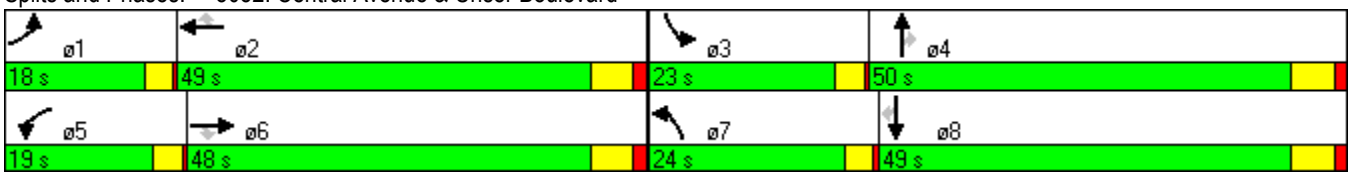
Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.48	

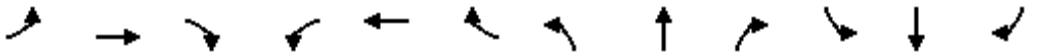
Intersection Signal Delay: 124.3	Intersection LOS: F
Intersection Capacity Utilization 100.9%	ICU Level of Service G
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

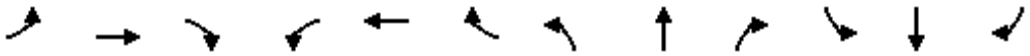
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5052: Central Avenue & Unser Boulevard





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	472	1118	93	225	416	169	54	1205	151	351	656	403
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Storage Length (ft)	410		250	440		440	250		250	440		440
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	80		80	80		80	80		80	80		80
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor	0.98		0.97	0.99		0.97	0.97		0.97	0.99		0.97
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3077	3172	1419	3077	3172	1419	3077	4558	1419	3077	4558	1419
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3004	3172	1382	3054	3172	1382	2977	4558	1382	3039	4558	1382
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			46			219			101			424
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		13065			12762			7869			7678	
Travel Time (s)		222.7			217.5			134.1			130.9	
Confl. Peds. (#/hr)	40		40	40		40	40		40	40		40
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.80	0.89	0.86	0.91	0.98	0.77	0.72	0.86	0.82	0.84	0.92	0.95
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Adj. Flow (vph)	590	1256	108	247	424	219	75	1401	184	418	713	424
Shared Lane Traffic (%)												
Lane Group Flow (vph)	590	1256	108	247	424	219	75	1401	184	418	713	424
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		32			32			32			32	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	5	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

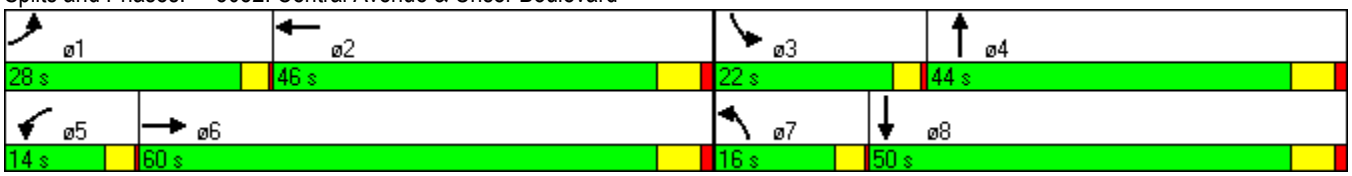


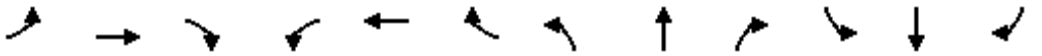
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Free
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			Free			Free			Free			Free
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	3.0	20.0		3.0	20.0		3.0	8.0		3.0	8.0	
Minimum Split (s)	8.0	45.0		8.0	45.0		8.0	38.0		8.0	38.0	
Total Split (s)	28.0	60.0	0.0	14.0	46.0	0.0	16.0	44.0	0.0	22.0	50.0	0.0
Total Split (%)	20.0%	42.9%	0.0%	10.0%	32.9%	0.0%	11.4%	31.4%	0.0%	15.7%	35.7%	0.0%
Maximum Green (s)	24.5	54.0		10.5	40.0		12.5	38.0		18.5	44.0	
Yellow Time (s)	3.0	4.5		3.0	4.5		3.0	4.5		3.0	4.5	
All-Red Time (s)	0.5	1.5		0.5	1.5		0.5	1.5		0.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.5	6.0	4.0	3.5	6.0	4.0	3.5	6.0	4.0	3.5	6.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	2.0		3.0	2.0		3.0	3.0		2.0	2.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		32.0			32.0			25.0			25.0	
Pedestrian Calls (#/hr)		100			100			100			100	
Act Effct Green (s)	24.5	54.0	140.0	10.5	40.0	140.0	8.8	38.0	140.0	18.5	47.7	140.0
Actuated g/C Ratio	0.18	0.39	1.00	0.08	0.29	1.00	0.06	0.27	1.00	0.13	0.34	1.00
v/c Ratio	1.10	1.03	0.08	1.07	0.47	0.16	0.39	1.13	0.13	1.03	0.46	0.31
Control Delay	120.4	74.9	0.1	138.3	43.3	0.2	68.4	116.1	0.2	110.3	37.5	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	120.4	74.9	0.1	138.3	43.3	0.2	68.4	116.1	0.2	110.3	37.5	0.6
LOS	F	E	A	F	D	A	E	F	A	F	D	A
Approach Delay		84.5			59.1			101.1			47.0	
Approach LOS		F			E			F			D	
Queue Length 50th (ft)	~312	~640	0	~128	168	0	34	~541	0	~209	185	0
Queue Length 95th (ft)	#355	#765	0	#218	221	0	48	#591	0	#284	233	0
Internal Link Dist (ft)		12985			12682			7789			7598	
Turn Bay Length (ft)	410		250	440		440	250		250	440		440
Base Capacity (vph)	538	1223	1382	231	906	1382	275	1237	1382	407	1553	1382
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.10	1.03	0.08	1.07	0.47	0.16	0.27	1.13	0.13	1.03	0.46	0.31

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.13			
Intersection Signal Delay: 75.7		Intersection LOS: E	

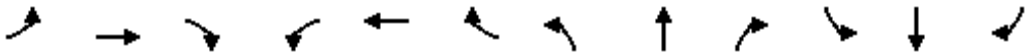
Intersection Capacity Utilization 94.2% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5052: Central Avenue & Unser Boulevard





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	378	668	223	257	1087	416	244	1035	162	260	1020	570
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Storage Length (ft)	410		250	440		440	250		250	440		440
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	80		80	80		80	80		80	80		80
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor	0.99		0.97	0.99		0.97	0.98		0.97	0.98		0.97
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3077	3172	1419	3077	3172	1419	3077	4558	1419	3077	4558	1419
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3051	3172	1382	3034	3172	1382	3024	4558	1382	3030	4558	1382
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			200			476			137			509
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		13065			12762			7869			7678	
Travel Time (s)		222.7			217.5			134.1			130.9	
Confl. Peds. (#/hr)	40		40	40		40	40		40	40		40
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.80	0.89	0.86	0.91	0.98	0.77	0.72	0.86	0.82	0.84	0.92	0.95
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Adj. Flow (vph)	472	751	259	282	1109	540	339	1203	198	310	1109	600
Shared Lane Traffic (%)												
Lane Group Flow (vph)	472	751	259	282	1109	540	339	1203	198	310	1109	600
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		32			32			32			32	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	5	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

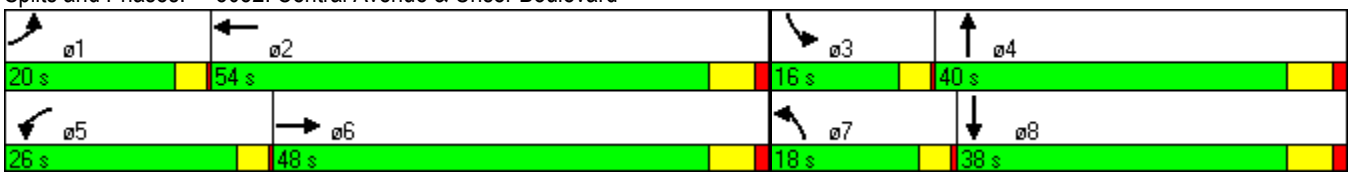


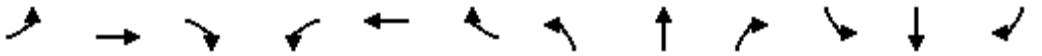
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot		Free	Prot		Free	Prot		Free	Prot		Free
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			Free			Free			Free			Free
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	3.0	20.0		3.0	20.0		3.0	8.0		3.0	8.0	
Minimum Split (s)	8.0	45.0		8.0	45.0		8.0	38.0		8.0	38.0	
Total Split (s)	20.0	48.0	0.0	26.0	54.0	0.0	18.0	40.0	0.0	16.0	38.0	0.0
Total Split (%)	15.4%	36.9%	0.0%	20.0%	41.5%	0.0%	13.8%	30.8%	0.0%	12.3%	29.2%	0.0%
Maximum Green (s)	16.5	42.0		22.5	48.0		14.5	34.0		12.5	32.0	
Yellow Time (s)	3.0	4.5		3.0	4.5		3.0	4.5		3.0	4.5	
All-Red Time (s)	0.5	1.5		0.5	1.5		0.5	1.5		0.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.5	6.0	4.0	3.5	6.0	4.0	3.5	6.0	4.0	3.5	6.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	2.0		3.0	2.0		3.0	3.0		2.0	2.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		32.0			32.0			25.0			25.0	
Pedestrian Calls (#/hr)		100			100			100			100	
Act Effct Green (s)	16.5	46.2	128.8	17.0	46.7	128.8	14.5	34.0	128.8	12.5	32.0	128.8
Actuated g/C Ratio	0.13	0.36	1.00	0.13	0.36	1.00	0.11	0.26	1.00	0.10	0.25	1.00
v/c Ratio	1.19	0.66	0.19	0.69	0.96	0.39	0.98	1.00	0.14	1.04	0.98	0.43
Control Delay	157.7	38.6	0.3	62.5	59.4	0.8	100.3	73.1	0.2	118.0	70.3	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	157.7	38.6	0.3	62.5	59.4	0.8	100.3	73.1	0.2	118.0	70.3	1.0
LOS	F	D	A	E	E	A	F	E	A	F	E	A
Approach Delay		69.8			43.5			70.1			57.0	
Approach LOS		E			D			E			E	
Queue Length 50th (ft)	~250	275	0	118	473	0	149	~379	0	~146	343	0
Queue Length 95th (ft)	#300	361	0	160	#618	0	#169	#446	0	#216	#446	0
Internal Link Dist (ft)		12985			12682			7789			7598	
Turn Bay Length (ft)	410		250	440		440	250		250	440		440
Base Capacity (vph)	395	1139	1382	538	1183	1382	346	1204	1382	299	1133	1382
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.19	0.66	0.19	0.52	0.94	0.39	0.98	1.00	0.14	1.04	0.98	0.43

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 128.8			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.19			
Intersection Signal Delay: 59.2		Intersection LOS: E	

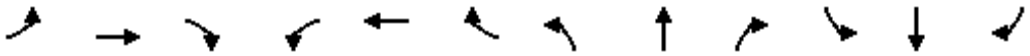
Intersection Capacity Utilization 91.6% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5052: Central Avenue & Unser Boulevard





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	472	1118	93	225	416	169	54	1205	151	351	656	403
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Storage Length (ft)	410		150	440		130	150		150	440		440
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor	0.98		0.94	0.99		0.94	0.99		0.94	0.99		0.94
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3077	4558	1419	3077	4558	1419	3077	4558	1419	3077	4558	1419
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3009	4558	1338	3056	4558	1337	3032	4558	1337	3060	4558	1338
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65			184			92			384
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		1688			1035			1648			1004	
Travel Time (s)		28.8			17.6			28.1			17.1	
Confl. Peds. (#/hr)	40		40	40		40	40		40	40		40
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.80	0.89	0.86	0.91	0.98	0.77	0.72	0.86	0.82	0.84	0.92	0.95
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Adj. Flow (vph)	590	1256	108	247	424	219	75	1401	184	418	713	424
Shared Lane Traffic (%)												
Lane Group Flow (vph)	590	1256	108	247	424	219	75	1401	184	418	713	424
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		40			40			32			32	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	5	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

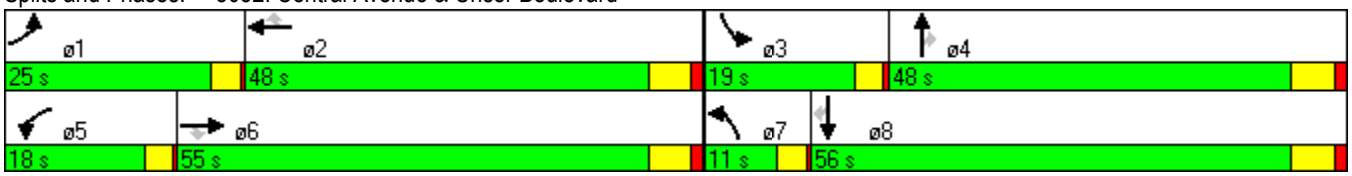


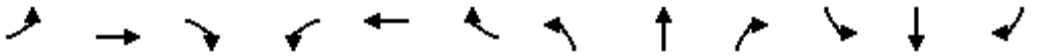
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			8
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	3.0	20.0	20.0	3.0	20.0	20.0	3.0	8.0	8.0	3.0	8.0	8.0
Minimum Split (s)	8.0	48.0	48.0	8.0	48.0	48.0	8.0	48.0	48.0	8.0	48.0	48.0
Total Split (s)	25.0	55.0	55.0	18.0	48.0	48.0	11.0	48.0	48.0	19.0	56.0	56.0
Total Split (%)	17.9%	39.3%	39.3%	12.9%	34.3%	34.3%	7.9%	34.3%	34.3%	13.6%	40.0%	40.0%
Maximum Green (s)	21.5	49.0	49.0	14.5	42.0	42.0	7.5	42.0	42.0	15.5	50.0	50.0
Yellow Time (s)	3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	0.5	1.5	1.5	0.5	1.5	1.5	0.5	1.5	1.5	0.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.5	6.0	6.0	3.5	6.0	6.0	3.5	6.0	6.0	3.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0	2.0
Recall Mode	None	Max	Max	None	Max	Max	None	None	None	None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		35.0	35.0		35.0	35.0		35.0	35.0		35.0	35.0
Pedestrian Calls (#/hr)		100	100		100	100		100	100		100	100
Act Effct Green (s)	21.5	49.4	49.4	14.1	42.0	42.0	7.3	42.0	42.0	15.5	50.2	50.2
Actuated g/C Ratio	0.15	0.35	0.35	0.10	0.30	0.30	0.05	0.30	0.30	0.11	0.36	0.36
v/c Ratio	1.25	0.78	0.21	0.80	0.31	0.41	0.47	1.02	0.39	1.23	0.44	0.58
Control Delay	175.5	44.7	15.0	80.7	38.6	10.6	74.3	78.7	21.7	175.2	35.2	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	175.5	44.7	15.0	80.7	38.6	10.6	74.3	78.7	21.7	175.2	35.2	8.3
LOS	F	D	B	F	D	B	E	E	C	F	D	A
Approach Delay		82.5			43.4			72.2			65.5	
Approach LOS		F			D			E			E	
Queue Length 50th (ft)	~344	375	26	114	109	23	35	~496	64	~241	180	24
Queue Length 95th (ft)	#387	428	66	#175	142	54	49	#546	114	#316	220	121
Internal Link Dist (ft)		1608			955			1568			924	
Turn Bay Length (ft)	410		150	440		130	150		150	440		440
Base Capacity (vph)	473	1609	515	319	1367	530	165	1367	466	341	1636	727
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	0.78	0.21	0.77	0.31	0.41	0.45	1.02	0.39	1.23	0.44	0.58

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Natural Cycle: 145			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.25			
Intersection Signal Delay: 69.6		Intersection LOS: E	

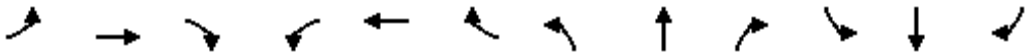
Intersection Capacity Utilization 107.1% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5052: Central Avenue & Unser Boulevard





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	378	668	223	257	1087	416	244	1035	162	260	1020	570
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Storage Length (ft)	410		150	440		130	150		250	440		440
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor	0.99		0.94	0.98		0.94	0.99		0.94	0.99		0.94
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3077	4558	1419	3077	4558	1419	3077	4558	1419	3077	4558	1419
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3049	4558	1333	3031	4558	1333	3049	4558	1333	3052	4558	1333
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			229			214			183			286
Link Speed (mph)		40			40			40			40	
Link Distance (ft)		13065			12762			7869			7678	
Travel Time (s)		222.7			217.5			134.1			130.9	
Confl. Peds. (#/hr)	40		40	40		40	40		40	40		40
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.80	0.89	0.86	0.91	0.98	0.77	0.72	0.86	0.82	0.84	0.92	0.95
Heavy Vehicles (%)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Adj. Flow (vph)	472	751	259	282	1109	540	339	1203	198	310	1109	600
Shared Lane Traffic (%)												
Lane Group Flow (vph)	472	751	259	282	1109	540	339	1203	198	310	1109	600
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		40			40			32			32	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	5	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												



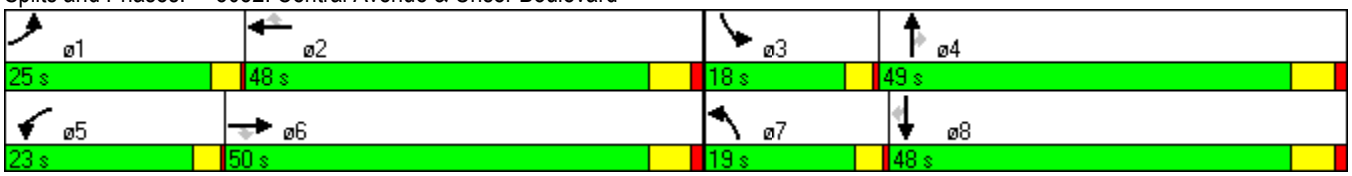
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6			2			4			8
Detector Phase	1	6	6	5	2	2	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	3.0	20.0	20.0	3.0	20.0	20.0	3.0	8.0	8.0	3.0	8.0	8.0
Minimum Split (s)	8.0	48.0	48.0	8.0	48.0	48.0	8.0	48.0	48.0	8.0	48.0	48.0
Total Split (s)	25.0	50.0	50.0	23.0	48.0	48.0	19.0	49.0	49.0	18.0	48.0	48.0
Total Split (%)	17.9%	35.7%	35.7%	16.4%	34.3%	34.3%	13.6%	35.0%	35.0%	12.9%	34.3%	34.3%
Maximum Green (s)	21.5	44.0	44.0	19.5	42.0	42.0	15.5	43.0	43.0	14.5	42.0	42.0
Yellow Time (s)	3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	0.5	1.5	1.5	0.5	1.5	1.5	0.5	1.5	1.5	0.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.5	6.0	6.0	3.5	6.0	6.0	3.5	6.0	6.0	3.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0	2.0	3.0	2.0	2.0	3.0	3.0	3.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		32.0	32.0		32.0	32.0		32.0	32.0		32.0	32.0
Pedestrian Calls (#/hr)		100	100		100	100		100	100		100	100
Act Effct Green (s)	21.5	46.3	46.3	17.2	42.0	42.0	15.5	43.0	43.0	14.5	42.0	42.0
Actuated g/C Ratio	0.15	0.33	0.33	0.12	0.30	0.30	0.11	0.31	0.31	0.10	0.30	0.30
v/c Ratio	1.00	0.50	0.44	0.74	0.81	0.98	0.99	0.86	0.37	0.97	0.81	1.00
Control Delay	99.5	39.3	9.0	71.5	51.0	63.5	108.8	53.0	8.3	105.6	51.0	62.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	99.5	39.3	9.0	71.5	51.0	63.5	108.8	53.0	8.3	105.6	51.0	62.4
LOS	F	D	A	E	D	E	F	D	A	F	D	E
Approach Delay		53.2			57.5			58.8			62.8	
Approach LOS		D			E			E			E	
Queue Length 50th (ft)	224	202	19	128	343	335	161	378	10	147	343	343
Queue Length 95th (ft)	#278	246	79	177	402	#403	#179	413	50	#219	402	#610
Internal Link Dist (ft)		12985			12682			7789			7598	
Turn Bay Length (ft)	410		150	440		130	150		250	440		440
Base Capacity (vph)	473	1506	594	429	1367	550	341	1400	536	319	1367	600
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.00	0.50	0.44	0.66	0.81	0.98	0.99	0.86	0.37	0.97	0.81	1.00

Intersection Summary	
Area Type:	Other
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 135	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.00	

Intersection Signal Delay: 58.4	Intersection LOS: E
Intersection Capacity Utilization 96.6%	ICU Level of Service F
Analysis Period (min) 15	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5052: Central Avenue & Unser Boulevard



Summary of All Intervals

Run Number	22	23	24	25	26	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	2673	2740	2697	2827	2627	2712
Vehs Exited	2680	2714	2679	2846	2617	2707
Starting Vehs	356	334	338	379	309	344
Ending Vehs	349	360	356	360	319	349
Denied Entry Before	59	68	87	54	126	80
Denied Entry After	2769	2602	2627	2486	2688	2634
Travel Distance (mi)	1332	1348	1324	1406	1301	1342
Travel Time (hr)	1718.0	1610.1	1645.9	1597.3	1761.7	1666.6
Total Delay (hr)	1678.0	1569.5	1606.2	1555.0	1722.5	1626.2
Total Stops	7413	7668	7531	7766	7708	7619
Fuel Used (gal)	416.6	394.1	401.7	392.5	425.7	406.1

Interval #0 Information Seeding

Start Time	6:45
End Time	7:00
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	22	23	24	25	26	Avg
Vehs Entered	2673	2740	2697	2827	2627	2712
Vehs Exited	2680	2714	2679	2846	2617	2707
Starting Vehs	356	334	338	379	309	344
Ending Vehs	349	360	356	360	319	349
Denied Entry Before	59	68	87	54	126	80
Denied Entry After	2769	2602	2627	2486	2688	2634
Travel Distance (mi)	1332	1348	1324	1406	1301	1342
Travel Time (hr)	1718.0	1610.1	1645.9	1597.3	1761.7	1666.6
Total Delay (hr)	1678.0	1569.5	1606.2	1555.0	1722.5	1626.2
Total Stops	7413	7668	7531	7766	7708	7619
Fuel Used (gal)	416.6	394.1	401.7	392.5	425.7	406.1

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	227.8	385.1	29.2	117.8	129.3	50.2	9.9	256.3	33.2	116.9	162.4	105.3
Delay / Veh (s)	5032.0	3301.3	3189.5	5299.7	2645.0	2508.9	1116.4	1067.9	1106.1	2227.3	1656.6	1684.3
Total Stops	1375	569	42	270	189	16	115	3013	412	1002	393	191
Travel Dist (mi)	51.2	128.5	10.1	14.8	32.4	13.0	9.6	258.5	32.6	34.2	63.7	39.2
Travel Time (hr)	229.1	387.8	29.5	118.2	130.1	50.5	10.2	263.0	34.2	117.9	164.1	106.5
Avg Speed (mph)	1	9	16	0	7	25	3	3	3	1	9	10
Fuel Used (gal)	51.9	89.0	6.7	26.5	29.8	11.5	2.5	64.5	8.3	27.1	38.0	24.3
HC Emissions (g)	784	1317	131	343	382	134	38	1026	128	368	590	372
CO Emissions (g)	11981	21911	2010	5362	6592	2301	608	16217	2034	5787	9739	5836
NOx Emissions (g)	713	1287	122	279	370	117	48	1340	164	353	627	344
Vehicles Entered	165	409	32	86	173	72	34	873	107	188	349	224
Vehicles Exited	160	432	35	75	178	71	31	856	109	189	357	225
Hourly Exit Rate	160	432	35	75	178	71	31	856	109	189	357	225
Input Volume	472	1118	93	225	416	169	54	1205	151	351	656	403
% of Volume	34	39	38	33	43	42	57	71	72	54	54	56
Denied Entry Before	11	27	3	1	0	1	1	12	1	5	11	7
Denied Entry After	311	720	59	132	254	105	14	333	44	161	298	203

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	All
Total Delay (hr)	1623.5
Delay / Veh (s)	2152.0
Total Stops	7587
Travel Dist (mi)	687.8
Travel Time (hr)	1641.0
Avg Speed (mph)	2
Fuel Used (gal)	380.1
HC Emissions (g)	5612
CO Emissions (g)	90376
NOx Emissions (g)	5764
Vehicles Entered	2712
Vehicles Exited	2718
Hourly Exit Rate	2718
Input Volume	5313
% of Volume	51
Denied Entry Before	80
Denied Entry After	2634

Total Network Performance

Total Delay (hr)	1626.2
Delay / Veh (s)	2161.1
Total Stops	7619
Travel Dist (mi)	1342.2
Travel Time (hr)	1666.6
Avg Speed (mph)	4
Fuel Used (gal)	406.1
HC Emissions (g)	6491
CO Emissions (g)	108104
NOx Emissions (g)	8295
Vehicles Entered	2712
Vehicles Exited	2707
Hourly Exit Rate	2707
Input Volume	10626
% of Volume	25
Denied Entry Before	80
Denied Entry After	2634

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	TR	L	L	T	T	R	L	T	TR
Maximum Queue (ft)	422	435	1686	1671	452	465	1017	1011	124	174	1638	1636
Average Queue (ft)	413	433	1656	1218	430	461	982	474	16	26	1607	1606
95th Queue (ft)	437	438	1675	2175	478	473	1045	1216	87	97	1630	1622
Link Distance (ft)			1637	1637			977	977			1588	1588
Upstream Blk Time (%)			78	6			82	1			61	65
Queuing Penalty (veh)			0	0			0	0			0	0
Storage Bay Dist (ft)	410	410			440	440			130	150		
Storage Blk Time (%)	26	87	3		37	93	6	6	0		66	
Queuing Penalty (veh)	146	489	14		77	193	13	10	0		36	

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	465	1005	997
Average Queue (ft)	464	973	783
95th Queue (ft)	466	992	1286
Link Distance (ft)		950	950
Upstream Blk Time (%)		74	2
Queuing Penalty (veh)		0	0
Storage Bay Dist (ft)	440		
Storage Blk Time (%)	89	2	
Queuing Penalty (veh)	291	7	

Network Summary

Network wide Queuing Penalty: 1276

Intersection: 5052: Central Avenue & Unser Boulevard

Phase	1	2	3	4	5	6	7	8
Movement(s) Served	EBL	WBT	SBL	NBTL	WBL	EBT	NBL	SBTL
Maximum Green (s)	10.5	51.0	11.5	48.0	6.5	55.0	4.5	55.0
Minimum Green (s)	3.0	20.0	3.0	8.0	3.0	20.0	3.0	8.0
Recall	None	C-Max	None	None	None	C-Max	None	None
Avg. Green (s)	10.7	51.0	11.3	48.0	6.7	55.0	4.7	60.2
g/C Ratio	0.08	0.36	0.08	0.34	0.05	0.39	0.01	0.43
Cycles Skipped (%)	0	0	0	0	0	0	65	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0	0
Cycles Maxed Out (%)	100	100	92	100	100	100	17	96
Cycles with Peds (%)	0	96	0	96	0	96	0	96

Controller Summary
Average Cycle Length (s): 140.0
Number of Complete Cycles : 24

SimTraffic Simulation Summary
2030 PM - No Build Alternative

Summary of All Intervals

Run Number	22	23	24	25	26	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	6399	6385	6014	6292	6303	6278
Vehs Exited	4322	4231	3770	4128	4062	4103
Starting Vehs	1220	1240	1260	1287	1282	1259
Ending Vehs	3297	3394	3504	3451	3523	3434
Denied Entry Before	0	0	1	1	0	0
Denied Entry After	3	0	209	0	0	42
Travel Distance (mi)	28214	27139	24715	26691	26478	26647
Travel Time (hr)	2177.3	2228.2	2289.8	2240.9	2295.4	2246.3
Total Delay (hr)	1392.4	1473.8	1602.3	1498.1	1557.6	1504.8
Total Stops	53530	53558	49699	48765	51452	51400
Fuel Used (gal)	1093.7	1082.6	1036.3	1071.2	1079.1	1072.6

Interval #0 Information Seeding

Start Time	6:45
End Time	7:00
Total Time (min)	15

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	22	23	24	25	26	Avg
Vehs Entered	6399	6385	6014	6292	6303	6278
Vehs Exited	4322	4231	3770	4128	4062	4103
Starting Vehs	1220	1240	1260	1287	1282	1259
Ending Vehs	3297	3394	3504	3451	3523	3434
Denied Entry Before	0	0	1	1	0	0
Denied Entry After	3	0	209	0	0	42
Travel Distance (mi)	28214	27139	24715	26691	26478	26647
Travel Time (hr)	2177.3	2228.2	2289.8	2240.9	2295.4	2246.3
Total Delay (hr)	1392.4	1473.8	1602.3	1498.1	1557.6	1504.8
Total Stops	53530	53558	49699	48765	51452	51400
Fuel Used (gal)	1093.7	1082.6	1036.3	1071.2	1079.1	1072.6

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	172.9	123.0	38.9	125.9	219.6	68.5	62.9	238.3	35.4	66.5	201.6	112.9
Delay / Veh (s)	2412.8	815.6	748.7	2714.8	907.7	729.4	1110.7	990.5	936.3	1119.4	852.9	845.2
Total Stops	3081	2967	972	1938	6119	2001	2759	10246	1487	3160	10784	5839
Travel Dist (mi)	1120.7	2062.9	704.4	524.4	2306.2	881.2	493.0	2104.0	327.2	604.1	2361.9	1330.4
Travel Time (hr)	195.9	165.1	53.4	136.7	266.7	86.8	75.5	291.6	43.8	82.0	261.5	147.1
Avg Speed (mph)	6	13	13	4	9	10	7	7	7	7	9	9
Fuel Used (gal)	68.4	82.4	27.2	42.0	110.4	38.5	27.3	109.5	16.7	31.5	109.5	61.4
HC Emissions (g)	1922	2984	812	927	3229	1236	723	2778	405	731	3120	1628
CO Emissions (g)	35663	57747	16209	17187	62373	23933	12206	47354	6909	12651	52942	27756
NOx Emissions (g)	4705	8313	2352	2028	8422	3273	1725	6788	1013	1808	7850	4116
Vehicles Entered	385	675	234	253	1056	402	244	1041	163	260	1002	563
Vehicles Exited	132	412	140	82	687	275	164	691	109	169	701	399
Hourly Exit Rate	132	412	140	82	687	275	164	691	109	169	701	399
Input Volume	378	668	223	257	1087	416	244	1035	162	260	1020	570
% of Volume	35	62	63	32	63	66	67	67	67	65	69	70
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	7	25	10	0	0	0	0	0	0

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	All
Total Delay (hr)	1466.5
Delay / Veh (s)	1031.2
Total Stops	51353
Travel Dist (mi)	14820.5
Travel Time (hr)	1806.0
Avg Speed (mph)	8
Fuel Used (gal)	724.8
HC Emissions (g)	20495
CO Emissions (g)	372929
NOx Emissions (g)	52392
Vehicles Entered	6278
Vehicles Exited	3961
Hourly Exit Rate	3961
Input Volume	6320
% of Volume	63
Denied Entry Before	0
Denied Entry After	42

Total Network Performance

Total Delay (hr)	1504.8
Delay / Veh (s)	1043.8
Total Stops	51400
Travel Dist (mi)	26647.4
Travel Time (hr)	2246.3
Avg Speed (mph)	12
Fuel Used (gal)	1072.6
HC Emissions (g)	30706
CO Emissions (g)	532993
NOx Emissions (g)	78666
Vehicles Entered	6278
Vehicles Exited	4103
Hourly Exit Rate	4103
Input Volume	12640
% of Volume	32
Denied Entry Before	0
Denied Entry After	42

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	TR	L	L	T	T	R	L	T	TR
Maximum Queue (ft)	422	434	11080	10975	452	465	13069	12770	155	175	9109	9030
Average Queue (ft)	414	432	5984	5181	432	459	6555	6306	61	173	5261	5212
95th Queue (ft)	437	438	11006	10555	488	482	13161	12807	179	185	9134	9116
Link Distance (ft)			18970	18970			14466	14466			12358	12358
Upstream Blk Time (%)							3	3				
Queuing Penalty (veh)							0	0				
Storage Bay Dist (ft)	410	410			440	440			130	150		
Storage Blk Time (%)	29	89	5		19	87	12	32	0	75	27	
Queuing Penalty (veh)	98	298	19		106	471	32	131	3	390	65	

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	SB	SB	SB
Directions Served	L	T	TR
Maximum Queue (ft)	465	11238	11067
Average Queue (ft)	449	6343	6310
95th Queue (ft)	535	11124	11058
Link Distance (ft)		14351	14351
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	440		
Storage Blk Time (%)	67	20	
Queuing Penalty (veh)	344	51	

Network Summary

Network wide Queuing Penalty: 2006

Intersection: 5052: Central Avenue & Unser Boulevard

Phase	1	2	3	4	5	6	7	8
Movement(s) Served	EBL	WBT	SBL	NBTL	WBL	EBT	NBL	SBTL
Maximum Green (s)	9.5	52.0	8.5	51.0	6.5	55.0	8.5	51.0
Minimum Green (s)	3.0	20.0	3.0	8.0	3.0	20.0	3.0	8.0
Recall	None	C-Max	None	None	None	C-Max	None	None
Avg. Green (s)	9.5	52.0	8.5	51.0	6.5	55.0	8.5	51.0
g/C Ratio	0.07	0.37	0.06	0.36	0.05	0.39	0.06	0.36
Cycles Skipped (%)	0	0	0	0	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0	0
Cycles Maxed Out (%)	100	100	100	100	100	100	96	100
Cycles with Peds (%)	0	96	0	96	0	96	0	96

Controller Summary
Average Cycle Length (s): 140.0
Number of Complete Cycles : 24

Summary of All Intervals

Run Number	22	23	24	25	26	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	5312	5297	5319	5217	5122	5253
Vehs Exited	4331	4280	4480	4487	4438	4403
Starting Vehs	854	905	876	940	944	903
Ending Vehs	1835	1922	1715	1670	1628	1753
Denied Entry Before	0	0	2	0	0	0
Denied Entry After	1	1	0	0	3	1
Travel Distance (mi)	21620	21241	21886	21795	21414	21591
Travel Time (hr)	1356.5	1324.6	1240.5	1274.5	1270.0	1293.2
Total Delay (hr)	729.9	705.7	605.9	640.5	645.7	665.5
Total Stops	27675	24582	22335	22941	23326	24171
Fuel Used (gal)	769.0	752.8	750.0	752.9	742.3	753.4

Interval #0 Information Seeding

Start Time	6:45
End Time	7:00
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	22	23	24	25	26	Avg
Vehs Entered	5312	5297	5319	5217	5122	5253
Vehs Exited	4331	4280	4480	4487	4438	4403
Starting Vehs	854	905	876	940	944	903
Ending Vehs	1835	1922	1715	1670	1628	1753
Denied Entry Before	0	0	2	0	0	0
Denied Entry After	1	1	0	0	3	1
Travel Distance (mi)	21620	21241	21886	21795	21414	21591
Travel Time (hr)	1356.5	1324.6	1240.5	1274.5	1270.0	1293.2
Total Delay (hr)	729.9	705.7	605.9	640.5	645.7	665.5
Total Stops	27675	24582	22335	22941	23326	24171
Fuel Used (gal)	769.0	752.8	750.0	752.9	742.3	753.4

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	91.1	125.3	8.7	10.1	5.6	0.8	10.2	224.2	27.7	73.0	43.3	14.2
Delay / Veh (s)	822.1	439.6	362.8	173.5	49.2	16.8	767.2	769.5	779.5	865.0	254.6	139.3
Total Stops	3297	5253	375	312	299	69	389	8138	1010	2471	1850	601
Travel Dist (mi)	1986.7	4804.9	394.9	387.6	725.3	305.9	72.1	1594.8	192.4	444.1	864.4	514.5
Travel Time (hr)	141.7	246.9	18.7	20.1	24.0	8.7	12.1	264.6	32.7	84.5	65.2	27.6
Avg Speed (mph)	14	19	21	19	30	35	6	6	6	5	13	19
Fuel Used (gal)	74.8	158.9	12.7	12.4	20.1	8.1	4.3	92.4	11.2	28.5	33.8	17.3
HC Emissions (g)	2031	5055	347	340	690	346	113	2235	285	663	965	581
CO Emissions (g)	34528	85549	5930	6172	12094	5937	1937	38163	4813	11738	18310	10892
NOx Emissions (g)	5725	14679	1035	1045	2165	1073	255	5178	646	1517	2674	1654
Vehicles Entered	469	1113	90	214	405	169	54	1195	147	351	656	390
Vehicles Exited	331	940	82	206	409	172	41	904	109	257	568	346
Hourly Exit Rate	331	940	82	206	409	172	41	904	109	257	568	346
Input Volume	472	1118	93	225	416	169	54	1205	151	351	656	403
% of Volume	70	84	88	92	98	102	76	75	72	73	87	86
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	1	0	0	0	0	0	0	0	0	0	0

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	All
Total Delay (hr)	634.3
Delay / Veh (s)	474.8
Total Stops	24064
Travel Dist (mi)	12287.6
Travel Time (hr)	946.6
Avg Speed (mph)	13
Fuel Used (gal)	474.5
HC Emissions (g)	13650
CO Emissions (g)	236062
NOx Emissions (g)	37645
Vehicles Entered	5253
Vehicles Exited	4365
Hourly Exit Rate	4365
Input Volume	5313
% of Volume	82
Denied Entry Before	0
Denied Entry After	1

Total Network Performance

Total Delay (hr)	665.5
Delay / Veh (s)	496.3
Total Stops	24171
Travel Dist (mi)	21591.3
Travel Time (hr)	1293.2
Avg Speed (mph)	17
Fuel Used (gal)	753.4
HC Emissions (g)	21814
CO Emissions (g)	366017
NOx Emissions (g)	59078
Vehicles Entered	5253
Vehicles Exited	4403
Hourly Exit Rate	4403
Input Volume	10626
% of Volume	41
Denied Entry Before	0
Denied Entry After	1

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	T
Maximum Queue (ft)	422	434	7184	6656	175	295	295	310	332	155	172	7086
Average Queue (ft)	397	425	3906	3421	40	172	181	153	173	57	53	4318
95th Queue (ft)	464	465	7592	6784	158	330	341	247	294	167	136	7166
Link Distance (ft)			23428	23428				9483	9483			8044
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	410	410			150	440	440			130	150	
Storage Blk Time (%)	13	50	20	56	0	0	0		16	0	1	67
Queuing Penalty (veh)	73	282	93	52	0	1	1		27	1	7	36

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	L	T	T	R
Maximum Queue (ft)	7098	173	465	5806	5436	156
Average Queue (ft)	4318	46	462	3105	2574	30
95th Queue (ft)	7156	172	475	5786	5245	103
Link Distance (ft)	8044			7449	7449	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		150	440			440
Storage Blk Time (%)	66	0	80	0		
Queuing Penalty (veh)	100	1	263	0		

Network Summary

Network wide Queuing Penalty: 936

Intersection: 5052: Central Avenue & Unser Boulevard

Phase	1	2	3	4	5	6	7	8
Movement(s) Served	EBL	WBT	SBL	NBT	WBL	EBT	NBL	SBT
Maximum Green (s)	14.5	40.0	22.5	44.0	8.5	46.0	13.5	53.0
Minimum Green (s)	3.0	20.0	3.0	8.0	3.0	20.0	3.0	8.0
Recall	None	C-Max	None	None	None	C-Max	None	None
Avg. Green (s)	15.4	40.0	21.6	44.0	9.2	46.2	8.7	60.0
g/C Ratio	0.11	0.29	0.15	0.31	0.07	0.33	0.05	0.43
Cycles Skipped (%)	0	0	0	0	0	0	24	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0	0
Cycles Maxed Out (%)	100	100	88	100	92	100	8	92
Cycles with Peds (%)	0	96	0	96	0	96	0	96

Controller Summary
Average Cycle Length (s): 140.0
Number of Complete Cycles : 24

SimTraffic Simulation Summary
2030 PM Alternative A - 4 Lanes Intersection

Summary of All Intervals

Run Number	22	23	24	25	26	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	6265	6134	6332	6236	6072	6205
Vehs Exited	5161	5138	5337	5185	4970	5159
Starting Vehs	1056	1067	1003	1140	1151	1082
Ending Vehs	2160	2063	1998	2191	2253	2133
Denied Entry Before	1	2	0	0	0	0
Denied Entry After	186	0	2	44	95	66
Travel Distance (mi)	25582	25284	26158	25429	24770	25445
Travel Time (hr)	1706.0	1538.5	1460.6	1644.0	1673.0	1604.4
Total Delay (hr)	947.9	787.4	685.4	889.4	936.7	849.4
Total Stops	35887	33377	27855	39264	34321	34142
Fuel Used (gal)	931.9	887.8	885.9	914.3	905.8	905.1

Interval #0 Information Seeding

Start Time	6:45
End Time	7:00
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	22	23	24	25	26	Avg
Vehs Entered	6265	6134	6332	6236	6072	6205
Vehs Exited	5161	5138	5337	5185	4970	5159
Starting Vehs	1056	1067	1003	1140	1151	1082
Ending Vehs	2160	2063	1998	2191	2253	2133
Denied Entry Before	1	2	0	0	0	0
Denied Entry After	186	0	2	44	95	66
Travel Distance (mi)	25582	25284	26158	25429	24770	25445
Travel Time (hr)	1706.0	1538.5	1460.6	1644.0	1673.0	1604.4
Total Delay (hr)	947.9	787.4	685.4	889.4	936.7	849.4
Total Stops	35887	33377	27855	39264	34321	34142
Fuel Used (gal)	931.9	887.8	885.9	914.3	905.8	905.1

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	86.3	46.0	9.8	15.4	73.8	29.8	58.2	208.6	30.2	63.8	125.8	50.6
Delay / Veh (s)	986.6	271.3	161.3	241.4	262.7	265.5	974.9	855.2	824.4	1083.4	493.9	342.8
Total Stops	2566	1666	368	774	3248	1318	2315	8372	1195	2666	6703	2799
Travel Dist (mi)	1636.5	2827.1	1003.7	430.5	1855.4	741.1	323.0	1310.8	197.1	307.2	1266.9	735.1
Travel Time (hr)	127.8	117.3	35.4	26.6	120.8	48.9	66.6	241.9	35.3	71.7	158.0	69.7
Avg Speed (mph)	13	24	28	16	15	15	5	5	6	4	8	11
Fuel Used (gal)	63.0	86.1	29.2	15.5	66.9	26.5	21.9	82.1	12.0	23.0	63.8	31.8
HC Emissions (g)	1624	2694	1008	501	1976	832	442	1985	321	502	1747	910
CO Emissions (g)	27620	46132	17024	9351	35360	14666	7751	33883	5374	8724	30966	16346
NOx Emissions (g)	4614	8254	3103	1413	5538	2291	996	4412	714	1072	4271	2297
Vehicles Entered	383	651	230	245	1050	420	252	1018	155	248	991	562
Vehicles Exited	247	569	208	216	972	388	179	738	109	176	843	500
Hourly Exit Rate	247	569	208	216	972	388	179	738	109	176	843	500
Input Volume	378	668	223	257	1087	416	244	1035	162	260	1020	570
% of Volume	65	85	93	84	89	93	73	71	67	68	83	88
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	1	7	1	6	33	18

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	All
Total Delay (hr)	798.3
Delay / Veh (s)	506.2
Total Stops	33990
Travel Dist (mi)	12634.2
Travel Time (hr)	1120.0
Avg Speed (mph)	11
Fuel Used (gal)	521.8
HC Emissions (g)	14543
CO Emissions (g)	253196
NOx Emissions (g)	38976
Vehicles Entered	6205
Vehicles Exited	5145
Hourly Exit Rate	5145
Input Volume	6320
% of Volume	81
Denied Entry Before	0
Denied Entry After	66

Total Network Performance

Total Delay (hr)	849.4
Delay / Veh (s)	537.9
Total Stops	34142
Travel Dist (mi)	25444.7
Travel Time (hr)	1604.4
Avg Speed (mph)	16
Fuel Used (gal)	905.1
HC Emissions (g)	25801
CO Emissions (g)	431731
NOx Emissions (g)	67919
Vehicles Entered	6205
Vehicles Exited	5159
Hourly Exit Rate	5159
Input Volume	12640
% of Volume	41
Denied Entry Before	0
Denied Entry After	66

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	T
Maximum Queue (ft)	422	435	5582	4910	175	221	464	3751	3720	155	174	7843
Average Queue (ft)	398	419	2777	2127	72	112	208	2247	2282	101	171	4767
95th Queue (ft)	479	494	5712	4764	198	191	466	3916	3916	219	192	8107
Link Distance (ft)			23428	23428				9483	9483			8044
Upstream Blk Time (%)												3
Queuing Penalty (veh)												0
Storage Bay Dist (ft)	410	410			150	440	440			130	150	
Storage Blk Time (%)	25	69	1	17	0		0	44	51	2	66	32
Queuing Penalty (veh)	84	231	4	37	2		0	112	214	10	344	77

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	NB	NB	SB	SB	SB	SB
Directions Served	T	R	L	T	T	R
Maximum Queue (ft)	7643	175	465	6990	6838	465
Average Queue (ft)	4726	65	460	4323	4222	249
95th Queue (ft)	8008	203	494	7501	7365	537
Link Distance (ft)	8044			7449	7449	
Upstream Blk Time (%)	1			9	4	
Queuing Penalty (veh)	0			0	0	
Storage Bay Dist (ft)		150	440			440
Storage Blk Time (%)	54	0	78	8	11	1
Queuing Penalty (veh)	87	1	396	20	61	4

Network Summary

Network wide Queuing Penalty: 1682

Intersection: 5052: Central Avenue & Unser Boulevard

Phase	1	2	3	4	5	6	7	8
Movement(s) Served	EBL	WBT	SBL	NBT	WBL	EBT	NBL	SBT
Maximum Green (s)	10.5	53.0	14.5	43.0	17.5	46.0	15.5	42.0
Minimum Green (s)	3.0	20.0	3.0	8.0	3.0	20.0	3.0	8.0
Recall	None	C-Max	None	None	None	C-Max	None	None
Avg. Green (s)	10.5	53.0	14.3	43.2	15.3	48.3	15.3	42.1
g/C Ratio	0.08	0.38	0.10	0.31	0.09	0.34	0.11	0.30
Cycles Skipped (%)	0	0	0	0	14	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0	0
Cycles Maxed Out (%)	100	100	92	100	31	100	96	96
Cycles with Peds (%)	0	96	0	96	0	96	0	96

Controller Summary

Average Cycle Length (s): 140.0
Number of Complete Cycles : 24

Summary of All Intervals

Run Number	22	23	24	25	26	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	5299	5178	5277	5235	5205	5239
Vehs Exited	5307	5133	5250	5212	5256	5232
Starting Vehs	718	683	702	699	788	718
Ending Vehs	710	728	729	722	737	723
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	2	0
Travel Distance (mi)	20455	19863	20261	20099	20051	20146
Travel Time (hr)	742.9	716.2	723.8	722.4	730.9	727.2
Total Delay (hr)	136.0	127.1	124.8	126.1	135.4	129.9
Total Stops	4649	4471	4475	4481	4644	4546
Fuel Used (gal)	603.7	586.6	599.5	593.3	592.9	595.2

Interval #0 Information Seeding

Start Time	6:45
End Time	7:00
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	22	23	24	25	26	Avg
Vehs Entered	5299	5178	5277	5235	5205	5239
Vehs Exited	5307	5133	5250	5212	5256	5232
Starting Vehs	718	683	702	699	788	718
Ending Vehs	710	728	729	722	737	723
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	2	0
Travel Distance (mi)	20455	19863	20261	20099	20051	20146
Travel Time (hr)	742.9	716.2	723.8	722.4	730.9	727.2
Total Delay (hr)	136.0	127.1	124.8	126.1	135.4	129.9
Total Stops	4649	4471	4475	4481	4644	4546
Fuel Used (gal)	603.7	586.6	599.5	593.3	592.9	595.2

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	11.7	24.5	1.1	7.0	6.0	0.7	1.0	24.6	1.2	9.7	6.9	1.4
Delay / Veh (s)	93.1	80.3	42.6	114.7	53.4	14.4	75.2	74.7	27.4	100.1	38.7	11.9
Total Stops	504	1032	44	264	300	19	54	1197	81	413	413	39
Travel Dist (mi)	1121.5	2708.7	224.9	529.0	963.4	396.8	70.5	1763.7	229.3	501.7	933.4	594.5
Travel Time (hr)	40.5	93.1	6.9	20.5	30.4	10.8	2.8	69.2	7.1	22.6	30.5	16.7
Avg Speed (mph)	28	29	33	26	32	37	25	26	32	22	31	36
Fuel Used (gal)	33.3	79.0	6.3	15.5	26.6	10.4	2.1	51.9	6.4	15.6	26.4	15.7
HC Emissions (g)	1062	2711	248	539	939	327	50	1729	239	524	993	558
CO Emissions (g)	19533	47835	4433	9508	16223	5784	1018	31219	4312	9780	18351	10329
NOx Emissions (g)	3264	8268	750	1660	2945	1049	165	5299	735	1579	3043	1740
Vehicles Entered	457	1100	91	221	399	166	47	1194	156	348	646	414
Vehicles Exited	451	1101	93	218	406	166	48	1180	155	346	647	414
Hourly Exit Rate	451	1101	93	218	406	166	48	1180	155	346	647	414
Input Volume	472	1118	93	225	416	169	54	1205	151	351	656	403
% of Volume	96	98	100	97	98	98	89	98	103	99	99	103
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	All
Total Delay (hr)	95.7
Delay / Veh (s)	65.9
Total Stops	4360
Travel Dist (mi)	10037.3
Travel Time (hr)	351.2
Avg Speed (mph)	29
Fuel Used (gal)	289.1
HC Emissions (g)	9921
CO Emissions (g)	178324
NOx Emissions (g)	30498
Vehicles Entered	5239
Vehicles Exited	5225
Hourly Exit Rate	5225
Input Volume	5313
% of Volume	98
Denied Entry Before	0
Denied Entry After	0

Total Network Performance

Total Delay (hr)	129.9
Delay / Veh (s)	89.3
Total Stops	4546
Travel Dist (mi)	20145.9
Travel Time (hr)	727.2
Avg Speed (mph)	28
Fuel Used (gal)	595.2
HC Emissions (g)	18993
CO Emissions (g)	325226
NOx Emissions (g)	54864
Vehicles Entered	5239
Vehicles Exited	5232
Hourly Exit Rate	5232
Input Volume	10626
% of Volume	49
Denied Entry Before	0
Denied Entry After	0

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	354	489	996	948	330	242	243	282	291	141	72	233
Average Queue (ft)	213	273	517	547	81	133	146	145	155	24	24	43
95th Queue (ft)	323	472	839	839	311	247	263	237	252	92	62	146
Link Distance (ft)			12997	12997				12694	12694			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	410	410			250	440	440			440	250	250
Storage Blk Time (%)	0	0	12	37								
Queuing Penalty (veh)	0	2	57	34								

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	NB	NB	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	T	T	R	L	L	T	T	T	R
Maximum Queue (ft)	614	653	682	330	340	364	304	256	267	159
Average Queue (ft)	356	400	435	109	200	205	123	135	158	46
95th Queue (ft)	544	606	648	334	353	361	241	214	231	133
Link Distance (ft)	7813	7813	7813				7623	7623	7623	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				250	440	440				440
Storage Blk Time (%)	26		36		0	1				
Queuing Penalty (veh)	14		54		0	2				

Network Summary

Network wide Queuing Penalty: 162

Intersection: 5052: Central Avenue & Unser Boulevard

Phase	1	2	3	4	5	6	7	8
Movement(s) Served	EBL	WBT	SBL	NBT	WBL	EBT	NBL	SBT
Maximum Green (s)	24.5	40.0	18.5	38.0	10.5	54.0	12.5	44.0
Minimum Green (s)	3.0	20.0	3.0	8.0	3.0	20.0	3.0	8.0
Recall	None	None	None	None	None	None	None	None
Avg. Green (s)	23.9	42.0	17.9	38.9	10.6	55.1	7.6	51.5
g/C Ratio	0.17	0.29	0.12	0.27	0.07	0.38	0.04	0.36
Cycles Skipped (%)	0	0	0	0	0	0	16	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0	0
Cycles Maxed Out (%)	72	88	77	100	100	84	0	96
Cycles with Peds (%)	0	96	0	100	0	100	0	96

Controller Summary
Average Cycle Length (s): 143.8
Number of Complete Cycles : 24

Summary of All Intervals

Run Number	22	23	24	25	26	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	6425	6206	6306	6234	6181	6271
Vehs Exited	6451	6178	6252	6260	6152	6258
Starting Vehs	856	818	826	855	920	854
Ending Vehs	830	846	880	829	949	869
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	2	0	2	0	0
Travel Distance (mi)	24923	23850	24216	23939	23862	24158
Travel Time (hr)	907.2	858.7	873.1	858.1	922.5	883.9
Total Delay (hr)	168.2	150.5	155.0	148.0	213.6	167.1
Total Stops	5974	5247	5421	5115	8560	6064
Fuel Used (gal)	740.7	709.6	720.1	709.2	722.4	720.4

Interval #0 Information Seeding

Start Time	6:45
End Time	7:00
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	22	23	24	25	26	Avg
Vehs Entered	6425	6206	6306	6234	6181	6271
Vehs Exited	6451	6178	6252	6260	6152	6258
Starting Vehs	856	818	826	855	920	854
Ending Vehs	830	846	880	829	949	869
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	2	0	2	0	0
Travel Distance (mi)	24923	23850	24216	23939	23862	24158
Travel Time (hr)	907.2	858.7	873.1	858.1	922.5	883.9
Total Delay (hr)	168.2	150.5	155.0	148.0	213.6	167.1
Total Stops	5974	5247	5421	5115	8560	6064
Fuel Used (gal)	740.7	709.6	720.1	709.2	722.4	720.4

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	10.2	9.1	1.4	7.1	35.5	7.7	4.8	16.7	0.7	5.8	18.1	6.1
Delay / Veh (s)	98.0	49.2	22.4	96.5	120.3	67.3	72.3	59.0	15.4	82.2	65.1	38.0
Total Stops	426	425	27	351	1521	360	246	891	25	274	928	360
Travel Dist (mi)	917.4	1622.4	559.6	638.8	2561.6	983.1	357.2	1511.6	226.8	365.2	1463.9	835.4
Travel Time (hr)	33.6	50.1	15.8	23.5	100.4	32.9	14.1	54.9	6.5	15.2	55.2	27.8
Avg Speed (mph)	27	32	36	27	26	30	25	28	35	24	27	30
Fuel Used (gal)	26.9	45.3	15.1	19.3	77.7	28.6	10.5	43.6	6.1	11.2	43.8	23.8
HC Emissions (g)	770	1618	461	597	2580	954	407	1516	207	425	1517	824
CO Emissions (g)	14156	28498	8145	11342	45663	17172	7458	27440	3845	8185	28595	15400
NOx Emissions (g)	2431	5017	1473	1815	7754	2888	1223	4652	648	1261	4580	2496
Vehicles Entered	374	661	227	268	1064	408	242	1026	155	251	1012	583
Vehicles Exited	375	664	229	260	1060	410	241	1009	154	254	990	574
Hourly Exit Rate	375	664	229	260	1060	410	241	1009	154	254	990	574
Input Volume	378	668	223	257	1087	416	244	1035	162	260	1020	570
% of Volume	99	99	103	101	98	99	99	97	95	98	97	101
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	All
Total Delay (hr)	123.0
Delay / Veh (s)	70.9
Total Stops	5834
Travel Dist (mi)	12043.0
Travel Time (hr)	429.9
Avg Speed (mph)	28
Fuel Used (gal)	351.9
HC Emissions (g)	11876
CO Emissions (g)	215898
NOx Emissions (g)	36237
Vehicles Entered	6271
Vehicles Exited	6220
Hourly Exit Rate	6220
Input Volume	6320
% of Volume	98
Denied Entry Before	0
Denied Entry After	0

Total Network Performance

Total Delay (hr)	167.1
Delay / Veh (s)	96.0
Total Stops	6064
Travel Dist (mi)	24157.9
Travel Time (hr)	883.9
Avg Speed (mph)	27
Fuel Used (gal)	720.4
HC Emissions (g)	22975
CO Emissions (g)	395811
NOx Emissions (g)	65881
Vehicles Entered	6271
Vehicles Exited	6258
Hourly Exit Rate	6258
Input Volume	12640
% of Volume	50
Denied Entry Before	0
Denied Entry After	0

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	R	L	L
Maximum Queue (ft)	318	327	323	369	328	214	519	1212	1277	520	216	280
Average Queue (ft)	189	202	191	209	43	109	198	788	831	278	122	117
95th Queue (ft)	292	298	299	317	169	188	468	1867	1921	615	193	227
Link Distance (ft)			12997	12997				12694	12694			
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	410	410			250	440	440			440	250	250
Storage Blk Time (%)			0	3				18	21	0	0	0
Queuing Penalty (veh)			0	7				47	88	1	0	0

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	NB	NB	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	T	T	R	L	L	T	T	T	R
Maximum Queue (ft)	399	442	496	330	225	224	487	537	631	518
Average Queue (ft)	246	279	311	62	127	133	258	294	339	298
95th Queue (ft)	351	396	438	257	206	206	396	455	551	501
Link Distance (ft)	7813	7813	7813				7623	7623	7623	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				250	440	440				440
Storage Blk Time (%)	6		17				0		1	3
Queuing Penalty (veh)	15		28				0		5	11

Network Summary

Network wide Queuing Penalty: 203

Intersection: 5052: Central Avenue & Unser Boulevard

Phase	1	2	3	4	5	6	7	8
Movement(s) Served	EBL	WBT	SBL	NBT	WBL	EBT	NBL	SBT
Maximum Green (s)	16.5	48.0	12.5	34.0	22.5	42.0	14.5	32.0
Minimum Green (s)	3.0	20.0	3.0	8.0	3.0	20.0	3.0	8.0
Recall	None	None	None	None	None	None	None	None
Avg. Green (s)	16.3	47.9	12.5	34.3	16.4	47.8	14.0	32.7
g/C Ratio	0.13	0.37	0.10	0.26	0.13	0.37	0.11	0.25
Cycles Skipped (%)	0	0	0	0	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0	0
Cycles Maxed Out (%)	89	93	85	100	14	96	74	100
Cycles with Peds (%)	0	96	0	96	0	96	0	96

Controller Summary
Average Cycle Length (s): 129.7
Number of Complete Cycles : 27

Summary of All Intervals

Run Number	22	23	24	25	26	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	5333	5247	5283	5377	5189	5287
Vehs Exited	5310	5200	5244	5309	5215	5255
Starting Vehs	170	129	157	128	189	156
Ending Vehs	193	176	196	196	163	185
Denied Entry Before	30	4	15	37	11	19
Denied Entry After	6	3	27	4	13	11
Travel Distance (mi)	2639	2597	2612	2657	2593	2619
Travel Time (hr)	211.1	167.8	179.1	200.9	179.4	187.7
Total Delay (hr)	129.1	87.2	98.3	118.7	98.8	106.4
Total Stops	5319	4269	4283	5269	4585	4744
Fuel Used (gal)	117.6	105.9	109.1	114.8	108.9	111.2

Interval #0 Information Seeding

Start Time	6:45
End Time	7:00
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	22	23	24	25	26	Avg
Vehs Entered	5333	5247	5283	5377	5189	5287
Vehs Exited	5310	5200	5244	5309	5215	5255
Starting Vehs	170	129	157	128	189	156
Ending Vehs	193	176	196	196	163	185
Denied Entry Before	30	4	15	37	11	19
Denied Entry After	6	3	27	4	13	11
Travel Distance (mi)	2639	2597	2612	2657	2593	2619
Travel Time (hr)	211.1	167.8	179.1	200.9	179.4	187.7
Total Delay (hr)	129.1	87.2	98.3	118.7	98.8	106.4
Total Stops	5319	4269	4283	5269	4585	4744
Fuel Used (gal)	117.6	105.9	109.1	114.8	108.9	111.2

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	16.1	13.5	0.6	4.5	4.7	0.6	1.7	30.3	2.6	13.2	9.6	3.4
Delay / Veh (s)	125.8	43.7	21.1	72.7	40.9	12.6	124.6	90.7	60.7	144.2	52.5	29.4
Total Stops	658	800	42	213	290	39	85	1455	151	446	394	20
Travel Dist (mi)	143.5	341.9	29.6	40.9	75.7	29.5	14.3	358.6	45.5	58.3	116.1	70.1
Travel Time (hr)	20.1	22.3	1.4	5.7	6.8	1.5	2.1	39.6	3.9	14.9	12.7	5.5
Avg Speed (mph)	7	16	24	8	12	25	7	9	12	5	13	27
Fuel Used (gal)	7.3	12.5	0.9	2.2	3.5	1.0	0.8	16.9	1.8	4.8	5.9	2.7
HC Emissions (g)	171	390	26	58	115	35	11	463	61	105	170	80
CO Emissions (g)	3287	8725	640	1399	2937	985	277	9880	1282	2359	4438	2170
NOx Emissions (g)	412	1056	71	135	285	90	30	1149	146	215	418	196
Vehicles Entered	469	1110	98	224	412	167	48	1204	157	329	657	412
Vehicles Exited	455	1113	98	219	418	166	49	1200	156	329	658	412
Hourly Exit Rate	455	1113	98	219	418	166	49	1200	156	329	658	412
Input Volume	472	1118	93	225	416	169	54	1205	151	351	656	403
% of Volume	96	100	105	97	100	98	91	100	103	94	100	102
Denied Entry Before	1	3	0	0	0	0	0	0	0	4	7	4
Denied Entry After	1	1	0	0	0	0	0	0	0	2	3	4

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	All
Total Delay (hr)	100.7
Delay / Veh (s)	68.7
Total Stops	4593
Travel Dist (mi)	1324.1
Travel Time (hr)	136.5
Avg Speed (mph)	11
Fuel Used (gal)	60.5
HC Emissions (g)	1683
CO Emissions (g)	38378
NOx Emissions (g)	4202
Vehicles Entered	5287
Vehicles Exited	5273
Hourly Exit Rate	5273
Input Volume	5313
% of Volume	99
Denied Entry Before	19
Denied Entry After	11

Total Network Performance

Total Delay (hr)	106.4
Delay / Veh (s)	72.7
Total Stops	4744
Travel Dist (mi)	2619.5
Travel Time (hr)	187.7
Avg Speed (mph)	15
Fuel Used (gal)	111.2
HC Emissions (g)	3317
CO Emissions (g)	71603
NOx Emissions (g)	8923
Vehicles Entered	5287
Vehicles Exited	5255
Hourly Exit Rate	5255
Input Volume	10626
% of Volume	49
Denied Entry Before	19
Denied Entry After	11

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	WB
Directions Served	L	L	T	T	T	R	L	L	T	T	T	R
Maximum Queue (ft)	409	422	732	574	502	175	205	216	169	355	412	155
Average Queue (ft)	286	297	311	282	304	44	100	111	80	105	126	50
95th Queue (ft)	434	446	708	459	440	167	170	174	143	238	273	150
Link Distance (ft)			1624	1624	1624				964	964	964	
Upstream Blk Time (%)										0	0	
Queuing Penalty (veh)										0	0	
Storage Bay Dist (ft)	410	410				150	440	440				130
Storage Blk Time (%)	2	7	0		32	0					8	0
Queuing Penalty (veh)	8	25	0		30	0					14	1

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	NB	NB	NB	NB	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	L	L	T	T	T	R	L	L	T	T	T	R
Maximum Queue (ft)	68	174	689	742	775	175	322	360	284	376	388	104
Average Queue (ft)	14	47	472	515	554	59	209	225	115	131	152	25
95th Queue (ft)	45	125	744	782	818	194	358	375	234	266	283	81
Link Distance (ft)			1571	1571	1571				932	932	932	
Upstream Blk Time (%)										0	0	
Queuing Penalty (veh)										0	0	
Storage Bay Dist (ft)	150	150				150	440	440				440
Storage Blk Time (%)		0	53		58	0	1	1				
Queuing Penalty (veh)		0	29		88	1	2	2				

Network Summary

Network wide Queuing Penalty: 198

Intersection: 5052: Central Avenue & Unser Boulevard

Phase	1	2	3	4	5	6	7	8
Movement(s) Served	EBL	WBT	SBL	NBT	WBL	EBT	NBL	SBT
Maximum Green (s)	21.5	42.0	15.5	42.0	14.5	49.0	7.5	50.0
Minimum Green (s)	3.0	20.0	3.0	8.0	3.0	20.0	3.0	8.0
Recall	None	Max	None	None	None	Max	None	None
Avg. Green (s)	21.6	43.4	15.9	42.3	13.6	51.2	6.9	52.4
g/C Ratio	0.15	0.31	0.11	0.30	0.10	0.36	0.04	0.37
Cycles Skipped (%)	0	0	0	0	0	0	16	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0	0
Cycles Maxed Out (%)	96	100	96	100	60	100	40	92
Cycles with Peds (%)	0	100	0	96	0	96	0	96

Controller Summary
Average Cycle Length (s): 141.0
Number of Complete Cycles : 24

SimTraffic Simulation Summary
2030 PM Alternative C

Summary of All Intervals

Run Number	22	23	24	25	26	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	6403	6164	6262	6237	6190	6251
Vehs Exited	6397	6151	6258	6298	6221	6264
Starting Vehs	860	845	852	833	930	865
Ending Vehs	866	858	856	772	899	851
Denied Entry Before	0	0	1	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	24763	23796	24121	24246	24052	24196
Travel Time (hr)	869.6	835.1	849.1	847.2	846.5	849.5
Total Delay (hr)	135.4	128.7	133.8	128.0	130.7	131.3
Total Stops	5083	4962	5045	4920	4949	4993
Fuel Used (gal)	730.8	699.8	710.4	710.7	709.5	712.2

Interval #0 Information Seeding

Start Time	6:45
End Time	7:00
Total Time (min)	15

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	22	23	24	25	26	Avg
Vehs Entered	6403	6164	6262	6237	6190	6251
Vehs Exited	6397	6151	6258	6298	6221	6264
Starting Vehs	860	845	852	833	930	865
Ending Vehs	866	858	856	772	899	851
Denied Entry Before	0	0	1	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	24763	23796	24121	24246	24052	24196
Travel Time (hr)	869.6	835.1	849.1	847.2	846.5	849.5
Total Delay (hr)	135.4	128.7	133.8	128.0	130.7	131.3
Total Stops	5083	4962	5045	4920	4949	4993
Fuel Used (gal)	730.8	699.8	710.4	710.7	709.5	712.2

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	7.9	8.5	1.2	5.2	20.0	6.1	5.7	16.0	0.8	6.2	14.8	3.3
Delay / Veh (s)	77.9	47.0	19.0	73.7	66.6	52.0	86.9	55.9	17.3	83.2	53.3	20.8
Total Stops	359	438	67	234	937	331	308	851	41	279	770	164
Travel Dist (mi)	917.2	1600.5	538.1	618.3	2572.3	1012.5	343.8	1514.7	240.9	385.5	1436.1	821.0
Travel Time (hr)	31.4	49.0	14.9	21.0	84.9	32.1	14.6	54.2	7.0	16.2	51.2	24.6
Avg Speed (mph)	29	33	36	29	30	32	24	28	34	24	28	33
Fuel Used (gal)	26.3	44.4	14.5	17.8	73.6	28.2	10.3	43.8	6.5	11.9	42.4	22.8
HC Emissions (g)	981	1640	487	628	2514	893	273	1420	235	420	1504	806
CO Emissions (g)	17739	28992	8578	11813	45710	16175	5295	26078	4326	8127	28408	15085
NOx Emissions (g)	3025	5130	1561	1940	7794	2791	861	4404	729	1253	4561	2463
Vehicles Entered	373	646	220	257	1071	421	233	1025	165	269	999	572
Vehicles Exited	358	654	219	247	1088	427	236	1032	164	267	1002	572
Hourly Exit Rate	358	654	219	247	1088	427	236	1032	164	267	1002	572
Input Volume	378	668	223	257	1087	416	244	1035	162	260	1020	570
% of Volume	95	98	98	96	100	103	97	100	101	103	98	100
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

5052: Central Avenue & Unser Boulevard Performance by movement

Movement	All
Total Delay (hr)	95.6
Delay / Veh (s)	55.0
Total Stops	4779
Travel Dist (mi)	12000.9
Travel Time (hr)	401.0
Avg Speed (mph)	30
Fuel Used (gal)	342.6
HC Emissions (g)	11801
CO Emissions (g)	216325
NOx Emissions (g)	36509
Vehicles Entered	6251
Vehicles Exited	6266
Hourly Exit Rate	6266
Input Volume	6320
% of Volume	99
Denied Entry Before	0
Denied Entry After	0

Total Network Performance

Total Delay (hr)	131.3
Delay / Veh (s)	75.6
Total Stops	4993
Travel Dist (mi)	24195.7
Travel Time (hr)	849.5
Avg Speed (mph)	28
Fuel Used (gal)	712.2
HC Emissions (g)	22641
CO Emissions (g)	393109
NOx Emissions (g)	66217
Vehicles Entered	6251
Vehicles Exited	6264
Hourly Exit Rate	6264
Input Volume	12640
% of Volume	50
Denied Entry Before	0
Denied Entry After	0

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	EB	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	WB
Directions Served	L	L	T	T	T	R	L	L	T	T	T	R
Maximum Queue (ft)	295	312	235	267	318	175	213	276	457	684	749	155
Average Queue (ft)	171	186	127	150	186	79	112	128	300	387	480	109
95th Queue (ft)	270	292	198	236	292	205	185	210	433	588	683	213
Link Distance (ft)			12997	12997	12997				12694	12694	12694	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	410	410				150	440	440				130
Storage Blk Time (%)					12	0			0		41	4
Queuing Penalty (veh)					27	1			1		169	16

Intersection: 5052: Central Avenue & Unser Boulevard

Movement	NB	NB	NB	NB	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	L	L	T	T	T	R	L	L	T	T	T	R
Maximum Queue (ft)	162	174	460	467	522	275	238	248	350	373	406	365
Average Queue (ft)	112	137	276	298	330	90	130	147	225	251	273	144
95th Queue (ft)	178	203	408	427	469	294	220	238	321	347	367	300
Link Distance (ft)			7797	7797	7797				7606	7606	7606	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150	150				250	440	440				440
Storage Blk Time (%)	3	9	21		17	0					0	0
Queuing Penalty (veh)	10	32	52		28	0					0	0

Network Summary

Network wide Queuing Penalty: 336

Intersection: 5052: Central Avenue & Unser Boulevard

Phase	1	2	3	4	5	6	7	8
Movement(s) Served	EBL	WBT	SBL	NBT	WBL	EBT	NBL	SBT
Maximum Green (s)	21.5	42.0	14.5	43.0	19.5	44.0	15.5	42.0
Minimum Green (s)	3.0	20.0	3.0	8.0	3.0	20.0	3.0	8.0
Recall	None	C-Max	None	None	None	C-Max	None	None
Avg. Green (s)	20.8	43.5	13.9	42.8	16.8	47.5	14.3	42.4
g/C Ratio	0.15	0.31	0.10	0.31	0.12	0.34	0.10	0.30
Cycles Skipped (%)	0	0	0	0	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0	0
Cycles Maxed Out (%)	60	100	69	80	32	100	58	76
Cycles with Peds (%)	0	96	0	96	0	96	0	96

Controller Summary
Average Cycle Length (s): 140.0
Number of Complete Cycles : 24

LEE ENGINEERING

Dekker/Perich/Sabatini
Fehr & Peers
Gannett Fleming West Inc.