HILLCREST

CORRIDOR MOBILITY PLAN

PRESENTED TO:

CITY PLANNING AND COMMUNITY INVESTMENT

FINAL REPORT

BY:

RBF CONSULTING

FEHR & PEERS TRANSPORTATION CONSULTANTS

IBI GROUP

TABLE OF CONTENTS

Chapter 1 Project Background — Page

1.0 Project History 1-1
1.1 Features of the 2005 Traffic Calming Concept. 1-2
1.2 Development of Alternatives 1-6
1.3 Goal of Hillcrest Corridor Mobility Strategy 1-6

Chapter 2 Public Outreach

2.0 Public Outreach Approach 2-1
2.1 Project Working Group 2.1
2.2 Public Workshops 2-1
2.3 Walk Audits 2-7
2.4 Additional Walk Audits 2-10
2.5 Presentations to Community Groups 2-11
2.6 Website 2-11
2.7 Information Center 2-11

Chapter 3 Methodology

3.0 Overview 3-1
3.1 Measures of Effectiveness 3-1
3.2 VISSIM – What is it? 3-4
3.3 City of San Diego Traffic Impact Study Requirements 3-4
3.4 Summary 3-7

Chapter 4 Existing Conditions

4.0 Overview 4-1
4.1 Description of Study Area 4-2
4.2 Existing Land Use 4-3
4.3 Existing Utilities Mapping 4-3
4.4 Existing Roadway Network 4-3
4.5 Existing Traffic Conditions 4-7
4.6 Existing Parking 4-16
4.7 Existing Transit Conditions 4-17
4.8 Pedestrian & Bicycle Activity Along the Corridor 4-21
4.9 Summary of Existing Conditions 4-25

Chapter 5 No Build Conditions (2010 & 2030)

5.0 Overview 5-1
5.1 Future Forecast Methodology 5-1
5.2 Future Traffic Volumes 5-3
5.3 Transit Forecast Methodology 5-8
5.4 Planned Changes in Transit Service Along Corridor 5-8
5.5 Future Pedestrian & Bicycle Activity on Corridor 5-8
5.6 Planned Changes in Pedestrian & Bicycle Facilities 5-9
5.7 2010 No Build Operational Analysis 5-9
5.8 2030 No Build Operational Analysis 5-14
5.9 VISSIM Analysis 5-20

5.10 Future Transit Activity and Operations 5-21
5.11 Conclusions 5-23

Chapter 6 Analysis of 2005 Concept Plan

6.0 Overview 6-1
6.1 Elements of the Concept Plan 6-1
6.2 SANDAG Traffic Modeling Efforts 6-8
6.3 Near-Term (Year 2010) with 2005 Concept Plan 6-9
6.4 Long-Term (2030) w/ 2005 Concept Plan 6-17
6.5 Identification of Corridor Constraints with 2005 Concept Plan 6-28

Chapter 7 Development of Project Alternatives

7.0 Overview 7-1
7.1 Identification of Constraints 7-1
7.2 Northern Corridor Options 7-2
7.3 Central Corridor Options 7-4
7.4 Southern Corridor Options 7-5
7.5 Identification of Alternatives 7-6
7.6 Queue Jumps 7-8
7.7 Traffic Signals 7-9
7.8 Summary 7-10

Chapter 8 Analysis of Alternatives

8.0 Overview 8-1
8.1 Comparison Criteria 8-1
8.2 Overview of Alternatives 8-1
8.3 Operational Analysis 8-1
8.4 Traffic Signal Warrants 8-24
8.5 Measures of Effectiveness 8-25
8.6 Parking 8-26
8.7 Diversion of Traffic 8-28
8.8 Selection of Refined Concept Plan 8-28
8.9 Conclusions 8-33

Chapter 9 Elements of Refined Concept Plan

9.0 Introduction 9-1
9.1 Design Elements of Refined Concept Plan 9-1
9.2 Cross Section 9-15
9.3 Traffic Signal Warrant Analysis 9-20
9.4 Traffic Calming Analysis 9-21
9.5 Right of Way Needs 9-23
9.6 Utility Relocation 9-23
9.7 Conclusions 9-24

Chapter 10 Cost Estimates

10.0 Overview 10-1
10.1 Pedestrian Improvements 10-4
10.2 Transit Improvements 10-5
10.3 Parking Improvements 10-6

10.4 Roadway Improvements 10-7
10.5 Streetscape Improvements 10-8
10.6 Summary 10-8

Chapter 11 Implementation Plan

11.0 Overview.. 11-1
11.1 Next Steps... 11-1
11.2 Implementation Program 11-3
11.3 Funding Sources 11-7
11-4 Conclusion 11-7

Chapter 12 Transit Report

12.0 Overview.. 12-1
12.1 Existing Conditions 12-2
12.3 Future Service Plan 12-19
12.4 Implementation Plan 12-20
Transit Technical Appenix TA-1

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Chapter 1:
Project Background

1.0 PROJECT HISTORY

The Hillcrest Corridor connects downtown San Diego to the Hillcrest area along the west side of Balboa Park on Fourth, Fifth and Sixth Avenues. Central Hillcrest is a regional activity center with two major hospital facilities on its northern edge. The corridor has a mixture of land uses, including restaurants, shops, moderate density apartments and historic, early-20th century homes. The neighborhoods of Park West, Bankers Hill and central Hillcrest are located along the corridor

The corridor lies completely within the Uptown Community, carrying both local and regional trips that use private motor vehicle, transit as well as pedestrian and bicycle trips. The Hillcrest Association, a business improvement district, lies in the northern portion of the corridor. Several community and historic associations also lie along the corridor.

Uptown Planners advises the City of San Diego on planning issues in this corridor; Uptown Partnership, Inc. manages the City's parking meter program in Uptown. City Council adopted the "Uptown Community Plan" in 1987 and the Uptown Partnership "Strategic Mobility Plan" in 1998. The 1998 Mobility Plan identifies parking, traffic, pedestrian travel, transit and "way finding" (or signage) as major concerns of the Partnership.

"Feet First" Pedestrian Study

In 2002, the Uptown Community began to develop a concept to improve pedestrian accessibility and safety. In a study called "Feet First," WalkSan Diego studied pedestrian travel in Uptown, including an identification of 10 priority areas where improvements could improve walkability. This study was funded by the Uptown Partnership, Inc, and was partially staffed by the San Diego County Air Pollution Control District's Indirect Source Program. During the spring and early summer, there was an initial Community "stakeholders" meeting, five walking tours (or audits) and a final Community Forum.

2005 Traffic Calming Study

Because half of ten priority areas were located west of Balboa Park along Fourth, Fifth and Sixth Avenues, the Uptown Partnership contracted with the Planning and Landscape Architecture firm of KTU+A in 2004 to use elements of the "Feet First" study to draft a concept for Hillcrest, Banker's Hill and Park West. The concept aimed to slow traffic as well as improve pedestrian safety and accessibility along Fourth, Fifth, and Sixth Avenues Washington Street south to Interstate 5.

Through the involvement of a Community Advisory Group and two public workshops, the traffic calming project developed a "concept" for "Proposed Improvements" in the corridor. This 2005 Traffic Calming Concept became the basis for seeking funding through the California Department of Transportation (Caltrans) for further evaluation of those improvements. The City was awarded Community-Based Planning grant funds and the San Diego Association of Governments (SANDAG) was awarded Transit Planning grant funds in 2006 to pursue the "Hillcrest Corridor Mobility Plan", which is the focus of this document. As the project got underway, the title of the project was changed to "Hillcrest Corridor Mobility Strategy" to coincide with the City of San Diego City Planning & Community Investment Department's policy of only identifying adopted land use documents as "plans."

Hillcrest Corridor Mobility Strategy

A mobility study evaluates the balance of transportation needs within a study area. All modes of transportation are considered because improvements relating to one mode of transportation, such as a pedestrian, should not negatively impact other modes of transportation, such as a bicycle. Whereas previous studies evaluated improvements solely to pedestrians, the Hillcrest Corridor Mobility Strategy evaluates the benefits and challenges related to balancing all modes of transportation as changes to the infrastructure along Fourth, Fifth and Sixth Avenue are considered.

Multiple options for changes to the existing roadways are considered in this Mobility Strategy, but the starting point for the evaluation was the 2005 Traffic Calming Concept developed in the Traffic Calming Study. This chapter discusses how the project evolved from the 2005 Concept to a Refined Concept Plan over an 11-month period.

1.1 FEATURES OF THE 2005 TRAFFIC CALMING CONCEPT

The 2005 Traffic Calming Concept was proposed by the Uptown Partnership at the end of their study in 2005 and integrates traffic calming concepts throughout the corridor. Exhibit 1-1 illustrates the 2005 Traffic Calming Concept as presented in the "Fourth, Fifth, Sixth Avenue Traffic Calming" report completed by KTU+A, which includes the following:

- CURB-EXTENSIONS (BULB-OUTS). Bulb-outs at intersections are identified to help reduce the crossing distance at several intersections. Bulb-outs are located along Fourth, Fifth and Sixth Avenues as well as along the side streets. Due to the existing crown of the road and the height of the existing curbs, some locations identified in the 2005 Traffic Calming Concept (2005 Concept) may be more difficult to construct than others.

- ON-STREET PARKING. On-street parking is maintained through the study area. On Fourth and Fifth Avenues, on-street parking is parallel to the travel way. Along Sixth Avenue, angled parking is proposed. Combining the angled parking with the proposed center median, a loss of one travel lane west of the Balboa Park, from Upas Street to I-5 would occur with the 2005 Concept Plan. A combination of both head-in angled parking and back-in angled parking was included in the Concept. Back-in angled parking, although not standard practice in City of San Diego, was proposed in areas where the grade of the road was rather steep.

- **TRANSIT.** On both Fourth and Fifth Avenue, the 2005 Concept includes dedicated transit lanes that would run from Upas Street to Elm Street. The purpose of the transit lanes is to improve travel time on on-time performance of transit services in the corridor. On-street parking would be maintained curbside with the proposed lane. Private motor vehicles could enter these lanes to make right turns or to park in the curbside spaces; bicycles could also use these lanes. The transit only lane would replace one travel lane. All transit stops would be located in the transit only lanes, thereby reducing the potential delay to passenger vehicles along the corridor that may otherwise be blocked by a stopped transit vehicle. Transit lanes in this corridor would also calm traffic by reducing the street capacity and minimizing conflicts between vehicles and buses.

- **RAISED MEDIAN AND LEFT TURN POCKETS.** Along Sixth Avenue, a raised median is recommended in the 2005 Concept from Upas Street to Elm Street. This raised median would result in dedicated left turn pockets at all intersections along Sixth Avenue. Juniper Street, which currently has restricted access, would continue to have restricted access. The existing barricades would be replaced by landscaping. The raised median and turn pockets combined with the angled parking would result in the loss of a travel lane in each direction on Sixth Avenue west of Balboa Park.

- **CONSOLIDATION OF TRANSIT STOPS.** There are 27 existing transit stops in the study area on Fourth and Fifth Avenue. The 2005 Concept reduces the total number of stops to 19. Transit stops would be eliminated at:

  <u>Fourth Avenue</u>

  - SW corner at Robinson Avenue
  - SW corner at Brookes Street
  - SW corner at Palm Street
  - NW corner at Fir Street

  <u>Fifth Avenue</u>

  - SE corner at Brookes Street
  - NE corner at Palm Street
  - NE corner at Hawthorne Street
  - NE corner at Fir Street

In addition, some transit stops will be relocated to balance the spacing between stops or to move the stop from the near side (approach) to the far side (departure) of the intersection. Stops to be relocated are:

- **Fourth Avenue at Redwood Street** – to be relocated to Fourth Avenue at Quince Street (approximately 300' south of existing location).
- **Fourth Avenue at Date Street** – to be relocated to Fourth Avenue at Elm Street (approximately 300' north of existing location).
- **Fifth Avenue at Laurel Street** – to be relocated approximately 100' north of existing stop to allow for Bus Rapid Transit (BRT) stop at intersection.

- **NEW TRAFFIC SIGNALS.** A total of 13 new traffic signals are included in the 2005 Concept:
  - o Fourth Avenue / Upas Street
  - o Fourth Avenue / Spruce Street
  - o Fifth Avenue / Spruce Street
  - o Sixth Avenue / Spruce Street
  - o Fifth Avenue / Quince Street
  - o Fourth Avenue / Nutmeg Street
  - o Fifth Avenue / Nutmeg Street
  - o Sixth Avenue / Nutmeg Street
  - o Fourth Avenue / Juniper Street
  - o Fifth Avenue / Juniper Street
  - o Sixth Avenue / Juniper Street
  - o Fifth Avenue / Grape Street
  - o Sixth Avenue / Grape Street

- **ENHANCED PEDESTRIAN CROSSWALKS.** Two mid-block crosswalks were included in the 2005 Concept. Enhanced crosswalks were proposed at both mid-block locations on Fifth Avenue between Washington Street and Robinson Avenue. These crosswalks would include the installation of in-pavement flashing beacons, roadside signage and potentially overhead signage.

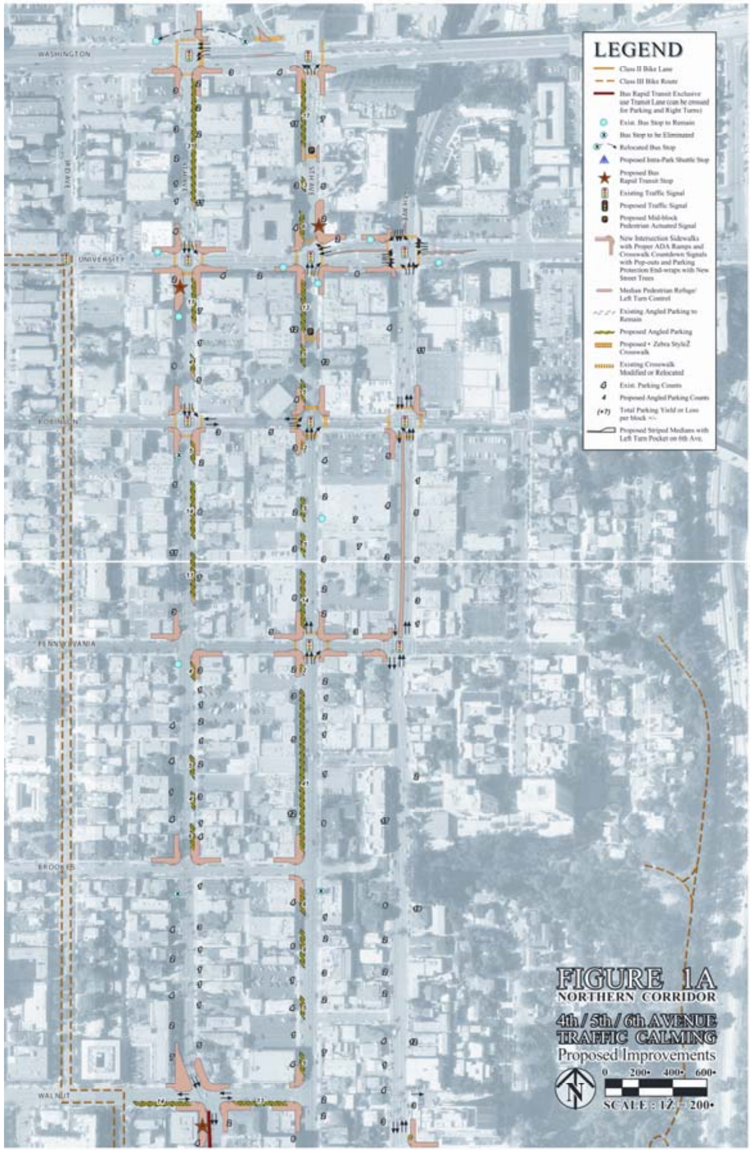

Exhibit 1-1a Northern Corridor

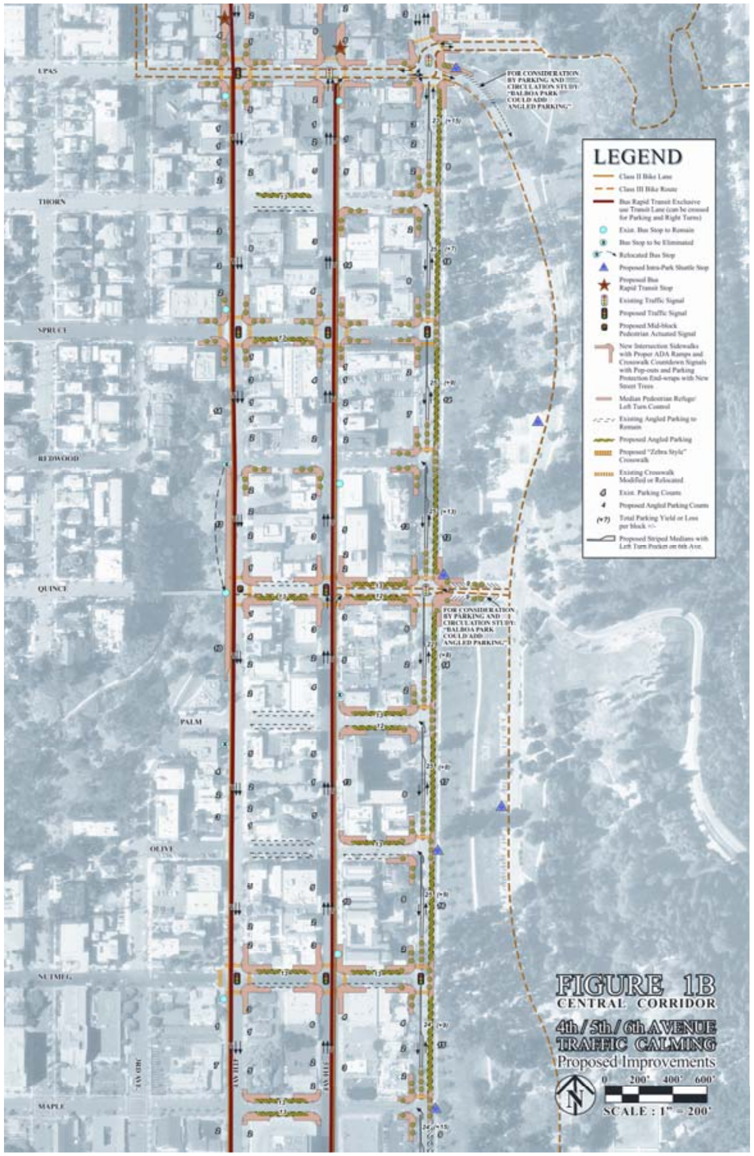

Exhibit 1-1b Central Corridor

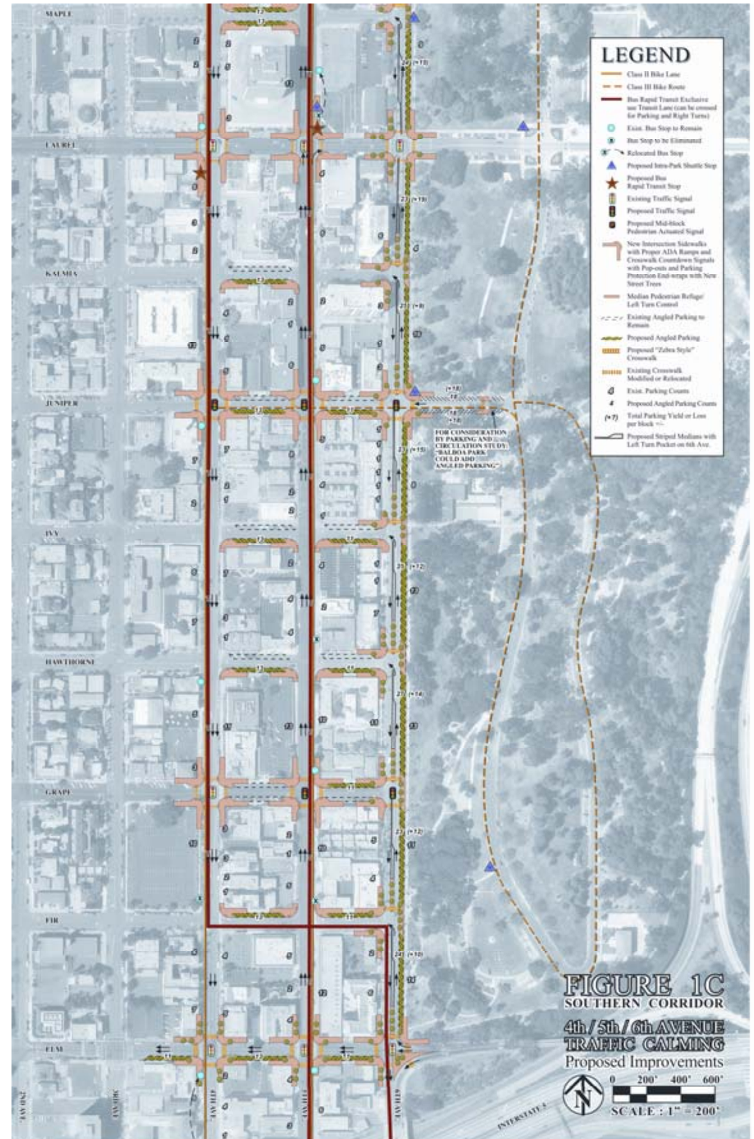

Exhibit 1-1c Southern Corridor

1.2 DEVELOPMENT OF ALTERNATIVES

The 2005 Concept was one alternative evaluated as part of this Mobility Strategy. Community members were given the opportunity to start with a clean slate or modify the 2005 Concept. The community worked together to develop a series of additional alternatives for the corridor that focused on each mode of transportation - automobiles, transit, bicycles and pedestrian - with the following goals:

- Reduce speeding
- Improve flow & safety
- Create a pedestrian friendly environment
- Improve transit performance
- Beautify the Avenues
- Increase parking

Technical analysis was conducted for each alternative. As part of the evaluation of each alternative, many criteria for improving mobility were assessed, including community concerns, vehicular travel time and delay, transit operations and on-time performance, pedestrian safety and accessibility, and bicycle facilities. The result of the alternatives analysis discussed in Chapter 8 of this document is the Refined Concept Plan. This Refined Concept Plan aims to meet the goals of the Hillcrest Corridor Mobility Strategy.

1.3 GOAL OF HILLCREST CORRIDOR MOBILITY STRATEGY

The goal of the Hillcrest Corridor Mobility Strategy is to develop a plan that will find a balance for all modes of transportation in the study area by conducting an operational feasibility study of the 2005 Traffic Calming Concept and alternatives to that concept. Operational feasibility includes the analysis of passenger vehicle delays and travel times, transit vehicle operations including delay, ridership and travel time, pedestrian accessibility and safety, and bicycle access.

A primary objective is to improve the balance between pedestrians, bicycles, transit operations and vehicular flow, while providing for reasonable travel speeds and acceptable delays to the motoring public. The operational analysis will focus heavily on delay and travel time on the corridor for several reasons. First, changes to roadways and intersections will affect transit passengers and vehicles. Reduction in lanes will slow traffic, but reducing the capacity too much might result in some diversion of motor vehicles to other routes or other destinations. Finding the balance of slowing traffic without diversion to parallel routes was one of many challenges on this project.

Another objective is to maintain the transit friendly nature of the corridor by improving transit operations. Improved on-time performance, reductions in travel time and removal of transit vehicles from mixed flow lanes will help foster the transit friendly environment that is envisioned for the neighborhoods in the study area.

Parking in the neighborhoods of Hillcrest, Banker's Hill and Park West is at a premium. Uptown Partnership's 2005 "Central Hillcrest Parking Study" found that the northern portion of the study area had an existing 100-space parking shortage, which could nearly triple by the year 2010. Therefore, minimizing parking losses and increasing parking where feasible will be crucial.

These objectives should be met without losing sight of the overall goal of the project: to provide a balanced transportation system and pedestrian/bicycle friendly environment in the study area. The project team strived to reach this goal through the analysis process outlined in this report, without compromising the overall vision.

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Chapter 2: Public Outreach

2.0 PUBLIC OUTREACH APPROACH

The Hillcrest Corridor Mobility Strategy had extensive public outreach. Monthly meetings were conducted with the community-based Project Working Group (PWG). Three public workshops were also conducted, public walk audits were conducted and presentations were made to local community groups.

An information center was set up at the Uptown Partnership Inc. (UPI) office where residents could review a PowerPoint presentation prepared for the meetings, illustrations of the draft concept plan and pick up materials referencing upcoming community meetings. A project website was established that provided the community with both an opportunity to view materials presented at the community workshops as well as submit comments on the study.

This chapter provides the details of each element of the public outreach process and how events were conducted.

2.1 PROJECT WORKING GROUP

The Project Working Group (PWG) was established during the first few weeks of the work program. Members of the community who represent active community groups or organizations within the study area were invited to attend monthly meetings on the project. The meetings were held at St. Paul's Cathedral located within the project study area on Tuesday afternoons.

The role of the PWG was to advise City staff and the consulting team on critical elements of the project. Issues such as back-in angled parking, roundabouts, and alternative recommendations were discussed at the PWG meetings. Members of the group were expected to represent the issues and the opinions that best suited the organization they represented.

In many cases, the recommendations of the PWG were integrated into the alternatives analyzed as part of the Refined Concept Plan selection process.

2.2 PUBLIC WORKSHOPS

Beginning in April and ending in November 2007, three public workshops were held at St. Paul's Cathedral to gather and refine community input: a Kick-Off Workshop, a Design Workshop and an Open House to discuss corridor alternatives. This section will describe the workshops and the findings of each. During this same period, two walk audits were also held as described in Section 2.3, below.

To promote the workshops, illustrative flyers were distributed to local business-persons and residents (stakeholders), notices were posted on the project website, and announcements were made during presentations to local groups. Participation grew with each workshop, from 20 participants to more than 40 for the final open house. In addition, many others accessed information from the project website and provided input at the information center.

Kick-Off Meeting: Sharing Information and Soliciting Input on Traffic Calming Concept

Thursday, April 26th, 6:30 - 8:30 pm, St. Paul's Cathedral

Workshop Description

A Kick-Off Meeting was held to share information about the Hillcrest Corridor Mobility Strategy and solicit input on the 2005 Traffic Calming Concept (2005 Concept). Approximately 20 community members participated in this workshop. The evening began with introductions from the project team and a presentation on the Mobility Strategy, including the process, existing conditions, and the 2005 Concept. Following the presentation, community members were invited to participate in a group exercise to review the 2005 Concept plans and provide their ideas and comments.

Participants recorded ideas and concerns on the 2005 Concept plans for northern, central, and southern portions of the corridor, using stickers to indicate concerns related to automobiles, transit, parking, pedestrians and bicycles. Members of the project team then reported back to the whole group a summary of the comments that were recorded.

The workshop participants also shared their ideas about how to get the word out about future workshops for the study, many of which were implemented. The workshop concluded with information on next steps, including the corridor walks held April 30th and May 1st (see Section 2.3 for description of walk audits).

Findings

Suggestions recorded on the 2005 Concept plans that were consistent among the participants included changes to automobile circulation, improved/new traffic signals, increased transit, increased motorcycle/scooter parking, and additional/safer pedestrian crossings.

Design Workshop: Improvements and Alternatives to 2005 Traffic Calming Concept

Saturday, June 23rd, 9 am - 1 pm, St. Paul's Cathedral

Workshop Description

More than 30 community members volunteered their time for this extensive workshop, which focused on developing improvements and alternatives to the original concept plan, as well as selecting a preferred alternative. Prior to the design workshop, a twenty-minute open house was held in the courtyard where participants were able to review information about the study area, including accident data, traffic volumes, transit routes, and walk audit summaries. The workshop began with a presentation including technical analysis of the 2005 Concept. Participants then worked in small groups with maps and markers to identify mobility priorities and design alternatives to the concept plan. During a final exercise, individuals cast votes for their preferred alternative elements.

Findings

During the workshop exercises, the participants were asked to prioritize the modes of transportation through the corridor. Table 2.1 summarizes the rankings for the north, central, and southern portions of the study area. As shown in Table 2.1, the workshop participants clearly identified that pedestrians are their number one priority in the study area.

Table 2.1
Community Ranking of Transportation Concerns in Study Area

	Ranking by Corridor			
	Northern	Central	Southern	Overall
Bicycle	5	4	3	4
Parking	3	5	5	5
Pedestrian	*1*	*1*	*1*	*1*
Transit	4	2	4	3
Vehicle	2	3	2	2

Numerous recommendations to improve the 2005 Traffic Calming Concept were suggested during the design sessions, including adding queue jumpers and pedestrian flashers at specific intersections and providing better signage, landscaping, and extending transit lanes in other locations. The groups also provided a critique of parking, mid-block crosswalks and other items currently included in the draft concept plan.

Several of the recommendations emerged as more important than others during this final group design exercise. Community members were asked to prioritize improvements identified through the use of color dots: green (important), yellow (use caution) and red (do not pursue). Improvements most essential to the community include synchronizing signals and pedestrian improvements. While transit was a discussion point throughout the workshop, transit-only lanes were neither strongly supported nor strongly contested by the participants. Table 2.2 summarizes the results of the green, yellow, red dot exercise.

Table 2.2
Prioritization of Community Identified Improvements

Green Dots (Important Features)	Yellow Dots (Use Caution in Considering)	Red Dots (Do Not Pursue)
Diagonal Crossing at Intersections	Queue Jumps at Washington & University	Tunnel / Alternative Artery
Mixed Opinion on Dedicated Bus Lanes	Mixed Opinion on Diagonal Parking	Mixed Opinion on Dedicated Bus Lanes
Back-in Angled Parking		Two-Way 4th & 5th
Synchronization of Traffic Signals		Mid-block Crossings on 5th
New Sidewalk on 4th near Quince		
Improved Mass Transit (buses, shuttles, rail)		
Landscaped Pop-Outs		
Add Bicycle Routes		
Countdown Signals at Intersections		
Remove Parking Spaces on University (3 spaces)		

Open House: Reviewing and Ranking Alternatives

Thursday, November 8th, 4:30 - 7:30 pm, St. Paul's Cathedral

Workshop Description

More than 40 community members participated in this workshop to review and rank the Mobility Strategy options developed from the previous input. Participants visited stations that showed how three options would affect different segments of Fourth, Fifth, and Sixth Avenues, including computer simulations and potential benefits and challenges. The first station provided background information for the project, and members of the Project Team were available to answer questions throughout. A brief description of the options presented is summarized in Table 2.3.

As they visited the stations, participants were informed on the benefits and constraints resulting from each of the potential options. Benefits and constraints focused on parking, pedestrian accessibility, traffic operations and travel time. Using the information provided, participants were then asked to rank the options for each corridor using an evaluation form, and to write additional reactions.

The final station showed two alternatives that demonstrated how the options could be combined. City staff was on hand to illustrate to the community members the draft final two alternatives and discuss the next steps of the project.

Findings

Participants ranked alternatives for six corridors along Fourth, Fifth, and Sixth Avenues, and provided comments on two additional alternatives for the entire area.

They consistently gave low rankings to the option of three lanes for Fourth and Fifth Avenues, preferring two lanes with either angled parking or a transit only lane, depending on the corridor. Likewise, they did not favor four lanes for the Central and Southern Corridors of Sixth Avenue. Below are the participant preferences for each corridor.

At the final station the options demonstrated at each station where combined into two final alternative. Alternative 1 maintained the number lanes along Fourth, Fifth and Sixth Avenues that currently exist and integrate pedestrian features such as new crosswalks and pop-outs, as well as new traffic signals at several locations. The second alternative was a reduced lane alternative, which reduced Fourth and Fifth Avenues to two lanes. Alternative 2 also integrated a southbound lane reduction in the southbound direction through the Central Corridor and the removal of one lane in both the northbound and southbound direction through the southern corridor along Sixth Avenue. The purpose of the station was to illustrate to the community how the options presented at the Open House may fit together. Although few written comments were received at this station, the majority of these comments provided support for Alternative 2.

Table 2.3
Summary of Options Identified at Each Station

	Options Identified at Each Station:		
	Option A	Option B	Option C
Station 2: 4th & 5th Avenue Northern Corridor	Maintain existing lanes (2 lanes on 4th & 3 lanes on 5th)	2 lanes plus transit only lanes (on 5th Avenue only)	2 lanes plus diagonal parking (on 5th Avenue only)
Station 3: 4th & 5th Avenue Central & Southern Corridors	Maintain existing 3 lanes	2 lanes plus transit only lanes	2 lanes plus diagonal parking
Station 4: 6th Avenue Northern Corridor	Maintain existing lanes		
Station 5: 6th Avenue Central Corridor	Maintain existing 4 lanes	2 northbound / 1 southbound lane plus raised median	1 northbound / 1 southbound lane plus raised median & diagonal parking
Station 6: 6th Avenue Southern Corridor	Maintain existing 4 lanes	2 northbound / 1 southbound lane plus raised median	1 northbound / 1 southbound lane plus raised median & roundabouts

Table 2.4
Community Identified Preferred Options

	Preferred Option		
	Northern	Central	Southern
4th Avenue	Option B: Two Lanes Plus Transit Only Lane (54%)	Option B: Two Lanes Plus Parking (44%) (78% support 2 lanes)	
5th Avenue	Option C: Two Lanes with Transit Only Lane (61%)	Option B: Two Lanes Plus Parking (38%) (76% support 2 lanes)	
6th Avenue	Option A: 4 Lanes with Intersection Improvements (100%)	Option B: Two Northbound / One Southbound Lane Plus Median (44%)	Option C: One Northbound / One Southbound Plus Median & Roundabouts (63%)

2.3 WALK AUDITS

In addition to the public workshops, three walk audits were conducted. Due to the size of the study area, the walk audits focused on different portions of the study corridor. Two walk audits were conducted on a weekday and one was conducted on a weekend. One of the three walk audits was conducted with the Project Working Group during the regularly scheduled meeting.

Walk audits were conducted so that participants could understand the challenges faced by pedestrians in the community and evaluate the pedestrian conditions within the study area. Held in small groups, the intent was the stimulate discussion between the community members as well as identify concerns that were specific to the corridor. During the walk audits, community members were toured through the community on foot and asked to review specific pedestrian related issues at key points in the study area. To help evaluate more areas, public transit (bus) was also used by participants during the walk audits in order to efficiently travel from one walk audit area to another.

The following sections discuss the walk audits conducted and the input received from the community during these surveys.

Walk Audit 1: April 30, 2007

Park West/Banker's Hill

This walk was conducted at 3:00 in the afternoon through the Park West/Banker's Hill neighborhoods. Approximately eight community members and six project team members attended the walk. The route started at Balboa Park and proceeded north on Sixth Avenue. At Quince Street, the route crossed over to Fourth Avenue, where the walk proceeded south on Fourth Avenue. The route then crossed back over to Sixth Avenue along Nutmeg Street. Stops were made at:

- Sixth Avenue – between Laurel Street & Quince Street
- Quince Street – between Sixth and Fourth
- Nutmeg Street – between Fourth and Fifth
- Sixth Avenue – between Kalmia Street and Laurel Street

Key points and comments made by community members included:

- Add tree grates along Fourth, Fifth, and Sixth Avenues
- Add textured pavement on the sidewalks and pedestrian crosswalks
- Fourth and Fifth Avenues are too wide to cross when busy, drivers do not yield to pedestrians
- Curb extensions may be problematic at some proposed locations due to the crowns of existing roads
- Diagonal parking proposed on Sixth Avenue was supported by one resident because it will inhibit trailer parking on street

Walk Audit 2: May 1, 2007

Hillcrest

This walk was conducted at 3:00 in the afternoon through the central Hillcrest neighborhood. Approximately 10 community members and four project team members attended the walk. The route started at Pizza Nova and proceeded north to Washington Street, where the group walked west to Fourth Avenue. The route headed south on Fourth Avenue where the group boarded the bus southbound to Upas Street. After the short bus ride, the group proceeded east on Upas to Sixth Avenue. After a brief stop at Sixth Avenue and Upas Street, the group boarded the bus again heading north on Fifth Avenue and exited at Fifth Avenue and University Avenue. The walk audit concluded at Fifth and University. Along the route, the group stopped at the following locations to complete their walk audit forms:

- Washington Street – between Fourth and Fifth
- Fourth Avenue – between Washington and University
- Fourth Avenue at Upas Street
- Upas Street – between Fourth and Sixth Avenues
- University Avenue – between Fifth and Sixth Avenues

Key points and comments made by community members included:

- At the intersection of Washington & Fifth: extend the raised median on the eastside of Washington up to the crosswalk to provide pedestrian refuge.
- Add a four-way crossing scramble at the intersection of Fifth & Washington.
- Signal crossing time too short at Fifth & Washington.
- Add a four-way crossing scramble at the intersection of Fourth & Washington.
- Add a four-way crossing scramble at the intersection of Fourth & University.
- Add a four-way crossing scramble at the intersection of Fourth & Robinson.
- Residents had questions about funding the improvements.
- One resident approves of diagonal parking.

- One resident disapproved of the transit lanes proposed in the concept plan.
- One resident would like to see more bike racks attached to the meters.
- At the intersection of Fourth & Walnut: residents would like to see a raised median pedestrian refuge on the north leg of the intersection.
- Residents suggested adding a bike route on Fifth Avenue to promote business to merchants from cyclists.
- Residents expressed they are worried about future traffic on Sixth Avenue if it is narrowed as proposed in the 2005 Concept. They do not want the result to be traffic being pushed onto Fourth or Fifth Avenues.
- One resident does not support traffic calming on Sixth Avenue because she felt it serves as a thoroughfare to 163 and 5 freeways. She did not support narrowing Sixth Avenue.

Walk Audit 3: May 9, 2007

Project Working Group (PWG)

Starting at St. Paul's Cathedral, the PWG took the bus northbound along Fifth Avenue, where they traveled to University Avenue. The PWG crossed University Avenue and headed west to Fourth Avenue. Heading south on Fourth Avenue, the PWG stopped at numerous locations to discuss issues in this area including Upas Street and Nutmeg Street. The group crossed over to Sixth Avenue at Quince Street and returned to St. Paul's Cathedral along Sixth Avenue. Stops were made at:

- Washington Street – between Fourth and Fifth
- Fourth Avenue – between Washington and University
- Fourth Avenue – between Maple and Upas
- Nutmeg – between Fourth and Sixth
- Sixth Avenue – along Balboa Park
- Sixth Avenue at Quince Street

Key points and comments made by PWG members included:

- o Drivers drove too fast, sped up for lights, and did not yield to pedestrians.
- o Not enough time to cross Washington during the walk cycle – drivers yelled at pedestrians.
- o Right turn on red light at Washington is a problem – eliminate or delay.
- o Tighten intersection of Washington and Fifth, especially northeast corner.
- o Add pedestrian scramble at intersections or crosswalks on all intersection legs.
- o Curb extensions and pedestrian refuges are needed.
- o Improve bike routes and create safer biking conditions.
- o Add diagonal parking on Fourth Ave.
- o Sidewalks need repair, surfaces are uneven, and ladder crosswalks are needed.
- o Improve transit with more frequent and faster service, posted route information, bike racks, bus shelters, public art, bigger trash cans, and cleaner areas around transit stops.
- o Buses speed, run red lights, and stop so rear exit is blocked by street signage.
- o Protect walkers, not cars, to encourage more walking and reduce noise/pollution.
- o Improve biking conditions and bike routes.
- o Wide skewed intersection at Walnut Street needs traffic signal or possibly a roundabout.
- o Drivers can't see pedestrians well at Upas – add a landscaped pedestrian refuge on Fourth Ave but keep all the traffic lanes.
- o Dedicated transit lanes are a bad idea – keep all traffic lanes.
- o Bus drivers going too fast and ran red lights.
- o Add diagonal parking to left lane of Fourth Ave.
- o Improve bike routes and biking conditions.

2.4 ADDITIONAL WALK AUDITS

One additional walk was scheduled and advertised for the morning of the Design Workshop (June 2007). The walk audit was included on the flyer distributed for the workshop and announced at the community group meetings prior to the workshop. However, no attendees showed for the walk. Therefore, the walk was not conducted and surveys were not collected.

Walk audit surveys were also posted on the website. Community members were able to download the walk audit forms and instructions. This information was announced at both the Kick-Off Workshop (April 2007) and Design Workshop (June 2007). Although this information was available, no walk audit surveys were submitted to the project team.

2.5 PRESENTATIONS TO COMMUNITY GROUPS

Members of the Project Working Group were asked to regularly provide updates to their representative organizations regarding the status of the Hillcrest Corridor Mobility Strategy. In addition to those updates, City staff and the consultant team attended community group meetings to advertise upcoming meetings, provide project updates and to respond to issues that may have arisen within each organization pertaining to the Strategy. Table 2.5 summarizes all community group meetings attended specifically by City staff and/or the consultant team. The table also summarizes all comments and/or concerns raised by the community during those meetings attended.

The community input received at each meeting was logged and integrated, where possible, into the development of the alternatives and into the Refined Concept Plan.

2.6 WEBSITE

Similar to the Information Center, the purpose of the website was to provide a resource for the community. Presentations made a community meetings were posted on the website along with flyers for upcoming events. Community members were also able to submit email questions and/or comments, which were received by both City staff and the consultant team. The project website can be accessed through the following link: www.hillcrestmobilityplan.info.

Table 2.6 is a log of all emails received through the project website.

2.7 INFORMATION CENTER

The purpose of Information Center, which was located at the Uptown Partnership Inc. (UPI) offices, was to disseminate information to the community about the project. Set up at the project's initiation, the Information Center contained valuable information regarding upcoming meetings, the basis for the project and copies of the Draft Concept Plan. Following the selection of the Refined Concept Plan, the Information Center was updated to include exhibits illustrating the elements of the Refined Concept Plan and information regarding upcoming phases of the project including community meetings.

Table 2.5
Summary of Community Meetings Attended and Concerns Expressed

Community Group	Meeting Dates Attended & Presentations Made	Concerns Expressed
Uptown Planners	6/5/07: Announcement 8/7/07: Announcement 9/4/07: Presentation	Alternatives do not address bicycles or bicycle facilities.
		Concerned about bus only lanes.
		Want improvements to Balboa Park Parking
		Agreement with most elements of concept plan to make more pedestrian friendly, particularly relating to access to park.
		Would like analysis of roundabouts and/or traffic calming on Sixth Avenue (based on proposal by James Frost).
		Concerned about diversion to First Avenue.
		Concerned about First Avenue Bridge structural stability (similar to Minneapolis bridge).
		Why wasn't First Avenue included in the scope?
		Want improved signage directing people to SR-163.
		Want traffic signal timed together (synchronized).
		Identify where the traffic is coming from.
		Want to keep mid-block crossings (not eliminate them) on Fifth Avenue or add more of them. Using the City standard for spacing shouldn't be a criteria.
		Concerned about reducing lanes between Washington and Robinson.
		How doe walk buttons work right now? Why do pedestrians have to push a button to get a walk symbol? Why are they timed the way they are?
		Trolley is the "golden answer" to congestion – why not provide incentives for developers to locate transit inside of buildings?

Table 2.5
Summary of Community Meetings Attended and Concerns Expressed

Community Group	Meeting Dates Attended & Presentations Made	Concerns Expressed
Hillcrest Business Improvement Association	6/12/07: Project Update 9/11/07: Project Update	Loss in parking related transit only lanes in Hillcrest (Washington to Upas).
		Explanation of what started the Hillcrest Corridor Mobility Strategy project.
		Concerned about diversion of traffic.
		Where will money come from to fund improvements?
		Stated that the HBIA would oppose reduction in lanes through Hillcrest.
		Mixed opinions on the diagonal parking.
Hillcrest Town Council	8/14/07: Project Update 9/11/07: Panel Discussion	Requested consideration of fixed rail on Fifth Avenue connecting Gas Lamp and Hillcrest.
		What bicycle facilities would be provided?
		Opposed to dedicated bus lanes.
		Requested traffic signals be coordinated.
		What is the schedule?
		Is there money for building improvements?
		What is status of Pedestrian Master Plan?
		Additional signage guiding drivers to freeway.
		Banker's Hill / Park West would prepare alternative.
Balboa Park Committee	6/5/07: Announcement 9/7/07: Project Update 1/3/08: Requested Input on Refined Concept Plan	Vote required to dedicate park land to roundabouts.
		Concerned about implications of adding bicycle lane on parkland.

Table 2.5
Summary of Community Meetings Attended and Concerns Expressed

Community Group	Meeting Dates Attended & Presentations Made	Concerns Expressed
		Requested additional parking to be considered on Quince (east of Sixth Avenue).
Banker's Hill/Park West Community Association	11/28/07: Project Update	Residents discussed urban compact roundabouts on Sixth Avenue.
Individual Community Member Meeting	Richard Ledford, Leo Wilson, Warren Simon, John Lamb.	Held at St. Paul's Manor to discuss the purpose of the HCMS.
Individual Community Member Meeting	5/24/07: Leo Wilson	Held in Hillcrest to discuss Uptown Planner's meeting. Discussed the potential alternatives and format for meeting.
Individual Community Member Meeting	11/28/07: Leo Wilson, John Lamb, Jeane & Eileen	Concerned about roundabouts and traffic diversion; Would oppose roundabouts and lane reductions in study area.

Table 2.6 Summary of Comments Received via Email	
Date of Email	Comment:
November 7, 2007	Regretfully, I will not be able to attend as I will be out of town. I thank you for your response. I did also want to mention regarding the current dividers at 6 and Juniper. It has been suggested that they are not effective as they seem to always need repair. I am able to observe the intersection regularly, and I note that other than the usual hoodlum who has to destroy everything nailed down, the dividers are normally not breached by civilian drivers rather the safety crews tend to run over the dividers and cause damage when they enter the Park from Juniper or turn left from 6th. Mostly ambulance service but police and fire run over the dividers as well. The safety crews do need access to the Park evidently and any solid divider could be a safety issue.
November 5, 2007	I live at 6th and Juniper. Traffic speed is the biggest problem at 6th and Juniper. Traffic actually flows well and stop signs work for Southbound turning onto 6th from Juniper. Traffic turning from Juniper to 6th Southbound is relatively little in amount. Any kind of Stop light would actually disturb the traffic flow and create a great deal of noise and additional pollution. How about a traffic circle or pop-outs or both to slow traffic? The 6th Ave. corridor should enhance the beauty and tranquility of the park. Traffic signals create noise, pollution and are just plain ugly with the wires and all of the extra equipment needed to have a stop light. There isn't any real difficulty for ingress and egress onto Juniper or from Juniper back to 6th. Please keep the flow going just slow it down and a traffic light, though effective should be the last alternative. Please keep the corridor beautiful. Do the right thing.
June 22, 2007	I will not be able to attend the workshop on the 23rd. I live on 5th Avenue and do not approve of the idea of changing 6th Avenue to only 1 lane of each of North and South bound traffic. That will only channel more traffic onto 5th and 4th Avenues. Please forgive this remark, but it sounds like a plot to make 6th Avenue quieter (where the rich condo owners are) at the expense of 5th Avenue (where the middle class owners are) and 4th Avenue (where the renters are). Sorry to introduce class warfare, but as a resident of 5th Avenue I have learned the 6th Avenue people get better attention from this City. You will create a terrible bottleneck on south bound 6th Avenue at Upas where the merge to 1 line occurs. Furthermore, the long rows of angled parking on 6th will be very unattractive. Thank you for your attention.
May 3, 2007	Please -- no dedicated bus lanes. Uptown -- a neighborhood of only 37,000 people in a city of 1.2 million -- is located on what amounts to a hilltop cul-de-sac surrounded by canyons and filled with dead-end streets. Tens of thousands (or hundreds of thousands) of commuters are NOT

Table 2.6 Summary of Comments Received via Email	
Date of Email	Comment:
	coming through Uptown to travel to or from downtown. Uptown is not a transportation hub and shouldn't be treated as one. San Diegans have many, many ways to get into and out of downtown without coming through Uptown: highways 5, 163, 805 and 15; the trolley and Coaster; 30th Street, Park Boulevard, etc. We have backed-up traffic in the heart of Uptown (Hillcrest) in the late afternoons on weekdays, with cars blocking intersections that ambulances (going to and coming from the two nearby hospitals) and fire trucks need to get through. These traffic conditions have nothing to do with the availability of lack of availability of public transit. Someone driving into Uptown might also be planning to drive to Pacific Beach and Chula Vista all in the same trip. No public transit system could accommodate that itinerary in a reasonable amount of time, and much if not most driving in Uptown is unrelated to any commuting downtown. With our many fire-prone canyons and the two hospitals, public safety dictates that traffic conditions not be worsened by removing lanes from use by automobiles. Does the city really want to play games with public safety? Some advocates of "smart growth" mistakenly believe that forcing people out of their cars by making driving conditions difficult will cause people to use public transportation. This is not true. San Franciscans have not given up their cars and will park them on sidewalks and collect tickets in order to keep them. And San Diego will never offer anything close to the comprehensive public transit available in San Francisco, which is much more compact than San Diego. But even if San Diego could do this, the experience of San Francisco shows that people will keep and drive cars no matter how inconvenient driving and parking is made for them. Thank you for considering what I have said.
May 1, 2007	hillcrest mobility study.. your webpage says…Improve the plan with your design ideas at the workshop on June 23…. what's the location?
April 27, 2007	Hello, We enjoyed your presentation very much last night. Please contact me for further interviews. Also, keep me posted regarding upcoming events, as I can keep many neighbors informed as to meetings and updates via www.FriendsofParkWest.org Thank you!

Chapter 3: Methodology

3.0 OVERVIEW

This chapter summarizes the methodology used to conduct the feasibility and alternatives analysis for the Hillcrest Corridor Mobility Strategy. The study analyzed the effects of potential changes in roadway configuration. Operational analysis was conducted to determine existing conditions and horizon year (year 2030) operations for the study alternatives. The operational analysis involved measuring and evaluating the ability of cars, trucks, emergency vehicles, transit, bicycles and pedestrians to access, serve, and travel within the study area.

The operational analysis requirements of the Hillcrest Corridor Mobility Strategy were as follows:

- Establish and report measures of effectiveness (MOEs) that assess conditions for pedestrians, bicycles, transit, cars/trucks, and parking
- Generate micro-simulations to accurately quantify and illustrate operations
- Conduct traffic analysis consistent with City of San Diego Traffic Impact Study Guidelines
- Assess impacts to, and accommodate, emergency vehicles in the recommended alternative.

3.1 MEASURES OF EFFECTIVENESS

In order to understand the effects of potential changes along Fourth, Fifth and Sixth Avenues, measures of effectiveness (MOEs) were developed based on community input to comprehensively assess future conditions for each mode under each study alternative. Traffic analysis and simulation software programs such as Synchro and VISSIM were used to determine some of the measures.

Measures of effectiveness can be quantitative or qualitative. Qualitative MOEs describe a benefit or disbenefit along the corridor that is difficult to quantify. Pedestrian features such as street lighting and landscaping are improvements that would be typically classified as qualitative MOEs. Quantitative MOEs can be measured and are reported in measurements such as seconds of delay and minutes of travel time. The following sections summarize the MOEs established for each mode for this study.

Pedestrians

The Hillcrest Corridor Mobility Strategy evolved from two prior studies that focused on identifying was to improve walkability in the study area. Walkability is a measure of the overall walking conditions in the area. Factors that affect walkability include land use mix, residential density, street connectivity, orientation and placement of homes and buildings, retail floor area ratio, access to mass transit, presence and quality of sidewalks, presence of curb ramps, presence of a buffer between walkways and moving vehicles (planter strips, on-street parking or bike lanes), safe and convenient pedestrian crossings, nearby local destinations, street furniture, street lighting, traffic flow, and air quality.

The walkability of the corridor was evaluated based on the criteria listed below. Based on the findings, recommendations to improve the walkable nature of the corridor were proposed.

- *Crosswalk Locations:* Spacing of safe, convenient, and accessible street crossings along the corridor.
- *Crosswalk Visibility:* Clearly marked and identifiable crosswalks for pedestrians and drivers.
- *Pedestrian Exposure at Crosswalks:* Distance/number of lanes for pedestrians to cross the street. (May indicate the need for center median refuge areas).
- *Vehicle Speeds at Pedestrian Crossings*
- *Conflicts between Pedestrians and Vehicles*
- *Presence and Quality of Sidewalks:* Adequate width, presence of four zones (edge zone, furnishings zone, throughway zone and frontage zone), accessible by persons with disabilities.
- *Walkability:* Quality of the walking environment considers presence of buffer from moving vehicles, street trees, street lighting, street furniture, and public art.
- *Access to Transit:* Spacing between transit stops, quality of the pedestrian waiting areas at stops and quality of pedestrian connections to transit stops.

Bicycles

Bicycle circulation was evaluated based on several different criteria. The project team was provided input from the San Diego Bicycle Coalition in developing the MOEs and in preparing a design to satisfy the bicycling needs. The bicycle MOEs are:

- *Capacity:* Ability to safely provide separate or shared facility for bicycle use on Fourth, Fifth and Sixth Avenues.
- *Crossings:* Safe and convenient east-west bicycle crossings of the principal north-south corridor streets to improve bicycle connectivity in study area.
- *Linkage to Bicycle Master Plan:* Evaluates potential alternative routes in the study area and whether direct linkage to the City's Bicycle Master Plan and/or Community Plan bicycle routes is provided to and within the study corridor.
- *Vehicle Speeds*
- *Access to Transit:* Quality of bicycle connections to transit service, presence of bicycle storage

facilities at transit stops and ability to transport bicycles on transit vehicles.

Transit

The alternatives analysis evaluated the potential for implementing transit lanes along portions of Fourth and Fifth Avenues. Additionally, a reduction of total transit stops and relocation of specific stops are being considered that would affect transit operations along the corridor. Some MOEs listed below are qualitative. For others, the VISSIM software was utilized to quantify results. The transit-specific MOEs are:

- *Headway:* Time between scheduled buses.
- *Transit Vehicle Travel Time (VISSIM):* The time it takes for a transit vehicle to travel from one end of the corridor to the other, reported in minutes per vehicle.
- *Transit Delay (VISSIM):* Average weighted delay time based on the number of transit vehicles and total delay imposed on transit vehicles during the peak hour.
- *Reliability/On-time Performance:* Percentage of transit vehicles arriving at a transit stop on time.
- *Transit Passenger Access:* Locations and spacing of transit stops along the corridor.

Traffic

The Highway Capacity Manual (HCM) methodology is the most widely accepted and familiar tool for analyzing intersection operations in the San Diego region. It is also required by the City of San Diego in traffic studies. As such, intersection delay using the HCM methodology was reported for both existing conditions and future changes to the intersection and roadway geometry as part of the alternatives analysis. VISSIM, a traffic micro-simulation program, was used to report additional MOEs for the Base and 2005 Concept scenarios as well as for all alternative concept plan scenarios because it provided a more accurate and useful tool to evaluate the alternatives. The traffic MOEs evaluated in the study area are as follows:

- *Intersections Delay (HCM Methodology):* Average vehicle delay for all approaches of an intersection, reported in seconds per vehicle.
- *Roadway Segment Daily Volume-to-Capacity (V/C) Ratios (City Average Daily Traffic (ADT) Thresholds):* Reports a Level of Service (LOS) based on daily traffic volumes and associated planning-level capacity thresholds.
- *Passenger Vehicle Travel Time (VISSIM):* Average time it takes to travel from one end of the corridor to the other, reported in minutes per vehicle. Additional information on the VISSIM traffic simulation software program is provided in Section 3.2
- *Corridor Delay (VISSIM):* Cumulative delay along each corridor during the peak hour measured in hours. Additional information on the VISSIM traffic

simulation software program is provided in Section 3.2.

Parking

Changes to the roadway configuration, pop-outs and transit improvements in the alternatives may affect parking supply and traffic flow. The measures of effectiveness for evaluating parking are as follows:

- *Number and Change in Number of Parking Spaces:* Number of spaces and net increase or decrease in parking spaces by block and corridor.
- *Effects of Increase/Decrease in Parking:* The effect of increase/decrease in parking by location.
- *Interaction of Parking Maneuvers and Traffic Flow:* Evaluation of safety and delay time to complete parking maneuvers for parallel, head-in diagonal and back-in diagonal parking which corresponds to delays imposed on traffic flow.

3.2 VISSIM – WHAT IS IT?

The VISSIM analysis software is a microscopic model capable of simulating multi-modal traffic flows, including cars, trucks, buses, heavy rail, light rail, bicycles, and pedestrians. The simulation capabilities of VISSIM are unlike typical HCM methods of analysis in that VISSIM tracks the individual vehicle interactions in the study corridor that affect overall operating conditions. VISSIM quantifies overall and individual intersection delays more realistically, as well as other measures of effectiveness, such as travel time and intersection delay. VISSIM also measures the effects of transit signal priority measures at individual intersections.

VISSIM was selected as an analytical tool because it is sensitive to the conditions that affect transit and traffic operations along the corridor, and allows passenger vehicle and transit travel characteristics to be quantified separately. The VISSIM traffic model generates travel time and delay based on multiple model runs that simulate a range of potential traffic operations scenarios.

3.3 CITY OF SAN DIEGO TRAFFIC IMPACT STUDY REQUIREMENTS

The Hillcrest Corridor Mobility Study was not a typical traffic impact study. Rather than analyzing the effects of a proposed development project or change in land use, the study analyzed the effects of potential changes in roadway configuration in order to determine the alternative that would best meet the project goals. The study still followed the City's Traffic Impact Study Guidelines to help evaluate the alternatives and to provide the required traffic analysis for the environmental study to follow.

Study Scenarios

The following scenarios were analyzed to determine the impacts of the proposed changes in roadway capacity along the corridor:

- o Existing Conditions
- o Near Term Year 2010 Conditions with Existing Roadway/Intersection Configuration
- o Near Term Year 2010 with 2005 Concept Plan
- o Horizon Year 2030 Conditions with Existing Roadway/ Intersection Configuration
- o Horizon Year 2030 with 2005 Concept Plan

Peak hour conditions within the a.m. peak period (7:00 to 9:00 a.m.) and p.m. peak period (4:00 to 6:00 P.M.) were evaluated for each study scenario. The following sections discuss the detailed operational analysis methodology.

Intersection Analysis Methodology

According to City standards, intersections are typically analyzed using the Highway Capacity Manual (HCM) methodology. Several software packages, such as Traffix, Synchro, and HCS, are available to evaluate traffic signals with the HCM methodology. The HCM methodology peak hour intersection analysis calculates the average delay per vehicle for all approaches of an intersection in the case of signalized and all-way stop intersections and for the stop-controlled approach only in the case of a minor street stop-controlled intersection. A letter designation ranging from A through F is then associated to the intersection operations based on a set of delay ranges. Levels of service (LOS) A, B, and C are generally considered acceptable, LOS D is considered marginal, and LOS E and F are considered unacceptable. Table 3-1 presents the delay range for LOS A through F at signalized and unsignalized intersections.

Table 3-1
Intersection LOS & Delay Ranges

LOS	Average Delay (sec)	
	Signalized Intersection	Unsignalized Intersection
A	0.0 – 10.0	0.0 – 10.0
B	>10.0 – 20.0	>10.0 – 15.0
C	>20.0 – 35.0	>15.0 – 25.0
D	>35.0 – 55.0	>25.0 – 35.0
E	>55.0 – 80.0	>35.0 – 50.0
F	>80.0	>50.0

Source: 2000 Highway Capacity Manual.

Roadway Segment Methodology

Roadway segment operations are generally evaluated by comparing existing and forecast average daily traffic levels to planning-level daily capacity thresholds. Daily capacity thresholds vary based on the street classification which is determined by functionality, roadway width, and the number of travel lanes.

Table 3-2 presents the various street classifications and associated planning-level daily traffic thresholds for LOS A through LOS E as published in the City of San Diego Traffic Impact Study Manual (TISM). The TISM indicates that the volumes and the average daily levels of service listed in Table 3-2 are only intended as a general planning guideline. The table does not take into consideration other factors that affect actual roadway capacity, such as lane widths, presence of a raised median, presence of driveways, number and spacing of cross streets, traffic controls, presence of parallel or angled parking and grade.

The City's TISM does not include thresholds for one-way streets. Due to the absence of on-coming traffic and associated conflicting turning movements, a one-way street typically capable of carrying more traffic than a two lane road with the same number of lanes. The daily roadway segment capacities summarized in Table 3-2 for the one-way streets were developed together with City of San Diego staff for this study.

Thresholds of Significance

The City has established thresholds of significance to determine when a project's impact is significant and mitigation measures are to be identified.

The thresholds are based upon the current and future operating conditions at an intersection or along a roadway segment. Table 3-3 summarizes the City's adopted thresholds of significance.

Table 3-2
Roadway Classifications, LOS, and ADT Thresholds

Street Classifications (# Lanes)	Levels of Service				
	A	B	C	D	E
Expressway (6)	30,000	42,000	60,000	70,000	80,000
Prime Arterial (6)	25,000	35,000	50,000	55,000	60,000
Major Arterial (6)	20,000	28,000	40,000	45,000	50,000
Major Arterial (4)	15,000	21,000	30,000	35,000	40,000
Secondary Arterial/Collector (4)	10,000	14,000	20,000	25,000	30,000
Collector, no center lane (4); continuous left-turn lane (2)	5,000	7,000	10,000	13,000	15,000
Collector, no fronting (2)	4,000	5,500	7,500	9,000	10,000
Collector, Commercial-industrial fronting (2)	2,500	3,500	5,000	6,500	8,000
Collector, multi-family (2)	2,500	3,500	5,000	6,500	8,000
Sub-Collector, single-family (2)	-	-	2,200	-	-
One-Way (3 Lanes)*	9,000	12,000	18,000	21,000	24,000
One-Way (2 Lanes)*	6,000	8,000	12,000	14,000	16,000

Source: City of San Diego Traffic Impact Study Manual
*The daily roadway segment capacities summarized in Table 3-2 for one-way Streets were developed with City of San Diego staff.

Table 3-3 City of San Diego Thresholds of Significance Criteria						
Level of Service with Project *	Allowable Change Due To Project Impact **					
	Freeways		Road Segment		Int.	Ramp Meter
	V/C	Speed (mph)	V/C	Speed (mph)	Delay (sec.)	Delay (min.)
E (or ramp meter delays above 15 min.)	0.010	1.0	0.020	1.0	2.0	2.0
F (or ramp meter delays above 15 min.)	0.050	1.0	0.010	0.5	1.0	1.0

* All LOS measurements are based upon Highway Capacity Manual procedures for peak-hour conditions. However, V/C ratios for roadway segments are estimated on an ADT/24-hour traffic volume basis (using Table 2 of the City's Traffic Impact Study Manual. The acceptable LOS for freeways, roadways, and intersections is generally "D" ("C" for undeveloped locations). For metered freeway ramps, LOS does not apply. However, ramp meter delays above 15 minutes are considered excessive.

** If a proposed project's traffic causes the values shown in the table to be exceeded, the impacts are determined to be significant. The project applicant shall then identify feasible improvements (within the Traffic Impact Study) that will restore/and maintain the traffic facility at an acceptable LOS. If the LOS with the proposed project becomes unacceptable (see above * note), or if the project adds a significant amount of peak-hour trips to cause any traffic queues to exceed on- or off-ramp storage capacities, the project applicant shall be responsible for mitigating the project's direct significant and/or cumulatively considerable traffic impacts.

KEY: Delay = Average control delay per vehicle measured in seconds for intersections, or minutes for ramp meters
LOS = Level of Service
Speed = Speed measured in miles per hour
V/C = Volume to Capacity ratio

3.4 SUMMARY

Establishing a clear set of measures of effectiveness at the onset of the project allowed the Project Team to objectively evaluate alternatives for the corridor. In this chapter, city criteria as well as project MOEs were established which were used and referenced throughout this document.

After a thorough review of the MOEs reported for each of the alternatives, the alternative with the most favorable overall balance of travel time and delay among the various modes and users along the corridor will be identified as the Refined Concept Plan. The Refined Concept Plan will be reviewed to ensure that the plan met the initial traffic calming goals and community concerns.

Chapter 4:
Existing Conditions

4.0 OVERVIEW

One of the keys to forecasting future operating conditions along a corridor is to have a firm understanding of the existing conditions. Existing conditions include:

- o Traffic Operations – Volume, Signal Timing, Lane Configuration, Parking
- o Transit Operations – Span of Service, Headways, Ridership, Stops
- o Physical Conditions – Topography, Utilities, Street Width, Signing, Striping
- o Pedestrian Access – Crosswalks, Sidewalks, Transit Access
- o Bicycle Access – Bicycle Facilities (Routes, Lanes, Paths), Transit Access

The interaction of these elements results in the day-to-day operations along the study corridors. The objective of the existing conditions data collection efforts is two-fold:

- o Create a computer-based transportation model that adequately reflects existing travel on the corridor; and
- o Identify the physical constraints that may affect the implementation of proposed changes to the corridor transportation facilities.

The VISSIM transportation model, established with the existing conditions data, will be used to simulate traffic operations for all the study alternatives for the existing and future year conditions. The VISSIM model melds the data collected for traffic, transit and pedestrian activity with the physical conditions of the roadway to produce both visual simulations as well as technical data regarding traffic and transit flow.

To establish the physical conditions along the corridor, an aerial photograph of the corridor was provided by the City of San Diego. City As-Built drawings were researched and utility companies were contacted to identify all existing underground utilities along the corridor. Existing curb, gutter, sidewalk and right-of-way were identified that will be used to estimate the costs of implementing the Refined Concept Plan as discussed in later chapters of this document.

This chapter provides a detailed review of the data collection efforts and existing operational analysis undertaken as part of the project to establish the existing conditions.

4.1 DESCRIPTION OF STUDY AREA

The project study area encompasses Fourth, Fifth and Sixth Avenues from Washington Street to Elm Street. A total of 20 signalized intersections, 50 unsignalized intersections and 37 roadway segments in the study area were analyzed.

Parallel parking is provided on both sides of Fourth, Fifth and Sixth Avenues throughout much of the study area. Parking is also permitted along all side streets. The configuration of the side street parking is typically a function of the width of the roadway, although several streets have sufficient curb-to-curb width to accommodate additional on-street parking by converting the existing parallel parking to angle parking.

Six bus routes currently travel through the study area, serving a total of 27 transit stops located primarily along Fourth and Fifth Avenues. Most transit stops are uncovered and without benches or amenities. Two routes travel the length of the corridor; three routes cross the corridor on University Avenue in central Hillcrest, one shuttle route connects the corridor to the west and one route has its western terminus in central Hillcrest.

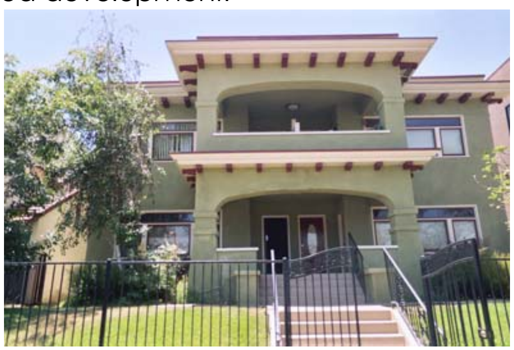
Sidewalks are currently provided along both sides of the street for Fourth, Fifth and Sixth Avenue, except for a portion of the west side of Fourth Avenue near the Quince Street Pedestrian Bridge. Sidewalks are also provided on all east-west streets in the study area. Sidewalk widths range from 5 to 15 feet. Pedestrian crossings are permitted at most intersections.

The Quince Street Bridge provides pedestrian access across a canyon west of Fourth Avenue in the central portion of the corridor. On Sixth Avenue at Juniper Street, there is a barricade that prohibits all cross traffic, including pedestrians. At the time this study was underway, an enhanced pedestrian crosswalk was being installed on Fifth Avenue at Nutmeg Street.

According to the Community Plan, an existing Class III bicycle route follows Fourth and Fifth Avenues north from downtown and crosses over to Third Avenue at Upas Street where it heads north to University Avenue. For all Class III bicycle facilities, bicycles are required to share the right travel lane with buses and passenger vehicles. No Class I bike paths or Class II bicycle lanes are provided in the study area. Bicycle racks are provided throughout the community, both free standing as well as mounted to existing parking meters.

4.2 EXISTING LAND USE

Existing land uses in the study area are a mix of retail, restaurant, office, and residential uses. However, the Uptown community continues to evolve. The Uptown Community Plan designates a predominant portion of the study area for mixed-use and commercial/residential development. Several new projects are planned and moving forward in the next five to ten years that will bring higher residential densities to the study area. Such densities are typical with mixed-use and transit-oriented development.



4.3 EXISTING UTILITIES MAPPING

As part of the base mapping for the corridor, dry utility companies were contacted including gas (SDG&E), telephone (SBC), and cable (Cox Communications). A copy of a map illustrating the study area and a request for utility information was sent out via fax to all identified utility companies along the corridor. Each company contacted provided the requested underground utility information.

As-built maps of the corridor, which illustrate existing right-of-way, curb, gutter, sidewalk, water, sewer and storm drain, were researched through the City of San Diego. RBF staff worked closely with City staff to locate as many as-built drawings as possible. Due to the age of the streets in the study area, some as-built drawings could not be found.

Property and right-of-way mapping was researched through the County of San Diego. The existing conditions base map information was drafted into AutoCAD and laid over the aerial photograph.

The existing utilities mapping is provided in Appendix 4-A.

4.4 EXISTING ROADWAY NETWORK

RBF Consulting conducted a detailed field investigation of the existing roadway conditions along Fourth, Fifth and Sixth Avenue that involved a survey of all existing parking spaces, existing lane widths, traffic control, bus stop locations and striping at the intersections. Data was collected using hand held GPS units. Existing conditions were further verified using a viewer program provided by City of San Diego for use in this project. Street classifications are defined by the City of San Diego in the Uptown Community Plan Circulation Element.

Fourth Avenue is a one-way (southbound) secondary arterial that extends from north of Arbor Drive in Uptown to K Street in downtown. In the northern portion of the corridor (Washington Street to Walnut Street), Fourth Avenue is two lanes with parallel parking on both sides. Through the central and southern portions of the study area (Walnut Street to Elm Street), Fourth Avenue is three lanes with parallel parking on both sides. The posted speed limit for Fourth Avenue is 30 mph.

Fifth Avenue is a three-lane one-way (northbound) secondary arterial that extends from Washington Street in Uptown to Harbor Drive in downtown. The posted speed limit for Fifth Avenue is 30 mph.

Sixth Avenue is a four-lane undivided secondary arterial as defined in the Uptown Community Plan. At the northern end, Sixth Avenue feeds directly into SR-163. To the south, at Elm Street, Sixth Avenue becomes one-way southbound and extends into downtown, terminating at L Street. Sixth Avenue is also the western boundary for Balboa Park, with access points to the park at Upas Street, Laurel Street, and Juniper Street. Parallel parking is provided on both sides of Sixth Avenue and the posted speed limit is 30 mph.

Washington Street is the northern boundary of the project study area, running east-west from west of I-5 to Park Boulevard. It is classified as a four to six lane major arterial. Traffic signals and turn pockets are currently provided at both Fourth and Fifth Avenues; Sixth Avenue is grade-separated from Washington Street. The posted speed limit through the study area on Washington Street is 40 mph.

University Avenue runs east-west through the northern section of the project study area. It is classified as a two lane collector west of Fifth Avenue and as a four lane major east of Fifth Avenue. It extends from Washington Street in the neighborhood of Mission Hills to Baltimore Street in the City of La Mesa. Through the study area, parallel parking on both sides of the street. Signalized intersections are provided at Fourth, Fifth and Sixth Avenues with left turn pockets available at Fourth and Sixth Avenues. The posted speed limit through the study area on University Avenue is 35 mph.

Robinson Avenue is also classified as a two-lane collector

road through the study area. It extends from Curlew Street in Uptown to Alabama Street in the Greater North Park community. Through the study area, parking is provided on both sides of Robinson Avenue and the posted speed limit is 30 mph. Left turn pockets are provided at Sixth Avenue.

Upas Street is located at the northern boundary of the central section of the study area and is classified as a two-lane collector arterial. Upas Street extends from Front Street to Sixth Avenue, where it continues into Balboa Park as Balboa Park Drive. East of Sixth Avenue, a separate section of Upas Street follows the north boundary of the park. Parking is currently provided on both sides of Upas Street and the speed limit is 30 mph.

Laurel Street is located in the southern section of the project study area. It is classified as a two-lane collector arterial and extends from west of I-5 to Sixth Avenue. Laurel Street is the major vehicular access point to Balboa Park. Parking is provided on both sides of Laurel Street and the speed limit through the study area is 30 mph.

Juniper Street runs east-west extending from west of I-5 to Sixth Avenue. It is also classified as a two-lane collector arterial with a speed limit of 30 mph through the study area. Parking is provided on both sides of the street. Juniper Street provides outbound access from Balboa Park, however a raised median has been constructed on Sixth Avenue that restricts left turn access to and from Juniper Street. This barrier also prohibits bicycle and restricts pedestrian access at this location.

Hawthorn Street and Grape Street are both classified in the Uptown Community Plan as a three-lane collector roads that extend from west of I-5 to Sixth Avenue. Currently, parking is allowed on both sides of Hawthorn Street and Grape Street through the study area. The speed limit is 30 mph.

Elm Street is classified as a three-lane one-way collector (westbound) arterial that extends from First Avenue to Sixth Avenue. At First Avenue, Elm Street feeds the I-5 northbound on-ramp. At Sixth Avenue, Elm Street receives traffic from the I-5 northbound offramp. Parking is permitted on both sides of Elm Avenue through the study area and the speed limit is 30 mph.

Numerous other local streets run east west through the project study area. These streets, illustrated in Exhibit 4-1 are not classified in the Uptown Community Plan. Most are two-lanes with stop controlled access at Fourth, Fifth and Sixth Avenue.

Parking (either head-in angled or parallel) is typically permitted on the local streets and the speed limit is 25 mph. Parking meters have been installed throughout the study area. In most areas, parking meters restrict parking to two-hours.

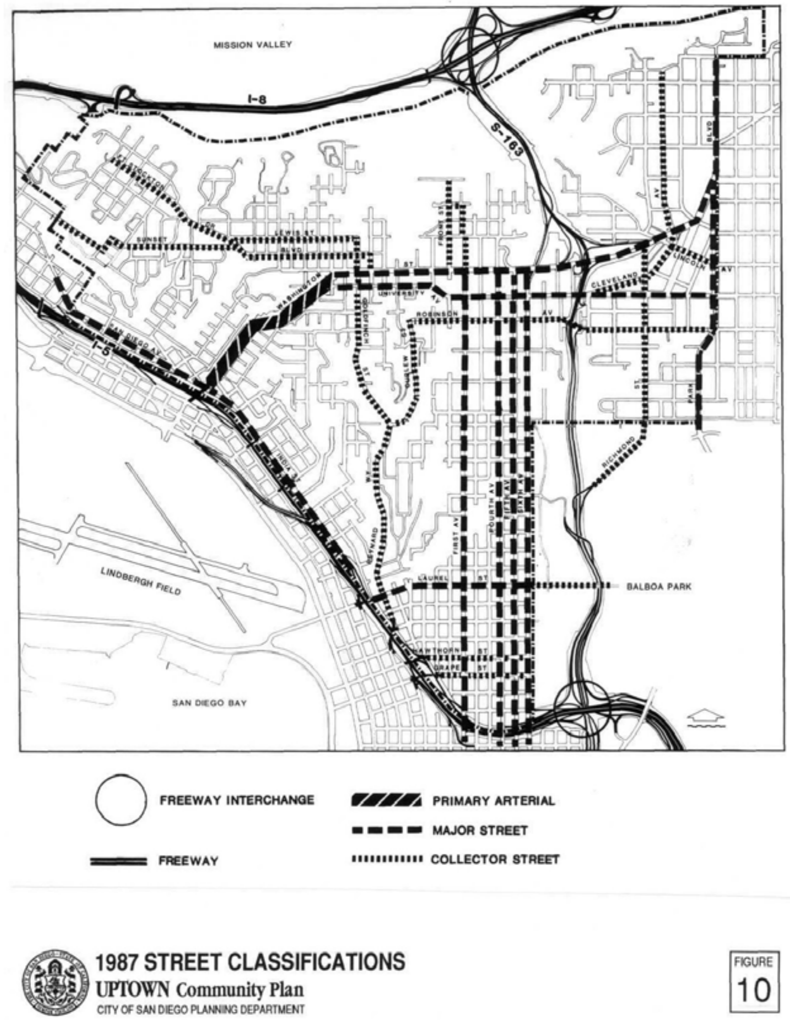


Exhibit 4-1 Uptown Community Plan Roadway Classifications

4.5 EXISTING TRAFFIC CONDITIONS

Data Collection

To evaluate traffic operations in the study corridor, detailed traffic count data was collected for all intersections and several roadway segments along Fourth, Fifth and Sixth Avenues.

Average daily traffic count data was collected for a 24-hour period at several locations along the corridor, as illustrated in Exhibit 4-2. This 24-hour data was used to assess the existing roadway segment operating conditions according to City of San Diego roadway classifications and level of service thresholds. The data was also used to determine the peak traffic volumes throughout out the day. The peak hours along the roadway were determined to fall between the hours of 7:00 and 9:00 a.m. and 4:00 and 6:00 p.m.

Based on this confirmation of the peak hours, intersection turning movement data was collected on a typical weekday (Tuesday, Wednesday or Thursday) for three peak periods: a.m. peak (7:00 to 9:00 a.m.), midday peak (11:00 a.m. to 1:00 p.m.) and p.m. peak (4:00 to 6:00 p.m.). RBF Consulting teamed with a traffic count consultant (Counts Unlimited) to collect the remaining data in December 2006. Traffic count data also included counting pedestrian crossings and bicycle activity along the corridor. Peak hour intersection turning movement volumes are provided as an appendix to this document.

In addition, floating car travel time surveys were conducted during the month of June to verify both traffic speeds and travel times along the corridors. This information was used to validate the VISSIM traffic modeling efforts.

Roadway Segment Operational Analysis

The City of San Diego aims to maintain roadway segment operations LOS D or better. Roadway segment level of service is based on capacity thresholds that correspond to roadway classifications established in the Uptown Community Plan. Average daily traffic volumes (ADT) collected for this project show that portions of Fourth, Fifth and Sixth Avenue in the central and southern portions of the study area operate at LOS C or better.

In the northern section of the study area, portions of Washington Street and Robinson Street currently operate at LOS F operating conditions. Sixth Avenue between Washington Street and University Avenue operates at LOS E. All other roadway segments operate at LOS D or better. The roadway segment level of service analysis for the study area is summarized in Table 4-1.

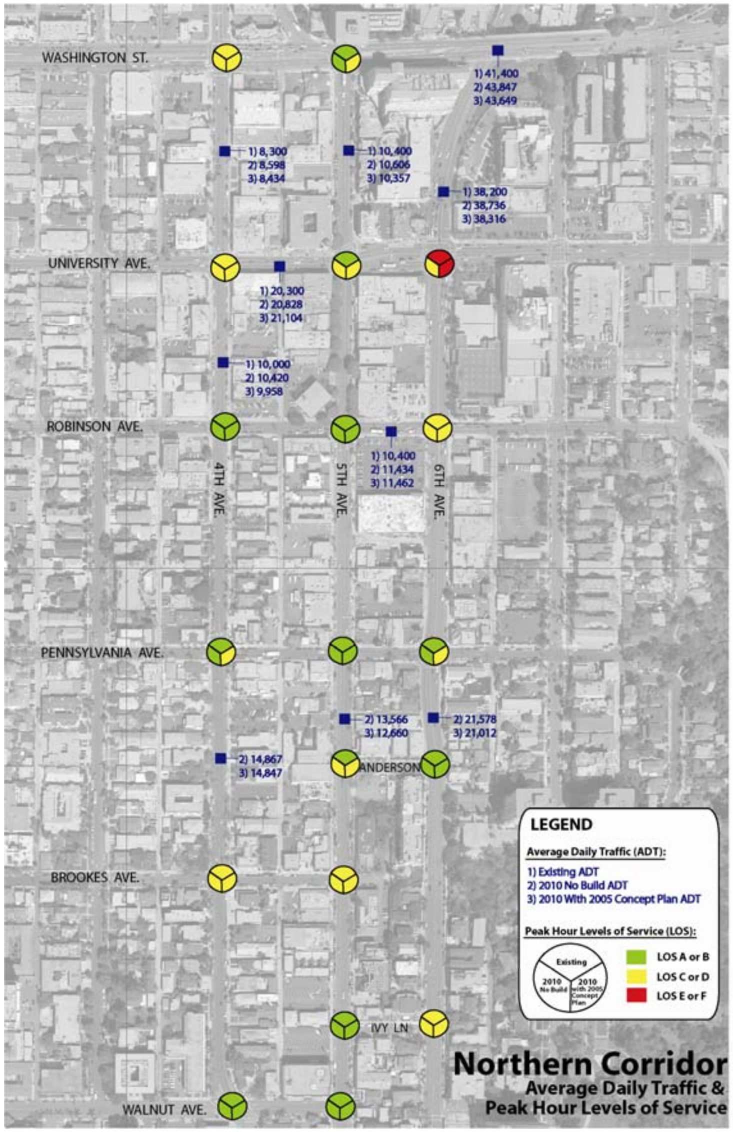


Exhibit 4-2 Existing Average Daily Traffic Volumes

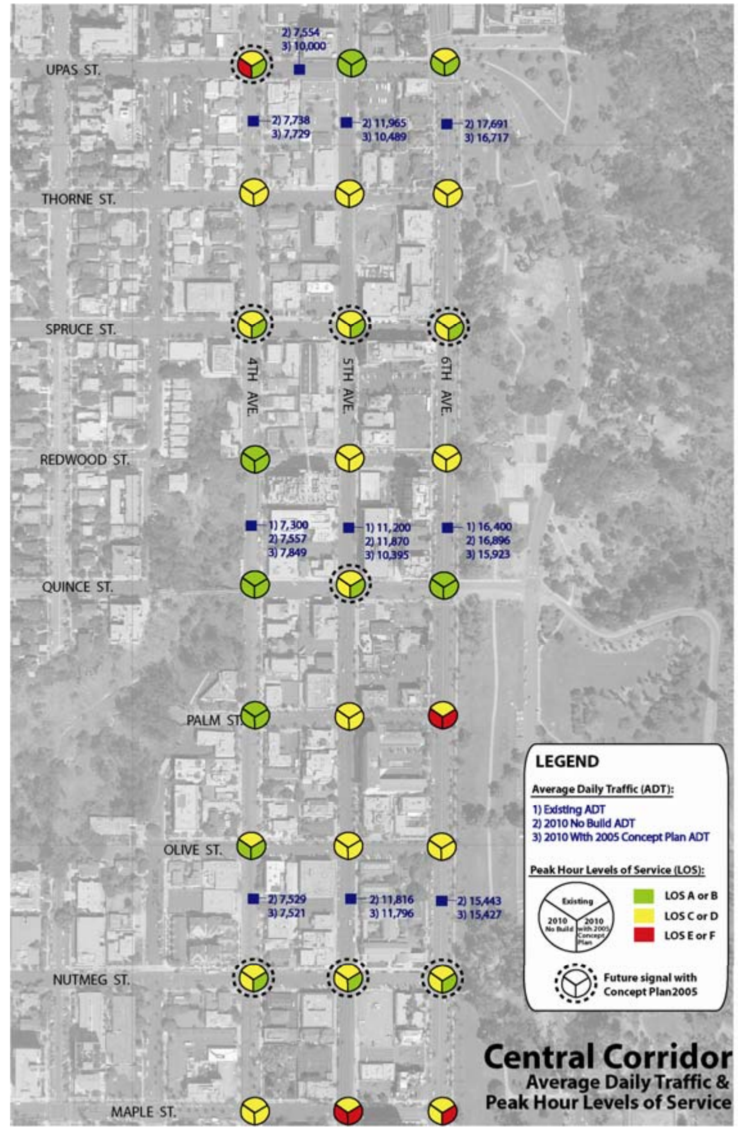


Exhibit 4-2 Existing Average Daily Traffic Volumes

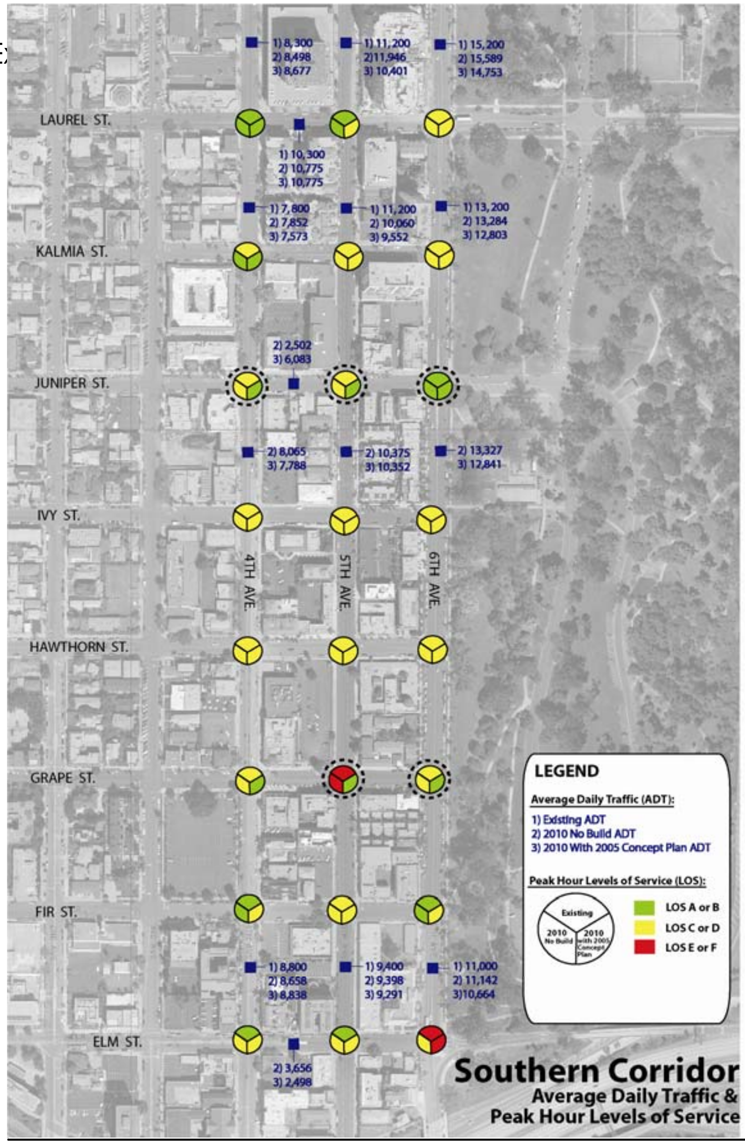


Exhibit 4-2 Existing Average Daily Traffic Volumes

As shown in Table 4-1, most segments along Fourth and Fifth Avenue operate at LOS A or LOS B with the ratio of volume to capacity of less than 50 percent. Low volume-to-capacity ratios indicate that the roads currently provide excess capacity compared to the existing demand for these roadways. Without horizontal or vertical deflections along the roadways, excess capacity may lead to higher travel speeds that what are desired.

Intersection Operational Analysis
HCM Level of Service

As described in Chapter 3, intersections in the study area were evaluated using the 2000 Highway Capacity Manual (HCM) methodology. Additionally, the VISSIM software program was utilized to report travel time and travel speed for the corridor. Traffic analysis worksheets for the existing conditions analysis are provided Appendix 4-B.

Table 4-2 presents the level of service at the signalized and unsignalized study intersections based on the HCM methodology. As shown in the table, two intersections currently operate at deficient levels of service:

- Sixth Avenue / University Avenue (signalized)
- Fifth Avenue / Grape Street (unsignalized)

Delay reported for signalized intersections is the total average delay for all movements through the intersection. For the stop-sign-controlled (unsignalized) intersections, delay is measured only on the stop-controlled approach and the left turn movements on the uncontrolled approach.

VISSIM Delay Summary
Motor Vehicle Travel Time

VISSIM Micro-simulation software was used to analyze conditions within the Fourth, Fifth, and Sixth Avenue corridors including both the overall corridors and major sub-areas of each corridor. Key indicators developed by VISSIM included travel time and speed. Travel time and speed are useful indicators for the following reasons:

- Travel time and speed are two items that drivers are keenly aware of. Drivers may not notice changes in LOS until they impact travel time and speed.
- A significant change in travel time can sometimes induce drivers to seek alternative routes.
- Travel time and speed can be easily compared across all corridors and segments of the corridor.
- Travel time and speed can also be compared between travel modes.

Table 4-3 provides travel time and speed data for automobiles along the study corridors (Fourth, Fifth, and Sixth Avenue) and also major sub-areas within these corridors.

Table 4-1
Existing Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Class (Lanes)	LOS E Capacity	Existing Conditions		
					ADT	V/C	LOS
1 .	Washington Ave.	From Fifth to 7th Ave.	Major NP (4)	40,000	41,380	1.03	F
2 .	University Ave.	From Fourth Ave. to Fifth Ave.	Collector WP (4)	30,000	20,256	0.68	D
3 .	Robinson St.	From Fifth to Sixth Ave.	Collector NP (2)	10,000	10,360	1.04	F
4 .	Upas St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	-	-	-
5 .	Laurel St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	15,000	10,348	0.69	D
6 .	Juniper St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	-	-	-
7 .	Elm St.	From Fourth Ave. to Fifth Ave.	One-Way WP (3)	24,000	-	-	-
8 .	Fourth Ave.	From Washington to University	One-Way WP (2)	16,000	8,291	0.52	C
9 .		From University to Robinson	One-Way WP (2)	16,000	10,034	0.63	C
10 .		From Pennsylvania to Brookes	One-Way WP (2)	16,000	-	-	-
11 .		From Upas to Thorn	One-Way WP (3)	24,000	-	-	-
12 .		From Redwood to Quince	One-Way WP (3)	24,000	7,346	0.31	A
13 .		From Olive to Nutmeg	One-Way WP (3)	24,000	-	-	-
14 .		From Maple to Laurel	One-Way WP (3)	24,000	8,265	0.34	A
15 .		From Laurel to Kalmia	One-Way WP (3)	24,000	7,825	0.33	A
16 .		From Juniper to Ivy	One-Way WP (3)	24,000	-	-	-
17 .		From Fir to Elm	One-Way WP (3)	24,000	8,817	0.37	A

Table 4-1 (Continued)
Existing Conditions Roadway Segment Level of Service Analysis

Street		Segment	Classification (Lanes)	LOS E Capacity	Existing Conditions ADT	Existing Conditions V/C	Existing Conditions LOS
18 .	Fifth Ave.	From Washington to University	One-Way WP (3)	24,000	10,391	0.43	B
19 .		From University to Robinson	One-Way WP (3)	24,000	10,428	0.43	B
20 .		From Pennsylvania to Brookes	One-Way WP (3)	24,000	-	-	-
21 .		From Upas to Thorn	One-Way WP (3)	24,000	-	-	-
22 .		From Redwood to Quince	One-Way WP (3)	24,000	11,157	0.46	B
23 .		From Olive to Nutmeg	One-Way WP (3)	24,000	-	-	-
24 .		From Maple to Laurel	One-Way WP (3)	24,000	11,233	0.47	B
25 .		From Laurel to Kalmia	One-Way WP (3)	24,000	10,187	0.42	B
26 .		From Juniper to Ivy	One-Way WP (3)	24,000	-	-	-
27 .		From Fir to Elm	One-Way WP (3)	24,000	9,405	0.39	B
28 .	Sixth Ave.	From Washington to University	Major NP (4)	40,000	38,178	0.95	E
29 .		From University to Robinson	Collector WP (4)	30,000	23,032	0.77	D
30 .		From Pennsylvania to Brookes	Collector WP (4)	30,000	-	-	-
31 .		From Upas to Thorn	Collector WP (4)	30,000	-	-	-
32 .		From Redwood to Quince	Collector WP (4)	30,000	16,398	0.55	C
33 .		From Olive to Nutmeg	Collector WP (4)	30,000	-	-	-
34 .		From Maple to Laurel	Collector WP (4)	30,000	15,208	0.51	C
35 .		From Laurel to Kalmia	Collector WP (4)	30,000	13,247	0.44	B
36 .		From Juniper to Ivy	Collector WP (4)	30,000	-	-	-
37 .		From Fir to Elm	Collector WP (4)	30,000	10,985	0.37	B

Table 4-2
Existing Conditions Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Washington St @								
1 .	Fourth Ave.	Yes	35.8	D	35.1	D	50.4	D
2 .	Fifth Ave.	Yes	16.5	B	18.9	B	18.3	B
University Ave. @								
3 .	Fourth Ave	Yes	28.3	C	30.7	C	34.3	C
4 .	Fifth Ave.	Yes	16.1	B	17.8	B	17.3	B
5 .	Sixth Ave.	Yes	47.5	D	50.4	D	91.9	F
Robinson Ave. @								
6 .	Fourth Ave.	Yes	13.8	B	12.2	B	17.3	B
7 .	Fifth Ave.	Yes	12.5	B	11.3	B	12.9	B
8 .	Sixth Ave.	Yes	25.9	C	28.9	C	32.3	C
Pennsylvania Ave @								
9 .	Fourth Ave.	No	9.7	A	10.6	B	10.7	B
10 .	Fifth Ave.	Yes	7.3	A	7.8	A	9.8	A
11 .	Sixth Ave.	Yes	8.5	A	10.0	B	16.4	B
Anderson Pl.@								
12 .	Fifth Ave.	No	10.7	B	11.6	B	14.6	B
13 .	Sixth Ave.	No	0.8	A	0.2	A	0.6	A
Brookes Ave. @								
14 .	Fourth Ave.	No	12.8	B	19.5	C	15.3	C
15 .	Fifth Ave.	No	12.9	B	19.8	C	17.1	C
Ivy Ln. @								
16 .	Fifth Ave.	No	10.3	B	12.1	B	12.7	B
17 .	Sixth Ave.	No	17.7	C	23.6	C	18.8	C

Table 4-2
Existing Conditions Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Walnut Ave. @								
18 .	Fourth Ave.	No	9.7	A	9.5	A	10.5	B
19 .	Fifth Ave.	No	12.1	B	11.7	B	11.0	B
Upas St.@								
20 .	Fourth Ave.	No	22.3	C	28.5	D	21.1	C
21 .	Fifth Ave.	Yes	8.3	A	7.1	A	7.0	A
22 .	Sixth Ave	Yes	26.1	C	9.0	A	10.8	B
Thorne St.@								
23 .	Fourth Ave.	No	13.9	B	15.2	C	15.3	C
24 .	Fifth Ave.	No	14.0	B	17.7	C	23.7	C
25 .	Sixth Ave.	No	13.0	B	14.7	B	15.1	C
Spuce St. @								
26 .	Fourth Ave.	No	20.4	C	16.9	C	18.6	C
27 .	Fifth Ave.	No	19.9	C	30.6	D	32.5	D
28 .	Sixth Ave.	No	16.3	C	15.1	C	14.0	B
Redwood St. @								
29 .	Fourth Ave.	No	10.5	B	11.3	B	10.8	B
30 .	Fifth Ave.	No	14.6	B	18.9	C	20.8	C
31 .	Sixth Ave.	No	18.1	C	11.6	B	13.0	B
Quince St. @								
32 .	Fourth Ave.	No	10.6	B	11.5	B	10.9	B
33 .	Fifth Ave.	No	15.0	B	17.7	C	24.7	C
34 .	Sixth Ave.	Yes	6.2	A	6.8	A	5.4	A

Table 4-2
Existing Conditions Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Palm St. @								
35 .	Fourth Ave.	No	12.0	B	11.9	B	11.9	B
36 .	Fifth Ave.	No	16.9	C	18.3	C	20.3	C
37 .	Sixth Ave.	No	13.6	B	32.4	D	13.6	B
Olive St. @								
38 .	Fourth Ave.	No	11.5	B	14.4	B	15.0	C
39 .	Fifth Ave.	No	21.2	C	17.8	C	26.7	D
40 .	Sixth Ave.	No	18.9	C	16.7	C	18.1	C
Nutmeg St. @								
41 .	Fourth Ave.	No	13.6	B	15.2	C	14.8	B
42 .	Fifth Ave.	No	16.1	C	23.1	C	28.4	D
43 .	Sixth Ave.	No	17.2	C	13.4	B	17.7	C
Maple St. @								
44 .	Fourth Ave.	No	16.1	C	22.3	C	18.6	C
45 .	Fifth Ave.	No	20.4	C	33.7	D	19.9	C
46 .	Sixth Ave.	No	15.4	C	13.6	B	28.5	D
Laurel St. @								
47 .	Fourth Ave.	Yes	13.0	B	13.4	B	15.2	B
48 .	Fifth Ave.	Yes	14.0	B	12.9	B	15.5	B
49 .	Sixth Ave.	Yes	18.6	B	18.2	B	23.0	C
Kalmia St. @								
50 .	Fourth Ave.	No	13.9	B	13.1	B	15.4	C
51 .	Fifth Ave.	No	15.0	C	19.1	C	22.4	C
52 .	Sixth Ave.	No	11.3	B	15.3	C	12.1	B

Table 4-2
Existing Conditions Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Juniper Street @								
53 .	Fourth Ave.	No	14.1	B	13.3	B	17.0	C
54 .	Fifth Ave.	No	15.5	C	16.0	C	18.8	C
55 .	Sixth Ave.	No	10.1	B	10.3	B	11.2	B
Ivy St. @								
56 .	Fourth Ave.	No	13.5	B	15.7	C	15.6	C
57 .	Fifth Ave.	No	14.7	B	15.9	C	19.7	C
58 .	Sixth Ave.	No	16.0	C	11.7	B	14.1	B
Hawthorn St. @								
59 .	Fourth Ave.	No	16.8	C	15.6	C	19.0	C
60 .	Fifth Ave.	No	20.4	C	17.4	C	24.6	C
61 .	Sixth Ave.	No	18.6	C	13.7	B	15.4	C
Grape St. @								
62 .	Fourth Ave.	Yes	20.2	C	20.3	C	18.6	B
63 .	Fifth Ave.	No	15.0	B	13.9	B	177.2	F
64 .	Sixth Ave.	No	13.8	B	14.2	B	23.5	C
Fir St. @								
65 .	Fourth Ave.	No	11.8	B	12.1	B	11.9	B
66 .	Fifth Ave.	No	17.1	C	16.7	C	17.1	C
67 .	Sixth Ave.	No	14.7	B	11.5	B	12.7	B
Elm St. @								
68 .	Fourth Ave.	Yes	14.0	B	10.4	B	5.9	A
69 .	Fifth Ave.	Yes	5.9	A	9.5	A	18.7	B
70 .	Sixth Ave.	Yes	29.8	C	14.1	B	15.2	B

Table 4-3 Existing Conditions VISSIM Results (Automobiles)		
Roadway Limits	Travel Time (min:sec)	Speed (mph)
	Average	Average
Sixth Avenue (Northbound)		
Walnut - Washington	04:18	8.5
Maple - Walnut	01:32	24.2
Elm - Maple	01:27	23.4
Total	07:17	14.4
Sixth Avenue (Southbound)		
Elm – Maple	01:37	21.0
Maple - Walnut	01:35	23.4
Walnut - Washington	02:56	12.3
Total	06:08	17.2
Fifth Avenue (Northbound)		
Elm – Maple	01:29	23.1
Maple - Walnut	01:27	25.5
Walnut - Washington	02:28	13.7
Total	05:24	19.4
Fourth Avenue (Southbound)		
Washington - Walnut	02:24	14.1
Walnut - Maple	01:30	25.0
Maple – Elm	01:40	20.6
Total	05:34	18.9

As shown in Table 4-3, there is some congestion, particularly at the northern end of the corridor. For example, the travel speed for the northern segment of Sixth Avenue (Walnut to Washington) in the northbound direction averages only 8 miles per hour. Review of the VISSIM model indicates that much of this congestion is attributable to delay at major intersections such as Sixth Avenue/University Avenue. Some of this congestion is evident in northern segments of Fourth and Fifth Avenues. Outside of this northern area, travel times and speeds approach free-flow conditions with little delay accruing to vehicles using the north-south streets.

Table 4-4 documents travel times and speeds for transit vehicles. Like automobiles, there is some delay at the northern end of the corridor but limited delay to the south. Given their need to stop periodically, transit vehicles have a higher overall travel time and lower overall speed than automobiles.

Table 4-4 Existing Conditions VISSIM Results (Transit)		
Roadway Limits	Average Travel Time (min:sec)	Average Speed (mph)
Fifth Avenue (Northbound)		
Elm - Maple	03:15	10.6
Maple - Walnut	01:40	22.2
Walnut - Washington	02:53	11.7
Total	07:48	13.4
Fourth Avenue (Southbound)		
Washington - Walnut	04:23	7.7
Walnut – Maple	03:12	11.7
Maple – Elm	03:23	10.1
Total	10:58	9.6

4.6 EXISTING PARKING

On-street parking is currently allowed through much of the study corridor along Fourth, Fifth, and Sixth Avenues as well as along the side streets. All side streets allow either diagonal or parallel parking. Table 4-5 summarizes the roadway width of each of the side streets and the type of parking, parallel (P) or diagonal (D), on either side of the street.

Table 4-5
Existing Conditions – Parking on Side Streets

Cross Street	Between Fourth & Fifth			Between Fifth & Sixth		
	Curb-to-Curb (ft)	North Side	South Side	Curb-to-Curb (ft)	North Side	South Side
Washington St.	80	P	P	82	P	D
University Ave.	44	P	P	82	P	P
Robinson St.	35	P	P	35	--	--
Pennsylvania Ave.	35	P	P	35	P	P
Brookes St.	35	P	P	35	P	P
Walnut St.	52	P	P	--	--	--
Upas St.	52	P	P	52	P	P
Thorn St.	52	P	D	40	P	P
Spruce St.	52	P	P	40	P	P
Redwood St.	40	P	P	40	P	P
Quince St.	52	D	P	52	P	P
Palm St.	52	D	D	52	P	P
Olive St.	52	D	D	52	P	D
Nutmeg St.	52	P	D	52	P	D
Maple St.	52	P	P	40	P	P
Laurel St.	52	P	P	52	--	P
Kalmia St.	52	D	P	46	P	P
Juniper St.	52	D	P	52	D	P
Ivy St.	52	D	P	52	D	P
Hawthorn St.	52	D	P	52	D	P
Grape St.	52	D	D	52	P	D
Fir St.	52	P	P	52	P	P
Elm St.	52	P	P	52	P	P

Note: P = Parallel, D = Diagonal or Angled.

4.7 EXISTING TRANSIT CONDITIONS

Two routes currently serve the full length of the Hillcrest study area between I-5 on the south and Washington Street on the north. Routes 3 and 120 connect Downtown and Hillcrest via Fourth and Fifth Avenues. Route 3 terminates north of Washington Street while Route 120 continues to Mission Valley. Several east/west routes operate on University Avenue at the northern edge of the study area. Routes 1, 10, 11, and 83 connect with Routes 3 and 120 at the stops near Fifth and University Avenue.

Route Descriptions

Route 3 provides local service on the Fourth and Fifth Avenue couplet in the study area. Its northern terminal is north of Washington Street near UCSD Medical Center. In addition to Hillcrest, the route serves Bankers Hill, Downtown, Sherman Heights, Logan Heights, Mountain View, Valencia Park and Lincoln Park. The route map is show in Exhibit 4 -3. The overall distance of the route is 9.4 miles, with 3.5 miles in the study area. Route 3 operates every 15 minutes on weekdays until 6:00 p.m., when it transitions to 30-minute service until midnight, providing 60 outbound and 60 inbound trips per day. On weekends and holidays, it runs every 30 minutes between 5:30 a.m. and 11:00 p.m., with 30 inbound trips and 31 outbound trips.

Route 120 provides limited stop service on Fourth and Fifth Avenues in the study area. It connects Hillcrest with Downtown to the south and Mission Valley, Linda Vista, and Kearny Mesa to the north as shown in Exhibit 4-4. The overall distance of the route is 12.5 miles, with 3.5 miles in the study area. Route 120 operates every 15 minutes between Downtown and Fashion Valley between 5:30 a.m. and 6:30 p.m., with 30-minute service between Fashion Valley and Kearny Mesa during those hours. Evening service is provided every 30 minutes for the entire route. Weekend and holiday service is operated between Downtown and Fashion Valley only, with 30-minute frequency between 5:30 a.m. and 11:00 p.m. A total of 60 trips are provided in each direction on weekdays, with 32 trips provided on weekends and holidays.

Route 1, which operates between La Mesa and Hillcrest, runs along University Avenue and portions of Fourth and Fifth Avenues to reach its terminal at Walnut Avenue.

Route 10 operates between the Old Town Transit Center and Mid-City, with a portion of the alignment running along University Avenue between Fourth and Sixth Avenues.

Route 11 operates between San Diego State University and Skyline via Hillcrest and Downtown. It runs along University Avenue in the study area.

Route 83 provides community circulator service between Mission Hills and Downtown, with a loop to serve Mercy Hospital that includes a portion of University Avenue. All four of these routes connect with Routes 3 and 120 at stops near Fifth and University.

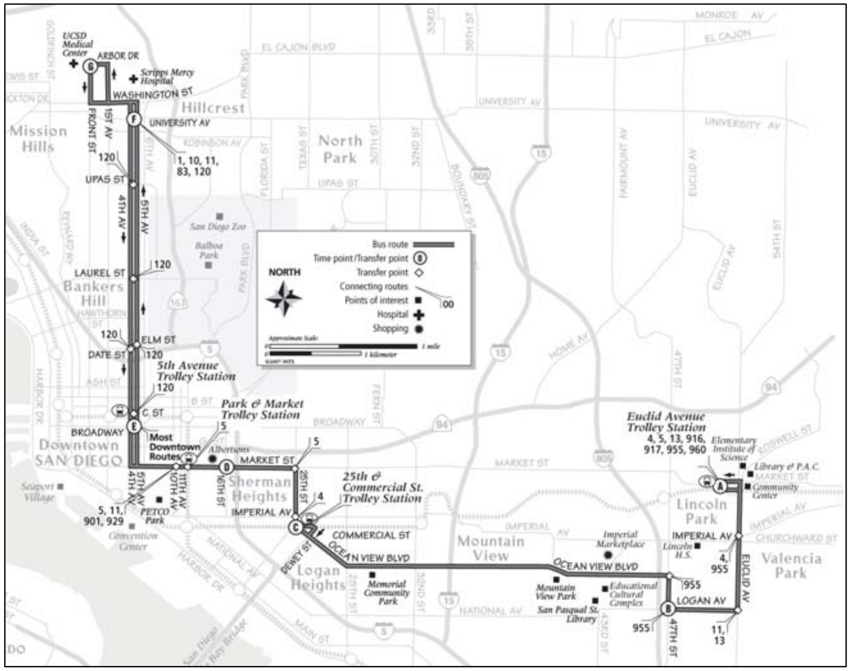


Exhibit 4-3 Route 3

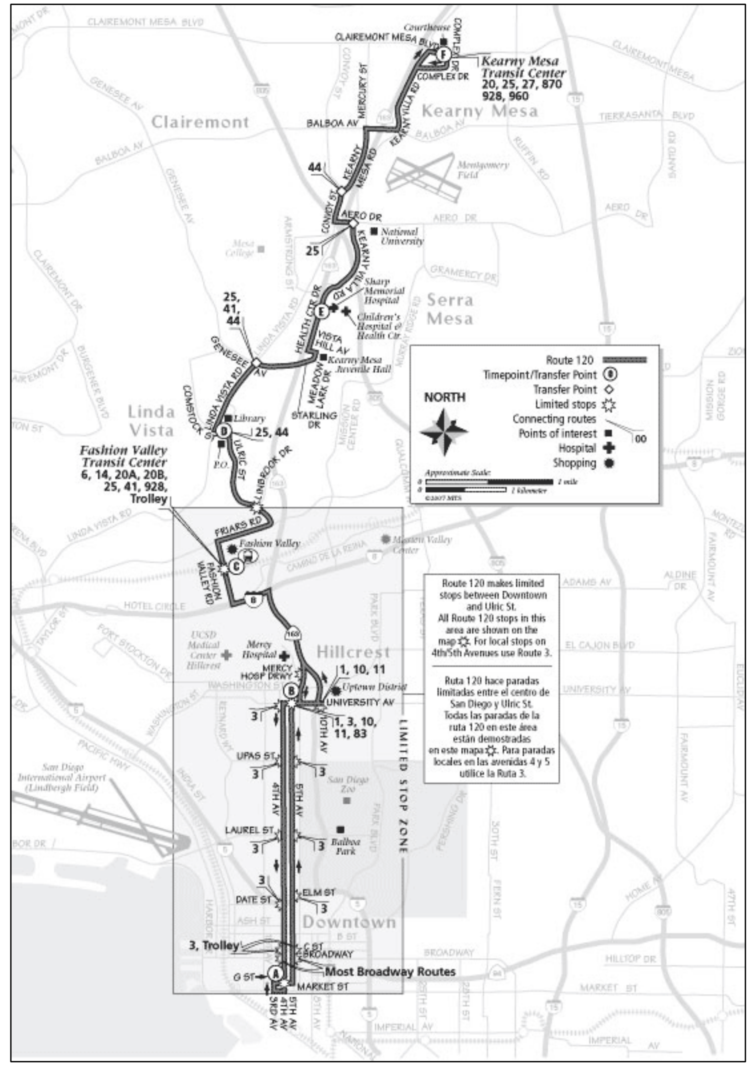
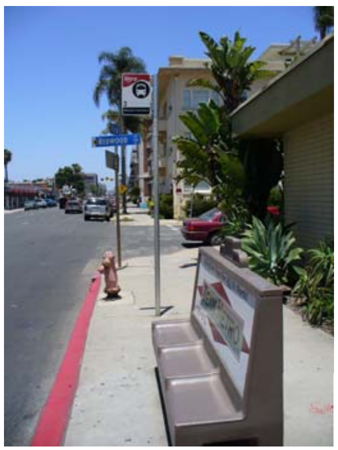


Exhibit 4-4 Route 120

Ridership and Passenger Counts

To assess the operating conditions of transit along the corridor, boarding and alighting data, and on-time performance data was collected for Routes 3 and 120. The ridership data was provided by MTS and SANDAG, and was collected in FY 2006 and 2007. Details of passenger boardings and alightings are provided in Chapter 13 to this document.



Route 3 ridership is heavier in the corridor than Route 120, due in part to the larger number of stops it has. Northbound ons and offs are 1,039, while southbound ons and offs total 916. For both directions of Route 3, there are over 1,900 ons and offs each day. Route 120 has 1,338 ons and offs per day. For both routes, the northbound and southbound ons are comparable, while there are significantly more northbound offs than southbound offs. This imbalance in offs is likely due to the higher demand to Hillcrest from Downtown compared to the demand to Hillcrest from Mission Valley and Kearney Mesa. Taken together, the corridor has over 3,200 ons and offs each day.

The transit stops in the corridor with the highest ridership activity (ons and offs) are: Fifth & University (719), Fourth and University (489), and Fifth & Elm (352). All of these stops are served by Routes 3 and 120, and the University Avenue stops are also served by some of the other routes (1, 10, 11, and 83). The least used stops are located at Fourth and Penn, Fourth and Redwood, and Fifth and Evans.

Transit Stop Locations

Currently 27 transit stops are located within the study area. The study area has 12 stops serving northbound transit vehicles, 13 stops serving southbound transit vehicles, with one stop each in the eastbound and westbound directions.

SANDAG/MTS does not have standards for distances between transit stops for the city's urbanized areas. These distances are typically based on activity centers, needs, and requests. Nationally, typical spacing for similar type transit stops is from

750 to 800 feet in urban areas not associated with central downtowns. Thus, the distances between transit stops along Fourth and Fifth Avenues are about average ranging from 700 to 950 feet apart. These distances are acceptable in the Hillcrest corridor considering the density of development and numerous trip generators served.

The existing transit stops are made up of both nearside and farside locations. At a near side transit stop, the transit vehicle stops prior to entering the intersection. At a farside transit stop, the transit vehicle passes through the intersection, then stops when it reaches the other side. It should be noted that from an operational standpoint, farside stops are preferred by most transit agencies including SANDAG/MTS.

For the northbound routes on Fifth Avenue, there are six nearside locations and six farside locations. For the southbound routes on Fourth Avenue, there are three nearside, eight farside locations, and two midblock locations. There are also one nearside eastbound stop and one nearside westbound stop on University Avenue.

Transit Travel Time

Transit vehicles usually experience good travel times and little congestion in the south and central portions of the corridor, but travel times slow considerably in the northern portion. The existing travel time on Fourth Avenue between I-5 and University Avenues is 9.6 minutes, and 13.4 minutes on Fifth Avenue. The greatest congestion and transit travel delays are experienced on Fifth Avenue between Pennsylvania and University Avenue, where the average travel time is three to four minutes.

On-Time Performance

As described earlier, the peak period and midday frequency for both Routes 3 and 120 is 15 minutes. This means that during this period a transit vehicle should arrive every 15 minutes to pick up passengers. During evening hours, the time between buses on both routes increases to 30 minutes.

On-time performance data from the automated passenger counting (APC) program was provided by MTS for Routes 3 and 120 (see Table 4-7). The on time performance (i.e., trips arriving no more than 5 minutes after the scheduled time) for Route 3 ranged from 69 percent in September 2006 to 86 percent in September 2007. Route 120's on time performance ranged from 74 percent in June 2007 to 84 percent in September 2006.

Table 4-7
Routes 3 and 120 On-Time Performance

Route	Percent of Vehicles Arriving On-Time				
	June 2006	Sept 2006	Jan 2007	June 2007	Sept 2007
3	71%	69%	80%	84%	86%
120	NA	84%	83%	74%	81%

Fiscal Year 2006 information was available from SANDAG for the Route 3 stops at Fourth and University, and Fifth and University. The data revealed that the on-time percentage for southbound trips was substantially higher than northbound trips. For southbound trips, 97 percent were on time at Fourth and University. The average delay was 1.1 minutes, ranging from 0 to 13 minutes. For northbound trips, 73 percent were on time at Fifth and University. The average delay was 3.2 minutes, ranging from 0 to 14 minutes. The largest delays occurred during the midday and the evening peak.

4.8 PEDESTRIAN AND BICYCLE ACTIVITY ALONG THE CORRIDOR

Pedestrian Activity

Sidewalks are provided throughout the study area on both sides of the street, except a segment on the west side of Fourth Avenue between Redwood Street and Palm Street, adjacent to canyon open space, where a sidewalk was never constructed. A pedestrian bridge crosses this canyon to the west of Fourth Avenue and was recently reconstructed.

Marked pedestrian crossings along the corridor are primarily provided at signalized intersections. Most intersections have curb ramps on all four corners of the intersections; however some locations may not meet current ADA standards.

Pedestrian activity was monitored during the peak hours at each of the study intersections. Table 4-12, summarizes the total number of pedestrians at each intersection for each peak hour.

As shown, the highest pedestrian activity typically occurs midday in the northern, central and southern portions of the corridor. Overall, the northern portion of the corridor has the highest pedestrian volume on Fourth, Fifth and Sixth Avenues. Through the central portion of the corridor, Upas Street, Quince Street and Nutmeg Street carry the highest pedestrian volumes at the intersections in the study corridor. In the southern corridor, Laurel Street, Grape Street and Elm Street also have high intersection pedestrian volumes.

A key factor for pedestrians is the distance across the street, which relates to "exposure time". By minimizing the pedestrian exposure to vehicular traffic, the risk of pedestrian/vehicular accidents is minimized and the pedestrian comfort level is improved. On Sixth Avenue, the curb-to-curb distance is approximately 54 feet along the length of the corridor. Fifth Avenue is approximately 52 feet wide. Fourth Avenue varies in width with 45 feet curb to curb in the between Washington Street and Walnut Street and 52 feet from Walnut Street to Elm Street. Most east-west street widths range from 50 to 52 feet curb to curb. Assuming a walking speed of four feet per second (4 fps), when a pedestrian crosses the street in the study area, they are exposed to vehicular traffic for between 11 seconds and 14 seconds.

Table 4-12
Existing Peak Hour Pedestrian Activity by Intersection

Cross Street	Fourth Avenue @				Fifth Avenue @				Sixth Avenue @			
	a.m.	Mid	p.m.	6-hour Total	a.m.	Mid	p.m.	6-hour Total	a.m.	Mid	p.m.	6-hour Total
Washington Street	138	**280**	155	1146	91	245	156	984	--	--	--	0
University Avenue	97	178	172	894	207	**642**	458	2614	86	219	**298**	1206
Robinson Street	119	229	163	1022	227	423	331	1962	69	140	110	638
Pennsylvania Avenue	4	24	10	76	62	148	74	568	47	69	58	348
Brookes Street	45	62	60	334	54	137	54	490	--	--	--	0
Walnut Street	32	48	23	206	32	47	17	192	--	--	--	0
Upas Street	74	**98**	57	458	84	111	85	560	57	56	63	352
Thorn Street	20	48	11	158	31	51	39	242	11	16	35	124
Spruce Street	33	54	58	290	46	107	72	450	36	16	94	292
Redwood Street	11	23	31	130	31	56	48	270	23	17	66	212
Quince Street	14	34	32	160	13	37	27	154	64	213	103	760
Palm Street	39	33	22	188	42	96	37	350	30	**302**	5	674
Olive Street	22	38	20	160	117	90	57	528	39	39	66	288
Nutmeg Street	34	45	22	202	82	**139**	55	552	30	5	40	150
Maple Street	39	91	46	352	83	173	94	700	44	51	91	372
Laurel Street	54	131	93	556	150	180	142	944	82	79	181	684
Kalmia Street	25	5	65	190	32	132	60	448	48	77	14	278
Juniper Street	51	56	67	348	34	53	59	292	22	51	33	212
Ivy Street	42	65	34	282	28	48	32	216	51	41	65	314
Hawthorn Street	30	40	22	184	28	35	28	182	72	90	73	470
Grape Street	157	164	**168**	978	23	33	18	148	3	53	69	250
Fir Street	36	66	23	250	27	66	52	290	0	24	24	96
Elm Street	74	114	103	582	148	**219**	133	1000	**227**	160	107	988

Notes: Total peak hour pedestrian crossing volumes greater than 200 are shown in bold.
A.m., mid, and p.m. pedestrian volumes reflect the peak one-hour volume during the peak period. The 6 hour total is the sum of the three peak hours multiplied by a factor of 2.

Bicycle Activity

Bicycle activity along the corridor is minimal, most likely due to the lack of bicycle lanes. Similar to the pedestrian volumes, the highest number of bicycle observed through intersections occurred along University Avenue.

Bicycle routes are designated along Sixth Avenue. Bicycles share the travel way with passenger vehicles. The outside or curb lane along Sixth Avenue is 12 feet wide with parallel parking along both sides of the street. This does not provide adequate room for bicycles between passenger vehicles traveling north and south and the vehicles parked along the curb.

Working with the bicycling community, the City of San Diego has established a Bicycle Master Plan. This plan includes goals and objectives to improve the overall bicycle safety and mobility throughout the City as well as recommendations to improve the bicycle circulation system. No additional bicycle routes are identified along Fourth, Fifth or Sixth Avenue or along any of the east-west corridors in the study area.

Table 4-13
Existing Peak Hour Bicycle Activity by Intersection

Cross Street	Fourth Avenue @			Fifth Avenue @			Sixth Avenue @		
	a.m.	mid	p.m.	a.m.	mid	p.m.	a.m.	mid	p.m.
Washington Street	24	25	31	9	7	18	0	0	0
University Avenue	21	6	7	33	18	56	29	23	22
Robinson Street	30	12	16	18	6	24	26	11	27
Pennsylvania Avenue	2	4	0	5	10	11	16	6	8
Brookes Street	9	8	2	4	4	14	0	0	0
Walnut Street	10	6	3	6	7	14	0	0	0
Upas Street	15	7	2	7	10	13	9	12	12
Thorn Street	13	3	2	7	4	21	2	1	3
Spruce Street	4	2	2	3	0	1	3	0	5
Redwood Street	9	4	4	2	5	11	1	5	13
Quince Street	9	4	3	0	7	0	8	7	3
Palm Street	9	5	1	7	4	14	3	0	7
Olive Street	6	3	4	8	7	7	5	9	6
Nutmeg Street	6	4	3	5	6	12	7	1	4
Maple Street	4	6	12	10	5	5	9	10	8
Laurel Street	9	13	13	3	6	11	10	19	17
Kalmia Street	9	5	9	1	8	9	5	5	0
Juniper Street	11	5	5	4	7	15	3	1	3
Ivy Street	11	4	3	1	3	7	8	11	4
Hawthorn Street	10	6	4	2	5	7	7	1	5
Grape Street	10	2	3	1	4	3	1	6	4
Fir Street	11	3	2	4	3	8	0	8	7
Elm Street	11	5	5	5	6	9	15	11	8

4.9 SUMMARY OF EXISTING CONDITIONS

From an operational perspective, Fourth, Fifth and Sixth Avenues operate within the City defined acceptable levels of service, in both the central and southern portions of the study area. In the northern portion, both Sixth Avenue to the north of Upas Street and Fifth Avenue from Pennsylvania to Washington Street currently operate at congested levels of service.

All existing signalized intersections operate at acceptable levels of service except Sixth Avenue at University Avenue which operates at LOS F during the evening peak hour. All unsignalized intersections, stop controlled on the eastbound and westbound approaches, also operate at acceptable levels of service except Fifth Avenue at Grape Street which operates at LOS F during the evening peak hour. The intersection operational analysis shows that in the peak hours, the following two intersections are currently operating deficiently (LOS E or F):

- o Sixth Avenue / University Avenue
- o Fifth Avenue / Grape Street

Travel times along the corridor range from ten to thirteen minutes. Congestion on Fifth Avenue through the northern portion of the corridor results in higher travel time and lower travel speeds, which is consistent with the findings of the intersection and roadway segment level of service analysis.

Of the 27 transit stops on Fourth and Fifth Avenues, most include a sign and bench; few have shelters or trash receptacles. Two routes travel along Fourth and Fifth Avenues (Route 3 and Route 120). Other routes pass through the study corridor primarily on University Avenue and on adjacent portions of Fourth and Fifth Avenues. Transit travel times on Fourth and Fifth Avenues vary from eight to eleven minutes according to the VISSIM simulations and travel time surveys. Overall the on-time performance, as reported by SANDAG/MTS is 86 percent on Route 3 and 81 percent on Route 120 (September 2007). Although all stops have frequent boardings and alightings, the busiest transit stops along the corridor are those located near the ends of the study corridor. According to data provided by SANDAG for Fiscal Year 2006-2007, stops at Fifth/University and Fourth/University had approximately 341 and 276 boardings(ons)/alightings(offs) per day, respectively. Along the Fifth Avenue corridor, a total 1,039 boardings/alightings occur per day compared to 916 boardings/alightings that occur on Fourth Avenue.

The highest pedestrian activity currently occurs in the northern portion of the study area, particularly along University Avenue. In most cases, the highest pedestrian activity was observed during the midday (11:00 a.m. to 1:00 p.m.).

Bicycle activity in the study area is low compared to both traffic volumes and pedestrian volumes. This is in large part due to the lack of designated bicycle lanes. On the average, six to nine bicycles per hour were observed during the morning and afternoon peak commute periods (7:00 – 9:00 a.m., 4:00 – 6:00 p.m.) along the study corridors. The highest bicycle activity occurred in the northern corridor when up to 56 bicycles were observed in the p.m. peak hour at University Avenue and Fifth Avenue. To increase bicycle activity, it will be necessary to create an environment that encourages bicycle activity such as reducing traffic speeds and providing wide outside lanes or dedicated bicycle lanes

Study Area Conclusions

Data collection efforts revealed that the study area is pedestrian-oriented with high levels of transit and walking. While it was found that there is some congestion in the northern corridor, there seems to be excess capacity west of Balboa Park. In addition, it became evident through the public outreach efforts that there is a parking shortage in the central corridor, particularly in the evenings and near Laurel Street.

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Chapter 5:
No Build Conditions (2010 & 2030)

5.0 OVERVIEW

The Hillcrest Corridor Mobility Strategy is a vision for the future of travel on Fourth, Fifth, and Sixth Avenues, between downtown San Diego and central Hillcrest. It would be short sighted to consider only the immediate impacts of the Preferred Concept Plan as it relates to traffic, transit, pedestrians and bicycles. The land uses along Fourth, Fifth, and Sixth Avenues are diverse and changing.

In conjunction with the City of San Diego, SANDAG recently updated the traffic model for the region. This traffic model uses existing and planned land uses as well as existing and planned roadway capacity and speeds to forecast the flow of traffic throughout the region. The traffic model integrates all modes of transportation including passenger vehicle and transit vehicle operations.

A minimum of 20 years is the regional standard for which roads and highways are designed and the year 2030 is the basis for the traffic model. This chapter presents the methodology for forecasting the year 2030 traffic volumes. The traffic and transit operations for the year 2030 based on the 2030 planned land uses and street network (2030 No Build) will also be evaluated in this chapter. To look at the interim conditions, a 2010 analysis was conducted. These traffic volumes were derived based on a growth factor. A 2010 analysis represents expected short-term travel growth in the study corridor.

5.1 FUTURE FORECAST METHODOLOGY

The San Diego Association of Governments (SANDAG) 2030 traffic model was used as a basis for the future year technical analysis, which utilizes land use, demographic data, roadway capacity, speed limits, transit ridership, and travel capacity constraints to forecast daily traffic volumes on roadways. Travel capacity constraints include the number of travel lanes, traffic signals and stop signs.

The model breaks the region into traffic analysis zones (TAZ). The TAZ's for Hillcrest are illustrated in Exhibit 5-1. Each TAZ includes land use data for all the land included within the TAZ boundary. This land use data is then used to forecast future traffic volumes that are subsequently distributed onto the roadway network using the traffic model.

The City recently provided SANDAG with detailed updated land use information for the entire City. For this project, the City further examined the street network and land uses in the Uptown Community Planning Area and with downtown's CCDC plan to ensure that they were consistent with the most recently approved or planned land use intensification and planned roadway improvements. City staff evaluated land uses in uptown and in CCDC's plan in updating the land uses included in the model for this study. The smaller-area traffic zones (TAZ's) and roadway network used for forecasting traffic volumes are illustrated in Exhibit 5-1.

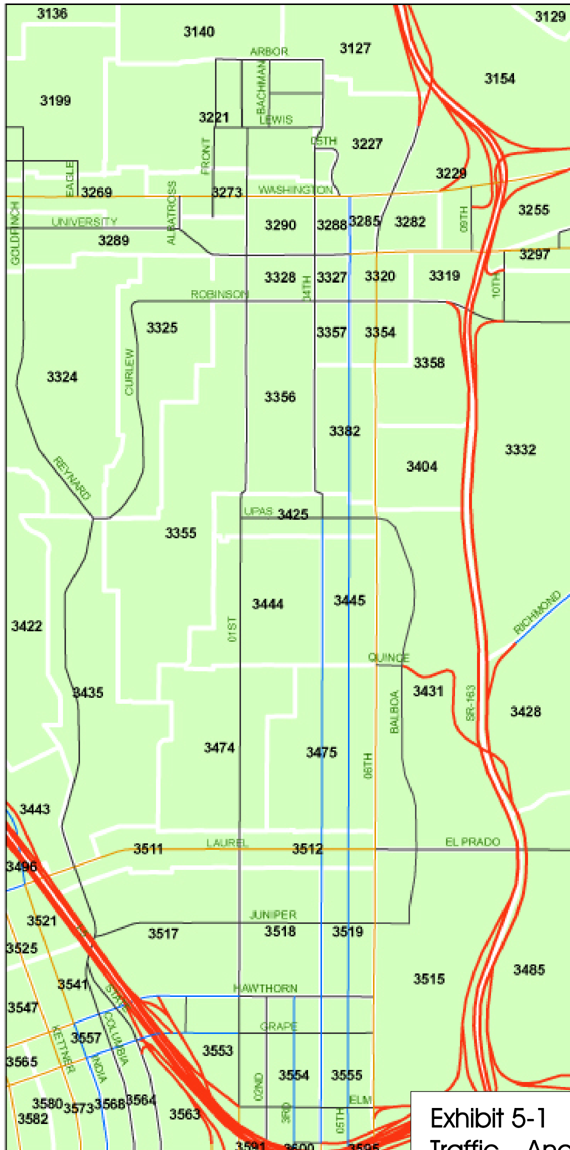

Exhibit 5-1
Traffic Analysis Zone Map
(Source: SANDAG Series 10)

The SANDAG traffic model provides forecast average daily traffic (ADT) volumes on regional roadways based on future land use and roadway classification assumptions contained in the various community and City plans, including the Uptown Community Plan. City of San Diego worked closely with SANDAG to refine the traffic model specifically for this project. To evaluate potential shifts in traffic volume in the study corridor, two 2030 model runs were conducted:

- o A regional 2030 "build" network including the currently adopted circulation plan for the City of San Diego and the Uptown Community.
- o A regional 2030 network with the addition of Projects proposed in the draft Concept Strategy.

In order to evaluate the future traffic growth within the corridor as well as to allow calibration for the 2030 traffic forecast data, base year 2000 network model run was also prepared.

Several select link model runs were also conducted. A select link model run traces vehicles as they disperse themselves on the roadway network. This model run illustrates the vehicle destinations and routes from the selected link. For this project, the select link model run was used to compare traffic patterns with and without Concept Strategies to determine how vehicle routes change with the implementation of the Concept Strategies.

5.2 FUTURE FORECAST TRAFFIC VOLUMES

The future year traffic volumes were estimated based on the SANDAG 2030 traffic model. The 2030 daily traffic volumes reported by the SANDAG model were compared to the base year 2000 model volumes to determine the expected growth in traffic and the corresponding traffic growth rate. The traffic growth rate reported by the SANDAG model was applied to existing ADT volumes collected specifically for this study.

Peak hour turning movement volumes for Horizon Year 2030 were developed by applying a growth factor to existing peak hour traffic volumes at each intersection approach based on the forecast growth rate in traffic volume from the base year 2000 model and the modeled 2030 conditions. The a.m. and p.m. peak hour volumes were then balanced between intersections along the entire corridor. Balancing was necessary in cases where adjacent intersection volumes were found to vary due to the applied growth factor. The lower volume approach or departure was adjusted upward to balance with the higher adjacent approach or departure.

The Year 2010 analysis determined the near-term operating conditions along the corridor. Based on the Implementation Plan, it would be reasonable to assume that the Hillcrest Corridor Mobility Plan would begin first phase of the project implementation following the completion of the Uptown Community Plan. The year 2010 was assumed as the short-term project initiation date. As described in Chapter _ (Implementation Plan), the short-term improvements involve signing and striping improvements for the corridors. 2010 No Build traffic volumes were developed by interpolating the growth between existing and 2030 traffic volumes.

Year 2010 peak hour turning movement volumes were developed by applying a growth rate to all intersections determined by comparing overall corridor growth between existing and 2030 conditions and interpolating to 2010.

Year 2010 daily traffic volumes are provided in Exhibit 5-2 (No Build and With 2005 Concept Plan). Horizon Year 2030 daily traffic volumes (No Build and 2005 Concept Plan) are shown in Exhibit 5-3.

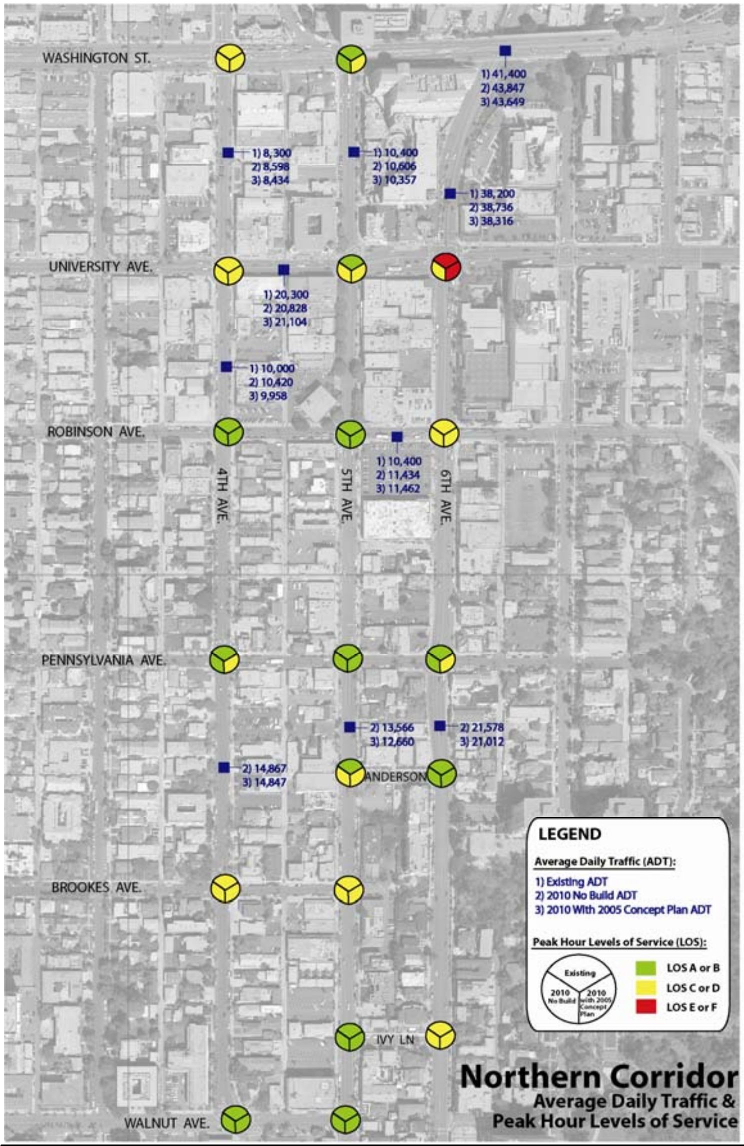

Exhibit 5-2 2010 Average Daily Traffic Volumes

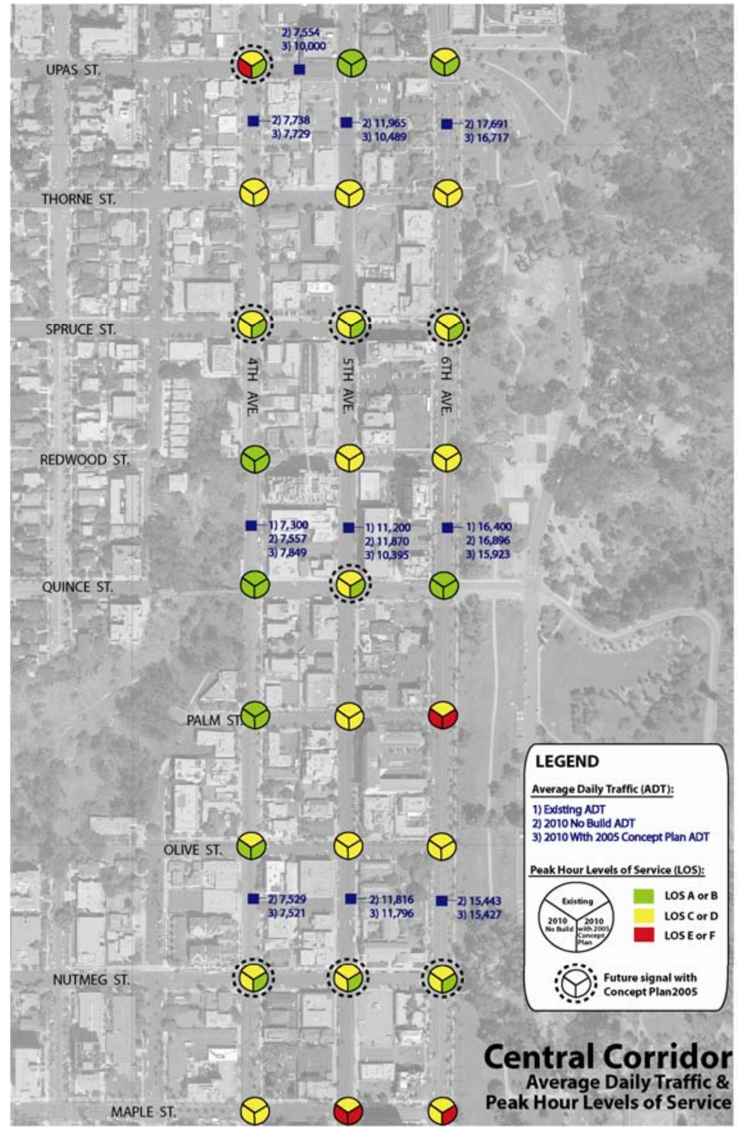

Exhibit 5-2 2010 Average Daily Traffic Volumes

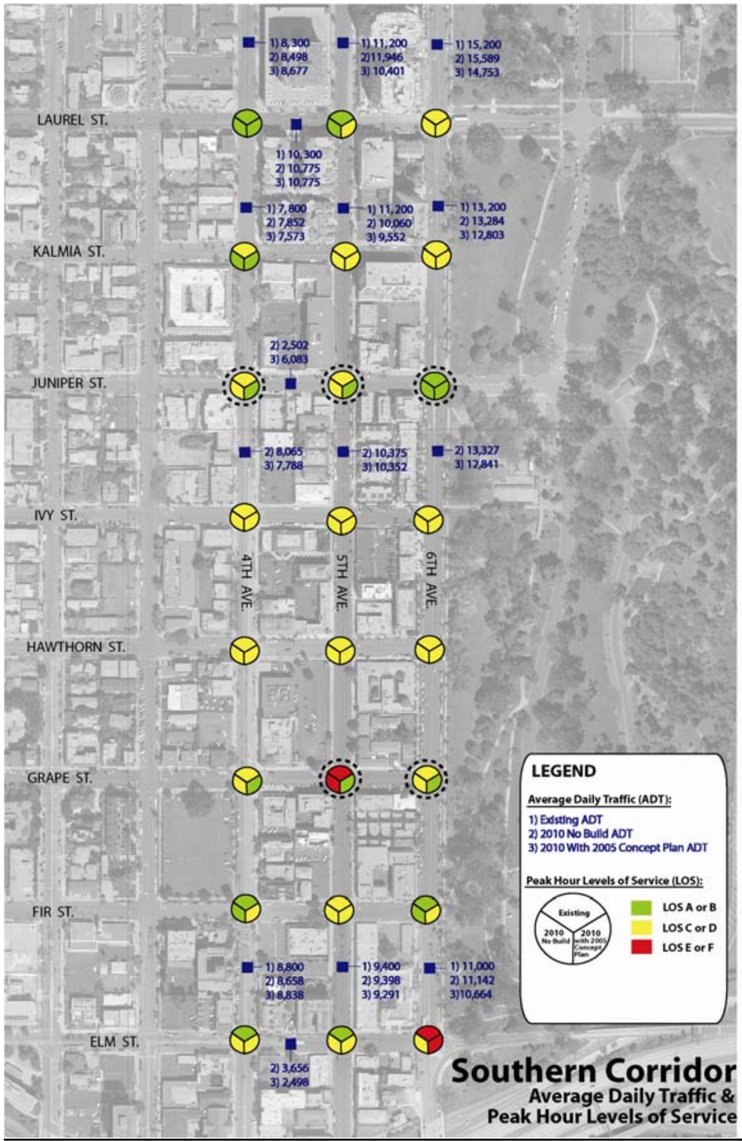

Exhibit 5-2 2010 Average Daily Traffic Volumes

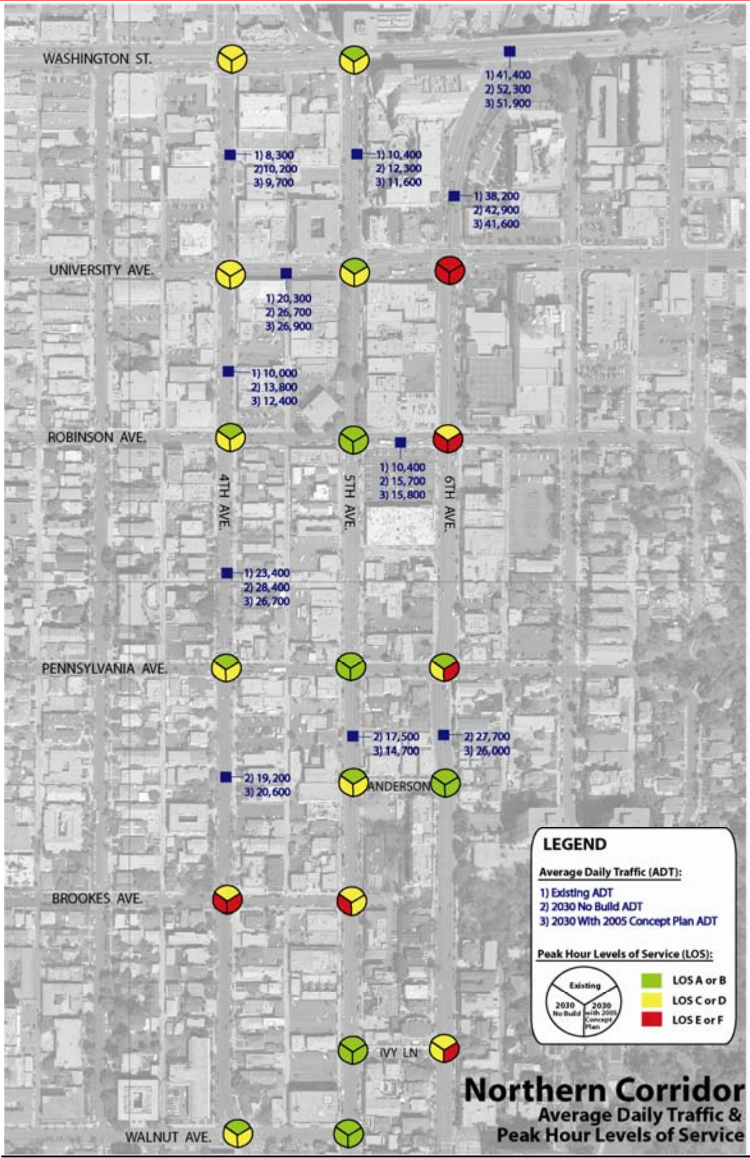

Exhibit 5-3 2030 Average Daily Traffic Volumes

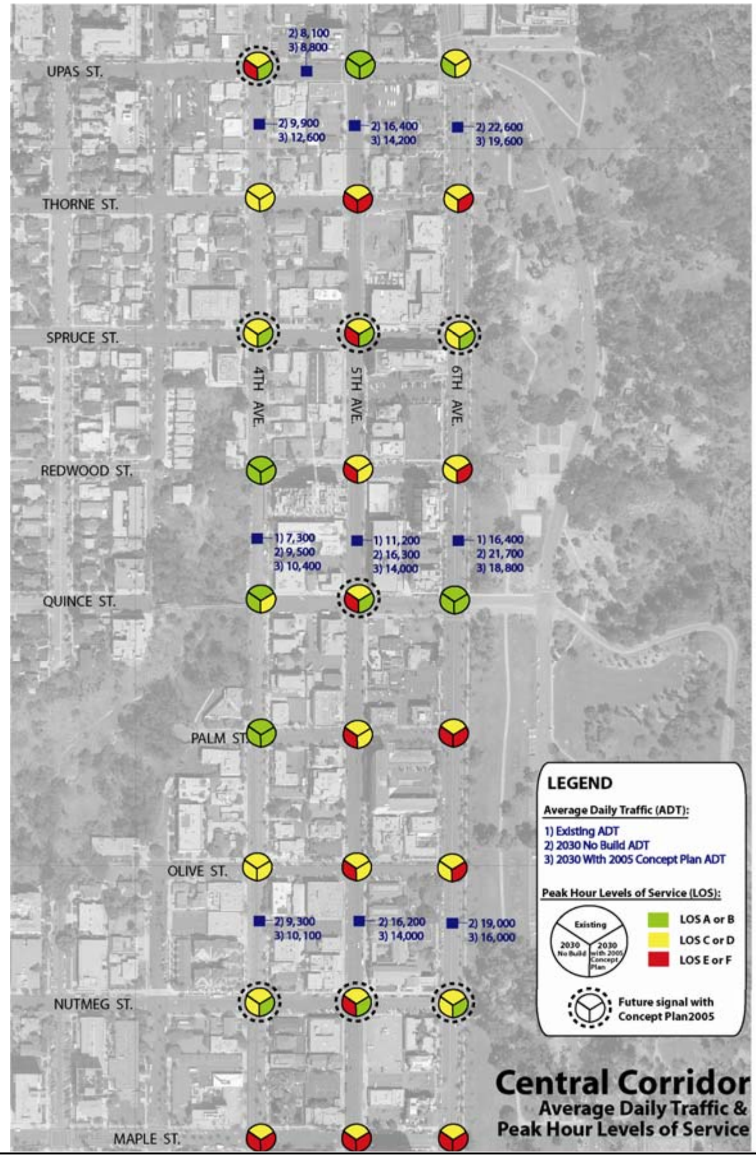

Exhibit 5-3 2030 Average Daily Traffic Volumes

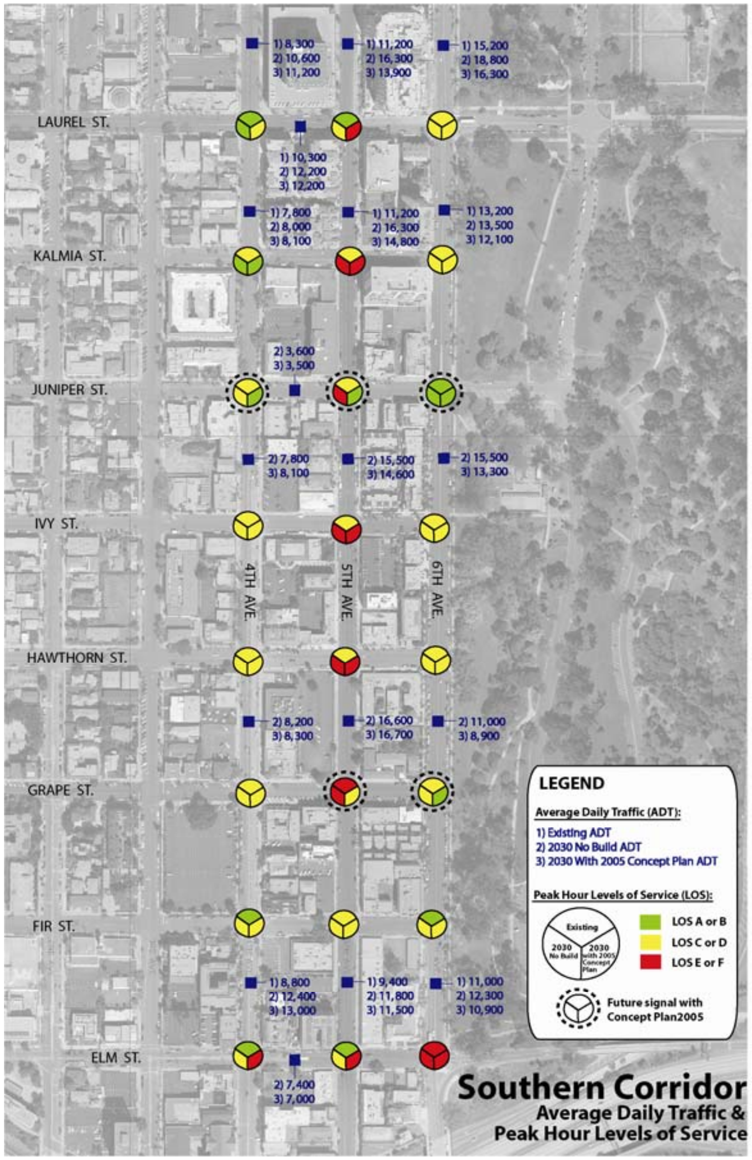

Exhibit 5-3 2030 Average Daily Traffic Volumes

5.3 TRANSIT RIDERSHIP FORECAST METHODOLOGY

Transit ridership forecasts were obtained from the regional travel model forecasts developed for the 2030 RTP adopted by SANDAG in November 2007. The model forecasted the overall travel demand generated by the 2030 Regional Growth Forecast Update, and through mode split and assignment algorithms, projected both traffic volumes and transit ridership for alternative transportation networks. A No Build option, which includes the major projects planned or under construction, and three improvement scenarios based on funding levels (Constrained, Reasonably Expected, and Unconstrained) were developed for modeling the region's transportation network.

Variations in the transit alternatives included alignments, travel speed (which is influenced by type of roadway and transit priority measures), service frequency, station location, availability of parking, fares, and connections with other transit services. The ridership forecasts were used to help determine the transit capital improvements needed in the corridor. The Reasonably Expected Scenario, which include improvements to Rapid Route 120 and new BRT Route 640, was used as the basis for this report.

5.4 PLANNED CHANGES IN TRANSIT SERVICE ALONG CORRIDOR

The study corridor is served by Routes 1, 3, 11, and 120. Route 120, which currently operates with 15-minute frequency on weekdays, is planned in the RTP to increase to 10-minute peak and off-peak frequency during the 2030 decade. The recently implemented Comprehensive Operations Analysis (COA) improvements have been operating well and no changes are currently planned for the other routes at this time. The queue jumps and transit lane proposed in this study will increase operating speed, reduce travel time, and enhance the reliability of services in the Corridor.

The region's transit operator, MTS, is facing a significant shortfall in operating funds at this time. It is possible that service reductions will be required throughout the system to cope with the situation, including the potential for reductions to the routes in the Hillcrest Corridor. MTS is currently developing its FY 2009 financial plan and the details of potential service changes are not known at this time. The magnitude and duration of the funding shortfall could affect the timing and nature of the proposed service changes for the corridor in the RTP. It is unlikely that existing transit capital facilities in the corridor would be affected.

5.5 FUTURE PEDESTRIAN AND BICYCLE ACTIVITY ON CORRIDOR

Pedestrian and bicycle future forecast volumes are based upon future forecast transit ridership and the planned changes in land use in Uptown. As the trend toward live/work and mixed-use development continues, pedestrian activity is also anticipated to increase. Increased pedestrian activity will result in more frequent pedestrian actuations at signalized intersections, the need for wider sidewalks, and the need for additional capacity and amenities at transit stops.

Bicycle activity on the corridor will also be a function of how bicycle friendly the corridor becomes in the future. Under the existing conditions, bicycles are required to share the travel way with passenger vehicles, trucks and transit vehicles. With the forecast increase in density planned for the study area, it is likely that bicycle activity will increase. Adding a dedicated lane for bicycle, which includes sharing a lane with transit vehicles, it is anticipated that bicycle activity will increase over the next 30 years. However, whether the bicycles use Fourth, Fifth, and Sixth Avenues or parallel routes such as 3rd Avenue or paths through Balboa Park will be determined by the lane designations along the principal corridor streets.

5.6 PLANNED CHANGES IN PEDESTRIAN AND BICYCLE FACILITIES

An enhanced pedestrian crossing that includes in-pavement flashing devices and striped crosswalks was planned at Fifth Avenue/Nutmeg Street. UPI has funded other crosswalk flashers such as at Fifth Avenue and Spruce Street.

5.7 2010 NO BUILD OPERATIONAL CHARACTERISTICS

Roadway Segments

To evaluate the 2010 No Build operating conditions of the roadways within the study area, the forecast daily traffic volumes were compared to the capacity thresholds identified by the City of San Diego for the appropriate classification of roadway. A level of service was assigned to each roadway segment based on the capacity thresholds.

The 2010 No Build roadway segment level of service analysis for the study area is summarized in Table 5-1. As shown in the table, five (5) study roadway segments are forecast to operate at deficient LOS (LOS E or F) by the year 2010. The City of San Diego defines LOS D as the threshold for acceptable operating conditions for roadway segments.

Intersections

Table 5-2 summarizes the results of the Year 2010 No Build HCM intersection level of service analysis for signalized and unsignalized intersections. HCM analysis worksheets are provided in the Appendix at the end of this report.

As shown in Table 5-2, four intersections are forecast to operate at LOS E or worse during one or more of the peak periods analyzed. These four deficient intersections are controlled by a two-way stop condition.

The unsignalized intersections at Fourth Avenue / Upas Street, Fifth Avenue / Maple Street, and Sixth Avenue / Palm Street are forecast to operate at LOS E during the mid-day peak hour. The unsignalized intersection at Fifth Avenue / Grape Street is forecast to operate at LOS F during the p.m. peak hour.

Table 5-1
Year 2010 No Build Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Class (Lanes)	LOS E Capacity	Year 2010 No Build		
					ADT	V/C	LOS
1 .	Washington Ave.	From Fifth to Seventh Ave.	Major NP (4)	40,000	43,847	1.10	F
2 .	University Ave.	From Fourth Ave. to Fifth Ave.	Collector WP (4)	30,000	20,828	0.69	D
3 .	Robinson St.	From Fifth to Sixth Ave.	Collector NP (2)	10,000	11,434	1.14	F
4 .	Upas St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	7,554	0.94	E
5 .	Laurel St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	15,000*	10,775	0.72	C
6 .	Juniper St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	2,502	0.31	A
7 .	Elm St.	From Fourth Ave. to Fifth Ave.	One-Way WP (3)	24,000	3,656	0.15	A
8 .	Fourth Ave.	From Washington to University	One-Way WP (2)	16,000	8,598	0.54	C
9 .		From University to Robinson	One-Way WP (2)	16,000	10,420	0.65	C
10 .		From Pennsylvania to Brookes	One-Way WP (2)	16,000	14,867	0.93	E
11 .		From Upas to Thorn	One-Way WP (3)	24,000	7,738	0.32	A
12 .		From Redwood to Quince	One-Way WP (3)	24,000	7,557	0.31	A
13 .		From Olive to Nutmeg	One-Way WP (3)	24,000	7,529	0.31	A
14 .		From Maple to Laurel	One-Way WP (3)	24,000	8,498	0.35	A
15 .		From Laurel to Kalmia	One-Way WP (3)	24,000	7,852	0.33	A
16 .		From Juniper to Ivy	One-Way WP (3)	24,000	8,065	0.34	A
17 .		From Fir to Elm	One-Way WP (3)	24,000	8,658	0.36	A

Notes: NP = No Parking, WP = With Parking, * = includes two-way left turn lane

Table 5-1 (Continued)
Year 2010 No Build Conditions Roadway Segment Level of Service Analysis

Street		Segment	Classification (Lanes)	LOS E Capacity	Year 2010 No Build		
					ADT	V/C	LOS
18 .	Fifth Ave.	From Washington to University	One-Way WP (3)	24,000	10,606	0.44	B
19 .		From University to Robinson	One-Way WP (3)	24,000	10,764	0.45	B
20 .		From Pennsylvania to Brookes	One-Way WP (3)	24,000	13,566	0.57	C
21 .		From Upas to Thorn	One-Way WP (3)	24,000	11,965	0.50	B
22 .		From Redwood to Quince	One-Way WP (3)	24,000	11,870	0.49	B
23 .		From Olive to Nutmeg	One-Way WP (3)	24,000	11,816	0.49	B
24 .		From Maple to Laurel	One-Way WP (3)	24,000	11,946	0.50	B
25 .		From Laurel to Kalmia	One-Way WP (3)	24,000	10,060	0.42	B
26 .		From Juniper to Ivy	One-Way WP (3)	24,000	10,375	0.43	B
27 .		From Fir to Elm	One-Way WP (3)	24,000	9,398	0.39	B
28 .	Sixth Ave.	From Washington to University	Major NP (4)	40,000	38,736	0.97	E
29 .		From University to Robinson	Collector WP (4)	30,000	23,625	0.79	D
30 .		From Pennsylvania to Brookes	Collector WP (4)	30,000	21,578	0.72	D
31 .		From Upas to Thorn	Collector WP (4)	30,000	17,691	0.59	C
32 .		From Redwood to Quince	Collector WP (4)	30,000	16,896	0.56	C
33 .		From Olive to Nutmeg	Collector WP (4)	30,000	15,443	0.51	C
34 .		From Maple to Laurel	Collector WP (4)	30,000	15,589	0.52	C
35 .		From Laurel to Kalmia	Collector WP (4)	30,000	13,284	0.44	B
36 .		From Juniper to Ivy	Collector WP (4)	30,000	13,327	0.44	B
37 .		From Fir to Elm	Collector WP (4)	30,000	11,142	0.37	B

Notes: NP = No Parking, WP = With Parking, * = includes two-way left turn lane

Table 5-2
Year 2010 No Build Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Washington St @								
1 .	Fourth Ave.	Yes	30.2	C	31.7	C	38.1	D
2 .	Fifth Ave.	Yes	15.2	B	17.6	B	18.0	B
University Ave. @								
3 .	Fourth Ave	Yes	36.9	D	29.2	C	38.1	C
4 .	Fifth Ave.	Yes	16.0	B	16.1	B	22.4	C
5 .	Sixth Ave.	Yes	46.6	D	39.2	D	50.3	D
Robinson Ave. @								
6 .	Fourth Ave.	Yes	13.0	B	12.0	B	14.9	B
7 .	Fifth Ave.	Yes	12.0	B	10.8	B	11.4	B
8 .	Sixth Ave.	Yes	22.2	C	26.5	C	26.3	C
Pennsylvania Ave @								
9 .	Fourth Ave.	No	9.6	A	10.8	B	11.0	B
10 .	Fifth Ave.	Yes	7.3	A	7.9	A	9.7	A
11 .	Sixth Ave.	Yes	9.7	A	15.6	B	19.3	B
Anderson Pl.@								
12 .	Fifth Ave.	No	11.0	B	12.1	B	15.6	C
13 .	Sixth Ave.	No	0.9	A	0.3	A	0.2	A
Brookes Ave. @								
14 .	Fourth Ave.	No	15.8	C	20.2	C	15.4	C
15 .	Fifth Ave.	No	13.4	B	21.6	C	18.2	C
Ivy Ln. @								
16 .	Fifth Ave.	No	10.5	B	12.7	B	13.4	B
17 .	Sixth Ave.	No	18.2	C	25.4	D	17.4	C

Table 5-2
Year 2010 No Build Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Walnut Ave. @								
18 .	Fourth Ave.	No	9.2	A	9.8	A	10.6	B
19 .	Fifth Ave.	No	11.9	B	12.0	B	11.0	B
Upas St.@								
20 .	Fourth Ave.	No	23.2	C	**40.2**	**E**	25.5	D
21 .	Fifth Ave.	Yes	8.6	A	7.5	A	7.2	A
22 .	Sixth Ave	Yes	9.1	A	9.2	A	11.6	B
Thorne St.@								
23 .	Fourth Ave.	No	14.8	B	15.2	C	15.1	C
24 .	Fifth Ave.	No	14.3	B	18.3	C	24.7	C
25 .	Sixth Ave.	No	16.3	C	16.0	C	16.4	C
Spuce St. @								
26 .	Fourth Ave.	No	20.1	C	15.2	C	20.7	C
27 .	Fifth Ave.	No	22.0	C	34.7	D	33.3	D
28 .	Sixth Ave.	No	21.6	C	15.2	C	15.2	C
Redwood St. @								
29 .	Fourth Ave.	No	10.5	B	11.5	B	11.2	B
30 .	Fifth Ave.	No	14.8	B	18.6	C	20.8	C
31 .	Sixth Ave.	No	17.6	C	12.3	B	13.7	B
Quince St. @								
32 .	Fourth Ave.	No	10.5	B	11.9	B	11.2	B
33 .	Fifth Ave.	No	14.8	B	17.5	C	22.9	C
34 .	Sixth Ave.	Yes	7.0	A	9.1	A	6.4	A

Table 5-2
Year 2010 No Build Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Palm St. @								
35 .	Fourth Ave.	No	12.6	B	12.4	B	12.0	B
36 .	Fifth Ave.	No	16.5	C	19.3	C	20.5	C
37 .	Sixth Ave.	No	14.7	B	**47.4**	**E**	14.0	B
Olive St. @								
38 .	Fourth Ave.	No	11.8	B	14.9	B	14.7	B
39 .	Fifth Ave.	No	21.2	C	18.7	C	28.6	D
40 .	Sixth Ave.	No	19.3	C	17.6	C	18.1	C
Nutmeg St. @								
41 .	Fourth Ave.	No	14.1	B	15.4	C	14.7	B
42 .	Fifth Ave.	No	17.4	C	26.1	D	29.2	D
43 .	Sixth Ave.	No	16.6	C	13.1	B	17.5	C
Maple St. @								
44 .	Fourth Ave.	No	17.5	C	25.2	D	19.6	C
45 .	Fifth Ave.	No	26.8	D	**40.0**	**E**	30.0	D
46 .	Sixth Ave.	No	15.3	C	14.0	B	28.8	D
Laurel St. @								
47 .	Fourth Ave.	Yes	13.0	B	13.2	B	13.6	B
48 .	Fifth Ave.	Yes	17.6	B	16.3	B	18.1	B
49 .	Sixth Ave.	Yes	18.8	B	18.2	B	21.9	C
Kalmia St. @								
50 .	Fourth Ave.	No	13.7	B	13.4	B	14.9	B
51 .	Fifth Ave.	No	16.8	C	22.6	C	25.3	D
52 .	Sixth Ave.	No	11.2	B	15.1	C	12.1	B

Table 5-2
Year 2010 No Build Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Juniper Street @								
53 .	Fourth Ave.	No	14.1	B	13.7	B	16.5	C
54 .	Fifth Ave.	No	17.1	C	17.6	C	21.4	C
55 .	Sixth Ave.	No	10.3	B	10.3	A	11.3	B
Ivy St. @								
56 .	Fourth Ave.	No	15.4	C	15.6	C	15.2	C
57 .	Fifth Ave.	No	16.2	C	17.7	C	21.4	C
58 .	Sixth Ave.	No	15.9	C	11.9	B	13.1	B
Hawthorn St. @								
59 .	Fourth Ave.	No	15.5	C	16.4	C	18.7	C
60 .	Fifth Ave.	No	27.4	D	22.2	C	29.8	D
61 .	Sixth Ave.	No	19.5	C	13.9	B	14.6	B
Grape St. @								
62 .	Fourth Ave.	Yes	20.2	C	19.6	B	18.5	B
63 .	Fifth Ave.	No	17.5	C	15.4	C	**78.0**	**F**
64 .	Sixth Ave.	No	13.9	B	14.0	B	22.8	C
Fir St. @								
65 .	Fourth Ave.	No	11.9	B	12.8	B	12.5	B
66 .	Fifth Ave.	No	14.3	B	17.8	C	18.5	C
67 .	Sixth Ave.	No	14.0	B	11.6	B	12.2	B
Elm St. @								
68 .	Fourth Ave.	Yes	24.6	C	14.1	B	14.6	B
69 .	Fifth Ave.	Yes	20.8	C	9.7	A	8.5	A
70 .	Sixth Ave.	Yes	32.3	C	13.9	B	14.1	B

5.8 2030 No Build Operational Analysis

Roadway Segments

The 2030 No Build roadway segment level of service analysis for the study area is summarized in Table 5-3. As shown in the table, Washington Street is expected to operate at LOS F from Fifth to Seventh Avenue by the year 2030 if existing intersection and roadway geometry remain unchanged. University Avenue from Fourth to Fifth Avenue is forecast to operate at LOS E and Upas Street from Fourth to Fifth Avenue is forecast to operate at LOS F. The City of San Diego defines LOS D as the threshold for acceptable operating conditions for roadway segments.

A review of the key north-south roadways serving the study corridor indicates that one segment on Fourth Avenue and three segments on Sixth Avenue would operate at LOS E or worse by the year 2030. Specifically, the segment of Fourth Avenue from Pennsylvania Avenue to Brookes Avenue is forecast to operate at LOS F. On Sixth Avenue, the segment from Washington Street to University Avenue is expected to operate at LOS F and the two segments from University Avenue to Robinson Avenue and Robinson Avenue to Brookes Avenue are forecast to operate at LOS E in the year 2030 No Build scenario.

Intersections

Table 5-4 presents the 2030 No Build scenario delays and levels of service at the signalized and unsignalized study intersections, respectively, based on the HCM methodology. HCM analysis worksheets are provided in the Appendix at the end of this report.

As shown in Table 5-4, 21 intersections are forecast to operate at LOS E or worse during one or more of the peak periods analyzed. Three of the deficient intersections are signalized and the remaining 18 intersections are controlled by a two-way stop condition.

The signalized intersection of Sixth Avenue and University Avenue is expected to operate at LOS E during the p.m. peak hour and the intersection of Sixth Avenue and Robinson Avenue is forecast to operate at LOS E during the mid-day peak hour. At the south end of the corridor, the signalized intersection of Sixth Avenue and Elm Street, a freeway off-ramp, is expected to operate at LOS F during the morning peak hour.

On Fourth Avenue, the unsignalized intersection at Brooks Avenue is expected to operate at LOS E during the mid-day peak hour and the unsignalized intersection at Upas Street is forecast to operate at LOS F during the a.m., mid-day and p.m. peak hours.

The majority of the deficient two-way stop controlled intersections are located on Fifth Avenue. Here, intersections at Brookes Avenue, Redwood Street, Quince Street, and Palm Street would operate at LOS E during the p.m. peak hour. Two-way stop controlled intersections on Fifth Avenue at Thorn Street, Spruce Street, Olive Street, Nutmeg Street, Maple Street, Kalmia Street, Juniper Street, Ivy Street, Hawthorne Street, and Grape Street are all expected to operate at LOS F during one or more of the peak hour periods.

On Sixth Avenue, the unsignalized intersection at Palm Street is expected to operate at LOS F during the mid-day peak hour and the unsignalized intersection at Maple Street is forecast to operate at LOS E during the p.m. peak hour.

The delay imposed on the eastbound or westbound left turning and through movement vehicles is the typical cause for failing operating conditions on the side streets under the 2030 No Build conditions. Due to the forecast increase in through traffic along Fourth, Fifth, and Sixth Avenues by the year 2030, delays to vehicles on the side streets are forecast to exceed acceptable levels of delay.

Table 5-3
Horizon Year 2030 No Build Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Class (Lanes)	LOS E Capacity	Year 2030 No Build		
					ADT	V/C	LOS
1 .	Washington Ave.	From Fifth to Seventh Ave.	Major NP (4)	40,000	52,343	1.31	F
2 .	University Ave.	From Fourth Ave. to Fifth Ave.	Collector WP (4)	30,000	25,976	0.87	E
3 .	Robinson St.	From Fifth to Sixth Ave.	Collector NP (2)	10,000	14,910	1.49	F
4 .	Upas St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	8,067	1.01	F
5 .	Laurel St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	15,000	12,164	0.81	D
6 .	Juniper St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	3,601	0.45	B
7 .	Elm St.	From Fourth Ave. to Fifth Ave.	One-Way WP (3)	24,000	7,395	0.31	A
8 .	Fourth Ave.	From Washington to University	One-Way WP (2)	16,000	9,769	0.61	C
9 .		From University to Robinson	One-Way WP (2)	16,000	13,555	0.85	D
10 .		From Pennsylvania to Brookes	One-Way WP (2)	16,000	19,203	1.20	F
11 .		From Upas to Thorn	One-Way WP (3)	24,000	10,049	0.42	B
12 .		From Redwood to Quince	One-Way WP (3)	24,000	9,480	0.40	B
13 .		From Olive to Nutmeg	One-Way WP (3)	24,000	9,593	0.40	B
14 .		From Maple to Laurel	One-Way WP (3)	24,000	10,585	0.44	B
15 .		From Laurel to Kalmia	One-Way WP (3)	24,000	7,110	0.30	A
16 .		From Juniper to Ivy	One-Way WP (3)	24,000	7,281	0.30	A
17 .		From Fir to Elm	One-Way WP (3)	24,000	13,506	0.56	C

Table 5-3 (Continued)
Horizon Year 2030 No Build Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Classification (Lanes)	LOS E Capacity	Year 2030 No Build		
					ADT	V/C	LOS
18 .	Fifth Ave.	From Washington to University	One-Way WP (3)	24,000	12,307	0.51	C
19 .		From University to Robinson	One-Way WP (3)	24,000	13,067	0.54	C
20 .		From Pennsylvania to Brookes	One-Way WP (3)	24,000	19,108	0.80	D
21 .		From Upas to Thorn	One-Way WP (3)	24,000	17,519	0.73	D
22 .		From Redwood to Quince	One-Way WP (3)	24,000	15,185	0.63	C
23 .		From Olive to Nutmeg	One-Way WP (3)	24,000	17,256	0.72	D
24 .		From Maple to Laurel	One-Way WP (3)	24,000	15,241	0.64	C
25 .		From Laurel to Kalmia	One-Way WP (3)	24,000	16,409	0.68	C
26 .		From Juniper to Ivy	One-Way WP (3)	24,000	14,520	0.61	C
27 .		From Fir to Elm	One-Way WP (3)	24,000	12,726	0.53	B
28 .	Sixth Ave.	From Washington to University	Major NP (4)	40,000	42,866	1.07	F
29 .		From University to Robinson	Collector WP (4)	30,000	28,252	0.94	E
30 .		From Pennsylvania to Brookes	Collector WP (4)	30,000	28,977	0.97	E
31 .		From Upas to Thorn	Collector WP (4)	30,000	23,232	0.77	D
32 .		From Redwood to Quince	Collector WP (4)	30,000	21,722	0.72	D
33 .		From Olive to Nutmeg	Collector WP (4)	30,000	19,294	0.64	C
34 .		From Maple to Laurel	Collector WP (4)	30,000	18,795	0.63	C
35 .		From Laurel to Kalmia	Collector WP (4)	30,000	13,535	0.45	B
36 .		From Juniper to Ivy	Collector WP (4)	30,000	14,585	0.49	C
37 .		From Fir to Elm	Collector WP (4)	30,000	12,303	0.41	B

Table 5-4
Year 2030 No Build Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Washington St @								
1 .	Fourth Ave.	Yes	33.9	C	36.4	D	52.0	D
2 .	Fifth Ave.	Yes	16.2	B	19.1	B	25.7	C
University Ave. @								
3 .	Fourth Ave	Yes	40.1	D	33.5	C	43.1	D
4 .	Fifth Ave.	Yes	16.3	B	18.0	B	26.0	C
5 .	Sixth Ave.	Yes	54.1	D	52.7	D	**65.7**	**E**
Robinson Ave. @								
6 .	Fourth Ave.	Yes	16.6	B	15.4	B	21.5	C
7 .	Fifth Ave.	Yes	14.2	B	17.9	B	18.8	B
8 .	Sixth Ave.	Yes	30.4	C	**73.1**	**E**	42.5	D
Pennsylvania Ave @								
9 .	Fourth Ave.	No	11.8	B	14.9	B	16.4	C
10 .	Fifth Ave.	Yes	7.7	A	8.6	A	12.7	B
11 .	Sixth Ave.	Yes	10.9	B	19.1	B	43.2	D
Anderson Pl.@								
12 .	Fifth Ave.	No	11.8	B	13.5	B	18.9	C
13 .	Sixth Ave.	No	1.0	A	0.3	A	0.8	A
Brookes Ave. @								
14 .	Fourth Ave.	No	21.5	C	**39.3**	**E**	21.9	C
15 .	Fifth Ave.	No	15.8	C	**37.1**	**E**	30.3	D
Ivy Ln. @								
16 .	Fifth Ave.	No	11.4	B	14.5	B	10.6	B
17 .	Sixth Ave.	No	21.1	C	32.6	D	16.8	C

Table 5-4
Year 2030 No Build Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Walnut Ave. @								
18 .	Fourth Ave.	No	13.9	B	13.2	B	15.4	C
19 .	Fifth Ave.	No	14.3	B	11.9	B	10.1	B
Upas St.@								
20 .	Fourth Ave.	No	**51.6**	**F**	**191.7**	**F**	**65.6**	**F**
21 .	Fifth Ave.	Yes	9.6	A	8.7	A	9.0	A
22 .	Sixth Ave	Yes	13.4	B	13.0	B	18.0	B
Thorne St.@								
23 .	Fourth Ave.	No	17.8	C	18.3	C	18.5	C
24 .	Fifth Ave.	No	18.8	C	30.6	D	**72.8**	**F**
25 .	Sixth Ave.	No	20.5	C	20.2	C	21.3	C
Spuce St. @								
26 .	Fourth Ave.	No	30.9	D	26.0	D	32.9	D
27 .	Fifth Ave.	No	**43.6**	**E**	**121.2**	**F**	**198.6**	**F**
28 .	Sixth Ave.	No	33.1	D	21.3	C	20.1	C
Redwood St. @								
29 .	Fourth Ave.	No	11.2	B	12.6	B	11.9	B
30 .	Fifth Ave.	No	21.0	C	31.2	D	**39.9**	**E**
31 .	Sixth Ave.	No	25.4	D	13.1	B	16.4	C
Quince St. @								
32 .	Fourth Ave.	No	11.2	B	13.1	B	12.0	B
33 .	Fifth Ave.	No	22.9	C	26.4	D	**49.7**	**E**
34 .	Sixth Ave.	Yes	9.5	A	10.2	B	7.4	A

Table 5-4
Year 2030 No Build Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Palm St. @								
35 .	Fourth Ave.	No	14.2	B	13.9	B	13.2	B
36 .	Fifth Ave.	No	23.0	C	30.5	D	**38.2**	**E**
37 .	Sixth Ave.	No	16.4	C	**65.7**	**F**	16.6	C
Olive St. @								
38 .	Fourth Ave.	No	13.0	B	17.6	C	17.1	C
39 .	Fifth Ave.	No	32.8	D	29.4	D	**116.9**	**F**
40 .	Sixth Ave.	No	23.4	C	23.4	C	24.7	C
Nutmeg St. @								
41 .	Fourth Ave.	No	16.7	C	19.3	C	18.0	C
42 .	Fifth Ave.	No	25.0	D	**62.6**	**F**	**36.1**	**E**
43 .	Sixth Ave.	No	21.6	C	15.3	C	22.9	C
Maple St. @								
44 .	Fourth Ave.	No	24.3	C	**52.4**	**F**	31.3	D
45 .	Fifth Ave.	No	**40.3**	**E**	**65.5**	**F**	**37.6**	**E**
46 .	Sixth Ave.	No	18.2	C	16.9	C	**46.5**	**E**
Laurel St. @								
47 .	Fourth Ave.	Yes	14.6	B	15.1	B	17.3	B
48 .	Fifth Ave.	Yes	23.5	C	18.7	B	21.5	C
49 .	Sixth Ave.	Yes	19.8	B	19.9	B	26.8	C
Kalmia St. @								
50 .	Fourth Ave.	No	14.4	B	14.0	B	14.9	B
51 .	Fifth Ave.	No	**53.0**	**F**	**148.5**	**F**	**219.4**	**F**
52 .	Sixth Ave.	No	10.8	B	15.5	C	12.4	B

Table 5-4
Year 2030 No Build Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Juniper Street @								
53 .	Fourth Ave.	No	15.0	C	14.6	B	18.8	C
54 .	Fifth Ave.	No	**50.4**	**F**	**68.2**	**F**	**268.0**	**F**
55 .	Sixth Ave.	No	10.3	B	10.3	B	11.6	B
Ivy St. @								
56 .	Fourth Ave.	No	15.8	C	16.3	C	16.2	C
57 .	Fifth Ave.	No	**48.7**	**E**	**84.9**	**F**	**157.0**	**F**
58 .	Sixth Ave.	No	16.3	C	12.0	B	13.3	B
Hawthorn St. @								
59 .	Fourth Ave.	No	17.0	C	18.2	C	21.3	C
60 .	Fifth Ave.	No	**872.7**	**F**	**OVFL**	**F**	**578.7**	**F**
61 .	Sixth Ave.	No	24.3	C	15.0	B	16.0	C
Grape St. @								
62 .	Fourth Ave.	Yes	17.3	B	18.2	B	25.5	C
63 .	Fifth Ave.	No	**391.7**	**F**	**81.6**	**F**	**181.1**	**F**
64 .	Sixth Ave.	No	15.4	C	15.4	C	28.7	D
Fir St. @								
65 .	Fourth Ave.	No	14.4	B	16.2	C	17.6	C
66 .	Fifth Ave.	No	24.8	C	25.4	D	29.5	D
67 .	Sixth Ave.	No	15.2	C	12.1	B	12.9	B
Elm St. @								
68 .	Fourth Ave.	Yes	27.6	C	17.8	B	22.0	C
69 .	Fifth Ave.	Yes	28.0	C	14.6	B	14.7	B
70 .	Sixth Ave.	Yes	48.5	D	14.4	B	15.5	B

5.9 VISSIM ANALYSIS

VISSIM was also used to analyze operational conditions along the corridor for the Horizon Year 2030 No Build Conditions for the study area. The main focus of the analysis was directed at travel time and speed. This information is provided for both sub-sections of the corridor and for each corridor overall (Fourth, Fifth, and Sixth Avenue), as shown in Table 5-5.

As shown in the table, travel time is longest in the northern end of the corridor, where most congestion occurs. In these same sections, the speed is also the lowest of all areas. Outside of the northern area of the corridor, which is defined as south of Walnut, the speed is generally higher and little delay is evident.

Table 5-6 provides the travel time and speed information for transit vehicles. Information is provided only for the Fourth and Fifth Avenue corridor as transit vehicles only travel along these roadways.

Table 5-5
Horizon Year 2030 No Build VISSIM Results (Automobiles)

Roadway Limits	P.M. Peak Travel Time (min:sec)	Average Speed (mph)
Sixth Avenue (Northbound)		
Walnut - Washington	03:48	9.1
Maple - Walnut	01:33	23.8
Elm - Maple	01:31	22.5
Total	06:52	15.3
Sixth Avenue (Southbound)		
Elm - Maple	01:41	20.3
Maple - Walnut	01:41	22.1
Walnut - Washington	05:58	5.9
Total	09:20	11.3
Fifth Avenue (Northbound)		
Elm - Maple	01:41	20.5
Maple - Walnut	02:06	21.2
Walnut - Washington	06:28	6.0
Total	10:15	10.3
Fourth Avenue (Sourthbound)		
Washington - Walnut	03:48	9.1
Walnut - Maple	01:33	24.1
Maple - Elm	02:02	16.9
Total	07:23	14.2

Table 5-6
Horizon Year 2030 No Build VISSIM Results (Transit)

Roadway Limits	P.M. Peak Travel Time (min:sec)	Average Speed (mph)
Fifth Avenue (Northbound)		
Elm - Maple	03:15	10.6
Maple - Walnut	01:40	22.2
Walnut - Washington	02:53	11.7
Total	07:48	13.4
Fourth Avenue (Southbound)		
Washington - Walnut	04:23	7.7
Walnut – Maple	03:12	11.7
Maple – Elm	03:23	10.1
Total	10:58	9.6

As shown in the table above, transit vehicles encounter significant delay on Fifth Avenue north of Walnut. The travel times in this section of the corridor are much higher than those for transit elsewhere, because of a reduction in bus speeds. Nearly no delay occurs in the central section between Maple and Walnut Streets, with some delay occurring in the southern section near Laurel Street.

5.10 FUTURE TRANSIT ACTIVITY AND OPERATIONS

The recently adopted SANDAG Regional Transportation Plan (RTP) includes two service improvements in the Hillcrest Corridor. Route 120 would be upgraded to Bus Rapid Transit (BRT) service and operate with 10-minute frequency on the Fourth/Fifth/SR 163 Corridor Guideway. The Fourth/Fifth/SR-163 Guideway and BRT system will have high performance vehicles outfitted with comfortable interiors and amenities, and stops with upgraded amenities such as next bus displays, travel information, upgraded seating, bicycle racks, and enhanced lighting. The vehicles and stations will be tied together with unique branding elements that will identify the service as part of the region's BRT system.

Route 640 would be a new BRT service operating between San Ysidro and Kearny Mesa with service to Downtown San Diego and Hillcrest. It would also use the Fourth/Fifth/SR 163 Corridor Guideway. Although the actual alignment of Route 640 is not fully determined, it is anticipated that it would stop at University Avenue on both Fourth and Fifth Avenues. Both improvements are planned to take place during the 2030 decade. Exhibit 5-4 illustrates the planned transit service through the study area.

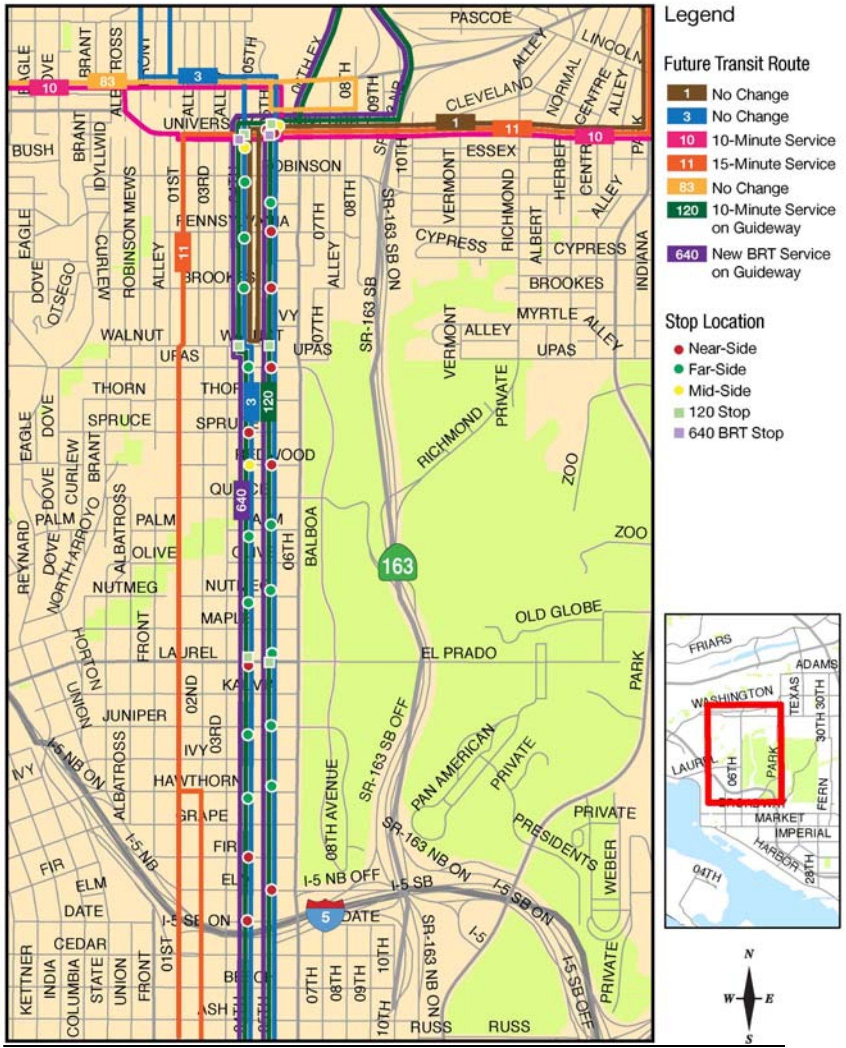

Exhibit 5-4 Future Transit Routes
(Source: SANDAG/MTS)

5.11 CONCLUSIONS

The City of San Diego traffic model was used to forecast the Horizon Year 2030 No Build Conditions for the study area. Average daily traffic volumes and transit ridership data were calculated by the model and post-processed to evaluate the operating conditions along the corridor if no physical conditions were changed on Fourth, Fifth or Sixth Avenue by the year 2030. A near term 2010 assessment was conducted by applying a growth rate factor to existing conditions based upon the forecast year 2030 traffic volumes.

For both 2010 and 2030, forecast increase in traffic volumes along Fourth, Fifth and Sixth Avenues continue to be well below the available capacities on those roadways in the central and southern sections. This is evident in the traffic analysis area where the majority of volume-to-capacity ratios on Fourth Avenue fall below 0.40 (40% of available capacity) south of Upas Street and below 0.70 on Fifth Avenue south of Upas Street. As a result, traffic speeds on these corridors are not likely to be slowed to ensure greater pedestrian safety without reducing the capacity of the roadway or through vertical or horizontal deflections. A combination of traffic calming measures aimed to improve pedestrian accessibility and reduce speeds would be preferred. Traffic speeds along the corridors currently exceed the posted speed limit of 30 mph, which is in large part due to the low volumes and excess available capacity.

Using the VISSIM microsimulation model, transit vehicle travel times are anticipated to increase by the year 2030 when compared to the existing travel time, primarily due to the forecast increase in traffic volumes. Ridership is forecast to increase by over 200 percent by 2030. No increase in service is currently programmed by SANDAG for the corridor. Existing capacity on the system is sufficient to meet the forecast demand by the year 2030. Ridership is forecast to increase and most of it is on the improved Route 120, which will be improved to have 10-minute frequency peak/off peak, up from 15-minute peak/off peak. This kind of capacity increase operating on the Fourth/Fifth/SR 163 Guideway would be needed to generate the forecasted ridership increase. Route 640 would also be added to the corridor.

As land uses in Uptown continue to intensify and integrate mixed-use type projects, demands for alternative forms of transportation along the corridor and within the community will increase. Similarly, as the Uptown Community continues to age, wider sidewalks will be needed to accommodate wheelchairs and mobility scooters along the corridor. Pedestrian ramps at all intersections will be needed to help improve the walkability and accessibility of the corridor in the future. Improvements to the sidewalks and transit stops along the study corridors will be necessary to both accommodate and encourage alternative forms of transportation. The widths of sidewalks and amenities at the transit stops will need to be evaluated to ensure that adequate space is provided for existing and future transit users.

Bicycle traffic along Fourth, Fifth and Sixth Avenues is currently very light, with less than 15 bicycles on the corridor during the peak hours. Bicycle ridership is anticipated to increase in the No Build scenarios due to the intensification of land uses in the area and pending updates to both the Bicycle Master Plan and Community Plan update.

Recreational bicyclists will continue to use parallel routes such paths through Balboa Park and lower volume roads such as Third Avenue unless traffic speeds are reduced and/or bicycle facilities such as dedicated lanes are provided along Fourth, Fifth or Sixth Avenue.

Pedestrian safety and accessibility were ranked as the highest priority by both residents who attended the public workshops as well as members of the project working group. Effective traffic calming devices working in parallel with one another will be the most effective method to slow down traffic and improve the pedestrian environment along the corridors in the study area.

In addition, improved east-west connections to Balboa Park should be provided through enhanced pedestrian crossings, traffic signals where warranted and improved signage.

Chapter 6:
Analysis of 2005 Concept Plan

6.0 OVERVIEW

The 2005 Concept Plan was developed as part of the "Fourth, Fifth, and Sixth Avenue Traffic Calming" study (KTU+A, 2004). The plan is made up of several traffic calming elements intended to slow traffic and improve the pedestrian friendliness and safety along the corridors. The 2005 Concept Plan was the starting point for the Hillcrest Corridor Mobility Study.

In this chapter, elements of the 2005 Concept Plan are discussed and the operating conditions associated with the 2005 Concept Plan are evaluated using the measures of effectiveness defined in Chapter 3 of this document. The goal of this chapter is to understand how the various elements of the 2005 Concept Plan meet the goals of improving mobility and where they do not.

6.1 ELEMENTS OF THE CONCEPT PLAN

The 2005 Concept Plan, as draft for the "Fourth, Fifth and Sixth Avenues Traffic Calming" study completed by KTU+A, is provided in Exhibit 6-1. Elements of the 2005 Concept Plan include:

- Curb Extensions (Bulb-outs)
- Enhanced Crosswalks
- Mid-block Crosswalks
- Transit Only Lanes from Upas to Elm on Fourth & Fifth Avenues
- Transit Stop Relocations or Removal
- Enhanced Transit Stops & Bus Rapid Transit Stations
- New Traffic Signals
- Raised Median on Sixth Avenue
- Reduction in Travel Lanes (Fourth, Fifth & Sixth Avenues)
- Conversion from Parallel to Diagonal Parking on Side Streets

Curb Extensions (Bulb-outs)

Curb extensions or pedestrian bulb-outs are extensions of the sidewalk into the street providing a wider waiting area for pedestrians or transit passengers at intersections and unsignalized crosswalks. Most curb extensions (bulb-outs) extend the sidewalk toward the traffic lane, reducing the curb-to-curb distance and pedestrian exposure time to moving vehicles.

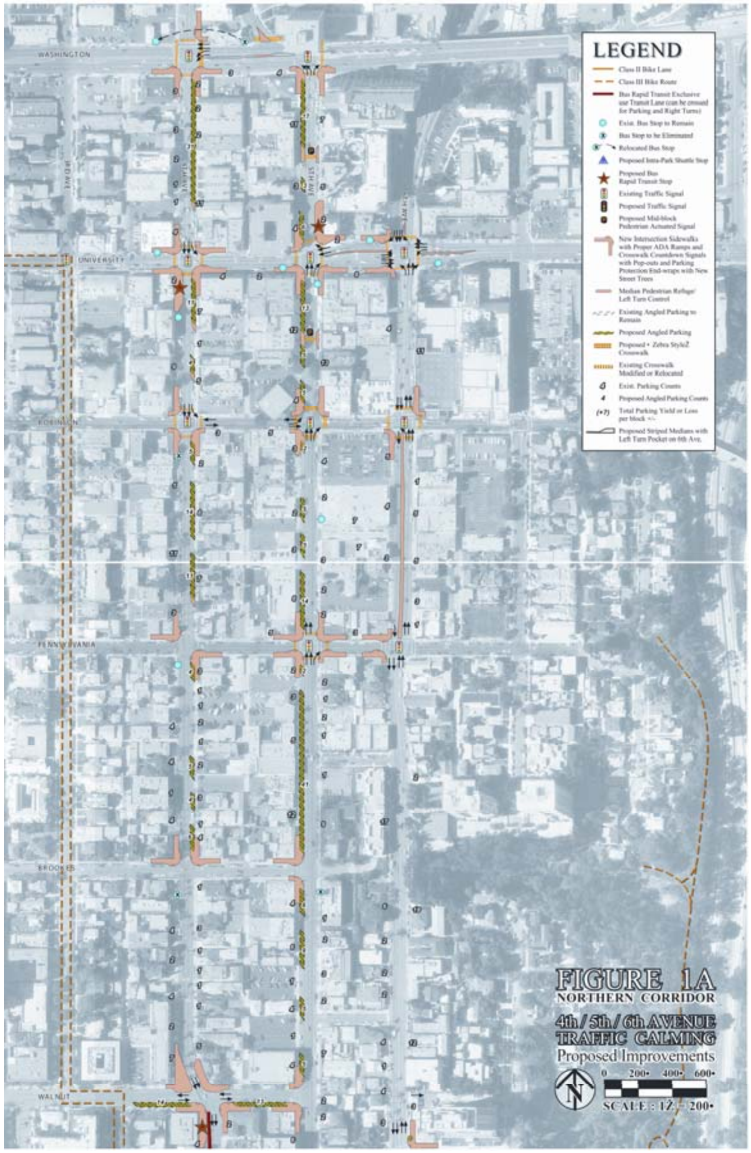

Exhibit 6-1 2005 Concept Plan – Northern Corridor

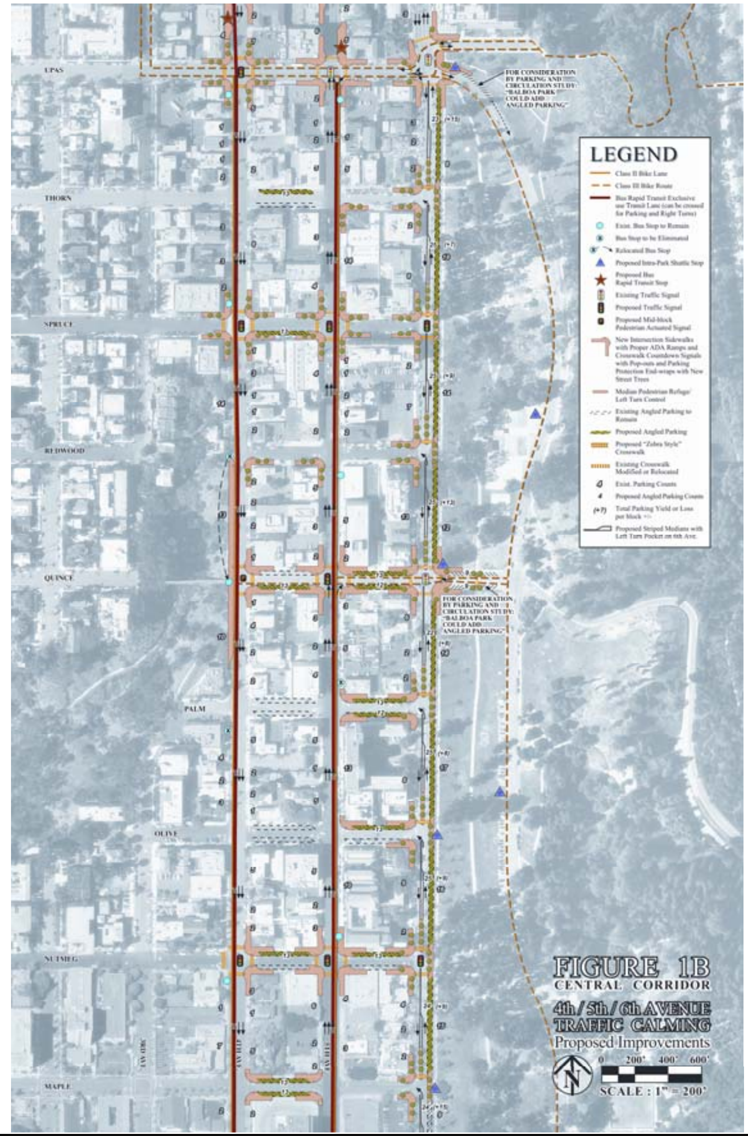

Exhibit 6-1 2005 Concept Plan – Central Corridor

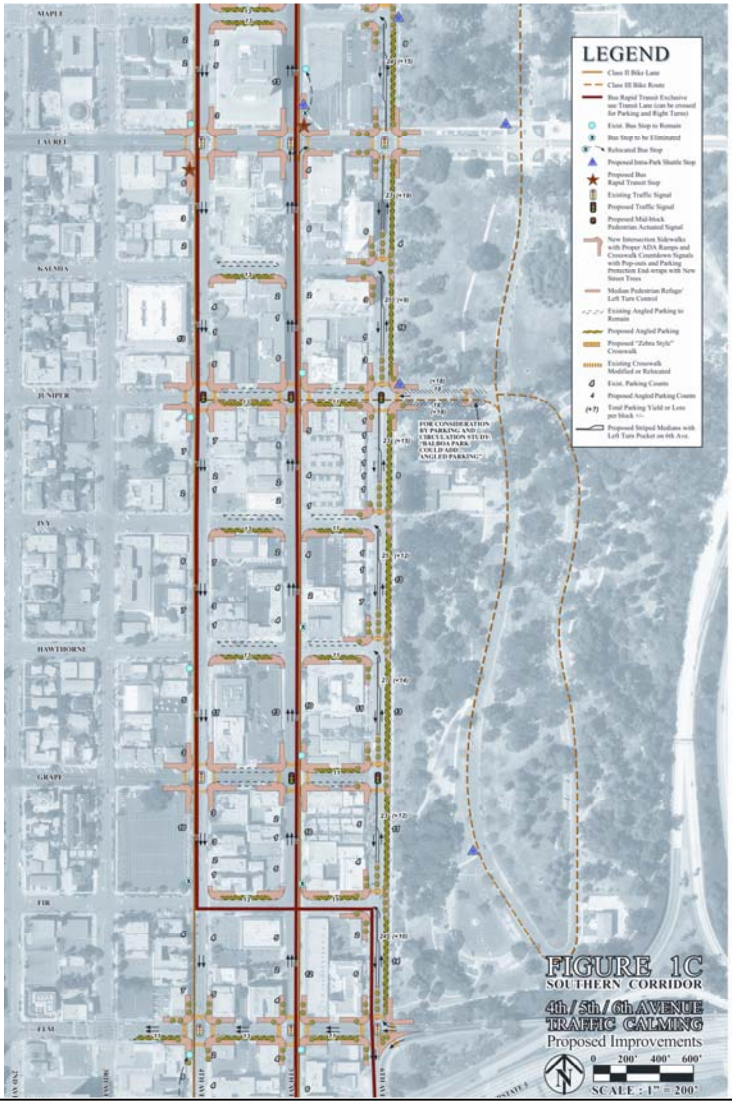

Exhibit 6-1 2005 Concept Plan – Southern Corridor

The 2005 Concept Plan includes multiple locations for these curb extensions (bulb-outs) to occur. Typically the bulb-outs are associated with major intersections, unsignalized pedestrian crossings, transit stops and protective areas for on-street parking.

Curb extensions (bulb-outs) at bus stops can reduce delay for buses and provide an enhanced passenger-waiting environment. Bulb-outs at transit stops reduce transit travel times by eliminating the time normally lost after stopping to board passengers when buses wait for an acceptable gap to re-enter traffic because the bus stops would stop in the travel lane.

Mid-block Crosswalks

Two proposed mid-block crossings on Fifth Avenue, between Washington Street and Robinson Avenue, include enhanced pedestrian crossings with bulb-outs and zebra-style pavement markings. In-pavement flashers are recommended, which would require a pedestrian push button, 4-foot post, and power source.

Enhanced Crosswalks

The 2005 Concept Plan includes new zebra-style crosswalk markings proposed at several locations to improve pedestrian access, visibility, and safety.

Transit Only Lanes from Upas to Elm on Fourth and Fifth Avenues

As proposed, the outside lane along Fourth and Fifth Avenues would serve as a dedicated transit only lane from Upas to Elm. The number of lanes on Fourth and Fifth Avenues available to traffic would therefore be reduced from three to two lanes through most of the corridor to allow for a transit only lane.

Dedicated turn lanes would be provided to improve the flow of traffic along the corridor; therefore the daily capacity of Fourth and Fifth Avenues would remain unchanged. The greatest impact to traffic would occur during the peak hours. Based on daily traffic volume counts collected along the corridors, the a.m. peak hour traffic volumes account for approximately six percent of the total daily traffic and the p.m. peak hour traffic volumes account for approximately nine percent of the total daily traffic.

Bicycles currently share the travel way with passenger vehicles, trucks and buses. Under the 2005 Concept Plan, bicycles would be allowed to travel in the transit only lane. Transit vehicles travel at approximately 6 to 10 minute headways along Fourth and Fifth Avenues. With 11 feet of travel way, bicycles would be provided more capacity with the transit only lane as proposed in the 2005 Concept Plan than in existing or 2030 No Build conditions.

Transit Stop Relocations or Removal

There are 27 existing transit stops along the study corridors. The existing stops are evenly divided with 14 stops on Fourth Avenue and 13 stops on Fifth Avenue. The 2005 Concept Plan would reduce the number of transit stops from 27 to 19. This reduction is intended to consolidate the passengers boarding and alighting areas, allow for fewer stops, and provide faster transit service within the corridor.

Consolidation of stops would lead to a decrease in travel time within the corridor. SANDAG/MTS has found that transit stop consolidation can have a time savings of typically 15-seconds for each eliminated stop.

With the reduction of transit stops, the redistribution of passengers to the new transit stop locations would occur. As part of this analysis, a table was prepared showing the potential redistribution of the passengers based on the transit stop reductions.

All of the proposed transit stops have been established at far side locations. The purpose for placing the stops on the far side of intersections, as shown in the 2005 Concept Plan, is to provide for improved transit times. Far-side transit stop are a preferred location by most transit agencies including SANDAG and MTS. Far-side stops have the added benefit of:

- Minimizing conflicts with right turning vehicles.
- Minimizing sight distance safety conflicts for both pedestrians and motorists.
- Encouraging pedestrians to cross behind the bus rather that in front of it.
- Better facilitating bus reentry into mixed-flow traffic.
- Allowing the transit vehicle to pass the intersection before loading/unloading passengers thereby eliminating the potential need to wait through another signal cycle.

Enhanced Transit Stops & Bus Rapid Transit Stations

The 2005 Concept Plan includes the integration of Bus Rapid Transit to the existing transit service along the corridor based upon SANDAG's long-range plan. The bus rapid transit or BRT service would have only 7 stops in the study corridor. These stops, identified with a red star in Exhibit 6-1 would have special features such as next-bus signs, illuminates shelters and decorative benches, ticket machines and schedule information.

New Traffic Signals

13 new traffic signals are proposed within the study area with the 2005 Concept Plan:

- Fourth Avenue / Upas
- Fourth Avenue / Spruce
- Fourth Avenue / Nutmeg
- Fourth Avenue / Juniper
- Fifth Avenue / Spruce
- Fifth Avenue / Quince
- Fifth Avenue / Nutmeg
- Fifth Avenue / Juniper
- Fifth Avenue / Grape
- Sixth Avenue / Spruce
- Sixth Avenue / Nutmeg
- Sixth Avenue / Juniper
- Sixth Avenue / Grape

With the installation of the new traffic signals at these locations, new crosswalks would be striped on all legs of the intersections. To maintain a smooth flow of traffic, the signalized intersections along the corridor will need to be coordinated. This is the process of setting the signal timing such that vehicles traveling along the corridor receive the green indication at as many signalized intersections as possible. This will be necessary to help the forecast traffic volumes traverse the corridor and minimize delays, stops and driver frustration. The more closely spaced intersections are, the more critical coordination becomes. If the signals for closely spaced intersections are not coordinated, queues will form that may affect the operations of the upstream intersections and the corridor as a whole.

Raised Median on Sixth Avenue

The 2005 Concept Plan includes a raised median planned along segments of Sixth Avenue. Raised medians would be placed on Sixth Avenue between Robinson and Pennsylvania, as well as on the north leg of each intersection south of Upas.

By introducing a raised median, left turn access in and out of some driveways would be prohibited. Vehicles exiting these driveways would be forced to make a right turn and either make a U-turn or make a right-turn towards Fifth Avenue as an alternate route. This would result in some re-routing of traffic along the side streets intersecting Sixth Avenue.

Reduction in Travel Lanes (Fourth, Fifth, and Sixth Avenues)

The 2005 Concept Plan includes a reduction in travel lanes along Fourth, Fifth, and Sixth Avenues through the central and south corridors of the study area. Along Fourth and Fifth Avenues, the installation of a transit-only lane would replace one lane of through traffic. Along Sixth Avenue, the conversion of parallel parking to diagonal parking on the northbound side of the street would replace on lane of through traffic to provide additional parking spaces.

Conversion from Parallel to Diagonal Parking

Parallel on-street parking is proposed to remain unchanged through of the 2005 Concept Plan on Fourth and Fifth Avenue. Through the central and southern portions of Sixth Avenue, the existing parallel parking is proposed to be converted to diagonal parking.

Portions of the diagonal parking on Sixth Avenue is "head-in", where driver pulls forward into the diagonal parking space. Along the southern portion of Sixth Avenue, where the grade of the road increases south of Laurel, back-in diagonal parking is proposed.

6.2 TRAFFIC MODELING EFFORTS

Chapter 5 discussed the details of the traffic modeling efforts for this project. As discussed in Chapter 5, the SANDAG Series 10 traffic model for the City of San Diego was used to forecast the future 2030 traffic volumes along the corridor. Capacity constraints were imposed along the corridor to reflect the 2005 Concept Plan including lane reductions on Fourth, Fifth and Sixth Avenues, new traffic signals along all three corridors, and transit only lanes. With and without 2005 Concept Plan conditions were modeled. In addition to the 2030 forecast traffic volumes for each scenario, several select link reports were produced for each scenario. The select link analysis was vital to the process of evaluating the redistribution of traffic due to the constrained capacity.

Through the modeling efforts, it was determined that a small portion (20 to 30 percent) of the traffic traveling through the corridor travels from one end to the other. Existing conditions data collected for the corridor confirms this model run data. Therefore, most trips entering and exiting the study area, from the north or from the south are destined for or are coming from locations within the study area.

The 2005 Concept Plan would reduce the capacity of Fourth and Fifth Avenues from three lanes each (one-way) to two lanes each (one-way plus a transit only lane from Upas Street to Elm Street).

Since the Concept Plan proposed a reduction in the number of general-purpose travel lanes on Fourth Avenue, Fifth Avenue, and portions of Sixth Avenue, a special analysis was performed to evaluate the potential for traffic to divert to other parallel roads outside the study corridor. This analysis relied in part, on the City of San Diego traffic-forecasting model to generate daily traffic forecasts for year 2030 traffic conditions without and with the Concept Plan.

Based on the results of the traffic model forecasts, it was determined that with the Concept Plan, the section of the Hillcrest corridor between Upas Street and Laurel Street is the capacity limiting section of the corridor. Within this section, both Fourth and Fifth Avenues have one general-purpose lane removed and re-assigned as a "transit only" lane. On Sixth Avenue, the Concept Plan calls for the four-lane street section to be reduced to a two-lane section with a left turn lane in a new median and angle parking along the east side of the street. These changes effectively reduce the traffic carrying capacity of the corridor by four travel lanes or approximately 31,000 vehicles per day.

Giving consideration to the volumes projected to be served by the three principal streets without the Concept Plan, it is estimated that up to 4,250 vehicles per day could be expected to divert to other parallel routes. Almost all of this traffic is expected to be northbound traffic. Since Fourth Avenue is less utilized than Fifth Avenue and has some reserve capacity even with the reduction of one travel lane, southbound traffic displaced from Sixth Avenue is able to shift to Fourth Avenue without exceeding its capacity. Northbound traffic projected to use Fifth Avenue is slightly higher than the remaining two-lane capacity and would result in the need for approximately 1,350 vehicles per day to divert to other available routes. Similarly, northbound traffic projected on Sixth Avenue would exceed the remaining one-lane capacity and approximately 2,900 vehicles per day would likely divert to other available routes.

The 2030 traffic model forecasts for the Concept Plan suggest that slightly more than half (2,250 vehicles per day) of the traffic diversion from the Hillcrest corridor would relocate to other nearby north-south regional corridors such as I-5 and State Route 163. The remaining 2,000 vehicles per day are expected to be distributed on nearby north-south surface streets such as Reynard Way (800 vehicles per day) and First Avenue (1,200 vehicles per day).

It is anticipated that the diversion of traffic would primarily occur during the peak hours, and when hourly traffic volume along the corridor exceeds the reasonable hourly per lane capacity of the corridor.

6.3 NEAR-TERM (Year 2010) TRAFFIC OPERATING CONDITIONS WITH THE 2005 CONCEPT PLAN

The Near-Term (Year 2010) analysis determined the operating conditions along the corridor in Year 2010 if 2005 Concept Plan were fully implemented. Based on the Implementation Plan, presented in Chapter 11 of this document, the short-term improvements (striping only) could be initiated as early as 2010. Since traffic operations are most directly related to changes in lane configurations on the roadway segments, the 2010 analysis is intended to reflect the short term operating condition.

Exhibit 6-2 illustrates the 2010 with 2005 Concept Plan scenario average daily traffic (ADT) volumes for the study corridor.

Roadway Segment Analysis

The 2010 with 2005 Concept Plan scenario roadway segment level of service analysis for the study area is summarized in Table 6-6. As shown in the table, the following roadway segments would be expected to operate at LOS F by the year 2010 due to the constrained capacity along the corridors:

- Washington Street: Fifth Avenue to Seventh Avenue
- Upas Street: Fourth Avenue to Fifth Avenue
- Fourth Avenue: Pennsylvania Avenue to Brookes Avenue
- Sixth Avenue: Washington Street to University Avenue
- Sixth Avenue: Upas Street to Thorn Street
- Sixth Avenue: Redwood Street to Quince Street
- Sixth Avenue: Olive Street to Nutmeg Street
- Sixth Avenue: Maple Street to Laurel Street

With the reduction in lanes on Sixth Avenue from a four to two-lane roadway, from Upas Street to Elm Street, the roadway would operate at LOS E and F from Upas Street to Laurel Street as forecast under 2010 with the 2005 Concept Plan conditions.

HCM Intersection Level of Service

Tables 6-7 and 6-8 present the 2010 With 2005 Concept Plan scenario level of service at the signalized and unsignalized study intersections, respectively, based on the HCM methodology.

As shown in Table 6-7, the following intersections would to operate at LOS F with the 2005 Concept Plan by year 2010:

- Sixth Avenue / University Avenue (signalized)
- Sixth Avenue / Palm Street (unsignalized)
- Fifth Avenue / Maple Street (unsignalized)
- Sixth Avenue / Maple Street (unsignalized)
- Sixth Avenue / Elm Street (signalized)

As previously described, the analysis of the 2005 Concept Plan includes 13 new traffic signals. All future signals would operate at LOS C or better.

The HCM analysis is not capable of evaluating the interaction between intersections, since HCM is an isolated intersection analysis methodology. Due to the high volume of traffic and the constrained capacity along the corridor, it is anticipated that queues will form along the corridors that may affect the access to and from the side streets. Such constraints were observed to occur using the VISSIM software analysis.

Table 6-1
Year 2010 With 2005 Concept Plan Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Class (Lanes)	LOS E Capacity	Year 2010 With 2005 Concept Plan		
					ADT	V/C	LOS
1 .	Washington Ave.	From Fifth to Seventh Ave.	Major NP (4)	40,000	43,649	1.09	F
2 .	University Ave.	From Fourth Ave. to Fifth Ave.	Collector WP (4)	30,000	21,104	0.70	D
3 .	Robinson St.	From Fifth to Sixth Ave.	Collector NP (3)	18,000	11,462	0.64	C
4 .	Upas St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	10,000	1.25	F
5 .	Laurel St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	15,000	10,775	0.72	C
6 .	Juniper St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	6,083	0.76	D
7 .	Elm St.	From Fourth Ave. to Fifth Ave.	One-Way WP (3)	24,000	2,498	0.10	A
8 .	Fourth Ave.	From Washington to University	One-Way WP (2)	16,000	8,434	0.53	C
9 .		From University to Robinson	One-Way WP (2)	16,000	9,958	0.62	C
10 .		From Pennsylvania to Brookes	One-Way WP (2)	16,000	14,847	0.93	E
11 .		From Upas to Thorn	One-Way WP (2)	16,000	7,729	0.48	B
12 .		From Redwood to Quince	One-Way WP (2)	16,000	7,849	0.49	B
13 .		From Olive to Nutmeg	One-Way WP (2)	16,000	7,521	0.47	B
14 .		From Maple to Laurel	One-Way WP (2)	16,000	8,677	0.54	C
15 .		From Laurel to Kalmia	One-Way WP (2)	16,000	7,573	0.47	B
16 .		From Juniper to Ivy	One-Way WP (2)	16,000	7,788	0.49	B
17 .		From Fir to Elm	One-Way WP (2)	16,000	8,838	0.55	C

Notes: NP = No Parking, WP = With Parking, * = includes two-way left turn lane

Table 6-1 (Continued)
Year 2010 with 2005 Concept Plan Conditions Roadway Segment Level of Service Analysis

Street		Segment	Classification (Lanes)	LOS E Capacity	Year 2010 With 2005 Concept Plan		
					ADT	V/C	LOS
18 .	Fifth Ave.	From Washington to University	One-Way WP (2)	16,000	10,357	0.65	C
19 .		From University to Robinson	One-Way WP (2)	16,000	10,610	0.66	C
20 .		From Pennsylvania to Brookes	One-Way WP (2)	16,000	12,660	0.79	D
21 .		From Upas to Thorn	One-Way WP (2)	16,000	10,489	0.66	C
22 .		From Redwood to Quince	One-Way WP (2)	16,000	10,395	0.65	C
23 .		From Olive to Nutmeg	One-Way WP (2)	16,000	11,796	0.74	C
24 .		From Maple to Laurel	One-Way WP (2)	16,000	10,401	0.65	B
25 .		From Laurel to Kalmia	One-Way WP (2)	16,000	9,552	0.60	B
26 .		From Juniper to Ivy	One-Way WP (2)	16,000	10,352	0.65	B
27 .		From Fir to Elm	One-Way WP (2)	16,000	9,291	0.58	B
28 .	Sixth Ave.	From Washington to University	Major NP (4)	40,000	38,316	0.96	E
29 .		From University to Robinson	Collector WP (4)	30,000	23,065	0.77	D
30 .		From Pennsylvania to Brookes	Collector WP (4)	30,000	21,012	0.70	C
31 .		From Upas to Thorn	Collector WP (2)	15,000	16,717	1.11	F
32 .		From Redwood to Quince	Collector WP (2)	15,000	15,923	1.06	F
33 .		From Olive to Nutmeg	Collector WP (2)	15,000	15,427	1.03	F
34 .		From Maple to Laurel	Collector WP (2)	15,000	14,753	0.98	E
35 .		From Laurel to Kalmia	Collector WP (2)	15,000	12,803	0.85	D
36 .		From Juniper to Ivy	Collector WP (2)	15,000	12,841	0.86	D
37 .		From Fir to Elm	Collector WP (2)	15,000	10,664	0.71	C

Notes: NP = No Parking, WP = With Parking, * = includes two-way left turn lane

Table 6-2
Year 2010 with 2005 Concept Plan
Intersection Level of Service Analysis

Intersection	Signal	AM		Midday		PM	
		Delay	LOS	Delay	LOS	Delay	LOS
Washington St @							
1 . Fourth Ave.	Yes	29.6	C	31.8	D	43.6	D
2 . Fifth Ave.	Yes	21.2	C	20.3	C	39.7	D
University Ave. @							
3 . Fourth Ave	Yes	21.5	C	30.2	C	34.3	C
4 . Fifth Ave.	Yes	15.7	B	17.6	B	22.2	C
5 . Sixth Ave.	Yes	42.6	D	45.1	D	56.3	E
Robinson Ave. @							
6 . Fourth Ave.	Yes	9.8	A	10.6	B	14.0	B
7 . Fifth Ave.	Yes	11.8	B	12.1	B	14.5	B
8 . Sixth Ave.	Yes	38.8	D	43.1	D	39.4	D
Pennsylvania Ave @							
9 . Fourth Ave.	No	12.5	B	16.2	C	16.4	C
10 . Fifth Ave.	Yes	7.5	A	10.2	B	12.6	B
11 . Sixth Ave.	Yes	13.6	B	13.4	B	36.5	D
Anderson Pl.@							
12 . Fifth Ave.	No	12.1	B	14.1	B	20.2	C
13 . Sixth Ave.	No	0.9	A	0.3	A	0.1	A
Brookes Ave. @							
14 . Fourth Ave.	No	15.8	C	14.4	B	15.4	C
15 . Fifth Ave.	No	15.1	C	27.9	D	25.7	D
Ivy Ln. @							
16 . Fifth Ave.	No	11.6	B	14.8	B	13.7	B
17 . Sixth Ave.	No	19.5	C	26.3	D	22.9	C

Table 6-2
Year 2010 with 2005 Concept Plan
Intersection Level of Service Analysis

Intersection	Signal	AM		Midday		PM	
		Delay	LOS	Delay	LOS	Delay	LOS
Walnut Ave. @							
18 . Fourth Ave.	No	10.8	B	10.4	B	10.9	B
19 . Fifth Ave.	No	12.5	B	12.4	B	12.7	B
Upas St.@							
20 . Fourth Ave.	*Yes*	11.3	B	12.1	B	11.0	B
21 . Fifth Ave.	Yes	7.5	A	6.1	A	6.9	A
22 . Sixth Ave	Yes	15.1	B	9.4	A	13.5	B
Thorne St.@							
23 . Fourth Ave.	No	15.1	C	15.4	C	15.1	C
24 . Fifth Ave.	No	15.6	C	19.6	C	23.5	C
25 . Sixth Ave.	No	27.3	D	21.8	C	22.6	C
Spuce St. @							
26 . Fourth Ave.	*Yes*	6.3	A	7.5	A	8.1	A
27 . Fifth Ave.	*Yes*	5.2	A	5.8	A	6.2	A
28 . Sixth Ave.	*Yes*	6.2	A	4.7	A	5.3	A
Redwood St. @							
29 . Fourth Ave.	No	11.4	B	12.5	B	12.1	B
30 . Fifth Ave.	No	15.0	B	18.1	C	18.9	C
31 . Sixth Ave.	No	23.1	C	14.6	B	16.5	C
Quince St. @							
32 . Fourth Ave.	No	11.4	B	13.1	B	12.3	B
33 . Fifth Ave.	Yes	5.5	A	5.2	A	4.0	A
34 . Sixth Ave.	Yes	12.7	B	8.9	A	6.7	A

Table 6-2
Year 2010 with 2005 Concept Plan
Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Palm St. @								
35 .	Fourth Ave.	No	13.4	B	13.2	B	12.9	B
36 .	Fifth Ave.	No	17.6	C	22.0	C	23.2	C
37 .	Sixth Ave.	No	26.0	D	**74.9**	**F**	18.7	C
Olive St. @								
38 .	Fourth Ave.	No	12.2	B	14.9	B	14.6	B
39 .	Fifth Ave.	No	24.1	C	19.4	C	25.6	D
40 .	Sixth Ave.	No	32.3	D	21.2	C	21.9	C
Nutmeg St. @								
41 .	Fourth Ave.	*Yes*	5.1	A	6.2	A	5.8	A
42 .	Fifth Ave.	*Yes*	4.5	A	5.0	A	4.1	A
43 .	Sixth Ave.	*Yes*	3.5	A	5.1	A	3.9	A
Maple St. @								
44 .	Fourth Ave.	No	18.8	C	29.9	D	21.9	C
45 .	Fifth Ave.	No	27.2	D	**131.6**	**F**	34.3	D
46 .	Sixth Ave.	No	18.6	C	15.3	C	**53.2**	**F**
Laurel St. @								
47 .	Fourth Ave.	Yes	15.3	B	13.2	B	17.3	B
48 .	Fifth Ave.	Yes	16.7	B	19.3	B	28.9	C
49 .	Sixth Ave.	Yes	26.1	C	25.2	C	35.4	D
Kalmia St. @								
50 .	Fourth Ave.	No	12.2	B	12.1	B	13.3	B
51 .	Fifth Ave.	No	16.9	C	24.8	C	23.5	C
52 .	Sixth Ave.	No	15.3	C	17.4	C	14.2	B

Table 6-2
Year 2010 with 2005 Concept Plan
Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Juniper Street @								
53 .	Fourth Ave.	*Yes*	5.4	A	3.4	A	5.2	A
54 .	Fifth Ave.	*Yes*	3.5	A	4.7	A	7.0	A
55 .	Sixth Ave.	*Yes*	3.4	A	5.9	A	9.4	A
Ivy St. @								
56 .	Fourth Ave.	No	14.6	B	16.2	C	15.4	C
57 .	Fifth Ave.	No	17.4	C	19.7	C	22.3	C
58 .	Sixth Ave.	No	19.4	C	13.0	B	15.2	C
Hawthorn St. @								
59 .	Fourth Ave.	No	15.5	C	16.4	C	18.7	C
60 .	Fifth Ave.	No	25.3	D	23.3	C	22.9	C
61 .	Sixth Ave.	No	24.8	C	15.2	C	17.1	C
Grape St. @								
62 .	Fourth Ave.	*Yes*	8.6	A	18.3	B	18.4	B
63 .	Fifth Ave.	*Yes*	6.0	A	6.9	A	9.4	A
64 .	Sixth Ave.	*Yes*	2.5	A	6.4	A	4.7	A
Fir St. @								
65 .	Fourth Ave.	No	15.0	C	12.9	B	12.5	B
66 .	Fifth Ave.	No	14.6	B	19.0	C	19.9	C
67 .	Sixth Ave.	No	16.8	C	12.8	B	14.0	B
Elm St. @								
68 .	Fourth Ave.	Yes	27.6	C	17.9	B	27.9	C
69 .	Fifth Ave.	Yes	23.1	C	14.3	B	20.5	C
70 .	Sixth Ave.	Yes	**283.0**	**F**	**82.8**	**F**	**79.2**	**E**

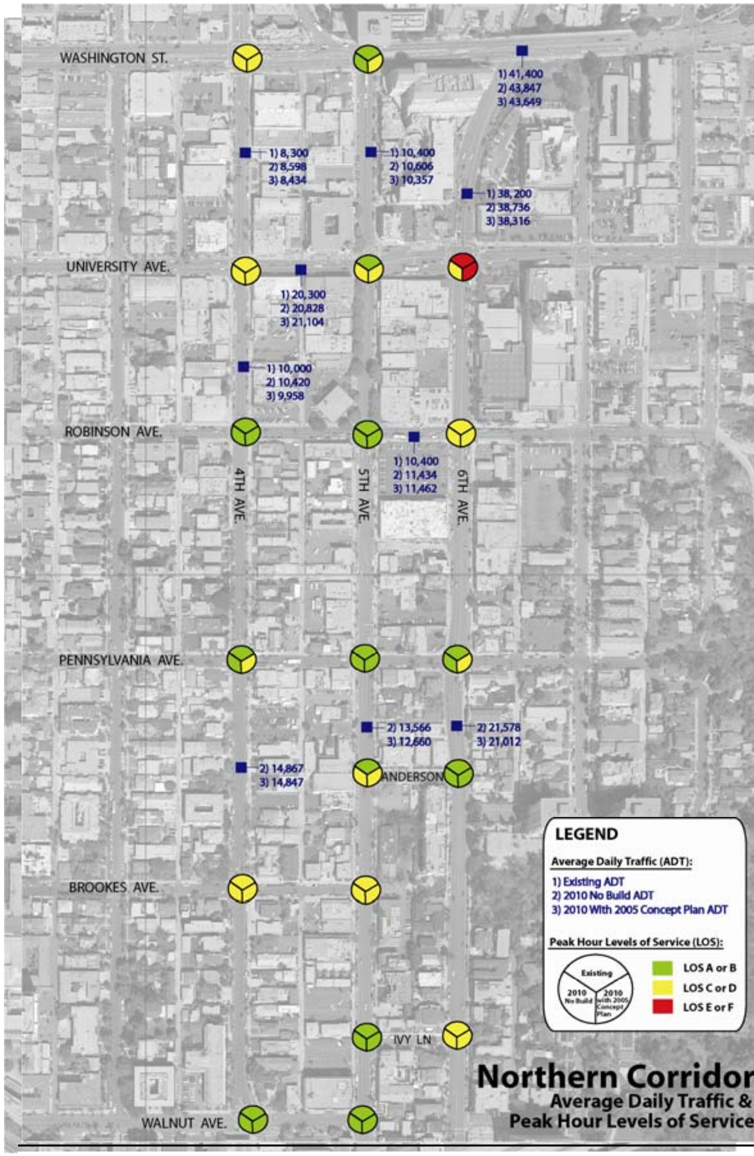

Exhibit 6-2 2010 Average Daily Traffic Volumes

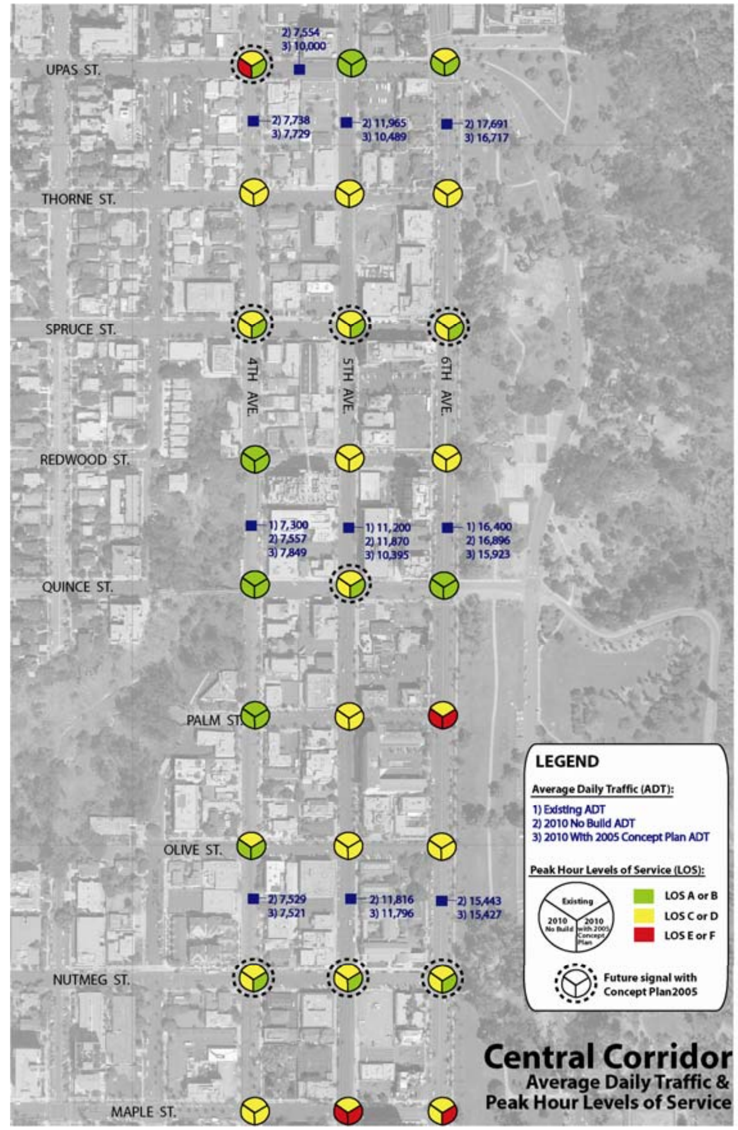

Exhibit 6-2 2010 Average Daily Traffic Volumes

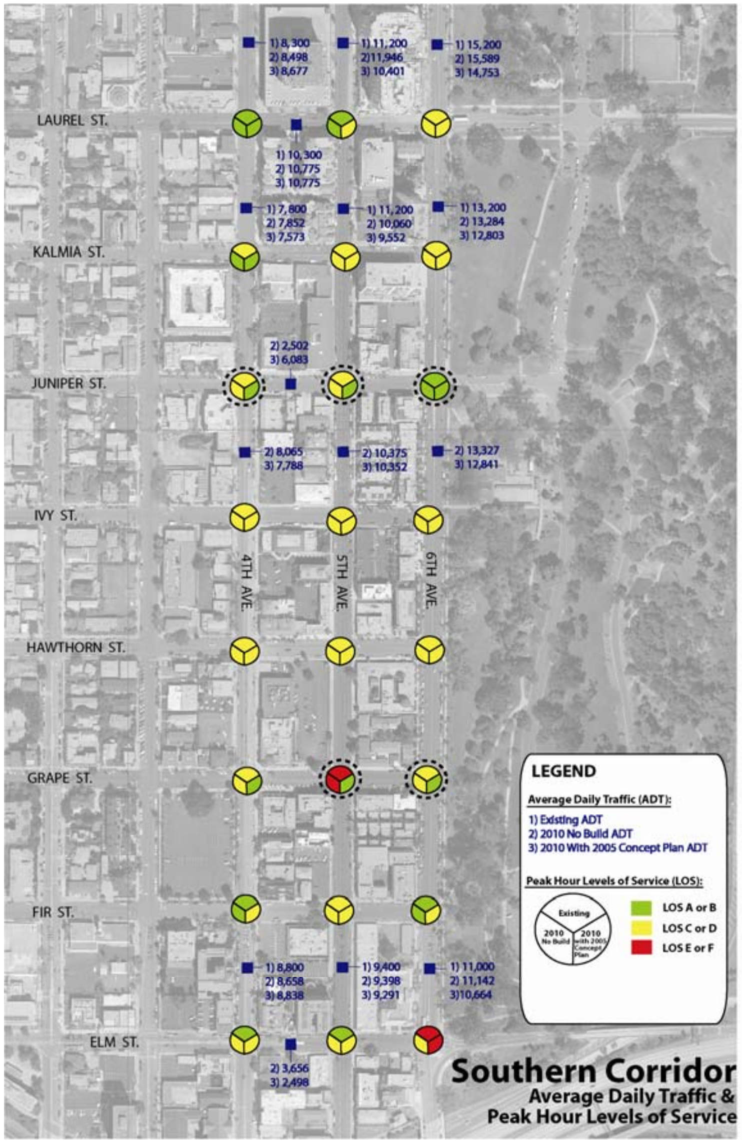

Exhibit 6-2 2010 Average Daily Traffic Volumes

6.4 LONG-TERM (2030) WITH 2005 CONCEPT PLAN

Horizon Year 2030 traffic and transit data was forecast using the SANDAG Series 10 traffic model. The changes made in the model to reflect the "With 2005 Concept Plan" scenarios are outlined herein.

Roadway Segments

Horizon Year 2030 With 2005 Concept Plan daily traffic volumes are shown in Exhibit 6-3. To evaluate the 2030 With 2005 Concept Plan operating conditions of the roadway segments within the study area, the ADT volumes were compared to the City LOS thresholds. No changes to capacity over existing or 2030 No Build conditions were applied to the side streets. A level of service was assigned to each roadway segment based on the level of service thresholds.

The 2030 with 2005 Concept Plan roadway segment level of service analysis for the study area is summarized in Table 6-12. As shown in the table, the following segments are forecast to operate at LOS E or F under the 2030 No Build scenario:

- Washington Street from Fifth to Seventh Avenues;
- University Avenue from Fourth to Fifth Avenues;
- Upas Street from Fourth to Fifth Avenues;
- Fourth Avenue from Pennsylvania to Brookes Avenue;
- Sixth Avenue from Washington to University Avenue;
- Sixth Avenue from University Avenue to Robinson Avenue; and
- Sixth Avenue from Pennsylvania to Brookes Avenue.

With the proposed corridor modifications included in the 2005 Concept Plan, these segments would continue to operate at LOS E or F. With implementation of the 2005 Concept Plan, the following roadway segments would change from acceptable operating conditions to deficient:

- Fifth Avenue from Pennsylvania to Brookes Avenue
- Fifth Avenue from Olive to Nutmeg Street
- Fifth Avenue from Laurel to Kalmia Street
- Fifth Avenue from Juniper to Ivy Street
- Sixth Avenue from Upas to Thorn Street
- Sixth Avenue from Redwood to Quince Street
- Sixth Avenue from Olive to Nutmeg Street
- Sixth Avenue from Maple to Laurel Street
- Sixth Avenue from Juniper to Ivy Street

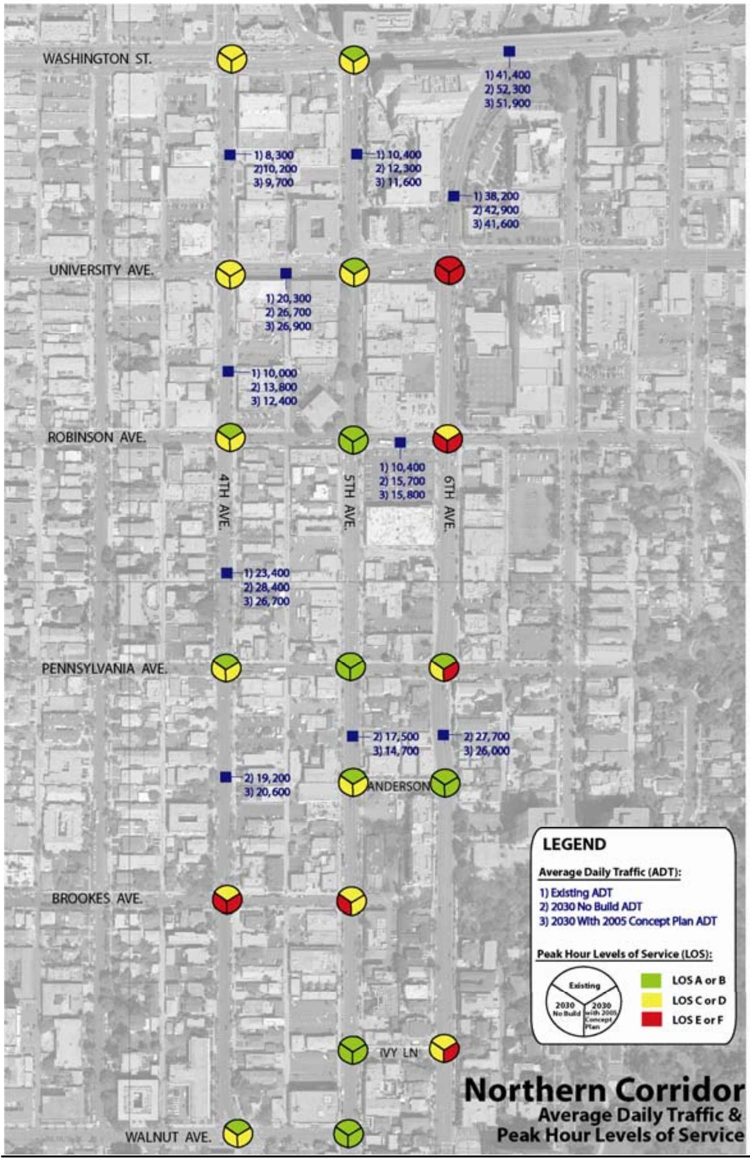

Exhibit 6-3 2030 Average Daily Traffic Volumes

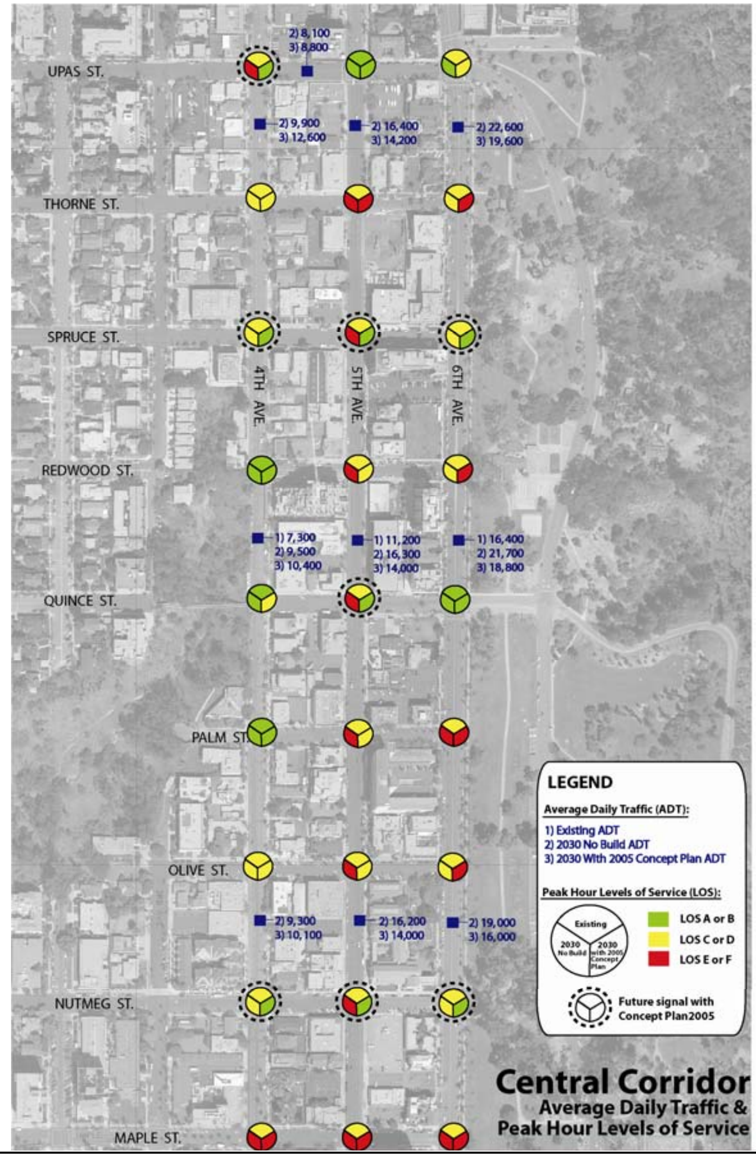

Exhibit 6-3 2030 Average Daily Traffic Volumes

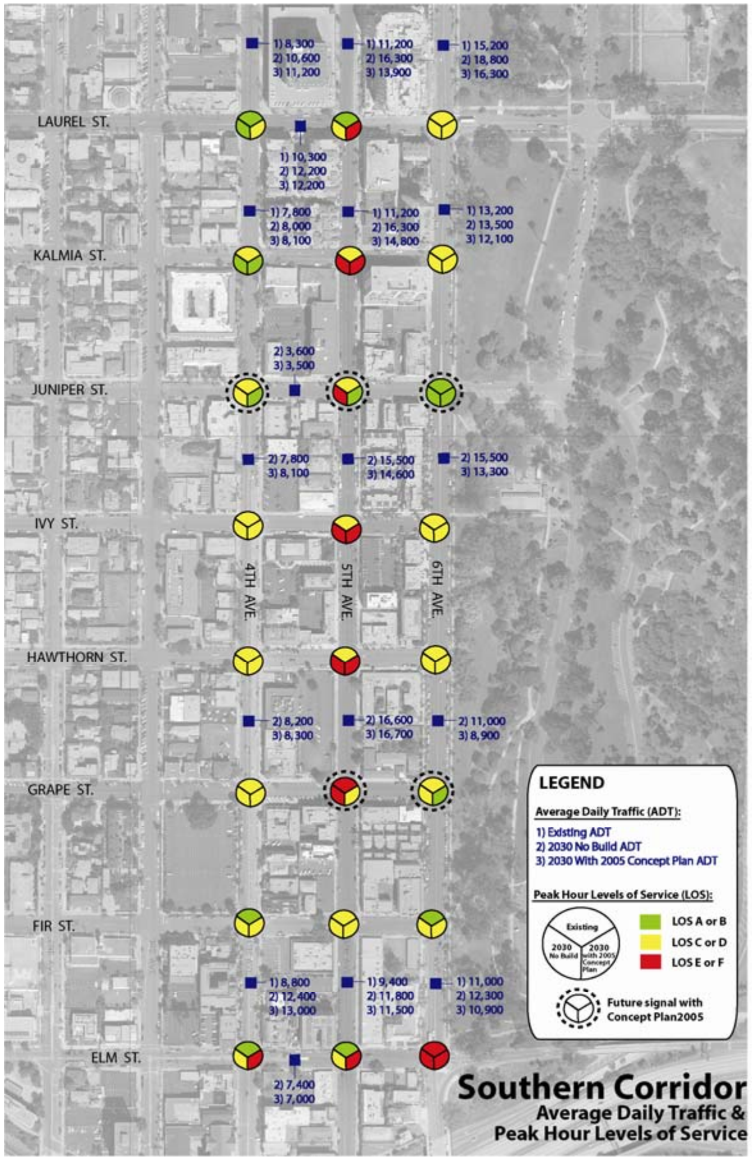

Exhibit 6-3 2030 Average Daily Traffic Volumes

Table 6-3
Year 2030 With 2005 Concept Plan Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Class (Lanes)	LOS E Capacity	Year 2030 With 2005 Concept Plan		
					ADT	V/C	LOS
1.	Washington Ave.	From Fifth to Seventh Ave.	Major NP (4)	40,000	51,857	1.30	F
2.	University Ave.	From Fourth Ave. to Fifth Ave.	Collector WP (4)	30,000	26,881	0.90	E
3.	Robinson St.	From Fifth to Sixth Ave.	Collector NP (3)	18,000	15,798	0.88	D
4.	Upas St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	10,508	1.31	F
5.	Laurel St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	15,000*	10,768	0.72	D
6.	Juniper St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	3,490	0.44	B
7.	Elm St.	From Fourth Ave. to Fifth Ave.	One-Way WP (3)	24,000	6,971	0.29	A
8.	Fourth Ave.	From Washington to University	One-Way WP (2)	16,000	9,712	0.61	C
9.		From University to Robinson	One-Way WP (2)	16,000	12,418	0.78	D
10.		From Pennsylvania to Brookes	One-Way WP (2)	16,000	19,203	1.20	F
11.		From Upas to Thorn	One-Way WP (2)	16,000	9,872	0.62	C
12.		From Redwood to Quince	One-Way WP (2)	16,000	10,391	0.65	C
13.		From Olive to Nutmeg	One-Way WP (2)	16,000	9,296	0.58	C
14.		From Maple to Laurel	One-Way WP (2)	16,000	11,158	0.70	C
15.		From Laurel to Kalmia	One-Way WP (2)	16,000	7,190	0.45	B
16.		From Juniper to Ivy	One-Way WP (2)	16,000	6977	0.44	B
17.		From Fir to Elm	One-Way WP (2)	16,000	13,038	0.81	D

Notes: NP = No Parking, WP = With Parking, * = includes two-way left turn lane

Table 6-3 (Continued)
Year 2030 With 2005 Concept Plan Conditions Roadway Segment Level of Service Analysis

#	Street	Segment	Classification (Lanes)	LOS E Capacity	Year 2030 With 2005 Concept Plan		
					ADT	V/C	LOS
18 .	Fifth Ave.	From Washington to University	One-Way WP (2)	16,000	11,575	0.72	C
19 .		From University to Robinson	One-Way WP (2)	16,000	12,817	0.80	D
20 .		From Pennsylvania to Brookes	One-Way WP (2)	16,000	14830	0.93	E
21 .		From Upas to Thorn	One-Way WP (2)	16,000	12013	0.75	C
22 .		From Redwood to Quince	One-Way WP (2)	16,000	11,860	0.74	C
23 .		From Olive to Nutmeg	One-Way WP (2)	16,000	16,209	1.01	F
24 .		From Maple to Laurel	One-Way WP (2)	16,000	11,700	0.73	C
25 .		From Laurel to Kalmia	One-Way WP (2)	16,000	14,816	0.93	E
26 .		From Juniper to Ivy	One-Way WP (2)	16,000	15,460	0.97	E
27 .		From Fir to Elm	One-Way WP (2)	16,000	11,527	0.72	D
28 .	Sixth Ave.	From Washington to University	Major NP (4)	40,000	41,649	1.04	F
29 .		From University to Robinson	Collector WP (4)	30,000	26,715	0.89	E
30 .		From Pennsylvania to Brookes	Collector WP (4)	30,000	25857	0.86	E
31 .		From Upas to Thorn	Collector WP (2)	15,000	19690	1.31	F
32 .		From Redwood to Quince	Collector WP (2)	15,000	18,839	1.26	F
33 .		From Olive to Nutmeg	Collector WP (2)	15,000	18,953	1.26	F
34 .		From Maple to Laurel	Collector WP (2)	15,000	16,305	1.09	F
35 .		From Laurel to Kalmia	Collector WP (2)	15,000	12,082	0.81	D
36 .		From Juniper to Ivy	Collector WP (2)	15,000	14101	0.94	E
37 .		From Fir to Elm	Collector WP (2)	15,000	10,871	0.72	D

Notes: NP = No Parking, WP = With Parking, * = includes two-way left turn lane

HCM Intersection Level of Service

Peak hour turning movement volumes for the Horizon Year 2030 with 2005 Concept Plan scenario were based upon the existing intersection volumes, the 2010 ADT volumes for the 2005 Concept Plan and redistribution of traffic volumes to account for the raised median along the corridor.

To begin, a growth factor was applied to each existing intersection approach volume based on the forecast increase in traffic from the existing ground count to the modeled 2030 with 2005 Concept Plan forecast. The peak hour volumes were then balanced between intersections along the entire corridor. Balancing was necessary in cases where adjacent intersection volumes were found to vary due to the applied growth factor. The lower volume approach or departure was adjusted upward to balance with the higher adjacent approach or departure.

Tables 6-13 and 6-14 present the 2030 With 2005 Concept Plan scenario levels of service at the signalized and unsignalized study intersections, respectively, based on the HCM methodology.

As shown in Table 6-13, in the year 2030, the following intersections are expected to operate at LOS E or F under 2030 No Build conditions:

- Sixth Avenue / University Avenue
- Sixth Avenue / Robinson Avenue
- Fourth Avenue / Brookes Avenue
- Fifth Avenue / Brookes Avenue
- Fourth Avenue / Upas Street
- Fifth Avenue / Thorn Street
- Fifth Avenue / Spruce Street
- Fifth Avenue / Redwood Street
- Fifth Avenue / Quince Street
- Fifth Avenue / Palm Street
- Sixth Avenue / Palm Street
- Fifth Avenue / Olive Street
- Fifth Avenue / Nutmeg Street
- Fourth Avenue / Maple Street
- Fifth Avenue / Maple Street
- Sixth Avenue / Maple Street
- Fifth Avenue / Kalmia Street
- Fifth Avenue / Juniper Street
- Fifth Avenue / Ivy Street
- Fifth Avenue / Hawthorn Street
- Fifth Avenue / Grape Street

The implementation of the 2005 Concept Plan results in a change in operating conditions from acceptable to deficient at the following intersections:

- Fifth Avenue / Pennsylvania Avenue
- Sixth Avenue / Ivy Lane
- Sixth Avenue / Thorn Street
- Sixth Avenue / Redwood Street
- Sixth Avenue / Olive Street
- Fifth Avenue / Laurel Street

- o Fouth Avenue / Elm Street
- o Fifth Avenue / Elm Street
- o Sixth Avenue / Elm Street

The deficiencies forecast to occur at these locations result from the decreased capacity along the corridors to accommodate a transit lane and diagonal parking.

In contrast, by decreasing the capacity of the corridors with the implementation of the 2005 Concept Plan, some traffic will divert to alternate routes to avoid anticipated delay, thereby reducing the number of trips traveling through the area and improved intersection operations at some locations.

This reduction in trips was observed in the City of San Diego traffic model, primarily for northbound trips along Fifth Avenue in the p.m. peak period. With the implementation of the 2005 Concept Plan and reduction in roadway capacity, the following intersections are forecast to change from deficient LOS (LOS E of F) conditions to acceptable operating conditions with the 2005 Concept Plan in place:

- o Fifth Avenue / Thorn Street
- o Fifth Avenue / Redwood Street
- o Fifth Avenue / Palm Street
- o Fifth Avenue / Olive Street

As previously described, the analysis of the 2005 Concept Plan includes 13 new traffic signals. All future signals would operate at LOS C or better, including at the following locations, which are forecast to operate deficiently under 2030 No Build conditions:

- o Fourth Avenue / Upas Street
- o Fifth Avenue / Spruce Street
- o Fifth Avenue / Quince Street
- o Fifth Avenue / Nutmeg Street
- o Fifth Avenue / Juniper Street
- o Fifth Avenue / Grape Street

Table 6-4
Year 2030 with 2005 Concept Plan
Intersection Level of Service Analysis

Intersection	Signal	AM		Midday		PM	
		Delay	LOS	Delay	LOS	Delay	LOS
Washington St @							
1 . Fourth Ave.	Yes	33.3	C	35.2	D	51.5	D
2 . Fifth Ave.	Yes	25.3	C	22.6	C	37.4	D
University Ave. @							
3 . Fourth Ave	Yes	23.3	C	32.3	C	38.0	D
4 . Fifth Ave.	Yes	18.1	B	19.5	B	30.1	C
5 . Sixth Ave.	Yes	**57.6**	**E**	**68.2**	**E**	**86.9**	**F**
Robinson Ave. @							
6 . Fourth Ave.	Yes	11.4	B	12.3	B	20.0	C
7 . Fifth Ave.	Yes	13.2	B	14.5	B	18.8	B
8 . Sixth Ave.	Yes	**95.1**	**F**	**128.6**	**F**	**96.6**	**F**
Pennsylvania Ave @							
9 . Fourth Ave.	No	12.5	B	16.2	C	16.4	C
10 . Fifth Ave.	Yes	8.0	A	11.4	B	16.6	B
11 . Sixth Ave.	Yes	41.2	D	20.8	C	**142.9**	**F**
Anderson Pl.@							
12 . Fifth Ave.	No	12.8	B	15.3	C	23.2	C
13 . Sixth Ave.	No	1.2	A	0.1	A	1.0	A
Brookes Ave. @							
14 . Fourth Ave.	No	22.9	C	**46.6**	**E**	23.7	C
15 . Fifth Ave.	No	16.8	C	**40.1**	**E**	23.7	C
Ivy Ln. @							
16 . Fifth Ave.	No	12.4	B	15.0	C	13.2	B
17 . Sixth Ave.	No	26.0	D	**45.8**	**E**	**35.9**	**E**

Table 6-4
Year 2030 with 2005 Concept Plan
Intersection Level of Service Analysis

Intersection	Signal	AM		Midday		PM	
		Delay	LOS	Delay	LOS	Delay	LOS
Walnut Ave. @							
18 . Fourth Ave.	No	17.0	C	16.8	C	17.2	C
19 . Fifth Ave.	No	13.0	B	12.6	B	12.8	B
Upas St.@							
20 . Fourth Ave.	*Yes*	11.3	B	12.8	B	11.2	B
21 . Fifth Ave.	Yes	8.9	A	7.3	A	8.6	A
22 . Sixth Ave	Yes	23.9	C	12.7	B	22.8	C
Thorne St.@							
23 . Fourth Ave.	No	18.6	C	18.4	C	19.4	C
24 . Fifth Ave.	No	16.9	C	21.9	C	27.1	D
25 . Sixth Ave.	No	**63.1**	**F**	29.3	D	29.2	D
Spuce St. @							
26 . Fourth Ave.	*Yes*	6.6	A	7.9	A	8.8	A
27 . Fifth Ave.	*Yes*	6.2	A	6.0	A	7.3	A
28 . Sixth Ave.	*Yes*	8.0	A	5.2	A	5.9	A
Redwood St. @							
29 . Fourth Ave.	No	12.0	B	14.7	B	12.5	B
30 . Fifth Ave.	No	16.2	C	20.5	C	21.9	C
31 . Sixth Ave.	No	**46.4**	**E**	15.9	C	18.3	C
Quince St. @							
32 . Fourth Ave.	No	12.8	B	15.6	C	14.2	B
33 . Fifth Ave.	Yes	5.9	A	5.7	A	4.3	A
34 . Sixth Ave.	Yes	17.1	B	10.8	B	7.8	A

Table 6-4
Year 2030 with 2005 Concept Plan
Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Palm St. @								
35 .	Fourth Ave.	No	15.8	C	15.3	C	14.8	B
36 .	Fifth Ave.	No	19.4	C	25.4	D	25.3	D
37 .	Sixth Ave.	No	**37.8**	**E**	**107.1**	**F**	20.1	C
Olive St. @								
38 .	Fourth Ave.	No	13.9	B	18.2	C	17.7	C
39 .	Fifth Ave.	No	26.5	D	21.3	C	32.5	D
40 .	Sixth Ave.	No	**50.8**	**F**	24.9	C	23.8	C
Nutmeg St. @								
41 .	Fourth Ave.	*Yes*	3.4	A	6.5	A	5.9	A
42 .	Fifth Ave.	*Yes*	4.5	A	5.3	A	4.6	A
43 .	Sixth Ave.	*Yes*	3.5	A	5.7	A	4.2	A
Maple St. @								
44 .	Fourth Ave.	No	29.1	D	**72.7**	**F**	**37.3**	**E**
45 .	Fifth Ave.	No	**38.7**	**E**	**336.8**	**F**	**288.2**	**F**
46 .	Sixth Ave.	No	20.5	C	16.7	C	**83.2**	**F**
Laurel St. @								
47 .	Fourth Ave.	Yes	16.5	B	14.3	B	19.2	B
48 .	Fifth Ave.	Yes	18.3	B	25.8	C	**57.9**	**E**
49 .	Sixth Ave.	Yes	28.4	C	27.3	C	45.3	D
Kalmia St. @								
50 .	Fourth Ave.	No	12.4	B	12.5	B	14.5	B
51 .	Fifth Ave.	No	29.6	D	**47.6**	**E**	**57.6**	**F**
52 .	Sixth Ave.	No	14.3	B	16.6	C	13.8	B

Table 6-4
Year 2030 with 2005 Concept Plan
Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Juniper Street @								
53 .	Fourth Ave.	*Yes*	6.2	A	3.8	A	5.9	A
54 .	Fifth Ave.	*Yes*	6.4	A	7.1	A	10.5	B
55 .	Sixth Ave.	*Yes*	7.7	A	10.2	B	15.9	B
Ivy St. @								
56 .	Fourth Ave.	No	15.3	C	17.1	C	16.5	C
57 .	Fifth Ave.	No	33.8	D	**60.8**	**F**	**35.1**	**E**
58 .	Sixth Ave.	No	17.7	C	12.3	B	14.1	B
Hawthorn St. @								
59 .	Fourth Ave.	No	16.5	C	17.5	C	20.3	C
60 .	Fifth Ave.	No	**470.6**	**F**	**698.8**	**F**	**370.3**	**F**
61 .	Sixth Ave.	No	26.3	D	15.1	C	16.9	C
Grape St. @								
62 .	Fourth Ave.	*Yes*	10.4	B	15.8	B	24.0	C
63 .	Fifth Ave.	*Yes*	9.4	A	10.8	B	31.9	C
64 .	Sixth Ave.	*Yes*	2.4	A	6.2	A	5.1	A
Fir St. @								
65 .	Fourth Ave.	No	20.6	C	17.4	C	18.7	C
66 .	Fifth Ave.	No	26.1	D	27.7	D	32.6	D
67 .	Sixth Ave.	No	16.7	C	12.8	B	14.0	B
Elm St. @								
68 .	Fourth Ave.	Yes	**88.7**	**F**	**64.0**	**E**	**102.4**	**F**
69 .	Fifth Ave.	Yes	**55.3**	**E**	22.2	C	36.9	D
70 .	Sixth Ave.	Yes	**81.9**	**F**	25.0	C	36.3	D

VISSIM Summary

VISSIM was used to evaluate the 2030 With 2005 Concept Plan **conditions in two capacities:**

- **Provide detailed travel time and delay values for the study corridors.**
- **Visually assess the impacts along the corridor.**

Table 6-5 summarizes the results of the p.m. peak travel time summary for the corridors by section and for the corridors as a whole. Table 6-6 presents the transit travel time and speeds calculated by VISSIM.

The results of the VISSIM analysis demonstrate that the highest travel time and resulting lowest speeds would occur in the p.m. peak hour, when compared to the a.m. and midday peak periods. With the changes proposed for the 2005 Concept Plan scenario, Fifth Avenue is forecast to have the longest travel time between Elm Street and Washington Street with a travel time of 12 minutes and 30 seconds. This is an increase of two minutes and 15 seconds over the 2030 No Build condition. The additional delay is due to the reduction in lanes between Walnut Street and Washington Street. Through the Northern Section, the vehicular travel time increases by over approximately one minute and thirty seconds. The Central and Southern portions of the Fifth Avenue corridor are forecast to have less than a 30 second change in travel time, which is negligible across the section.

Table 6-5
2030 With 2005 Concept Plan VISSIM Results (Automobiles)

Roadway Limits	P.M. Peak Travel Time (min:sec)		Speed (mph)	
	No Build	2005 Concept Plan	No Build	2005 Concept Plan
Sixth Avenue (Northbound)				
Walnut - Washington	03:48	3:00	9	11
Maple - Walnut	1:33	2:00	24	19
Elm - Maple	1:31	2:00	23	17
Total	6:52	7:00	15	16
Sixth Avenue (Southbound)				
Elm – Maple	1:41	2:00	20	17
Maple - Walnut	1:41	2:00	22	19
Walnut - Washington	5:58	8:00	6	4
Total	9:20	12:00	11	13
Fifth Avenue (Northbound)				
Elm – Maple	1:41	2:00	21	17
Maple - Walnut	2:06	2:30	21	12
Walnut - Washington	6:28	8:00	6	4
Total	10:15	12:30	10	11
Fourth Avenue (Southbound)				
Washington - Walnut	3:48	4:00	9	8
Walnut - Maple	1:33	2:00	24	15
Maple – Elm	2:02	3:30	17	10
Total	7:23	9:30	14	11

Sixth Avenue southbound is also forecast to have a relatively high change in travel time increasing from 9 minutes and 20 seconds under the No Build condition to 12 minutes with the 2005 Concept Plan (increase of two minutes and 40 seconds). This increase is primarily due to the increase in delay in the Northern portion of the corridor, where the travel time increases from approximately six minutes to eight minutes in the p.m. peak. This additional delay is due to the narrowing of Sixth Avenue from two southbound lanes to a single southbound lane between Robinson Avenue and Pennsylvania Avenue.

Based on the travel time assessments through the central and southern sections as well as the visual simulation review, the narrowing of Fourth and Fifth Avenue from Upas Street to Elm Street did not have a negative impact on traffic flow. Since the travel times modeled in VISSIM reflect the posted and/or observed speed limits along the corridor, the No Build condition and the 2005 Concept Plan condition result in similar traffic flow characteristics despite lane reduction included in the 2005 Concept Plan.

Transit Travel Time

Travel time is the greatest measure of transit effectiveness. The 2005 Concept Plan provided an enhanced level of transit service within the project study area by identifying dedicated transit lanes. The goal is to reduce delay to transit vehicles and provide clear access to transit stops along the corridor. VISSIM was used to model transit operations with the dedicated transit lane. As shown in Table 6-6, transit vehicles could traverse northbound Fifth Avenue is approximately 16 minutes and southbound Fourth Avenue in approximately 14 minutes.

When compared to the No-Build Conditions, the travel times for transit vehicles increases along both corridors with the addition of the transit only lanes. Along Fifth Avenue, the travel time increases by approximately 8 minutes with the 2005 Concept Plan over No Build and Fourth Avenue transit travel times increase by approximately three minutes.

Table 6-6
2030 VISSIM Results (Transit)

Roadway Limits	P.M. Peak Travel Time (min:sec)		Average Speed (mph)	
	No Build	2005 Concept Plan	No Build	2005 Concept Plan
Fifth Avenue (Northbound)				
Elm – Maple	3:15	4:00	10.6	9
Maple - Walnut	1:40	4:00	22.2	9
Walnut - Washington	2:53	8:00	11.7	4
Total	7:48	16:00	13.4	7
Fourth Avenue (Southbound)				
Washington - Walnut	4:23	6:00	7.7	6
Walnut - Maple	3:12	4:30	11.7	8
Maple – Elm	3:23	3:30	10.1	8
Total	10:58	14:00	9.6	7

6.5 IDENTIFICATION OF CORRIDOR CONSTRAINTS WITH 2005 CONCEPT PLAN

The operational analysis of the 2005 Concept Plan revealed the following:

Transit operations through the southern and central sections of the corridor benefit only moderately from the proposed transit only lane. Analysis of the operating conditions shows that transit vehicles receive only moderate benefit from the transit only lane. Similar results could be achieved through the implementation of queue jump lanes and transit signal priority at key locations. Capacity consumed by the transit only lane may be better allocated to other modes.

Reducing Sixth Avenue from four to two lanes from Upas Street to Maple Street results in diversion of traffic to First Avenue and other parallel routes. Although the reduction in travel lanes on Fourth and Fifth Avenue through the central and southern portions of the corridors does not adversely impact parallel corridors, the combination of reduction in lanes on both Fifth Avenue and Sixth Avenue between Upas Street and Maple Street may result in a diversion in traffic to First Avenue and other parallel routes. Traffic from Fifth and Sixth Avenue would only divert when the peak hour capacity is exceeded and a short path is perceived by the driver. Because the central section northbound was determined to be the pinch point for the diversion, alternatives to this plan increase northbound capacity until diversion from Fifth and Sixth Avenues no longer affects parallel routes.

Median along Sixth Avenue from Pennsylvania Street to Robinson Street results in excessive queue and delay. The proposed median creates a choke-point on Sixth Avenue where capacity is needed the most. The median creates design challenges at both Robinson Street and Pennsylvania Street and increases delays on the side streets. It is recommended that Sixth Avenue remain four lanes from University Avenue to Upas Street to maintain the maximum capacity in the northern corridor.

Mid-block crossings do not meet City of San Diego Design Standards. The proposed mid-block crosswalks are spaced approximately 130 to 160 feet from the existing crosswalks at signalized intersections. The mid-block crosswalks also reduce the number of parking spaces to accommodate both crosswalk and curb extension. In this northernmost portion of the study area, parking is limited. With adequately spaced existing marked and signal controlled crosswalks, the additional mid-block crosswalks are not recommended.

Proposed Geometry on Elm Street results in high delays and queuing. Elm Street provides a direct connection between I-5 off-ramps at Sixth Avenue and I-5 on-ramps at First Avenue. Heavy traffic volumes and high turning movement volumes occur along Elm Street between First Avenue and Sixth Avenue. The proposed geometry does not sufficiently meet the existing or forecast demand for Elm Street. Changes in intersection configurations should be considered to address the forecast delays based upon the results of the 2030 with 2005 Concept Plan operating conditions.

Removal of Transit Only Lanes affects bicycle transportation. Based on the 2005 Concept Plan, bicycle lanes would share the transit only lane with the transit vehicles. Operational analysis of the transit only lanes shows that the transit only lanes do not provide result in a significant reduction in travel time through the central and southern sections of the study corridors. If the transit only lanes are removed, special consideration for bicycle transportation should be included in the alternatives analysis.

Existing curbs heights may preclude construction of pop-outs. In many locations along the corridor the height of the curb is equal to the height of the existing street. Hence, there is no vertical difference between the curb and the street. The crown of the street is much higher than the edges of the street, such that the crossfall exceeds the normal two to three percent. This is due to many years of overlaying the street to repair aging or damaged pavement. At locations where this situation exists, reconstruction of the intersection including drainage improvements, sidewalk reconstruction and utility relocation may be necessary in order to construct pop-outs.

These constraints were presented to the public at the June 23rd Community Workshop held at St. Paul's Cathedral. Chapter 7 discusses the alternatives evaluated to improve the overall operations of the corridor and to find a balance for vehicular, transit, bicycles, and pedestrian mobility through Hillcrest.

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Chapter 7: Development of Project Alternatives

7.0 OVERVIEW

Following the analysis of the 2005 Concept Plan, understanding of existing and future "No Build" constraints and review of concerns identified by the community, multiple alternatives were developed and evaluated. This chapter focuses on how the alternatives were developed and key elements of the four alternatives. Chapter 8 summarizes the results of the analysis.

7.1 IDENTIFICATION OF CONSTRAINTS

The starting point for developing the alternatives was the 2005 Traffic Calming Concept (2005 Concept). As discussed in the previous chapter, a number of constraints were identified with that plan:

- Transit operations through the southern and central sections of the corridor benefit only moderately from the proposed transit only lane.
- Reducing Sixth Avenue from four to two lanes from Upas Street to Maple Street results in diversion of traffic to First Avenue and other parallel routes.
- Median along Sixth Avenue from Pennsylvania Street to Robinson Street results in excessive queue and delay.
- Mid-block crossings do not meet City Design Standards.
- Proposed geometry on Elm Street results in high delays and queuing.
- Removal of transit only lanes affects bicycle transportation. Based on the 2005 Concept Plan, bicycle lanes would share the transit only lane with the transit vehicles.
- Existing curbs heights may preclude construction of pop-outs.

From these constraints, multiple options were developed for the north, central, and southern portions of the corridor. Features that were considered in developing the options included:

Transit Changes

- Modify Transit Only Lanes
- Other Transit Improvements
- Stop Locations/Improvements
- Other BRT Improvements

Pedestrian Changes

- Add Midblock Crossings
- Add/Remove Traffic Signals
- Adding/Removing Pop-outs

Parking Changes

- Other Locations to Add or Modify Parking

Roadway Changes

- Add/Remove Turn Lanes
- Add/Remove Medians
- Modify Striping
- Add/Remove Traffic Signals

Working together with the Project Working Group, multiple options were identified. The following section summarizes the cross-sectional concepts developed.

7.2 NORTHERN CORRIDOR OPTIONS

The northern corridor extends from Washington Street to Upas Street. Three options were developed for Fourth and Fifth Avenues in this study area:

Option 1 – Fourth & Fifth Avenues

Option 1: Maintain existing number of lanes and existing parallel parking. Bicycles and transit would share the travel way with passenger vehicles.

Option 2 - Fourth & Fifth Avenues

Option 2: Reduce Fourth and Fifth Avenue to two lanes and provide a transit only lane. Parallel parking would be maintained. Bicycles could use the transit lane.

Option 3 – Fourth & Fifth Avenues

Option 3: Reduce Fourth and Fifth Avenues to two lanes and convert existing parallel parking to diagonal parking on one side of the street. Bicycle lanes are provided along the parallel parking side of the street.

All three options would provide pedestrian pop-outs and enhanced crosswalks at key intersections.

Along Sixth Avenue, one alternative was identified for the northern corridor. Because of the need to maximize vehicular capacity, no capacity reductions were considered in this segment. By improving operations and adding necessary turn pockets, it is anticipated that the capacity enhancements identified for Sixth Avenue would encourage traffic to move to Sixth Avenue from Fourth and Fifth Avenues in the northern corridor. Signage may also be effective in encouraging drivers to select Sixth Avenue in the northern corridor.


Option 1 - Northern Corridor
Sixth Avenue

7.3 CENTRAL CORRIDOR OPTIONS

Similar to the northern corridor, three options were developed for the central corridor along Fourth and Fifth Avenues. The central corridor extends from Upas Street to Maple Street. The three options identified for Fourth and Fifth Avenues include:

> **Option 1:** Maintain existing number of lanes and existing parallel parking. Bicycles and transit would share the travel way with passenger vehicles.
>
> **Option 2:** Reduce Fourth and Fifth Avenue to two lanes and provide a transit only lane. Parallel parking would be maintained. Bicycles could use
>
> **Option 3:** Reduce Fourth and Fifth Avenues to two-lane and convert existing parallel parking to diagonal parking on one side of the street. Bicycle lanes are provided along the parallel parking side of the street.

Along Sixth Avenue, three alternatives were identified for the central corridor. Through this section, it was determined under existing conditions that excess capacity may be available to enhance Sixth Avenue landscaping in a center median and improve parking along Balboa Park. The three options identified for the central corridor along Sixth Avenue include:


Option 1 – Central Corridor
Sixth Avenue

Option 1: Maintain existing number of lanes and existing parallel parking. Bicycles and would share the travel way with passenger vehicles.


Option 2 – Central Corridor
Sixth Avenue

Option 2: Reduce Sixth Avenue to by one travel lane southbound. A center median provides both pedestrian refuge areas at intersections as well as opportunities for landscaping. Left turn pockets would be provided at all intersections. Existing parallel parking would be maintained on both sides of the street.


Option 3 - Central Corridor
Sixth Avenue

Option 3: Reduce Sixth Avenues to two-lane and convert existing parallel parking along Balboa Park to diagonal parking. Bicycles would share travel way with passenger vehicles. A center median would be provided to allow for pedestrian refuge areas at intersections, landscaping along the corridor and left turn pockets at intersections.

All of the options include new traffic signals along the corridor, modifications to side street parking (conversion from parallel to angled parking), pop-outs at key intersections and enhanced pedestrian crosswalks.

7.4 SOUTHERN CORRIDOR OPTIONS

Along Fourth and Fifth Avenues, the same three options were considered for the southern corridor, which extends from Maple Street to Elm Street:

Option 1: Maintain existing number of lanes and existing parallel parking. Bicycles and transit would share the travel way with passenger vehicles.

Option 2: Reduce Fourth and Fifth Avenue to two lanes and provide a transit only lane. Parallel parking would be maintained.

Option 3: Reduce Fourth and Fifth Avenues to two-lanes and convert existing parallel parking to diagonal parking on one side of the street. Bicycle lanes are provided along the parallel parking side of the street.

Along Sixth Avenue, three alternatives were also identified for the southern corridor. Similar to the central section, it was determined under existing conditions that excess capacity may be available to enhance Sixth Avenue. Potential enhancements include landscaping in a center median and improve parking along Balboa Park. The three options identified for the southern corridor along Sixth Avenue include:

Option 1: Maintain existing number of lanes and existing parallel parking. Bicycles and would share the travel way with passenger vehicles.

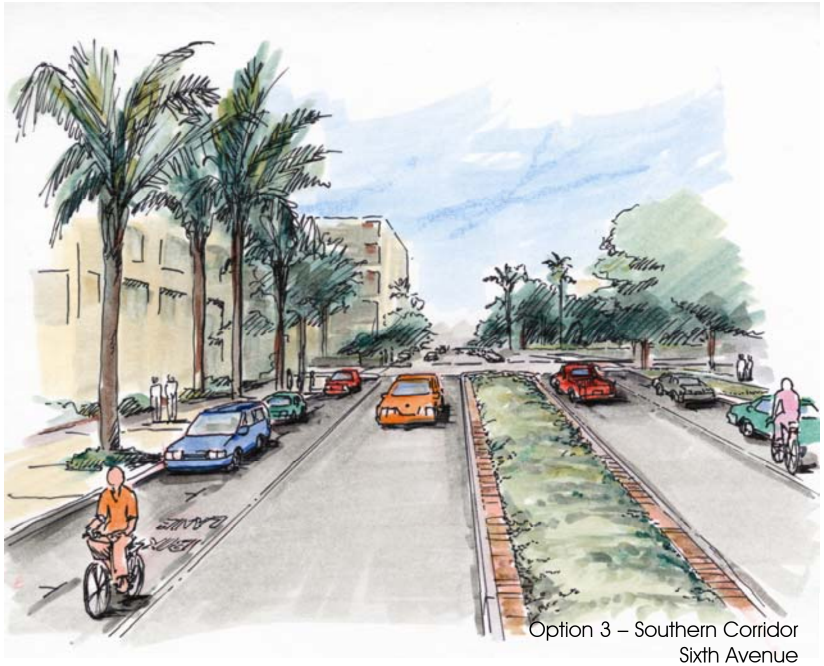
Option 2: Reduce Sixth Avenue southbound to one travel lane. A center median provides both pedestrian refuge areas at intersections as well as opportunities for landscaping. Left turn pockets would be provided at all intersections. Existing parallel parking would be maintained on both sides of the street.

Option 3: Reduce Sixth Avenues to two-lanes and maintain parallel parking on both sides of the street. Bicycles would be provided a dedicated lane both northbound and southboundl A center median would be provided to allow for pedestrian refuge areas, landscaping along the corridor and left turn pockets at intersections.

All of the options include new traffic signals along the corridor, modifications to side street parking (conversion from parallel to angled parking), pop-outs at key intersections and enhanced pedestrian crosswalks.

For the southern section, roundabouts were also considered along Sixth Avenue at both Juniper Street and Grape Street.

The roundabouts were identified as potential traffic control devices that could be installed in lieu of a traffic signal at these locations.



Option 3 – Southern Corridor
Sixth Avenue

7.5 IDENTIFICATION OF ALTERNATIVES

Once the options for the corridor were identified, they were grouped together and evaluated as alternatives. The alternatives included not only the cross-section options as discussed above, but also modifications to transit and traffic signal locations. Some elements of the 2005 Concept Plan were maintained in the evaluation of the alternatives, which includes pedestrian pop-out locations and enhanced crosswalk locations. Tables 7.1 through 7.4 summarize the elements that varied between the four alternatives considered.

Table 7.1
Alternative 1 – Parking Enhancement Alternative

	Fourth	Fifth	Sixth
North	Option 1	Option 3	Option 1
Central	Option 3	Option 3	Option 3
South	Option 3	Option 3	Option 3
New Traffic Signals @			
Upas	X	E	E
Spruce			
Quince			
Nutmeg			
Juniper	X	X	X
Hawthorne			
Grape	E	X	X
Transit Treatment			
	None	None	None
Bicycle Lanes			
	Bike lanes	Bike lanes	N/A
Parking			
	Diagonal & Parallel	Diagonal & Parallel	Diagonal & Parallel

Note: E = Existing

Table 7.2 Alternative 2 – Parking Enhancement Alternative with Northern Corridor Transit Lanes and Queue Jumps			
	Fourth	Fifth	Sixth
North	Option 2	Option 2	Option 1
Central	Option 3	Option 3	Option 2
South	Option 3	Option 3	Option 2
New Traffic Signals @			
Upas	X	E	E
Spruce			
Quince	X	X	E
Nutmeg			
Juniper	X	X	X
Hawthorne			
Grape	E	X	X
Transit Treatment			
	Queue Jumps at Key Locations	Dedicated transit lane in northern corridor. Queue jumps at key locations in central & south.	N/A
Bicycle Lanes			
	None	None	None
Parking			
	Diagonal & Parallel	Diagonal & Parallel	Diagonal & Parallel

Note: E = Existing

Table 7.3 Alternative 3 – Transit Boulevard Alternative			
	Fourth	Fifth	Sixth
North	Option 1	Option 2	Option 1
Central	Option 2	Option 2	Option 2
South	Option 2	Option 2	Option 3
New Traffic Signals @			
Upas	X	E	E
Spruce			
Quince			
Nutmeg			
Juniper	X	X	X
Hawthorne			
Grape	E	X	X
Transit Treatment			
	Transit Lane	Transit Lane	N/A
Bicycle Lanes			
	Share Transit Lane	Share Transit Lane	None
Parking			
	Parallel	Parallel	Parallel in north and central. Angled in south.

Note: E = Existing

Table 7.4 Alternative 4 – Promenade Plan			
	Fourth	Fifth	Sixth
North	Option 1	Option 1	Option 1
Central	Option 1	Option 1	Option 1
South	Option 1	Option 1	Option 1
New Traffic Signals @			
Upas	X	E	E
Spruce			
Quince	X	X	E
Nutmeg	X	X	X
Juniper			
Hawthorne	X	X	X
Grape	E		
Transit Treatment			
	None	None	N/A
Bicycle Lanes			
	None	None	None
Parking			
	Parallel	Parallel	Parallel

Note: E = Existing

7.6 QUEUE JUMPS

Option 2 for Fourth and Fifth Avenues, evaluated in Alternatives 2 and 3, include a dedicated transit only lane. The dedicated transit lane is intended to improve the on-time performance, to improve transit stop access and to improve transit service along the corridor by reducing delay and travel time. Although the lane would primarily be used by transit vehicles, it would be shared with right turning vehicles at intersections and bicycles along the corridor.

When traffic operations along a corridor can be maintained at acceptable levels of service, the addition of transit only lanes may not result in a significant or measurable improvement in transit travel time. Therefore, transit only lanes may not be necessary and the lane dedicated to transit could be better used in other ways such as bicycle lanes and/or parking lanes.

However, transit vehicles may benefit if dedicated lanes, such as queue jump lanes, are provided at congested signalized intersections. Queue jump lanes allow transit vehicle to move to the front of the queue in a dedicated lane at the intersection. When combined with transit signal priority, transit vehicles get a head start through the intersection when the light turns green. Queue jumps can help to reduce delay and improve on-time performance while minimizing the amount of dedicated transit space on the corridor.

Two types of queue jumps were considered in the alternatives analysis: separated queue jumps and shared queue jumps. Separated queue jumps would provide for both a dedicated right turn lane and a queue jump lane. Shared queue jump lanes would not provide for the dedicated right turn lane. Right turning vehicles would be permitted in the queue jump lane at the intersection to make their turn. Details of the queues jumps and selection criteria are outlined in Chapter 13 of this report. However, the concepts for each are illustrated in Figures 7.1 and 7.2. Alternative 2 evaluates the operational benefits of queue jump lanes along the corridor.

7.7 TRAFFIC SIGNALS

New traffic signals are identified in the 2005 Concept Plan along Fourth, Fifth and Sixth Avenues. To determine whether or not traffic signals should be placed at an intersection, traffic signal warrants are typically conducted in conjunction with delay and level of service analysis. Many of the traffic signals in the 2005 Concept Plan were determine to not meet the traffic signal warrant criteria established in the Manual of Uniform Control Devices (MUTCD). A discussion of the traffic signal warrants conducted and locations where warrants were met is provided in Chapter 8.

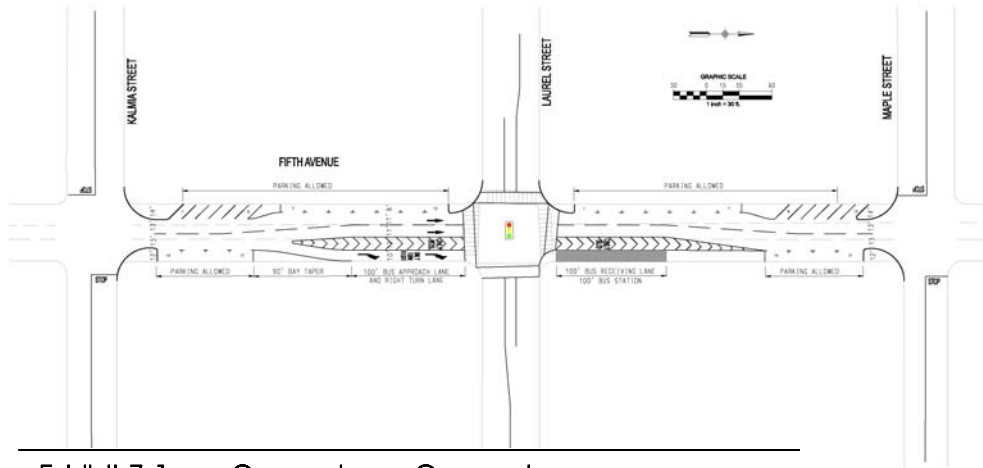


Exhibit 7-1 Queue Jump Concept
Dedicated Queue Jump Lane

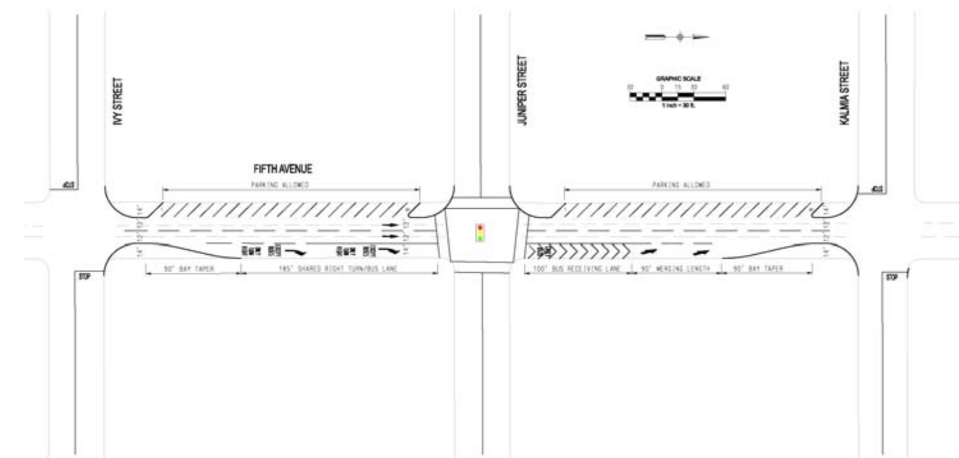


Exhibit 7-2 Queue Jump Concept
Shared Queue Jump Lane

7.8 SUMMARY

The goal of the alternatives analysis is to determine what options provide a benefit to the corridor and which options do not. In the coming chapter, travel time, speed and delay will be used to measure performance of the corridor. These elements will also be used to determine if the traffic calming concepts such as diagonal parking, pop-outs and enhanced crosswalks are effective at reducing traffic speeds along Fourth and Fifth Avenues.

The alternatives analysis will also evaluate the possibility of diversion of traffic from the study area to parallel routes such as First Avenue and SR-163. Evaluation of these measures of effectiveness will be used to reduce the alternatives from four to two.

Chapter 8:
Analysis of Alternatives

8.0 OVERVIEW

As outlined in previous chapters, the community is concerned about pedestrian safety, speed of traffic, improving the walking environment, providing improved bicycle access for the corridor traffic flow, access to transit and parking. Review of the 2005 Concept Plan showed that although pedestrian features can be integrated into the community, additional changes to the 2005 Concept Plan could be made that would improve the mobility balance. The details of the options identified in this report are outlined in Chapter 7. This chapter focuses on the operational analysis of the alternatives and the comparison of the measures of effectiveness.

8.1 COMPARISON CRITERIA

The analysis methodology and measures of effectiveness are outlined in detail in Chapter 2 of this document. The operational criteria by which the alternatives will be compared include:

- Intersection delay
- Roadway segment level of service (LOS)
- Travel time (passenger vehicle and transit vehicle)

The measures of effectiveness that will be assessed include:

- Effectiveness of alternative to calm traffic
- Provisions for improving bicycle accessibility
- Provisions for improving walkability and/or pedestrian access
- Change in parking conditions
- Diversion of traffic

8.2 OVERVIEW OF ALTERNATIVES

Four alternatives were developed based on input from the community, understanding of the operational constraints, and the 2005 Concept. Table 8-1 summarizes the key elements of the alternatives evaluated. Figures 8-1 through 8-4 illustrate the four alternatives.

8.3 OPERATIONAL ANALYSIS

Roadway Segment Analysis

Tables 8-2 to 8-5 compare the results of the roadway segment level of service analysis for each of the alternatives under Horizon Year 2030 conditions.

Alternatives 1, 2, and 3 include a reduction in capacity along the Fourth, Fifth, and Sixth Avenues from three lanes to two lanes through the length of the corridor, except along Sixth Avenue from Washington Avenue to Brookes where the capacity remains the same as in Existing and No Build conditions.

The reduction in the number of lanes results in a reduction of roadway capacity of 8,000 vehicles per day. As shown in Tables 8-2 (Alternative 1), 8-3 (Alternative 2), and 8-4 (Alternative 3), a reduction in lanes from three to two lanes along Fourth Avenue does not result in a change in LOS from acceptable to deficient along any of the Fourth Avenue roadway segments.

The results of this analysis indicate that there is sufficient capacity along Fourth Avenue with the reduction from three to two lanes. High traffic speeds along the corridor have been measured. The high speeds are directly related to the wide-open travel way along Fourth and Fifth Avenues. By reducing the number of lanes and thereby reducing the travel way, speeds along the corridor are likely to be reduced. The lane reductions would be coupled with pop-outs at intersections, new pedestrian markings, modifications to parking and bicycle lanes. Collaboratively, these changes to the roadway create friction for the driver, which makes the driver more aware of his or her surroundings leading to lower travel speeds.

Along Fifth Avenue, the reduction of one lane of capacity is forecast to result in a change from acceptable to deficient LOS along four roadway segments, as listed below:

- Pennsylvania to Brookes
- Olive to Nutmeg
- Laurel to Kalmia
- Juniper to Ivy

The remaining roadway segments along Fifth Avenue are forecast to operate at acceptable LOS with the reduction in lanes. Similar to Fourth Avenue, the reduction in lanes along these segments will provide the necessary side friction, both due to physical changes in the roadway and traffic flow, to reduce the traffic speeds to acceptable levels.

Along Sixth Avenue, the reduction of one lane of capacity is forecast to result in a change from acceptable to deficient LOS along five roadway segments, as listed below:

- Upas to Thorn
- Redwood to Quince
- Olive to Nutmeg
- Maple to Laurel
- Juniper to Ivy

The reduction in the number of lanes is not proposed along Sixth Avenue from Washington to Brookes. These roadway segments are forecast to operate at deficient LOS under No Build conditions. No changes are proposed on these segments, therefore there is no LOS change with any of the alternatives.

Table 8.1
Comparison of Alternatives

		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Cross-Sectional Options					
4th / 5th	North (Washington to Walnut)	Option 1 / Option 3	Option 2	Option 1 / Option 2	Option 1
	Central (Walnut to Maple)	Option 3	Option 3	Option 2	Option 1
	South (Maple to Elm)	Option 3	Option 3	Option 2	Option 1
6th	North (Washington to Walnut)	Option 1	Option 1	Option 1	Option 1
	Central (Walnut to Maple)	Option 3	Option 2	Option 2	Option 1
	South (Maple to Elm)	Option 3	Option 2	Option 3	Option 1
Transit Only Lanes		None	University to Walnut	University to Elm	None

Queue Jump Lanes		Alternative 1		Alternative 2		Alternative 3		Alternative 4	
Intersection of:		*4th*	*5th*	*4th*	*5th*	*4th*	*5th*	*4th*	*5th*
	University								
	Robinson								
	Pennsylvania								
	Upas			None	Separate				
	Laurel			Shared	Separate				
	Juniper			None	Shared				
	Grape			Shared	Shared				

Parking Configuration		Alternative 1	Alternative 2	Alternative 3	Alternative 4
4th / 5th	North (Washington to Walnut)	Parallel / Diagonal	Parallel	Parallel	Parallel
	Central (Walnut to Maple)	Diagonal	Diagonal	Parallel	Parallel
	South (Maple to Elm)	Diagonal	Diagonal	Parallel	Parallel
6th	North (Washington to Walnut)	Parallel	Parallel	Parallel	Parallel
	Central (Walnut to Maple)	Diagonal	Parallel	Parallel	Parallel
	South (Maple to Elm)	Diagonal	Parallel	Diagonal	Parallel

New Traffic Signal		Alternative 1			Alternative 2			Alternative 3			Alternative 4		
Intersection of:		*4th*	*5th*	*6th*	*4th*	*5th*	*6th*	*4th*	*5th*	*6th*	*4th*	*5th*	*6th*
	Upas	X	E	E	X	E	E	X	E	E	X	E	E
	Spruce												
	Quince			E	X	X	E				X	X	E
	Nutmeg										X	X	X
	Juniper	X	X	X	X	X	X	X	X	X			
	Hawthorne										X	X	X
	Grape	E	X	X	E	X	X	E	X	X	E		

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Bicycle Lanes	Dedicated Lane	Dedicated Lane	Share w/ Transit	Mixed Flow

* New Traffic Signal; E – Existing Traffic

Table 8-2
Alternative 1: Year 2030 Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Class (Lanes)	LOS E Capacity	Alternative 1 ADT	Alternative 1 V/C	Alternative 1 LOS
1.	Washington Ave.	From Fifth to Seventh Ave.	Major NP (4)	40,000	51,857	1.30	F
2.	University Ave.	From Fourth Ave. to Fifth Ave.	Collector WP (4)	30,000	26,881	0.90	E
3.	Robinson St.	From Fifth to Sixth Ave.	Collector NP (3)	18,000	15,798	0.88	D
4.	Upas St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	8,800	1.10	F
5.	Laurel St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	15,000*	10,768	0.72	D
6.	Juniper St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	3,490	0.44	B
7.	Elm St.	From Fourth Ave. to Fifth Ave.	One-Way WP (3)	24,000	7,000	0.29	A
8.	Fourth Ave.	From Washington to University	One-Way WP (2)	16,000	9,712	0.61	C
9.		From University to Robinson	One-Way WP (2)	16,000	12,418	0.78	D
10.		From Pennsylvania to Brookes	One-Way WP (2)	16,000	19,203	1.20	F
11.		From Upas to Thorn	One-Way WP (2)	16,000	9,872	0.62	C
12.		From Redwood to Quince	One-Way WP (2)	16,000	10,391	0.65	C
13.		From Olive to Nutmeg	One-Way WP (2)	16,000	9,296	0.58	C
14.		From Maple to Laurel	One-Way WP (2)	16,000	11,158	0.70	C
15.		From Laurel to Kalmia	One-Way WP (2)	16,000	7,190	0.45	B
16.		From Juniper to Ivy	One-Way WP (2)	16,000	6,977	0.44	B
17.		From Fir to Elm	One-Way WP (2)	16,000	13,038	0.81	D

Note: WP – with parking, NP – no parking, * = center turn lane

Table 8-2 (Continued)
Alternative 1: Year 2030 Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Classification (Lanes)	LOS E Capacity	Alternative 1 ADT	Alternative 1 V/C	Alternative 1 LOS
18 .	Fifth Ave.	From Washington to University	One-Way WP (2)	16,000	11,575	0.72	C
19 .		From University to Robinson	One-Way WP (2)	16,000	12,817	0.80	D
20 .		From Pennsylvania to Brookes	One-Way WP (2)	16,000	14,830	0.93	E
21 .		From Upas to Thorn	One-Way WP (2)	16,000	12,013	0.75	C
22 .		From Redwood to Quince	One-Way WP (2)	16,000	11,860	0.74	C
23 .		From Olive to Nutmeg	One-Way WP (2)	16,000	16,209	1.01	F
24 .		From Maple to Laurel	One-Way WP (2)	16,000	11,700	0.73	C
25 .		From Laurel to Kalmia	One-Way WP (2)	16,000	14,816	0.93	E
26 .		From Juniper to Ivy	One-Way WP (2)	16,000	15,460	0.97	E
27 .		From Fir to Elm	One-Way WP (2)	16,000	11,527	0.72	D
28 .	Sixth Ave.	From Washington to University	Major NP (4)	40,000	41,649	1.04	F
29 .		From University to Robinson	Collector WP (4)	30,000	26,715	0.89	E
30 .		From Pennsylvania to Brookes	Collector WP (4)	30,000	27,500	0.92	E
31 .		From Upas to Thorn	Collector WP (2)	15,000*	19,600	1.31	F
32 .		From Redwood to Quince	Collector WP (2)	15,000*	18,800	1.25	F
33 .		From Olive to Nutmeg	Collector WP (2)	15,000*	16,000	1.07	F
34 .		From Maple to Laurel	Collector WP (2)	15,000*	16,300	1.09	F
35 .		From Laurel to Kalmia	Collector WP (2)	15,000*	12,100	0.81	D
36 .		From Juniper to Ivy	Collector WP (2)	15,000*	13,300	0.89	E
37 .		From Fir to Elm	Collector WP (2)	15,000*	10,900	0.73	D

Note: WP – with parking, NP – no parking, * = center turn lane or median

Table 8-3
Alternative 2: Year 2030 Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Class (Lanes)	LOS E Capacity	Alternative 2 ADT	Alternative 2 V/C	Alternative 2 LOS
1 .	Washington Ave.	From Fifth to Seventh Ave.	Major NP (4)	40,000	51,857	1.30	F
2 .	University Ave.	From Fourth Ave. to Fifth Ave.	Collector WP (4)	30,000	26,881	0.90	E
3 .	Robinson St.	From Fifth to Sixth Ave.	Collector NP (3)	18,000	15,798	0.88	D
4 .	Upas St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	8,800	1.10	F
5 .	Laurel St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	15,000*	10,768	0.72	D
6 .	Juniper St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	3,490	0.44	B
7 .	Elm St.	From Fourth Ave. to Fifth Ave.	One-Way WP (3)	24,000	7,000	0.29	A
8 .	Fourth Ave.	From Washington to University	One-Way WP (2)	16,000	9,712	0.61	C
9 .		From University to Robinson	One-Way WP (2)	16,000	12,418	0.78	D
10 .		From Pennsylvania to Brookes	One-Way WP (2)	16,000	19,203	1.20	F
11 .		From Upas to Thorn	One-Way WP (2)	16,000	9,872	0.62	C
12 .		From Redwood to Quince	One-Way WP (2)	16,000	10,391	0.65	C
13 .		From Olive to Nutmeg	One-Way WP (2)	16,000	9,296	0.58	C
14 .		From Maple to Laurel	One-Way WP (2)	16,000	11,158	0.70	C
15 .		From Laurel to Kalmia	One-Way WP (2)	16,000	7,190	0.45	B
16 .		From Juniper to Ivy	One-Way WP (2)	16,000	6,977	0.44	B
17 .		From Fir to Elm	One-Way WP (2)	16,000	13,038	0.81	D

Note: WP – with parking, NP – no parking, * = center turn lane or median

Table 8-3 (Continued)
Alternative 2: Year 2030 Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Classification (Lanes)	LOS E Capacity	Alternative 2 ADT	Alternative 2 V/C	Alternative 2 LOS
18.	Fifth Ave.	From Washington to University	One-Way WP (2)	16,000	11,575	0.72	C
19.		From University to Robinson	One-Way WP (2)	16,000	12,817	0.80	D
20.		From Pennsylvania to Brookes	One-Way WP (2)	16,000	14,830	0.93	E
21.		From Upas to Thorn	One-Way WP (2)	16,000	12,013	0.75	C
22.		From Redwood to Quince	One-Way WP (2)	16,000	11,860	0.74	C
23.		From Olive to Nutmeg	One-Way WP (2)	16,000	16,209	1.01	F
24.		From Maple to Laurel	One-Way WP (2)	16,000	11,700	0.73	C
25.		From Laurel to Kalmia	One-Way WP (2)	16,000	14,816	0.93	E
26.		From Juniper to Ivy	One-Way WP (2)	16,000	15,460	0.97	E
27.		From Fir to Elm	One-Way WP (2)	16,000	11,527	0.72	D
28.	Sixth Ave.	From Washington to University	Major NP (4)	40,000	41,649	1.04	F
29.		From University to Robinson	Collector WP (4)	30,000	26,715	0.89	E
30.		From Pennsylvania to Brookes	Collector WP (4)	30,000	27,500	0.92	E
31.		From Upas to Thorn	Collector WP (2)	15,000*	19,600	1.31	F
32.		From Redwood to Quince	Collector WP (2)	15,000*	18,800	1.25	F
33.		From Olive to Nutmeg	Collector WP (2)	15,000*	16,000	1.07	F
34.		From Maple to Laurel	Collector WP (2)	15,000*	16,300	1.09	F
35.		From Laurel to Kalmia	Collector WP (2)	15,000*	12,100	0.81	D
36.		From Juniper to Ivy	Collector WP (2)	15,000*	13,300	0.89	E
37.		From Fir to Elm	Collector WP (2)	15,000*	10,900	0.73	D

Note: WP – with parking, NP – no parking, * = center turn lane or median

Table 8-4
Alternative 3: Year 2030 Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Class (Lanes)	LOS E Capacity	Alternative 3 ADT	Alternative 3 V/C	Alternative 3 LOS
1 .	Washington Ave.	From Fifth to Seventh Ave.	Major NP (4)	40,000	51,857	**1.30**	**F**
2 .	University Ave.	From Fourth Ave. to Fifth Ave.	Collector WP (4)	30,000	26,881	**0.90**	**E**
3 .	Robinson St.	From Fifth to Sixth Ave.	Collector NP (3)	18,000	15,798	0.88	D
4 .	Upas St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	8,450	**1.06**	**F**
5 .	Laurel St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	15,000*	10,768	0.72	D
6 .	Juniper St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	3,490	0.44	B
7 .	Elm St.	From Fourth Ave. to Fifth Ave.	One-Way WP (3)	24,000	7,200	0.30	A
8 .	Fourth Ave.	From Washington to University	One-Way WP (2)	16,000	9,712	0.61	C
9 .	Fourth Ave.	From University to Robinson	One-Way WP (2)	16,000	12,418	0.78	D
10 .	Fourth Ave.	From Pennsylvania to Brookes	One-Way WP (2)	16,000	19,203	**1.20**	**F**
11 .	Fourth Ave.	From Upas to Thorn	One-Way WP (2)	16,000	9,872	0.62	C
12 .	Fourth Ave.	From Redwood to Quince	One-Way WP (2)	16,000	10,391	0.65	C
13 .	Fourth Ave.	From Olive to Nutmeg	One-Way WP (2)	16,000	9,296	0.58	C
14 .	Fourth Ave.	From Maple to Laurel	One-Way WP (2)	16,000	11,158	0.70	C
15 .	Fourth Ave.	From Laurel to Kalmia	One-Way WP (2)	16,000	7,190	0.45	B
16 .	Fourth Ave.	From Juniper to Ivy	One-Way WP (2)	16,000	6,977	0.44	B
17 .	Fourth Ave.	From Fir to Elm	One-Way WP (2)	16,000	13,038	0.81	D

Note: WP – with parking, NP – no parking, * = center turn lane or median

Table 8-4 (Continued)
Alternative 3: Year 2030 Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Classification (Lanes)	LOS E Capacity	Alternative 3 ADT	Alternative 3 V/C	Alternative 3 LOS
18 .	Fifth Ave.	From Washington to University	One-Way WP (2)	16,000	11,575	0.72	C
19 .		From University to Robinson	One-Way WP (2)	16,000	12,817	0.80	D
20 .		From Pennsylvania to Brookes	One-Way WP (2)	16,000	14,830	0.93	E
21 .		From Upas to Thorn	One-Way WP (2)	16,000	12,013	0.75	C
22 .		From Redwood to Quince	One-Way WP (2)	16,000	11,860	0.74	C
23 .		From Olive to Nutmeg	One-Way WP (2)	16,000	16,209	1.01	F
24 .		From Maple to Laurel	One-Way WP (2)	16,000	11,700	0.73	C
25 .		From Laurel to Kalmia	One-Way WP (2)	16,000	14,816	0.93	E
26 .		From Juniper to Ivy	One-Way WP (2)	16,000	15,460	0.97	E
27 .		From Fir to Elm	One-Way WP (2)	16,000	11,527	0.72	D
28 .	Sixth Ave.	From Washington to University	Major NP (4)	40,000	41,649	1.04	F
29 .		From University to Robinson	Collector WP (4)	30,000	26,715	0.89	E
30 .		From Pennsylvania to Brookes	Collector WP (4)	30,000	27,700	0.92	E
31 .		From Upas to Thorn	Collector WP (2)	15,000*	21,100	1.41	F
32 .		From Redwood to Quince	Collector WP (2)	15,000*	20,250	1.35	F
33 .		From Olive to Nutmeg	Collector WP (2)	15,000*	17,500	1.17	F
34 .		From Maple to Laurel	Collector WP (2)	15,000*	17,550	1.17	F
35 .		From Laurel to Kalmia	Collector WP (2)	15,000*	12,800	0.85	D
36 .		From Juniper to Ivy	Collector WP (2)	15,000*	14,400	0.96	E
37 .		From Fir to Elm	Collector WP (2)	15,000*	11,600	0.77	D

Note: WP – with parking, NP – no parking, * = center turn lane or median

Table 8-5
Alternative 4: Year 2030 Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Class (Lanes)	LOS E Capacity	Alternative 4 ADT	Alternative 4 V/C	Alternative 4 LOS
1.	Washington Ave.	From Fifth to Seventh Ave.	Major NP (4)	40,000	52,343	1.31	F
2.	University Ave.	From Fourth Ave. to Fifth Ave.	Collector WP (4)	30,000	25,976	0.87	E
3.	Robinson St.	From Fifth to Sixth Ave.	Collector NP (3)	18,000	14,910	0.83	D
4.	Upas St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	8,100	1.01	F
5.	Laurel St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	15,000*	12,164	0.81	D
6.	Juniper St.	From Fourth Ave. to Fifth Ave.	Collector WP (2)	8,000	3,601	0.45	B
7.	Elm St.	From Fourth Ave. to Fifth Ave.	One-Way WP (3)	24,000	7,400	0.31	A
8.	Fourth Ave.	From Washington to University	One-Way WP (2)	16,000	9,769	0.61	C
9.	Fourth Ave.	From University to Robinson	One-Way WP (2)	16,000	13,555	0.85	D
10.	Fourth Ave.	From Pennsylvania to Brookes	One-Way WP (2)	16,000	19,203	1.20	F
11.	Fourth Ave.	From Upas to Thorn	One-Way WP (3)	24,000	10,049	0.42	B
12.	Fourth Ave.	From Redwood to Quince	One-Way WP (3)	24,000	9,480	0.40	B
13.	Fourth Ave.	From Olive to Nutmeg	One-Way WP (3)	24,000	9,593	0.40	B
14.	Fourth Ave.	From Maple to Laurel	One-Way WP (3)	24,000	10,585	0.44	B
15.	Fourth Ave.	From Laurel to Kalmia	One-Way WP (3)	24,000	7,110	0.30	A
16.	Fourth Ave.	From Juniper to Ivy	One-Way WP (3)	24,000	7,281	0.30	A
17.	Fourth Ave.	From Fir to Elm	One-Way WP (3)	24,000	13,506	0.56	C

Note: WP – with parking, NP – no parking, * = center turn lane or median

Table 8-5 (Continued)
Alternative 4: Year 2030 Conditions Roadway Segment Level of Service Analysis

	Street	Segment	Classification (Lanes)	LOS E Capacity	Alternative 4 ADT	Alternative 4 V/C	Alternative 4 LOS
18 .	Fifth Ave.	From Washington to University	One-Way WP (3)	24,000	12,307	0.51	C
19 .		From University to Robinson	One-Way WP (3)	24,000	13,067	0.54	C
20 .		From Pennsylvania to Brookes	One-Way WP (3)	24,000	19,108	0.80	D
21 .		From Upas to Thorn	One-Way WP (3)	24,000	17,519	0.73	D
22 .		From Redwood to Quince	One-Way WP (3)	24,000	15,185	0.63	C
23 .		From Olive to Nutmeg	One-Way WP (3)	24,000	17,256	0.72	D
24 .		From Maple to Laurel	One-Way WP (3)	24,000	15,241	0.64	C
25 .		From Laurel to Kalmia	One-Way WP (3)	24,000	16,409	0.68	C
26 .		From Juniper to Ivy	One-Way WP (3)	24,000	14,520	0.61	C
27 .		From Fir to Elm	One-Way WP (3)	24,000	12,726	0.53	C
28 .	Sixth Ave.	From Washington to University	Major NP (4)	40,000	42,866	1.07	F
29 .		From University to Robinson	Collector WP (4)	30,000	28,252	0.94	E
30 .		From Pennsylvania to Brookes	Collector WP (4)	30,000	27,700	0.92	E
31 .		From Upas to Thorn	Collector WP (4)	30,000	22,600	0.75	D
32 .		From Redwood to Quince	Collector WP (4)	30,000	21,700	0.72	D
33 .		From Olive to Nutmeg	Collector WP (4)	30,000	19,000	0.63	C
34 .		From Maple to Laurel	Collector WP (4)	30,000	18,800	0.63	C
35 .		From Laurel to Kalmia	Collector WP (4)	30,000	13,500	0.45	B
36 .		From Juniper to Ivy	Collector WP (4)	30,000	15,500	0.52	B
37 .		From Fir to Elm	Collector WP (4)	30,000	12,300	0.41	B

Note: WP – with parking, NP – no parking, * = center turn lane or median

Intersection Levels of Service

Intersection level of service analysis is measured based on delay at the intersection. Tables 8-6 to 8-9 summarize the results of the intersection operational analysis for each of the alternatives under year 2030 conditions.

The results of the analysis of alternatives show that the majority of intersections operating at deficient LOS (LOS E or F) are unsignalized. At an unsignailzed intersection, delay is reported only for the approach with the highest delay per vehicle, which occurs only on the stop controlled movements. The change in intersection geometry results in a change in levels of service at some locations from acceptable to deficient.

Alternatives that include installing a signal show acceptable operating conditions with the proposed signal. However, traffic signals must be warranted to be justified. Although the analysis shows an improved LOS with a signal, it is not reasonable to assume that the signal will be installed.

The reduction in travel lanes from three to two lanes results in a change in LOS from acceptable to deficient along some segments of Fourth Avenue, Fifth Avenue, Sixth Avenue, and Elm Street, particularly during the p.m. peak hour. As discussed in the Roadway Segment Analysis section, the reduction in lanes decreases the capacity of the roadway by one-third, or approximately 8,000 vehicles per day. Although it is anticipated that trips will divert as a result of reduced capacity, some segments are forecast to fail with the reduced capacity.

Table 8-6
Alternative 1 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Washington St @								
1 .	Fourth Ave.	Yes	33.3	C	35.2	D	51.5	D
2 .	Fifth Ave.	Yes	25.3	C	22.6	C	**56.7**	**E**
University Ave. @								
3 .	Fourth Ave	Yes	23.1	C	32.3	C	38.1	D
4 .	Fifth Ave.	Yes	16.4	B	20.3	C	30.5	C
5 .	Sixth Ave.	Yes	54.6	D	**60.7**	**E**	**77.2**	**E**
Robinson Ave. @								
6 .	Fourth Ave.	Yes	12.1	B	21.2	C	**69.6**	**E**
7 .	Fifth Ave.	Yes	14.5	B	19.0	B	24.6	C
8 .	Sixth Ave.	Yes	33.3	C	45.4	D	42.7	D
Pennsylvania Ave @								
9 .	Fourth Ave.	No	16.6	C	18.9	C	22.3	C
10 .	Fifth Ave.	Yes	5.0	A	7.2	A	13.0	B
11 .	Sixth Ave.	Yes	5.9	A	10.2	B	12.6	B
Anderson Pl.@								
12 .	Fifth Ave.	No	12.8	B	15.4	C	23.8	C
13 .	Sixth Ave.	No	1.6	A	0.5	A	1.2	A
Brookes Ave. @								
14 .	Fourth Ave.	No	26.8	D	**56.4**	**F**	27.5	D
15 .	Fifth Ave.	No	18.4	C	**43.7**	**E**	26.3	D
Ivy Ln. @								
16 .	Fifth Ave.	No	12.4	A	15.0	C	13.2	B
17 .	Sixth Ave.	No	23.2	C	**44.6**	**E**	33.0	D

Table 8-6
Alternative 1 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Walnut Ave. @								
18 .	Fourth Ave.	No	15.0	C	14.2	B	16.9	C
19 .	Fifth Ave.	No	13.0	B	12.6	B	12.8	B
Upas St.@								
20 .	Fourth Ave.	Yes	11.5	B	12.9	B	11.3	B
21 .	Fifth Ave.	Yes	10.4	B	8.2	A	9.7	A
22 .	Sixth Ave	Yes	32.1	C	12.7	B	22.8	C
Thorne St.@								
23 .	Fourth Ave.	No	18.6	C	18.5	C	19.5	C
24 .	Fifth Ave.	No	17.1	C	25.2	D	**41.4**	**E**
25 .	Sixth Ave.	No	**111.4**	**F**	**37.5**	**E**	34.2	D
Spuce St. @								
26 .	Fourth Ave.	No	**43.7**	**E**	32.8	D	**43.1**	**E**
27 .	Fifth Ave.	No	26.8	D	**47.5**	**E**	**51.7**	**F**
28 .	Sixth Ave.	No	**141.2**	**F**	25.4	D	19.2	C
Redwood St. @								
29 .	Fourth Ave.	No	12.9	B	16.9	C	14.1	B
30 .	Fifth Ave.	No	16.3	C	20.7	C	21.9	C
31 .	Sixth Ave.	No	**37.5**	**E**	15.8	C	17.9	C
Quince St. @								
32 .	Fourth Ave.	Yes	3.4	A	4.5	A	3.4	A
33 .	Fifth Ave.	Yes	5.9	A	5.7	A	4.6	A
34 .	Sixth Ave.	Yes	20.1	C	8.5	A	8.4	A

Table 8-6
Alternative 1 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Palm St. @								
35 .	Fourth Ave.	No	15.8	C	15.3	C	14.8	B
36 .	Fifth Ave.	No	19.4	C	25.4	D	24.8	C
37 .	Sixth Ave.	No	**37.8**	**E**	**132.4**	**F**	20.1	C
Olive St. @								
38 .	Fourth Ave.	No	13.9	B	18.2	C	17.8	C
39 .	Fifth Ave.	No	26.3	D	21.1	C	31.8	D
40 .	Sixth Ave.	No	**50.8**	**F**	24.9	C	23.8	C
Nutmeg St. @								
41 .	Fourth Ave.	Yes	3.7	A	6.1	A	5.7	A
42 .	Fifth Ave.	Yes	4.5	A	5.3	A	4.6	A
43 .	Sixth Ave.	Yes	3.6	A	4.5	A	3.8	A
Maple St. @								
44 .	Fourth Ave.	No	28.9	D	**71.2**	**F**	**36.3**	**E**
45 .	Fifth Ave.	No	**40.1**	**E**	**355.3**	**F**	28.5	D
46 .	Sixth Ave.	No	20.5	C	16.7	C	**83.2**	**F**
Laurel St. @								
47 .	Fourth Ave.	Yes	16.5	B	14.3	B	19.2	B
48 .	Fifth Ave.	Yes	19.0	B	25.8	C	**57.9**	**E**
49 .	Sixth Ave.	Yes	28.1	C	27.3	C	45.5	D
Kalmia St. @								
50 .	Fourth Ave.	No	12.4	B	12.3	B	14.3	B
51 .	Fifth Ave.	No	**55.3**	**F**	**165.5**	**F**	**63.1**	**F**
52 .	Sixth Ave.	No	14.3	B	16.6	C	13.8	B

Table 8-6
Alternative 1 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Juniper Street @								
53 .	Fourth Ave.	No	14.4	B	14.4	B	17.0	C
54 .	Fifth Ave.	No	24.6	C	28.5	D	33.0	D
55 .	Sixth Ave.	No	11.1	B	10.8	B	12.5	B
Ivy St. @								
56 .	Fourth Ave.	No	15.3	C	17.1	C	16.8	C
57 .	Fifth Ave.	No	18.7	C	23.9	C	31.2	D
58 .	Sixth Ave.	No	16.7	C	12.4	B	14.3	B
Hawthorn St. @								
59 .	Fourth Ave.	Yes	5.5	A	4.7	A	4.5	A
60 .	Fifth Ave.	Yes	12.9	B	11.3	B	24.7	C
61 .	Sixth Ave.	Yes	4.9	A	4.2	A	5.5	A
Grape St. @								
62 .	Fourth Ave.	Yes	10.1	B	14.7	B	22.5	C
63 .	Fifth Ave.	No	218.5	F	91.1	F	651.9	F
64 .	Sixth Ave.	No	16.1	C	14.6	B	27.5	D
Fir St. @								
65 .	Fourth Ave.	No	20.4	C	17.3	C	18.8	C
66 .	Fifth Ave.	No	18.9	C	19.6	C	22.1	C
67 .	Sixth Ave.	No	16.7	C	12.9	B	14.1	B
Elm St. @								
68 .	Fourth Ave.	Yes	66.7	E	44.3	D	68.6	E
69 .	Fifth Ave.	Yes	45.3	D	19.0	B	40.3	D
70 .	Sixth Ave.	Yes	108.2	F	39.6	D	39.9	D

Table 8-7
Alternative 2 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Washington St @								
1 .	Fourth Ave.	Yes	33.3	C	35.2	D	51.5	D
2 .	Fifth Ave.	Yes	25.3	C	22.6	C	**56.7**	**E**
University Ave. @								
3 .	Fourth Ave	Yes	23.1	C	32.3	C	38.1	D
4 .	Fifth Ave.	Yes	16.4	B	20.3	C	30.5	C
5 .	Sixth Ave.	Yes	54.6	D	**60.7**	**E**	**77.2**	**E**
Robinson Ave. @								
6 .	Fourth Ave.	Yes	12.7	B	13.4	B	20.7	C
7 .	Fifth Ave.	Yes	13.2	B	14.2	B	19.1	B
8 .	Sixth Ave.	Yes	30.0	C	39.5	D	40.0	D
Pennsylvania Ave @								
9 .	Fourth Ave.	No	14.7	B	16.2	B	16.2	C
10 .	Fifth Ave.	Yes	8.0	A	11.2	B	17.4	B
11 .	Sixth Ave.	Yes	10.3	B	16.1	B	43.5	D
Anderson Pl.@								
12 .	Fifth Ave.	No	12.8	B	15.3	C	23.2	C
13 .	Sixth Ave.	No	1.1	A	0.3	A	0.9	A
Brookes Ave. @								
14 .	Fourth Ave.	No	22.9	C	**46.6**	**E**	23.7	C
15 .	Fifth Ave.	No	16.8	C	**40.1**	**E**	23.7	C
Ivy Ln. @								
16 .	Fifth Ave.	No	12.4	B	15.0	C	13.2	B
17 .	Sixth Ave.	No	19.4	C	33.9	D	18.5	C

Table 8-7
Alternative 2 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Walnut Ave. @								
18 .	Fourth Ave.	No	16.4	C	14.2	B	16.9	C
19 .	Fifth Ave.	No	13.0	B	12.6	B	12.8	B
Upas St.@								
20 .	Fourth Ave.	Yes	11.5	B	12.9	B	11.3	B
21 .	Fifth Ave.	Yes	9.9	A	8.8	A	10.9	B
22 .	Sixth Ave	Yes	29.0	C	11.8	B	16.6	B
Thorne St.@								
23 .	Fourth Ave.	No	18.5	C	18.5	C	19.5	C
24 .	Fifth Ave.	No	17.1	C	25.2	D	**41.4**	**E**
25 .	Sixth Ave.	No	**53.2**	**F**	30.6	D	**41.9**	**E**
Spuce St. @								
26 .	Fourth Ave.	No	**43.7**	**E**	32.8	D	**43.1**	**E**
27 .	Fifth Ave.	No	26.8	D	**47.5**	**E**	**51.7**	**F**
28 .	Sixth Ave.	No	**109.1**	**F**	22.3	C	21.7	C
Redwood St. @								
29 .	Fourth Ave.	No	12.9	B	16.9	C	14.1	B
30 .	Fifth Ave.	No	16.3	C	20.7	C	21.9	C
31 .	Sixth Ave.	No	**38.3**	**E**	17.2	C	18.6	C
Quince St. @								
32 .	Fourth Ave.	Yes	3.4	A	4.5	A	3.4	A
33 .	Fifth Ave.	Yes	6.0	A	5.8	A	4.5	A
34 .	Sixth Ave.	Yes	19.2	B	11.2	B	8.0	A

Table 8-7
Alternative 2 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Palm St. @								
35 .	Fourth Ave.	No	15.8	C	15.3	C	14.8	B
36 .	Fifth Ave.	No	19.4	C	25.4	D	28.4	D
37 .	Sixth Ave.	No	**36.4**	**E**	**107.4**	**F**	21.4	C
Olive St. @								
38 .	Fourth Ave.	No	13.9	B	18.2	C	17.8	C
39 .	Fifth Ave.	No	28.4	D	24.9	C	**53.6**	**F**
40 .	Sixth Ave.	No	**47.3**	**E**	25.9	D	26.5	D
Nutmeg St. @								
41 .	Fourth Ave.	No	18.9	C	21.0	C	20.7	C
42 .	Fifth Ave.	No	19.3	C	31.9	D	**35.7**	**E**
43 .	Sixth Ave.	No	23.3	C	16.9	C	22.9	C
Maple St. @								
44 .	Fourth Ave.	No	29.7	D	**96.9**	**F**	**44.6**	**E**
45 .	Fifth Ave.	No	**40.1**	**E**	**355.3**	**F**	28.5	D
46 .	Sixth Ave.	No	23.3	C	19.2	C	**47.4**	**E**
Laurel St. @								
47 .	Fourth Ave.	Yes	17.7	B	14.3	B	19.2	B
48 .	Fifth Ave.	Yes	18.4	B	25.9	C	**58.0**	**E**
49 .	Sixth Ave.	Yes	29.5	C	29.1	C	47.4	D
Kalmia St. @								
50 .	Fourth Ave.	No	12.4	B	12.3	B	14.3	B
51 .	Fifth Ave.	No	30.0	D	**46.7**	**E**	**59.0**	**F**
52 .	Sixth Ave.	No	14.3	B	16.6	C	13.8	B

Table 8-7
Alternative 2 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Juniper Street @								
53 .	Fourth Ave.	Yes	6.2	A	3.8	A	6.0	A
54 .	Fifth Ave.	Yes	6.4	A	7.1	A	10.5	B
55 .	Sixth Ave.	Yes	7.7	A	10.2	B	15.9	B
Ivy St. @								
56 .	Fourth Ave.	No	15.3	C	17.1	C	16.5	C
57 .	Fifth Ave.	No	34.0	D	**59.2**	**F**	34.6	D
58 .	Sixth Ave.	No	17.7	C	12.3	B	14.1	B
Hawthorn St. @								
59 .	Fourth Ave.	No	16.5	C	17.6	C	20.3	C
60 .	Fifth Ave.	No	**520.2**	**F**	**791.0**	**F**	**379.4**	**F**
61 .	Sixth Ave.	No	26.3	D	15.1	C	16.9	C
Grape St. @								
62 .	Fourth Ave.	Yes	10.4	B	15.7	B	24.0	C
63 .	Fifth Ave.	Yes	9.4	A	10.8	B	31.9	C
64 .	Sixth Ave.	Yes	2.4	A	6.2	A	5.1	A
Fir St. @								
65 .	Fourth Ave.	No	20.6	C	17.3	C	18.8	C
66 .	Fifth Ave.	No	26.2	D	27.8	D	32.7	D
67 .	Sixth Ave.	No	16.7	C	12.8	B	14.0	B
Elm St. @								
68 .	Fourth Ave.	Yes	**88.6**	**F**	**64.2**	**E**	**102.5**	**F**
69 .	Fifth Ave.	Yes	**56.0**	**E**	21.7	C	36.6	D
70 .	Sixth Ave.	Yes	**108.2**	**F**	39.6	D	39.9	D

Table 8-8
Alternative 3 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Washington St @								
1 .	Fourth Ave.	Yes	34.0	C	35.4	D	51.9	D
2 .	Fifth Ave.	Yes	16.1	B	20.2	C	37.4	D
University Ave. @								
3 .	Fourth Ave	Yes	23.1	C	32.3	C	38.1	D
4 .	Fifth Ave.	Yes	16.5	B	20.3	C	30.5	C
5 .	Sixth Ave.	Yes	54.3	D	**60.7**	**E**	**77.9**	**E**
Robinson Ave. @								
6 .	Fourth Ave.	Yes	12.7	B	13.4	B	20.7	C
7 .	Fifth Ave.	Yes	13.2	B	14.2	B	19.1	B
8 .	Sixth Ave.	Yes	30.1	C	37.4	D	38.6	D
Pennsylvania Ave @								
9 .	Fourth Ave.	No	12.5	B	17.0	C	16.2	C
10 .	Fifth Ave.	Yes	8.0	A	11.4	B	14.4	B
11 .	Sixth Ave.	Yes	10.3	B	16.3	B	43.5	D
Anderson Pl.@								
12 .	Fifth Ave.	No	12.8	B	15.3	C	23.6	C
13 .	Sixth Ave.	No	1.1	A	0.3	A	0.9	A
Brookes Ave. @								
14 .	Fourth Ave.	No	22.9	C	**46.4**	**E**	23.6	C
15 .	Fifth Ave.	No	16.8	C	**40.1**	**E**	32.3	D
Ivy Ln. @								
16 .	Fifth Ave.	No	12.6	B	15.9	C	15.1	C
17 .	Sixth Ave.	No	20.0	C	**47.6**	**E**	22.1	C

Table 8-8
Alternative 3 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Walnut Ave. @								
18 .	Fourth Ave.	No	18.6	C	15.6	C	18.1	C
19 .	Fifth Ave.	No	15.9	C	15.3	C	17.5	C
Upas St.@								
20 .	Fourth Ave.	Yes	5.4	A	6.9	A	6.8	A
21 .	Fifth Ave.	Yes	4.2	A	4.0	A	5.0	A
22 .	Sixth Ave	Yes	14.3	B	7.7	A	9.5	A
Thorne St.@								
23 .	Fourth Ave.	No	**57.7**	**F**	**64.1**	**F**	**41.5**	**E**
24 .	Fifth Ave.	No	**66.6**	**F**	**266.0**	**F**	**270.8**	**F**
25 .	Sixth Ave.	No	**52.7**	**F**	32.4	D	**40.9**	**E**
Spuce St. @								
26 .	Fourth Ave.	No	**45.2**	**E**	32.7	D	**42.8**	**E**
27 .	Fifth Ave.	No	26.7	D	**47.5**	**E**	**62.3**	**F**
28 .	Sixth Ave.	No	**95.8**	**F**	22.8	C	22.2	C
Redwood St. @								
29 .	Fourth Ave.	No	12.9	B	16.9	C	14.1	B
30 .	Fifth Ave.	No	16.8	C	20.5	C	26.2	D
31 .	Sixth Ave.	No	**39.3**	**E**	17.9	C	19.2	C
Quince St. @								
32 .	Fourth Ave.	No	12.8	B	15.6	C	14.2	B
33 .	Fifth Ave.	No	17.4	C	22.4	C	30.9	D
34 .	Sixth Ave.	Yes	27.6	C	11.7	B	9.1	A

Table 8-8
Alternative 3 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Palm St. @								
35 .	Fourth Ave.	No	15.8	C	15.3	C	14.8	B
36 .	Fifth Ave.	No	19.4	C	25.4	D	28.4	D
37 .	Sixth Ave.	No	32.8	D	**102.2**	**F**	20.3	C
Olive St. @								
38 .	Fourth Ave.	No	13.9	B	18.2	C	17.7	C
39 .	Fifth Ave.	No	28.3	D	24.9	C	**53.3**	**F**
40 .	Sixth Ave.	No	**45.5**	**E**	22.6	C	26.6	D
Nutmeg St. @								
41 .	Fourth Ave.	No	18.7	C	20.4	C	20.7	C
42 .	Fifth Ave.	No	19.3	C	31.8	D	35.2	E
43 .	Sixth Ave.	No	22.3	C	16.4	C	20.7	C
Maple St. @								
44 .	Fourth Ave.	No	29.7	D	**95.8**	**F**	**44.1**	**E**
45 .	Fifth Ave.	No	**38.7**	**E**	**336.8**	**F**	**288.2**	**F**
46 .	Sixth Ave.	No	22.0	C	18.5	C	**38.9**	**E**
Laurel St. @								
47 .	Fourth Ave.	Yes	16.5	B	14.3	B	19.2	B
48 .	Fifth Ave.	Yes	18.4	B	25.9	C	**58.0**	**E**
49 .	Sixth Ave.	Yes	27.8	C	26.4	C	43.6	D
Kalmia St. @								
50 .	Fourth Ave.	No	12.4	B	12.5	B	14.5	B
51 .	Fifth Ave.	No	29.6	D	**47.6**	**E**	**57.6**	**F**
52 .	Sixth Ave.	No	13.2	B	16.2	C	14.0	B

Table 8-8
Alternative 3 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Juniper Street @								
53 .	Fourth Ave.	Yes	6.2	A	3.8	A	5.9	A
54 .	Fifth Ave.	Yes	6.4	A	7.1	A	10.5	B
55 .	Sixth Ave.	Yes	4.6	A	8.6	A	15.4	B
Ivy St. @								
56 .	Fourth Ave.	No	15.3	C	17.1	C	16.5	C
57 .	Fifth Ave.	No	33.8	D	**60.8**	**F**	**35.1**	**E**
58 .	Sixth Ave.	No	17.0	C	12.5	B	13.9	B
Hawthorn St. @								
59 .	Fourth Ave.	No	16.5	C	17.5	C	20.3	C
60 .	Fifth Ave.	No	**470.6**	**F**	**698.8**	**F**	**370.3**	**F**
61 .	Sixth Ave.	No	25.4	D	15.6	C	17.5	C
Grape St. @								
62 .	Fourth Ave.	Yes	10.4	B	15.8	B	24.0	C
63 .	Fifth Ave.	Yes	9.4	A	10.8	B	31.9	C
64 .	Sixth Ave.	Yes	2.3	A	6.2	A	4.9	A
Fir St. @								
65 .	Fourth Ave.	No	20.6	C	17.4	C	18.7	C
66 .	Fifth Ave.	No	26.1	D	27.7	D	32.6	D
67 .	Sixth Ave.	No	15.9	C	13.0	B	14.4	B
Elm St. @								
68 .	Fourth Ave.	Yes	**71.1**	**E**	49.0	D	**80.6**	**F**
69 .	Fifth Ave.	Yes	**56.1**	**E**	21.7	C	36.7	D
70 .	Sixth Ave.	Yes	**106.7**	**F**	39.2	D	40.0	D

Table 8-9
Alternative 4 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Washington St @								
1 .	Fourth Ave.	Yes	33.9	C	36.4	D	52.0	D
2 .	Fifth Ave.	Yes	16.2	B	19.1	B	25.7	C
University Ave. @								
3 .	Fourth Ave	Yes	40.1	D	33.5	C	43.0	D
4 .	Fifth Ave.	Yes	16.3	B	18.4	B	26.2	C
5 .	Sixth Ave.	Yes	53.4	D	52.7	D	**65.7**	**E**
Robinson Ave. @								
6 .	Fourth Ave.	Yes	16.6	B	15.4	B	21.5	C
7 .	Fifth Ave.	Yes	14.2	B	17.9	B	18.8	B
8 .	Sixth Ave.	Yes	30.4	C	**73.1**	**E**	42.5	D
Pennsylvania Ave @								
9 .	Fourth Ave.	No	11.8	B	14.9	B	16.4	C
10 .	Fifth Ave.	Yes	7.7	A	8.6	A	12.7	B
11 .	Sixth Ave.	Yes	10.9	B	19.1	B	43.2	D
Anderson Pl.@								
12 .	Fifth Ave.	No	11.8	B	13.5	B	18.9	C
13 .	Sixth Ave.	No	1.0	A	0.3	A	0.9	A
Brookes Ave. @								
14 .	Fourth Ave.	No	21.5	C	**39.3**	**E**	21.9	C
15 .	Fifth Ave.	No	15.8	C	**37.1**	**E**	30.3	D
Ivy Ln. @								
16 .	Fifth Ave.	No	11.4	B	14.5	B	10.6	B
17 .	Sixth Ave.	No	21.1	C	32.5	D	16.8	C

Table 8-9
Alternative 4 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Walnut Ave. @								
18 .	Fourth Ave.	No	13.9	B	13.2	B	15.4	C
19 .	Fifth Ave.	No	14.3	B	12.2	B	10.1	B
Upas St.@								
20 .	Fourth Ave.	Yes	7.2	A	8.6	A	7.1	A
21 .	Fifth Ave.	Yes	9.6	A	8.7	A	9.0	A
22 .	Sixth Ave	Yes	13.6	B	13.0	B	18.0	B
Thorne St.@								
23 .	Fourth Ave.	No	17.8	C	18.3	C	18.5	C
24 .	Fifth Ave.	No	18.8	C	26.3	D	33.8	D
25 .	Sixth Ave.	No	20.5	C	20.2	C	15.9	C
Spuce St. @								
26 .	Fourth Ave.	Yes	6.4	A	7.5	A	7.1	A
27 .	Fifth Ave.	Yes	4.5	A	5.5	A	6.1	A
28 .	Sixth Ave.	Yes	3.5	A	3.2	A	3.7	A
Redwood St. @								
29 .	Fourth Ave.	No	11.2	B	12.6	B	11.9	B
30 .	Fifth Ave.	No	21.0	C	27.8	D	25.3	D
31 .	Sixth Ave.	No	19.2	C	12.8	B	15.3	C
Quince St. @								
32 .	Fourth Ave.	Yes	3.8	A	4.4	A	3.1	A
33 .	Fifth Ave.	Yes	6.5	A	7.1	A	**6.6**	**A**
34 .	Sixth Ave.	Yes	8.7	A	10.9	B	7.4	A

Table 8-9
Alternative 4 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Palm St. @								
35 .	Fourth Ave.	No	14.2	B	13.9	B	13.2	B
36 .	Fifth Ave.	No	23.0	C	30.5	D	**38.2**	**E**
37 .	Sixth Ave.	No	16.4	C	**65.7**	**F**	16.6	C
Olive St. @								
38 .	Fourth Ave.	No	13.0	B	17.6	C	17.1	C
39 .	Fifth Ave.	No	32.8	D	22.6	C	**39.7**	**E**
40 .	Sixth Ave.	No	23.4	C	23.4	C	23.8	C
Nutmeg St. @								
41 .	Fourth Ave.	Yes	5.1	A	5.5	A	5.3	A
42 .	Fifth Ave.	Yes	3.7	A	4.9	A	3.8	A
43 .	Sixth Ave.	Yes	2.3	A	3.0	A	2.6	A
Maple St. @								
44 .	Fourth Ave.	No	24.3	C	**52.4**	**F**	31.3	D
45 .	Fifth Ave.	No	**40.3**	**E**	**65.5**	**F**	**37.6**	**E**
46 .	Sixth Ave.	No	16.9	C	16.9	C	**46.5**	**E**
Laurel St. @								
47 .	Fourth Ave.	Yes	14.6	B	15.1	B	17.3	B
48 .	Fifth Ave.	Yes	23.5	C	18.7	B	21.5	C
49 .	Sixth Ave.	Yes	19.8	B	19.9	B	26.8	C
Kalmia St. @								
50 .	Fourth Ave.	No	14.4	B	14.0	B	14.9	B
51 .	Fifth Ave.	No	31.2	D	**47.4**	**E**	**43.4**	**E**
52 .	Sixth Ave.	No	10.8	B	15.5	C	12.4	B

Table 8-9
Alternative 4 Intersection Level of Service Analysis

Intersection		Signal	AM		Midday		PM	
			Delay	LOS	Delay	LOS	Delay	LOS
Juniper Street @								
53 .	Fourth Ave.	Yes	5.0	A	3.2	A	4.7	A
54 .	Fifth Ave.	Yes	5.6	A	6.0	A	7.3	A
55 .	Sixth Ave.	Yes	3.6	A	4.8	A	6.7	A
Ivy St. @								
56 .	Fourth Ave.	No	15.8	C	16.3	C	16.2	C
57 .	Fifth Ave.	No	**48.7**	**E**	**84.9**	**F**	31.4	D
58 .	Sixth Ave.	No	16.3	C	12.0	B	13.3	B
Hawthorn St. @								
59 .	Fourth Ave.	No	17.0	C	18.2	C	21.3	C
60 .	Fifth Ave.	No	**405.4**	**F**	**436.7**	**F**	**58.9**	**F**
61 .	Sixth Ave.	No	24.3	C	15.0	B	16.0	C
Grape St. @								
62 .	Fourth Ave.	Yes	17.3	B	18.2	B	25.5	C
63 .	Fifth Ave.	Yes	7.6	A	8.0	A	16.7	B
64 .	Sixth Ave.	Yes	3.2	A	5.0	A	4.6	A
Fir St. @								
65 .	Fourth Ave.	No	14.4	B	16.2	C	17.6	C
66 .	Fifth Ave.	No	24.8	C	25.4	D	29.5	D
67 .	Sixth Ave.	No	15.2	C	12.1	B	12.9	B
Elm St. @								
68 .	Fourth Ave.	Yes	27.5	C	17.8	B	22.0	C
69 .	Fifth Ave.	Yes	28.5	C	12.9	B	13.2	B
70 .	Sixth Ave.	Yes	48.5	D	14.4	B	15.5	B

Passenger Vehicle Travel Time

Passenger vehicle travel time was calculated for each alternative using the VISSIM software program. The corridor was modeled for the p.m. peak hour under 2030 conditions. Results of the passenger vehicle travel time are summarized in Table 8-10.

Results of the travel time analysis show that reducing roadway capacity from three lanes to two lanes on Fourth and Fifth Avenues result in an increase in travel time by approximately 30 to 60 seconds, with the exception of Alternative 1, which includes diagonal parking along Fourth and Fifth Avenues north of Pennsylvania Avenue.

Vehicles parking in diagonal parking spaces block traffic while exiting a parking space. This can increase travel times along a corridor as it requires through traffic vehicles to wait while the parked vehicle enters into traffic. Similar delays can occur with parallel parking spaces. During parallel parking maneuvers, the vehicle entering the parking space tends to affect the flow of traffic along a corridor.

Travel time projections for Alternative 1 shows increases in travel time for northbound Fifth Avenue from Maple to Washington. Northbound Fifth Avenue is forecast to have an increase in travel time of an additional five minutes (seven minutes total) from Maple to Walnut and an additional seven and one-half minutes (16 minutes total) from Walnut to Washington. The increase in travel time could be related to many factors which include the reduction in travel lanes and the introduction of diagonal parking along the corridor.

Reducing the number of lanes along Sixth Avenue from four to three lanes in the central and southern corridors does not result in an increase in travel lime, except for southbound Sixth Avenue from Maple to Elm, which results in an additional one to two minutes of travel time due to the decreased capacity and diagonal parking. Alternatives 2 and 3 show a decrease in travel time along Sixth Avenue from Walnut to Washington.

Overall, Alternative 1 is forecast to have the highest increases in travel time throughout the study area. Alternatives 2 and 3 are comparable and include decreases in travel time along Sixth Avenue (NB Maple to Walnut; SB Washington to Walnut).

Transit Vehicle Travel Times

Similarly, the transit vehicle travel times were calculated using the VISSIM software program. The results of the p.m. peak hour operating conditions for the 2030 conditions are summarized in Table 8-11.

The transit vehicle travel time analysis shows that the presence of a transit-only lane results in decreased travel time, as evident in Table 8-11 for Alternatives 2 and 3. Overall, Alternatives 2 and 4 show the lowest transit travel times for southbound Fourth Avenue. Alternative 3 shows the lowest transit travel times for northbound Fifth Avenue. Northbound Fifth Avenue from Walnut to Washington is shown to have a decrease in transit travel time of up to nine minutes with the a transit-only lane, as shown between Alternatives 3 (with a transit-only line) and 4 (no transit lane).

Table 8-10
Passenger Vehicle Travel Time

Route	Limits	Travel Time (min:sec)				
		2005 Concept	Alt. 1	Alt. 2	Alt. 3	Alt. 4
4th Avenue						
SB	Washington - Walnut	04:00	05:00	04:00	05:00	04:30
	Walnut - Maple	02:00	02:00	02:00	02:00	02:00
	Maple - Elm	03:30	03:00	03:30	03:00	03:00
	Total	10:00	10:00	09:30	10:00	09:30
5th Avenue						
NB	Elm - Maple	02:00	03:00	02:30	02:30	02:00
	Maple - Walnut	02:30	07:00	02:00	02:00	02:00
	Walnut - Washington	08:00	16:00	08:30	07:30	08:30
	Total	13:00	27:00	13:00	11:30	12:00
6th Avenue						
NB	Walnut - Washington	03:00	02:30	03:00	03:30	03:00
	Maple - Walnut	02:00	03:00	01:30	01:30	02:00
	Elm - Maple	02:00	02:00	02:00	02:00	02:00
	Total	07:00	07:30	06:30	07:00	06:30
SB	Washington - Walnut	08:00	05:30	03:30	03:30	04:00
	Walnut - Maple	02:00	02:30	02:00	02:00	02:00
	Maple - Elm	02:00	03:00	04:00	03:00	02:00
	Total	12:00	11:00	09:30	08:30	08:00

Table 8-11
Transit Vehicle Travel Time

Route	Limits	Travel Time (min:sec)				
		2005 Concept	Alt. 1	Alt. 2	Alt. 3	Alt. 4
4th Avenue						
SB	Washington - Walnut	06:00	05:00	05:30	05:30	05:00
	Walnut - Maple	04:30	03:30	03:00	03:30	03:00
	Maple - Elm	03:30	03:00	03:00	04:00	03:30
	Total	14:00	11:30	11:30	13:00	11:30
5th Avenue						
NB	Elm - Maple	04:00	05:30	04:30	04:00	05:00
	Maple - Walnut	04:00	05:30	03:30	03:30	03:30
	Walnut - Washington	08:00	15:00	09:30	07:30	16:30
	Total	16:00	26:00	17:30	15:00	25:00

8.4 TRAFFIC SIGNAL WARRANTS

As summarized in Chapter 7, each of the alternatives include new traffic signals along Fourth, Fifth and Sixth Avenues. Although the traffic signals improve operating conditions at the intersections, the traffic signals are not necessarily warranted at these locations.

Traffic signal warrants are based on the Manual of Uniform Traffic Control Devices (MUTCD). A total of five warrants were evaluated for this study:

Warrant 1: Eight-Hour Vehicular Volume. This warrant assesses two conditions during any eight-hour period of an average day: a.) the minimum vehicle volume of intersecting traffic at an intersection and b.) the interruption of continuous traffic between the major and minor street. A signal may be warranted for the first condition (a) where a large volume of intersecting traffic is present or for the second condition (b) if traffic on a minor street suffers excessive delay from traffic on the major street.

Warrant 2: Four-Hour Vehicular Volume. This warrant assesses signal warrant conditions based on the volume of intersecting traffic during any four hours of an average day. A signal may be warranted if the vehicle volumes meet the criteria provided in the MUTCD.

Warrant 3: Peak Hour. This warrant assesses signal warrant conditions based on the volume of intersecting traffic during a minimum of one hour of an average day. The peak hour warrant is typically applied in unusual cases, such as office complexes, or other locations which have high vehicle volumes during a short period of time. A signal may be warranted if the vehicle volumes meet the criteria provided in the MUTCD.

Warrant 6: Coordinated Signal System. This warrant for a coordinated signal system determines the need of installing traffic control signals at locations where they may not otherwise be needed for the purpose of maintaining efficient movement of traffic. This warrant is evaluated based on the distance from the nearest signal and operating conditions of the adjacent signals in moving traffic.

Warrant 8: Roadway Network. This warrant is based on the number of vehicles traveling through the intersection and must be located on a roadway serving a principal network, traveling through a city, or located as planned on an official plan, such as a major street plan in a transportation study. A signal may be warranted if the vehicle volumes meet the criteria provided in the MUTCD.

The results of the traffic signal warrant analysis are summarized in Table 8-12 below. As shown, the intersections of Fourth Avenue / Quince Street, Fifth Avenue / Quince Street, Sixth Avenue / Quince Street, Fifth Avenue / Nutmeg Street, and Sixth Avenue / Nutmeg Street are warranted under 2030 conditions. Although traffic signals at the other locations may help to improve pedestrian crossings, they may not be the appropriate solution for controlling traffic, which is the purpose of a traffic signal. At locations where traffic signals are not warranted, but pedestrian activity warrants marked or enhanced crossings, lighted crosswalks should be considered. Details of lighted crosswalks will be discussed in Chapter 9.

Table 8-12 Summary of Traffic Signal Warrant Analysis Year 2030 Conditions with 2005 Concept Plan					
Intersection	Warrant				
	1	2	3	6	8
Fourth Ave / Quince St				x	
Fifth Ave / Quince St	x			X	
Fourth Ave / Nutmeg St					
Fifth Ave / Nutmeg St	X				x
Sixth Ave / Nutmeg St	x	x			

8.5 MEASURES OF EFFECTIVENESS

The measures of effectiveness encapsulate all elements of the plan that relate to both the operational characteristics of the corridor and the qualitative characteristics of the corridor. To this point, this chapter has focused on the operational measures of effectiveness which included volume-capacity ratios, delay, travel time and speed. This section describes the qualitative measures of effectiveness developed for this project such as traffic calming, bicycle features and walkability. Each alternative will be evaluated on how it addresses these measures.

Traffic Calming

Traffic speeds is a concern for both pedestrians and bicycles. Integrating multiple features along the corridor aimed at reducing vehicles speeds is the goal of the traffic calming component of this project. Analysis of both existing conditions and 2030 conditions show that if three lanes are provided on Fourth and Fifth Avenue, the volume will be well below the available capacity. As a result, there will not be the necessary friction along Fourth or Fifth Avenue to encourage vehicles to slow down and traffic speeds will continue to be high. To effectively slow down, capacity should be reduced and physical changes to the roadway, such as pop-outs, crosswalks, and parking, should compliment the capacity reduction.

As shown in Table 8-10, Alternative 1 - which includes reducing capacity by one lane of traffic, including diagonal parking in the northern corridor and no transit-only lane - would increase passenger vehicle travel time and reducing speeds.

Provisions for Bicycles

Alternative 1 includes a bike lane along Fourth and Fifth Avenue. Alternative 3 includes a transit-only lane that may be shared as a bicycle lane. Alternatives 2 and 4 do not include bicycle lanes.

Provisions for Pedestrian Walkability/Access

The alternatives developed for the study area encompass several pedestrian-oriented facilities to promote walkability and increase access for all users. For instance, each alternative includes the installation of curb extensions and enhanced crosswalks. These features promote walkability by decreasing the crossing distance for pedestrians and increasing the frequency of established crossing areas. Increasing the frequency of marked crosswalks may encourage pedestrians to cross at intersections and improving the visibility of pedestrians to drivers.

Other common features include replacing parallel parking with diagonal parking. Diagonal parking takes more roadway width and therefore would require removal of one travel lane, such as in Alternatives 1 and 2. Reducing the number of lanes decreases roadway capacity. Consequently, speeds typically reduce with a reduction in lanes as there is less freedom to maneuver a vehicle. Vehicles will also slow down with the anticipation of drivers pulling into and out of diagonal parking spaces. In addition, installing diagonal parking increases the barrier between the pedestrians on the sidewalk and vehicular traffic, thereby increasing pedestrian comfort.

Alternatives 2 and 3 include a transit-only lane along portions of Fourth and Fifth Avenues. A transit-only lane is similar to installing diagonal parking in that it reduces the capacity available to vehicular traffic. The speed of traffic along the corridors varies based on the number of lanes provided in each section. Hence, traffic may be slower when one travel lane is replaced with diagonal parking than a transit-only lane.

Alternatives 1, 2, and 3 include the installation of an intermittent raised median along Sixth Avenue. Raised medians create a physical barrier between opposing traffic and narrow the travel way, which is effective in traffic calming to lower speeds. Raised medians located near intersections allow pedestrians to find acceptable gaps and cross one direction of traffic at a time. At such locations, marked crosswalks will be provided to increase pedestrian visibility and driver awareness.

New traffic signals are suggested throughout the project area. Installing traffic signals can benefit the area by improving the flow of traffic, decreasing delay for vehicles on the side streets, and providing adequate time for pedestrians to cross the street. However, for a signal to be installed it must meet MUTCD criteria and satisfy a warrant. As noted in this chapter, signal warrants were completed for this study and not all proposed locations are warranted. If a signal is not warranted or needed, there are other features that may be used to improve access, such as lighted crosswalks between intersections, curb extensions, and increasing the buffer between pedestrians and vehicular traffic, such as with diagonal parking.

8.6 PARKING

Tables 8-13 to 8-16 summarize the net change in parking spaces for the north, central, and southern corridors for each alternative. For each alternative, it was assumed that if a pop-out or curb extension was provided at both ends of the block, a net loss of one parking space would occur. If a pop-out or curb extension was proposed at only one end of the block, no loss in parking associated with the pop-out or curb extension was assumed. This is a conservative analysis. In many cases, the existing number of parking spaces could be maintained with the pop-outs and curb extension. The actual size and shape of the pop-out or curb extension will be determined during final design. The size and shape of the pop-out or curb extension will dictate the number of parking spaces along the block.

Table 8-13 Estimated Change in Parking Spaces – Alternative 1			
	Alternative 1		
	4TH	5TH	6TH
North	-13	51	-4
Central	9	32	44
South	26	16	31
Total	22	99	71
Alt. Total	192		

Table 8-14 Estimated Change in Parking Spaces – Alternative 2			
	Alternative 2		
	4TH	5TH	6TH
North	-10	-9	-4
Central	9	32	-17
South	26	16	-8
Total	25	39	-29
Alt. Total	35		

Table 8-15 Estimated Change in Parking Spaces – Alternative 3			
	Alternative 3		
	5TH	6TH	4TH
North	-9	-4	-10
Central	32	-17	-9
South	16	-8	9
Total	39	-29	-10
Alt. Total	-10		

Table 8-16 Estimated Change in Parking Spaces – Alternative 4			
	Alternative 4		
	4TH	5TH	6TH
North	-13	-9	-4
Central	-9	-4	-9
South	9	5	-8
Total	-13	-8	-21
Alt. Total	-42		

8.7 DIVERSION OF TRAFFIC

Since the Concept Plan and several of the alternatives to the Concept Plan proposed a reduction in the number of general-purpose travel lanes on Fourth Avenue, Fifth Avenue, and portions of Sixth Avenue, a special analysis was performed to evaluate the potential for traffic to divert to other parallel roads outside the study corridor. This analysis relied in part, on the City of San Diego traffic forecasting model to generate daily traffic forecasts for year 2030 traffic conditions without and with the Concept Plan.

With the Concept plan, reductions in roadway capacity on Fourth, Fifth, and Sixth Avenues would result in a shift in some southbound traffic to Fourth Avenue which has sufficient reserve capacity. In the northbound direction, reduced roadway capacities on Fifth and Sixth Avenues would result in a shift in traffic of approximately 4,250 vehicles per day to other nearby parallel routes such as I-5, S.R. 163, First Avenue and Reynard Way.

In Alternatives 1, 2, and 3, the loss in southbound capacity on Sixth Avenue would shift the excess southbound traffic to Fourth Avenue which has sufficient reserve capacity even with the loss of one lane. The loss in northbound capacity on Fifth Avenue and in some cases on Sixth Avenue would result in same diversion in northbound traffic for Alternative 1 as with the Concept Plan. Alternatives 2 and 3 maintain two northbound lanes on Sixth Avenue for all or most of the corridor and would divert less than 3,500 vehicles per day to other nearby parallel routes. Alternative 4 does not reduce the capacity of Fourth, Fifth, and Sixth Avenues and therefore would not result in any traffic diversion.

8.8 SELECTION OF REFINED CONCEPT PLAN

The cross-sectional options identified in Chapter 7 and the results of the alternatives analysis were presented at the project Open House in November 2007, to the project working group in November 2007 and to the Project Team in December 2008. Based on the operational analysis and input from the community, the four alternatives were consolidated to two. Alternatives 2 and 4 were selected for refinement. The reasons for accepting or rejecting the alternatives are provided below. Table 8-17 provides a summary of the Measures of Effectiveness used in selecting the Refined Concept Plan.

Alternative 1:

Description: Alternative 1 includes reducing Fourth and Fifth Avenues from three to two lanes of traffic and reducing Sixth Avenue from four to two lanes of traffic. Queue jumps are proposed along Fourth and Fifth Avenue. Diagonal parking is proposed along each of the corridors. New traffic signals are proposed to be installed at Fourth Avenue / Upas, Fourth Avenue / Quince, Fifth Avenue / Quince, Fourth Avenue / Nutmeg, Fifth Avenue / Nutmeg, Sixth Avenue / Nutmeg, Fourth Avenue / Hawthorne, Fifth Avenue / Hawthorne, and Sixth Avenue / Hawthorne. Curb extensions and enhanced pedestrian crossings are proposed throughout the area. Under Alternative 1, Pennsylvania Avenue is proposed to be

Table 8-17
Summary of Measures of Effectiveness

Measure of Effectiveness	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Segments Operation at LOS E or F	16	16	16	7
Intersections Operating at LOS E or F	22	24	24	13
Passenger Vehicle Travel Time (min:sec) – P.M. Peak Hour				
Fourth Avenue	10:00	9:30	10:00	9:30
Fifth Avenue	27:00	13:00	11:30	12:00
Sixth Avenue - Northbound	7:30	6:30	7:00	6:30
Sixth Avenue - Southbound	11:00	9:30	8:30	8:00
Transit Vehicle Travel Time (min:sec) – P.M. Peak Hour				
Fourth Avenue	11:30	11:30	13:00	11:30
Fifth Avenue	26:00	17:30	15:00	25:00
Bicycle Facilities	Bicycle Lanes	Bicycle Lanes	Share Transit Lane	None
Pedestrian Facilities	Curb Extensions Enhanced Cross Walks Narrower Streets	Curb Extensions Enhanced Cross Walks Narrower Streets	Curb Extensions Enhanced Cross Walks Narrower Streets	Curb Extensions Enhanced Crosswalks
New Parking Spaces	192	35	-10	-42
New Traffic Signals*	6	7	6	9
Effectively Calms Traffic?	Yes	Yes	Yes	No

* Note: Not all traffic signals proposed in each alternative are forecast to meet traffic signal warrant criteria. Although identified in this study as signalized, traffic volumes, pedestrian volumes and need for signal should be evaluated on a case by case basis as the strategy is implemented.

converted to one-way eastbound traffic between Fourth and Sixth Avenues.

Reason for Rejecting: The analysis shows that reducing Sixth Avenue from four lanes to two lanes would result in diversion of traffic from the Fourth/Fifth/Sixth Avenue study area to other parallel roadways. As a result, the amount of traffic that enters the study area altogether is reduced. It was determined that the diversion is due to the capacity constraints through the central portion of the corridor. The potential impact of traffic diversion influenced the decision to reject this alternative. Reducing Fourth and Fifth Avenues from three lanes to two lanes will help to reduce traffic speeds along these corridors. Analysis of operating conditions shows that the volume of traffic on these roadways is well below the available capacity along many portions of the study corridor.

Acceptable travel times can be maintained for transit vehicles for most of the corridor. Therefore, the queue jumps and improved stop locations will improve both on-time performance and improve transit access to stops. Although this alternative was rejected, queue jumps are recommended for the corridor. To improve overall transit operations, a dedicated lane should be provided through the northern corridor (Pennsylvania to University).

Pedestrians would benefit from the reduced number of lanes, additional traffic signals, median on Sixth Avenue and pop-outs throughout the study area. Bicycles will benefit from the bicycle lanes along Fourth and Fifth Avenues identified with this alternative. Without reducing the number of through lanes, it is not possible to provide these facilities to bicyclists.

Alternative 2:

Description: Alternative 2 includes reducing Fourth and Fifth Avenues from three to two lanes of traffic. Sixth Avenue is proposed to be reduced from four to three lanes from Walnut to Maple, and from four to two lanes from Maple to Elm Street. Transit-only lanes are proposed from University to Pennsylvania. Queue jumps are proposed along Fourth and Fifth Avenues. Diagonal parking is proposed along each of the corridors, except for portions of the north corridor which will maintain some existing parallel parking to accommodate the transit-only lane. New traffic signals are proposed to be installed at Fourth Avenue / Upas, Fourth Avenue / Quince, Fifth Avenue / Quince, Fourth Avenue / Juniper, Fifth Avenue / Juniper, Sixth Avenue / Juniper, Fifth Avenue / Grape, and Sixth Avenue / Grape. If a signal is installed at Sixth Avenue / Juniper, this location would grant full access to traffic and permit northbound left turns, which are currently prohibited. Curb extensions and enhanced pedestrian crossings are proposed throughout the area.

Reason for Accepting: As discussed previously, reducing Fourth and Fifth Avenue from three to two lanes through the central and southern sections will benefit pedestrians and bicycles. Crossing distances for pedestrians are reduced and bicycles are provided dedicated bicycle lanes. Combined with pop-outs, new pavement markings and diagonal parking, traffic speeds along Fourth and Fifth Avenues would also be reduced without resulting in diverted traffic to parallel corridors. This alternative provides the best overall balance of transportation modes for Fourth and Fifth Avenues through the central and southern sections.

Reducing Fourth and Fifth Avenues to two lanes would not negatively impact transit access through the corridor. Queue jump lanes could be provided at signalized intersections to improve the transit access and on-time performance. Queue jump lanes may result in a reduction in parking spaces in some blocks. However, this reduction in parking is offset by the conversion to diagonal parking on nearby blocks and cross-streets.

In the northern portion of the study area, this alternative would provide a transit lane from University Avenue to Pennsylvania Avenue on Fifth Avenue. The transit lane would be shared with right turning passenger vehicles. Parking would be maintained along both sides of the street. Forecast traffic volumes along this portion of the corridor are estimated to result in significant impacts to transit travel time by year 2030. By providing the transit lane through this portion of the corridor, access to the transit stop along Fifth Avenue will be improved and travel time significantly reduced when compared to making no changes at all.

In the northern portion of the corridor, Sixth Avenue would be improved at key intersections by providing dedicated left turn lanes and signal timing. However, four lanes of traffic should be maintained from University Avenue to Upas Street in order to encourage freeway bound traffic to take this route. South of Upas Street to Elm Street, this alternative reduces Sixth Avenue to three lanes (two northbound, one southbound). The one-lane reduction will allow for dedicated left turn lanes at key intersections and medians (either raised or striped). It is recommended that this alternative be revised to further reduce the capacity through the southern section from three lanes to two lanes. This would allow diagonal parking in addition to the raised median. With this modification, Sixth Avenue would be two lanes (one northbound, one southbound) with diagonal parking from Maple Street to Elm Street. Traffic control such as traffic signals or roundabouts are recommended at Juniper Street and Grape Street to help improve pedestrian access and traffic flow.

This alternative helps to improve pedestrian access along Sixth Avenue by reducing traffic speeds, providing marked crosswalks and new traffic signals, and constructing new pop-outs to reduce pedestrian crossing distances.

This alternative is able to maintain traffic flow through most of the corridor through an effective combination of traffic calming features, transit enhancements, bicycle improvements, and pedestrian accessibility improvements. The lane reductions proposed in this alternative does not result in diversion of traffic from the study corridors to parallel routes outside the study area which implies the improvements recommended will have minimal impact on the surrounding community. As a result, this alternative has been identified as the Preferred Alternative.

Alternative 3:

Description: Alternative 3 includes reducing Fourth and Fifth Avenues from three to two lanes of traffic and reducing Sixth Avenue from four to three lanes of traffic from Walnut to Elm Street. A transit-only lane is proposed throughout the north, central, and south corridors along Fourth and Fifth Avenues from University Avenue to Elm Street. Parallel parking would be maintained. New traffic signals are proposed at Fourth

Avenue / Upas, Fourth Avenue / Juniper, Fifth Avenue / Juniper, Sixth Avenue / Juniper, Fifth Avenue / Grape, and Sixth Avenue / Grape. Curb extensions and enhanced pedestrian crossings are proposed throughout the area. Under Alternative 3, Upas Street is proposed to be converted to one-way eastbound traffic between Fourth and Sixth Avenues.

Reason for Rejecting: It was determined that providing transit only lanes would not provide a significant benefit to transit operations and reduction in travel times. This is because the volume of traffic is well below the capacity of the roadway through the central and southern portions of the corridor. Both passenger vehicles and transit vehicles can currently travel at free-flow speeds during the peak hours.

Because the transit only lanes did not provide a direct benefit to transit through the central and southern portions of the study corridor, this alternative was rejected.

Alternative 4:

Description: Alternative 4 contains the least amount of change to the road configurations. Roadway capacity and the number of lanes are proposed to remain the same as existing conditions. No changes in parking are proposed. New traffic signals are proposed at Fourth Avenue / Upas, Fourth Avenue / Spruce, Fifth Avenue / Spruce, Sixth Avenue / Spruce, Fourth Avenue / Quince, Fifth Avenue / Quince, Fourth Avenue / Nutmeg, Fifth Avenue / Nutmeg, Sixth Avenue / Nutmeg, Fourth Avenue / Juniper, Fifth Avenue / Juniper, Sixth Avenue / Juniper, Fifth Avenue / Grape, and Sixth Avenue / Grape. Curb extensions and enhanced pedestrian crossings are proposed throughout the area. Under Alternative 4, Upas Street is proposed to be converted to one-way eastbound traffic between Fourth and Sixth Avenues.

Reason for Rejecting: Alternative 4 (The Promenade Plan) makes no changes to the number of lanes through the study area. As shown in the operational analysis, this alternative would not result in any diversion of traffic and would not result in a change in operating conditions from acceptable to deficient.

This alternative provides the greatest number of new traffic signals. However, the traffic signal warrant analysis has shown that not all signals proposed in this plan would be warranted and therefore there is reason to believe some signals may not be constructed.

This plan does provide pop-outs or curb extensions at most intersections. This would help to improve the visibility of pedestrians at intersections and would help to reduce the pedestrian exposure time while crossing the street. Coupled with new marked crosswalks, pedestrians would receive some benefit from this alternative.

The key concern raised by community members during the "Feet First" study, the "Fourth, Fifth and Sixth Avenue Traffic Calming Study" and public outreach efforts for this project was pedestrian safety. Reducing traffic speeds along Fourth, Fifth and Sixth Avenues to reflect the current speed limits is the first step toward improving pedestrian safety. By maintaining three lanes, traffic speeds will not be reduced. It is the combination of multiple traffic calming features that effectively slow down traffic.

By maintaining three lanes of traffic on Fourth and Fifth Avenues, dedicated bicycle lanes cannot be provided. The curb to curb with along Fourth and Fifth Avenues will not allow for three lanes of traffic and dedicated bicycle facilities.

8.9 CONCLUSIONS

Detailed analysis of the operating conditions, pedestrian accessibility, bicycle facilities and transit operations have shown that Fourth, Fifth and Sixth Avenues have excess capacity available which is currently leading to high speeds along these corridors. Capacity at the northern end of the corridor (Washington Avenue to Upas Street) should be maintained at existing conditions, with the exception of Fifth Avenue from University Avenue to Pennsylvania Street. Through this section, transit is forecast to experience very high levels of delay if transit related improvements are not implemented. The high delay is due in large part to transit vehicle inability to reach the transit stops.

Pedestrians and bicycles will both benefit from lower speeds along the corridor. By implementing a series of traffic calming elements such as angled or diagonal parking, curb extensions and improved crosswalks, the speed of traffic will be reduced and pedestrians will enjoy a more walkable environment.

Although transit only lanes were considered in the alternatives analysis, it was determined that the benefit to transit did not exceed the impacts to parking and traffic that would occur with the dedicated lanes. Delay to transit vehicles most commonly occurred at traffic signals and waiting in queues. Therefore, it was determined that queue jump lanes, either shared with right turning vehicles or dedicated lanes, would provide improved on-time performance. This in turn could lead to more efficient and frequent transit service along the corridor.

The details of the selected alternative, Alternative 2, will be outlined in the following chapter. Minor modifications to this alternative were made and the recommended alternative will be called the Refined Concept Plan.

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Chapter 9: Elements of Refined Concept Plan

9.0 INTRODUCTION

This chapter provides an overview of the design elements of the Refined Concept Plan, including roadway cross-sections, traffic signal phasing, turn pocket needs and traffic signal warrants for the proposed signalized intersections along the corridor.

9.1 DESIGN ELEMENTS OF REFINED CONCEPT PLAN

The Refined Concept Plan integrates many elements to help calm traffic, to improve the pedestrian and bicycle environment and to improve transit service along the corridor. The combination of elements selected minimize the impacts to parallel roadways within the study area, such as First Avenue. Exhibit 9-1 provides a plan view of the Refined Concept Plan. Each of the key elements of the Refined Concept Plan are described in detail below.

<u>Roadway Improvements</u>

Traffic Signals. Eight (8) new traffic signals are included in the Refined Concept Plan:

- Fourth Avenue / Upas Street
- Fourth Avenue / Quince Street
- Fifth Avenue / Quince Street
- Fourth Avenue / Juniper Street
- Fifth Avenue / Juniper Street
- Sixth Avenue / Juniper Street
- Fifth Avenue / Grape Street
- Sixth Avenue / Grape Street

Discussion of the traffic signal warrants conducted for these intersections are provided in a later section of this chapter. Some of these locations do not currently meet traffic signal warrants and may not meet the warrants in the future. In such instances, enhanced pedestrian crosswalks that include flashing crosswalks and improved striping should be considered in lieu of a traffic signal.

Roundabout. The Refined Concept Plan identifies two potential roundabout locations. These two locations are located in the southern corridor along Sixth Avenue - Grape Street and Juniper Street. Either a roundabout or a traffic signal would effectively control traffic at these two intersections. Exhibit 9-2 illustrates the roundabout at Sixth Avenue and Grape Street. The roundabout at Sixth Avenue and Juniper Street is illustrated in Exhibit 9-3. Both roundabouts are designed to AASHTO roundabout standards with an inscribed diameter of 100 feet to maintain a desired speed through the intersection of 15 mph. Turning templates were overlaid on each roundabout to demonstrate the ability for large vehicles, including fire trucks, to navigate the roundabout. Based the turning analysis, both front and back wheels of large profile vehicles would be able to stay within the available paved area of the roundabout.

Exhibit 9-1
Refined Concept Plan
Northern Corridor

Exhibit 9-1
Refined Concept Plan
Central Corridor

Exhibit 9-1
Refined Concept Plan
Southern Corridor

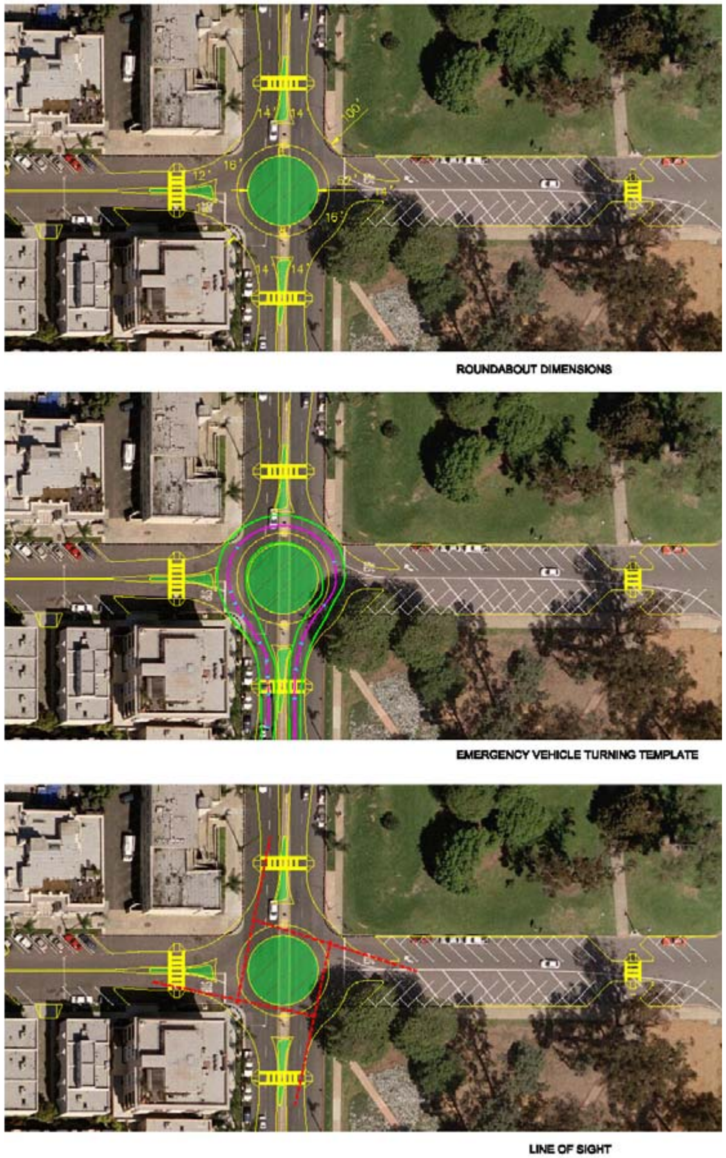


Exhibit 9-2 Roundabout at Juniper Street

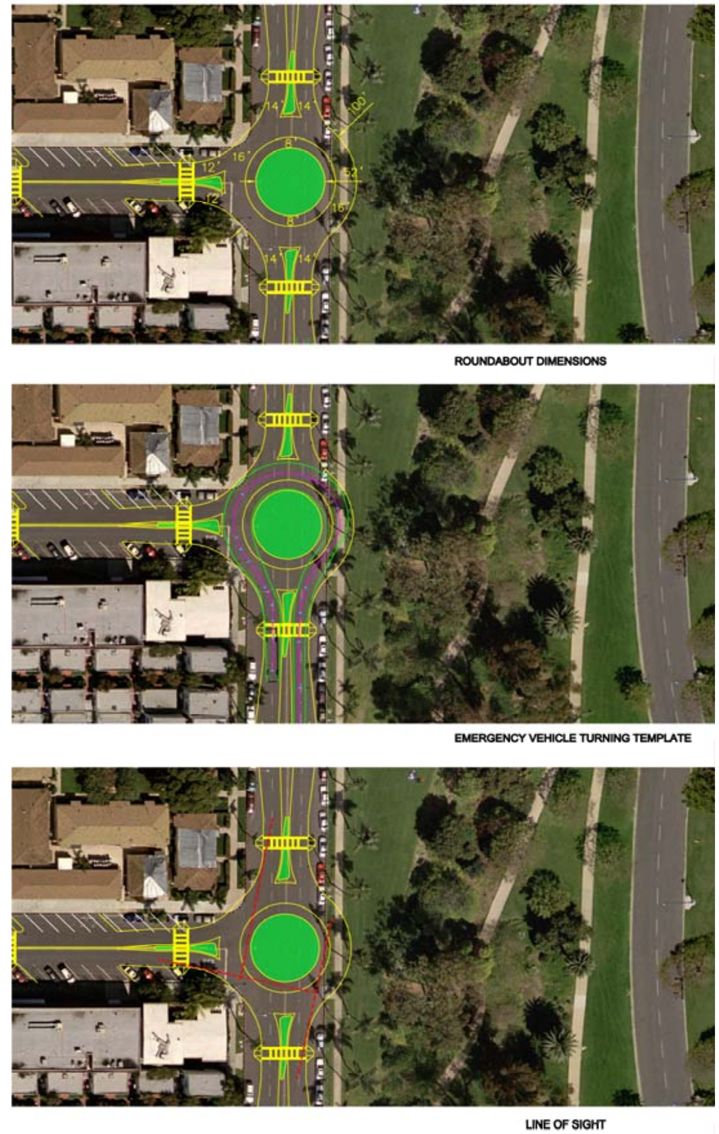


Exhibit 9-3 Roundabout at Grape Street

Several factors about the roundabout may make it an infeasible solution:

- Cost – Roundabouts cost three to four times that of a traffic signal. The estimated cost per roundabout for construction ranges from $500,000 to over $1.0 million.

- Pedestrian Accessibility – As illustrated in the provided figures, pedestrians cross outside the roundabout. When compared to a traffic signal, roundabouts provide a lower level of accessibility for pedestrians.

- ADA Accessibility – Because pedestrian crossings are away from the intersection, providing the appropriate ADA accessible solutions for the visually impaired may make the roundabout a more difficult solution when compared to a traffic signal.

Raised Median. A raised median is recommended on Sixth Avenue from Upas Street to Elm Street. Installation of the median will require one through lane be removed in the southbound direction. The raised median will allow for pedestrian refuge areas when crossing Sixth Avenue and will provide for left turn pockets for northbound vehicles.

It is recommended that the raised median include plantings such as trees and shrubs to help reduce traffic speeds on Sixth Avenue. The height of the tree canopy should be evaluated when selecting planting materials. The tree canopy should exceed the height of high profile vehicles to prevent the vehicles from coming in contact with the lower branches of the trees.

Emergency services was provided the opportunity to review the Refined Concept Plan. As part of the comments received, it was suggested that 22 feet clear space be provided along all streets. Along Sixth Avenue, one lane is provided through the Central and Southern sections of the corridor in the southbound direction and one lane is provided northbound through the Central section. A median is provided throughout the Central and Southern sections. The one lane travel lane adjacent to the median is between 12 and 14 feet wide and will not meet the requirement for 22 feet clear space. Therefore, additional discussions will need to be had with Emergency Services to resolve this issue. Potential solutions may include providing red curb areas at regular intervals or replacing the raised median with a striped median through some blocks.

Left Turn Pockets. The construction of the raised median will provide for left turn pockets at most intersections along Sixth Avenue. The raised median will end prior to the transition into the left turn pocket.

Traffic Signal Modifications. Signal modifications that involve adding a left turn pocket and associated protected left turn phase is planned at Sixth Avenue and Robinson Street in the northern portion of the study corridor. Although left turn phases often lead to longer cycle lengths and delays to vehicles and pedestrians, the reduction in left turn access along the corridor would result in an increase in left turn traffic at the signalized intersections. To accommodate this increase in demand, new left turn phases will be necessary.

Road Repaving and Striping. With the construction of the raised median and proposed striping modifications, Sixth Avenue should be resurfaced and restriped. Similarly, with the proposed curb extensions along portions of Fourth and Fifth Avenues, these roads may need to reconstructed to allow for the appropriate cross-fall and drainage with the proposed curb extensions. Observations along Fourth and Fifth Avenues show that the typical cross-fall (difference between centerline and edge of pavement) is between four and six percent particularly in the northern and central sections. Standard crossfall is approximately two percent on a typical street. Reconstruction of the street will allow for construction of curb extensions that meet ADA requirements and drainage improvements for the corridors.

Pedestrian Improvements

Enhanced Pedestrian Crossings. Enhanced pedestrian crossings would include flashing in pavement devices and highly reflective pavement markings warning drivers of the presence of a pedestrian in the crosswalk. To activate the crossing, two technologies are available that could be installed. Either the pedestrian would press a button to activate the crossing or motion sensors would be installed that would automatically activate the sensors. Both devices have been installed in the City of San Diego. The in- pavement devices would continue to flash for a pre-determined time. It is recommended that if traffic signals identified in the Refined Concept Plan do not meet traffic signal warrants, the enhanced pedestrian crossing be installed until the warrants are met or in lieu of the traffic signal.

Exhibit 9-4 illustrates a typical enhanced pedestrian crossing system. As shown, the system would require a power source, activation technology (either push button or automatic sensor), control unit and in-pavement flashers.

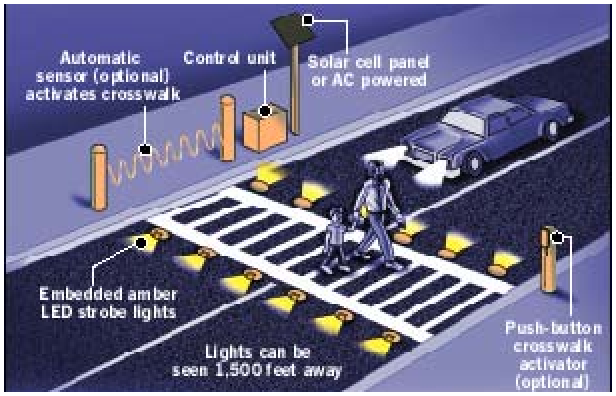


Exhibit 9-4 Enhanced Pedestrian Crossing Technology
Source: Lightguard Systems Inc.

Exhibit 9-5 illustrates some of the physical elements of the Enhanced Pedestrian Crossing System. At the time this report was prepared, the cost to construct a typical Enhanced Pedestrian Crossing was estimated to be $20,000. This includes installation of pedestrian push button, wiring of push button to control box, acquisition and installation of the control unit, connection to a power source, in pavement flashers and highly reflective pavement markings.

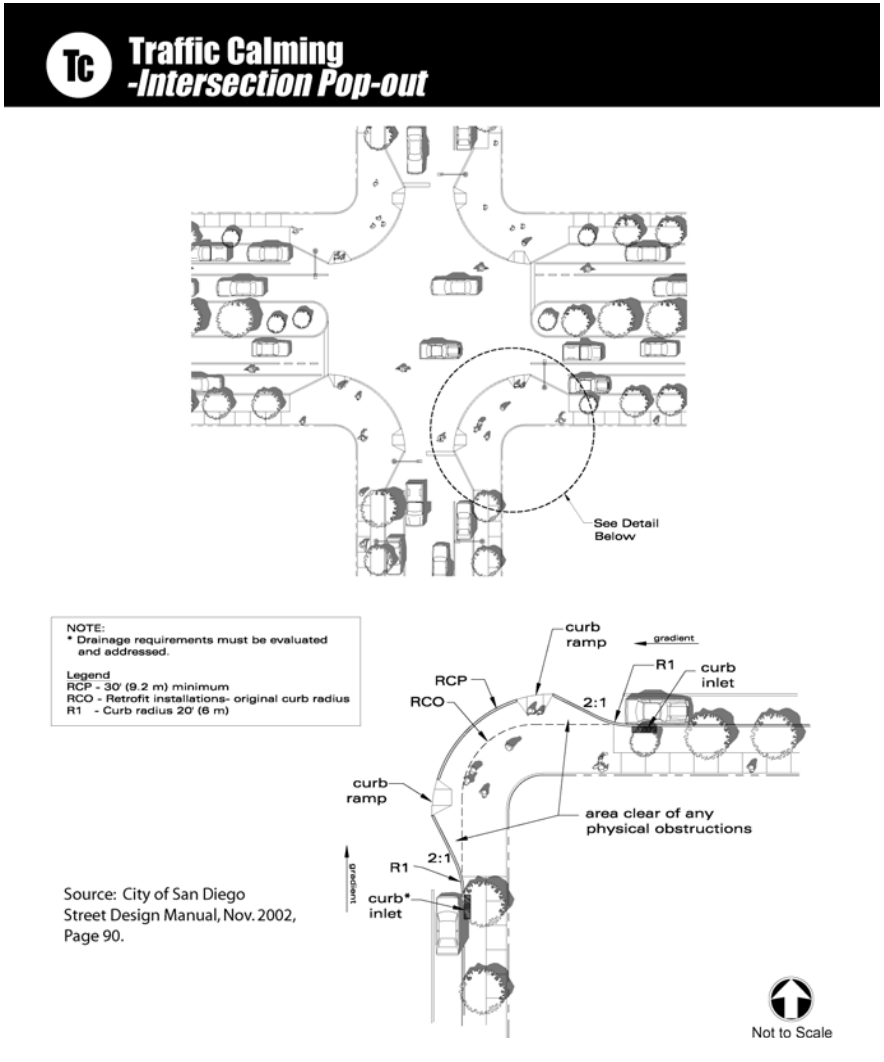
Curb Extensions (Bulb-outs or Pop-outs). Curb extensions, also called pop-outs or bulb-outs, will be provided at several intersections. Curb extensions reduce the exposure time for pedestrians as they cross the mixed flow lanes by reducing the distance from curb to curb. Curb extensions should only be provided on blocks where on-street parking is provided. Exhibit 9-6 illustrates the minimum design requirements for a curb extension according to the City of San Diego Street Design Manual. As shown, the minimum curb radius is 30 feet, which is consistent with the minimum turning radius for large (WB-50) trucks.

The design manual recommends that the crosswalks be located at the narrowest point between the two curb extensions. Because the existing development is within 15 feet or less of the existing curb along many blocks within the study area, existing buildings may block the view of a pedestrian in a crosswalk. Pop-outs extend further than the existing edge of sidewalk, therefore improving the visibility of the pedestrian and reducing the building blockage issue. Final design should evaluate the appropriate location of the crosswalks and pop-outs to meet minimum sight distance requirements.

Along Fourth and Fifth Avenues, the curb face is at the same elevation as the surface of the street. Installation of curb extensions at those locations will require either lowering the elevation and cross-fall of the street or raising the sidewalk. ADA standards and drainage design will need to be addressed on a case-by-case basis. Exhibit 9-7 illustrates the locations where the curb face is at or near the elevation of the street.

a) Pedestrian Push Button
b) Automated Sensor
c) In Pavement Flasher

Exhibit 9-5 Enhanced Pedestrian Crossing Elements
Source: Lightguard Systems, Inc.



Source: City of San Diego Street Design Manual, Nov. 2002, Page 90.

Exhibit 9-6
Street Design Manual for Curb Extensions

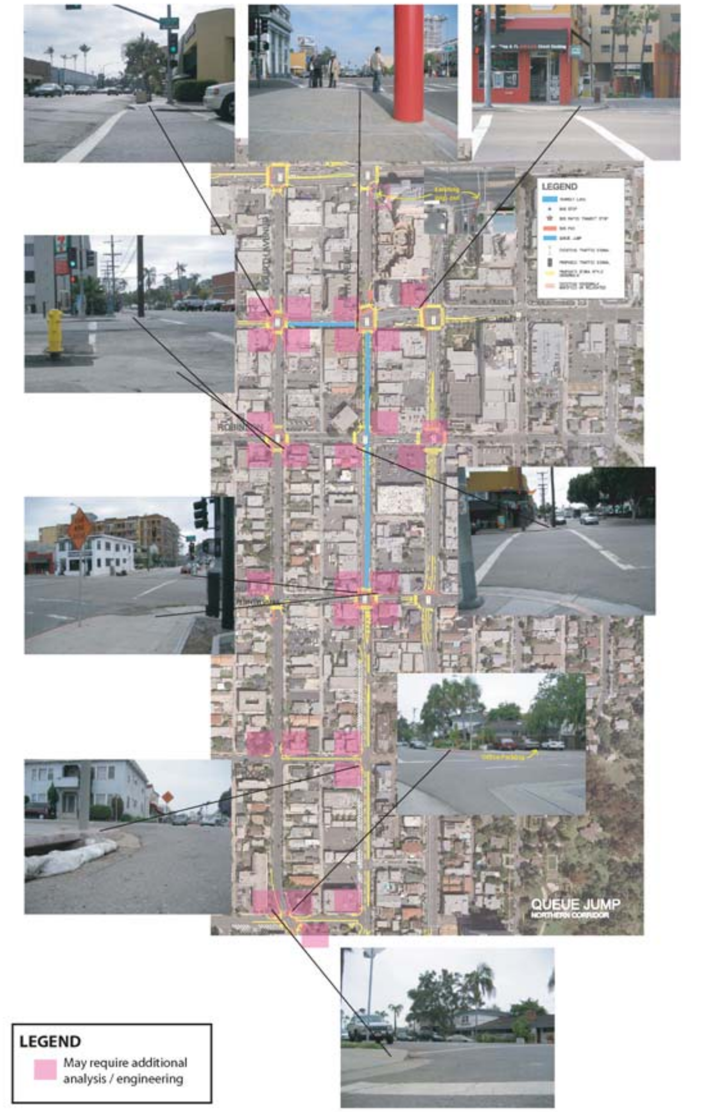


Exhibit 9-7
Northern Corridor Curb Extension Issues

Exhibit 9-7
Central Corridor Curb Extension Issues

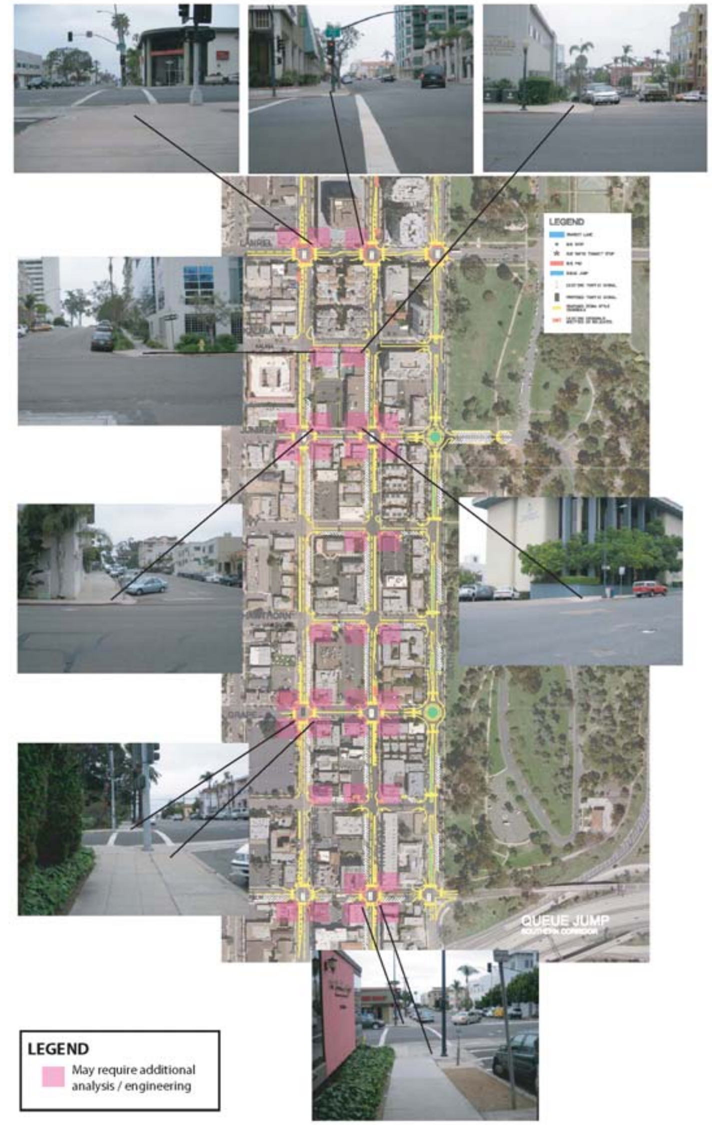


Exhibit 9-7
Southern Corridor Curb Extension Issues

Bicycle Improvements

The Refined Concept Plan includes the striping of four to five foot bicycle lanes along Fourth and Fifth Avenue. Bicycle lanes shall conform to the design standards established by City of San Diego. Bicycle lanes can only be provided if one of the three existing through lanes is removed and converted to parallel parking on one side and diagonal parking on the other. The bicycle lane will be provided on the side of the street where parallel parking is provided. However, if back-in diagonal parking is implemented, consideration should be made for moving the bicycle lane adjacent to the back-in diagonal parking spaces.

Transit Improvements

Consolidation and Removal of Transit Stops. A total of 14 transit stops are currently provided along Fourth Avenue and 13 along Fifth Avenue. Routes 3 and 120 serve the study area along Fourth Avenue and Fifth Avenue. Additional transit lines run along University Avenue and Washington Avenue, as well as along parallel routes such as First Avenue and SR-163.

The Refined Concept Plan would reduce the total number of stops within the study area from 27 to 19 by either eliminating or consolidating stops. The purpose of this change is to improve the efficiency of transit along the corridor. Some of the stops along Fourth and Fifth Avenue are located very close together. In such cases, the two stops are combined into one stop.

The majority of the transit stops proposed in the Refined Concept Plan are located on the farside of the intersection. Farside transit stops are a preferred location by most transit agencies including SANDAG/MTS. Farside stops have the added benefit of:

- Minimizing conflicts with right turning vehicles.
- Minimizing sight distance safety conflicts for both pedestrians and motorist.
- Encouraging pedestrians to cross behind the bus rather that in front of it.
- Better facilitating bus reentry into mixed-flow traffic.
- Allowing the transit vehicle to go through the intersection, thus eliminating the need to wait through another signal cycle.

Transit Stop Amenities and Improvements. For each of the remaining transit stops, improvements would be made such that each stop would be equipped with a minimum of seating, signage, concrete bus pad, raised sidewalk for at-grade boarding and trash receptacle.

Transit shelters should fit within the existing right-of-way. However it should be noted that no detailed plans for either of the shelters were provided to the consultant to determine if the shelters would fit into the intended station location. If streetscape plans are developed for the corridors, consideration should be made such that the designs for the shelters can fit within the available right-of-way. This will ensure that there will be sufficient room for the transit shelter furniture, and for smooth pedestrian movement in the station area.

Transit Priority Lanes. The Refined Concept Plan includes a transit priority lane northbound on Fifth Avenue from Pennsylvania Street to University Avenue, as illustrated by the blue line in Exhibit 9-1 (Northern Corridor). Right turning vehicles would be allowed to enter the transit only lane within approximately 100 feet of the upstream intersection. This is the only location where passenger vehicles should be allowed to enter the transit priority lane.

Transit priority lanes should be a minimum of 11 feet wide, with a preferred width of 12 to 13 feet. The pavement should be color treated to clearly identify a difference in travel way. "Transit Priority Lane" signs should be placed at regular intervals along the corridor. Signs should clearly indicate that bicycles are permitted in the transit priority lane.

In addition to the benefits of a transit priority lane to transit vehicles, emergency vehicles may also benefit from the proposed transit only lane design. Emergency service vehicles could either travel in the transit priority lane or passenger vehicles would have the ability to move to the side of the road into the transit only lane to allow emergency vehicles to pass.

Queue Jump Lanes. The VISSIM simulation model was used to determine the benefits of queue jump lanes and advanced green indication along the Fourth and Fifth Avenue corridors. Two types of queue jump lanes were considered. For locations where more than 100 peak hour right turning vehicles either exist today or are forecast to exist by year 2030, separate queue jump lane and right turn lane are provided.

At locations where less than 100 right turning vehicles exist or are forecast to exist by 2030, the right turning vehicles are anticipated to share the queue jump lane with the transit vehicle. In either case, the transit vehicle will be provided an advanced green indication that includes a right turn arrow and transit indication. This will allow the transit vehicle to pass through the intersection in advance of the mixed flow vehicles. Table 9-1 summarizes all the recommended queue jump locations and the type of queue jump lane provided.

The selection of queue jump lane locations was based on several factors including forecast ridership, location of transit stop and parking impacts. Transit stops located on the far side of a signalized intersection were ranked higher over transi stops located on the near side of the intersection. Benefits of the queue jumps were evaluated in the VISSIM simulations. The VISSIM model assumed that all buses were granted advanced green when arriving at a red light. The results of the VISSIM simulation model run analysis indicate that there is an overall travel time saving along the corridor associated with the implementation of queue jumps and advanced green indications when implemented with the other elements of the Refined Concept Plan.

Table 9-1
Recommended Queue Jump Locations

Intersection		Type	BRT Stop?	Stop Location
Grape	Fourth	Shared	No	Farside
	Fifth	Shared		Farside
Juniper	Fifth	Shared	No	Farside
Laurel	Fourth	Separate	Yes	BRT Only – Farside
	Fifth	Separate		BRT Only - Farside
Upas	Fourth	Shared	Yes	Local - Farside BRT - Nearside
	Fifth	Separate		Local - Nearside BRT - Farside
Pennsylvania	Fifth	Separate	No	Farside

Although the simulation model assumed that all intersections were equipped with communication technology to notifiy the controller of the presence of transit, actual operations in the field will more than likely be far more restrictive. For example, a bus traveling ahead of schedule may not need to be provided advanced green. Details of the operations of the queue jumps and advanced green system should be explored in greater detail between MTS and City of San Diego during implementation of the Refined Concept Plan.

Bus Rapid Transit. The Refined Concept Plan includes the integration of Bus Rapid Transit to the existing transit service along the corridor based upon SANDAG's long-range plan. Route 640, which would traverse the Fourth and Fifth Avenue corridors, has been identified by SANDAG as the BRT service that would connect San Ysidro and Kearney Mesa. Further study will need to be conducted by SANDAG prior to design and implementation of the BRT guideway. However, when implemented, BRT is expected to improve frequency between buses by one to two minutes. This would result in a shorter wait time between buses and increased service along the corridor.

The bus rapid transit or BRT service would have only 7 stops in the study corridor. These stops, identified with a red star in Exhibit 9-1 would have special features such as next-bus signs, illuminates shelters and decorative benches, ticket machines and schedule information.

Details of the Bus Rapid Transit and other transit features can be located in Chapter 12 of this document (Transit Study).

<u>Parking</u>

Parking was one of the most controversial elements of the Refined Concept Plan. In order to increase on street parking in the study area, the capacity of each roadway would need to be reduced by at least one travel lane to accommodate diagonal parking.

In addition, the 2004 Concept Plan developed by KTU+A for the Uptown Partnership, Inc. included a mix of head-in angled parking and back-in angled parking. Although the back-in angled parking would benefit bicyclists and would be beneficial on steeply sloped roads and along Balboa Park, City of San Diego does not currently have a standard for the design of back-in angled parking.

Analysis of the operations of the study corridor showed that there is sufficient capacity to meet both the peak hour and daily traffic demands on Fourth, Fifth and Sixth Avenues particularly south of Upas Street. Evaluation of volume to capacity ratios and travel time show little change when comparing the two and three lane scenarios. Reducing the number of lanes provides an opportunity to increase parking by converting the parallel parking to diagonal parking.

Converting the parking on Fourth and Fifth Avenues from parallel to diagonal on one side of the street no only increases the number of parking spaces on most blocks, it also helps to slow traffic. Traffic speeds currently exceed the posted speed limit and the community has expressed a desire to improve the pedestrian environment on the corridor. The parking conversion would help achieve this goal. The diagonal parking should be provided on the side opposite the transit stops from Elm Street to Pennsylvania Street. Along Sixth Avenue, diagonal parking should be provided along the east side of the street, fronting Balboa Park, from Elm Street to Maple Street. North of Maple, parking should remain parallel in order to provide two northbound and one southbound lane.

In addition to the parking modifications along Fourth, Fifth and Sixth Avenues, side street improvements have been identified that convert parallel parking to diagonal parking. A total of 15 streets were identified to have curb-to-curb widths of 52 feet or wider:

Northern Corridor:

- Walnut Street

Central Corridor:

- Thorn Street
- Spruce Street
- Quince Street
- Palm Street
- Olive Street
- Nutmeg Street
- Maple Street

Southern Corridor

- Kalmia Street
- Juniper Street
- Ivy Street
- Hawthorn Street
- Grape Street
- Fir Street
- Elm Street

Based on City standards for collector roadways, diagonal parking can be provided on both sides of the street within the 52 foot curb-to-curb width. The typical diagonal parking design of is illustrated in Exhibit 9-6, as provided by City of San Diego for use in this project.

Coordination with emergency services revealed that providing angled parking along Fourth and Fifth Avenue may affect their ability to access buildings higher than 35 feet. According to the fire department, access from the street to buildings greater than 35 feet must be provided within 25 feet in order for the ladder to reach the upper floors of the building. Exhibit 9-9 illustrates existing buildings in the study corridor that are estimated to exceed 35 feet.

For such buildings, a minimum 25 foot horizontal distance should be provided along the major face (or widest) face of the building. Based on this requirement, 32 buildings may be affected by the proposed diagonal parking. Table 9-1 summarizes the buildings affected and potential solutions to resolving the distance issues.

In addition to resolving existing building issues, many buildings along Fourth and Fifth Avenue could be redeveloped prior to the implementation of this phase of the Refined Concept Plan. Therefore, conversion of parking should be re-evaluated on a block-by-block basis to ensure that fire requirements are met prior to re-striping the roadway. Red curb areas within the block or at the ends of the block could be provided along Fourth and Fifth Avenues to accommodate the emergency services requirements and allow for diagonal parking.

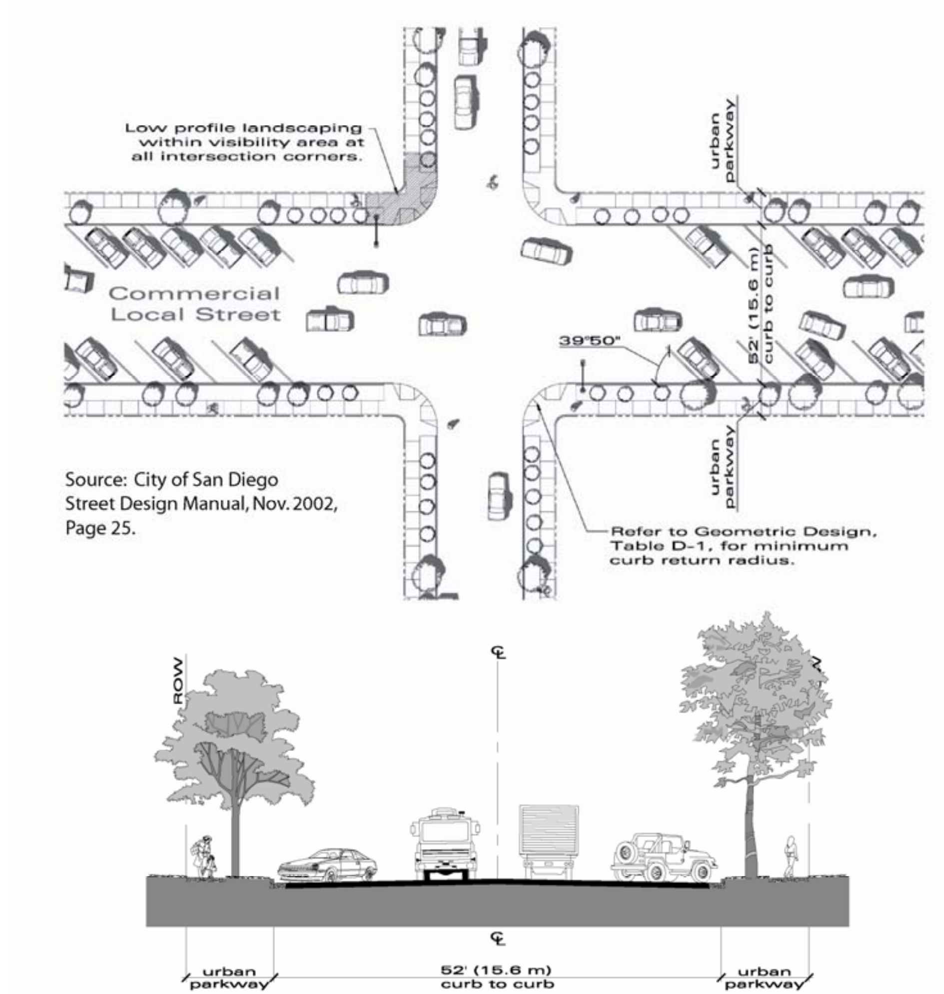


Exhibit 9-8
Side Street Diagonal Parking Cross-section
Source: City of San Diego

9.2 CROSS-SECTIONS

Cross-sections provide a street level view of the corridor that illustrate lane widths, lane utilization type and other key elements of the roadway that cannot be illustrated in a plan or overhead view. A total of six typical cross-sections illustrate the changes in design along Fourth, Fifth and Sixth Avenues with the Refined Concept Plan. Exhibit 9-9 illustrates the locations of the cross-sections. Typical cross-sections are illustrated in Exhibits 9-10 through 9-14.

Cross-section A, illustrated in Exhibit 9-9, provides an overview of the typical roadway segment along Fourth Avenue from Washington Street to Upas Street. Through this section two southbound lanes and a dedicated bicycle lane would be provided within the existing right-of-way. Parallel on-street parking would be allowed on both sides of the street.

Cross-section B, illustrated in Exhibit 9-10, provides an overview of the typical roadway section along Fifth Avenue from University Avenue to Pennsylvania Street. This is the only section in the study area where a transit priority lane is provided. In addition to the transit priority lane, two northbound mixed flow lanes are also provided. Parallel parking is provided on each side of the street. Bicycles will be allowed to share the transit priority lane.

Cross-section C, illustrated in Exhibit 9-11, provides an overview of the typical roadway section along Sixth Avenue from University Avenue to Upas Street. The typical section is identical to the existing conditions, however some intersections will be modified to included dedicated left turn pockets northbound and southbound. This modification will result in the loss of up to nine parking spaces on the west side of Sixth Avenue.

Cross-section D, illustrated in Exhibit 9-12, provides an overview of Fourth Avenue from Upas Street to Elm Street and Fifth Avenue from Pennsylvania Street to Elm Street. This section would provide for two through lanes, a dedicated bicycle lane, parallel parking on one side of the street and diagonal parking on the other.

Cross-section E, illustrated in Exhibit 9-13, provides an overview of Sixth Avenue from Upas Street to Maple Street. This section would provide for two northbound through lanes and one southbound through lane. A raised median is provided along with dedicated northbound left turn pockets at key intersections. Parallel parking is maintained on both sides of Sixth Avenue through this section.

Cross-section F, illustrated in Exhibit 9-14, provides an overview of Sixth Avenue from Maple Street to Elm Street. This section would provide for one northbound through lane and one southbound through lane. A raised median is provided along with dedicated northbound left turn pockets at key intersections. Diagonal parking is provided on the east side of the street and the existing parallel parking is maintained on the west side of the street. One traffic control option considered for two intersections (Grape Street and Juniper Street) is an urban roundabout. Further analysis and funding of this improvement will be necessary prior to implementation of the roundabout at these locations.

Exhibit 9-9
Cross-section Locations

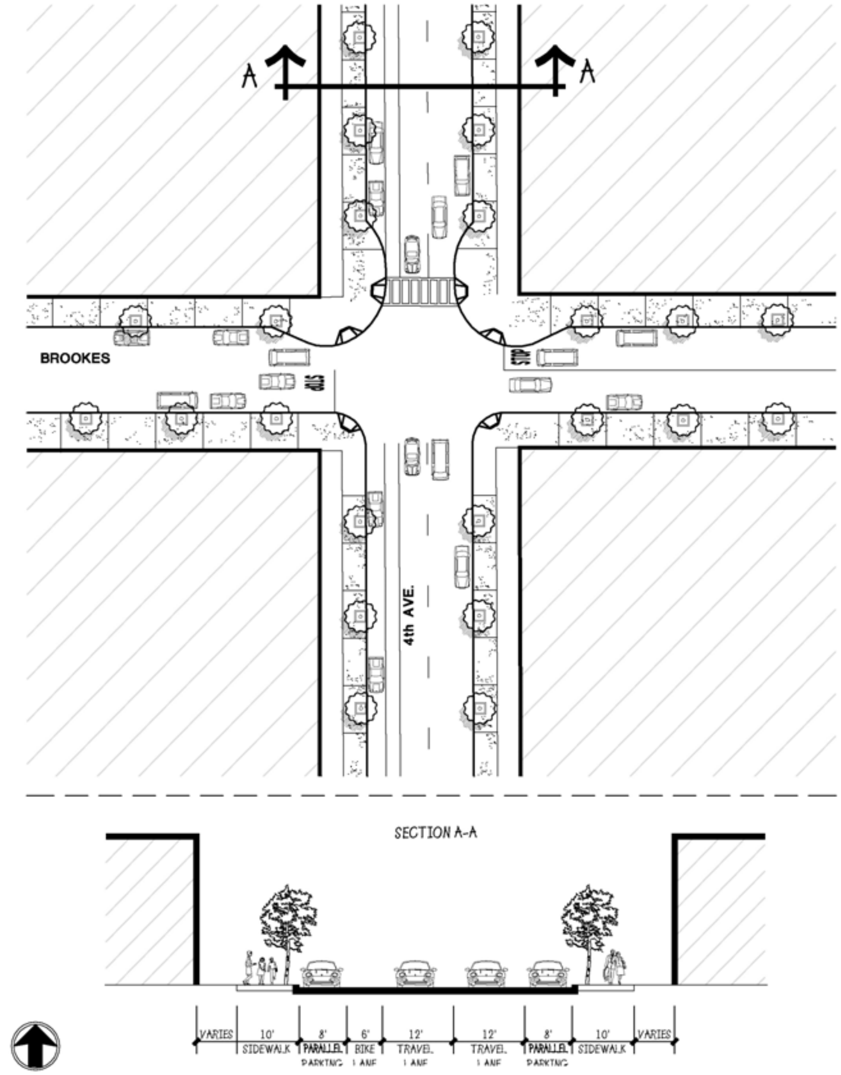


Exhibit 9-10
Cross-Section A-A
Fourth Avenue: Washington Street to Upas Street

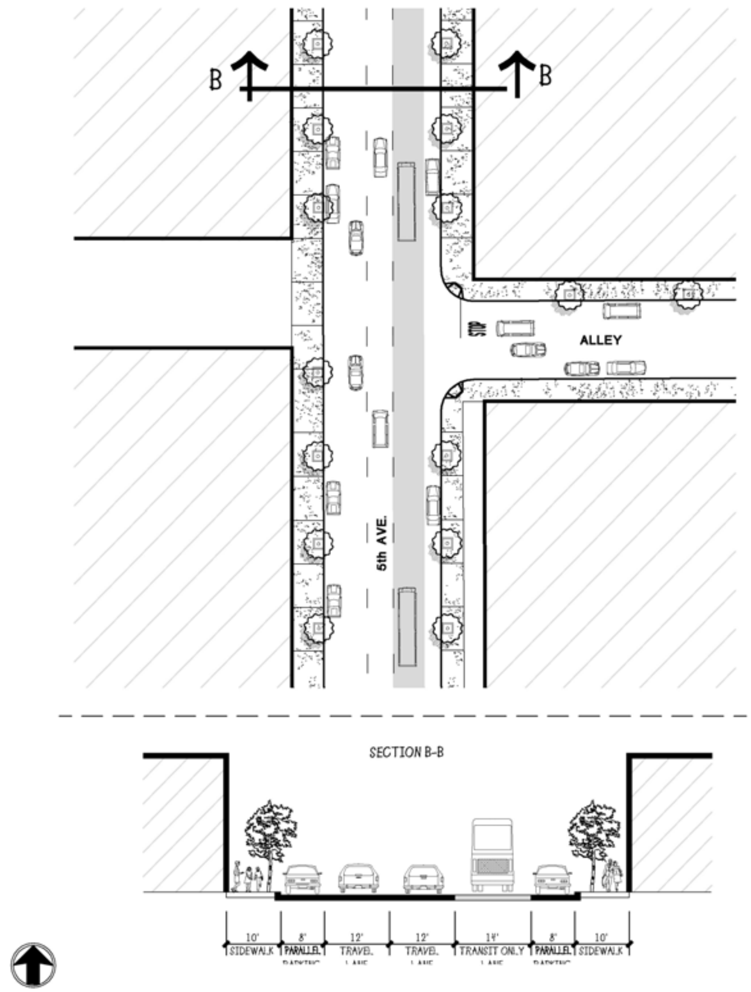


Exhibit 9-11
Cross-Section B-B
Fifth Avenue: Washington Street to Pennsylvania Street

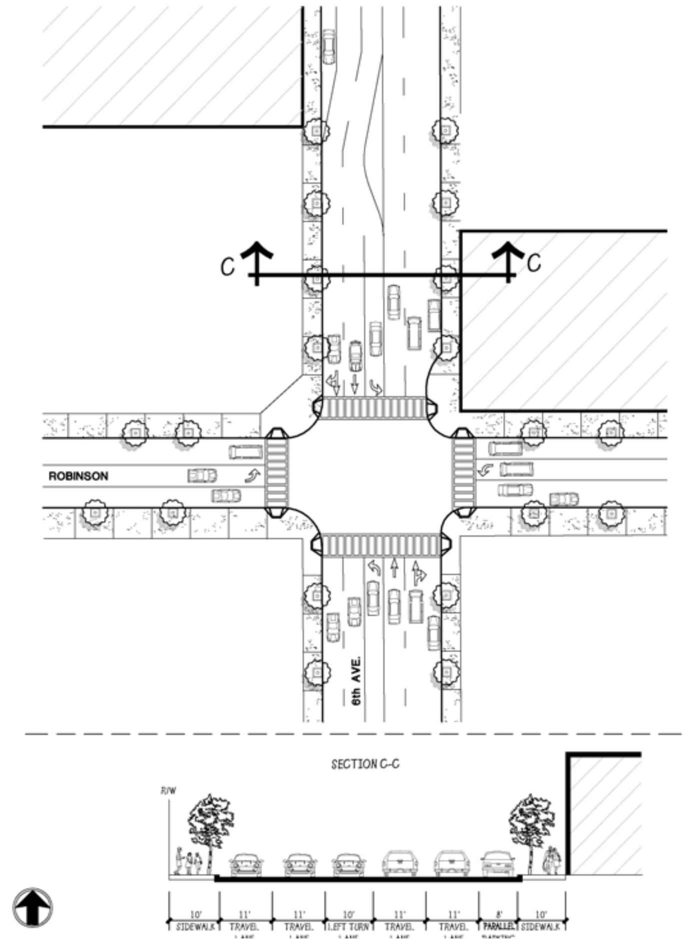


Exhibit 9-12
Cross-Section C-C
Sixth Avenue: Washington Street to Upas Street

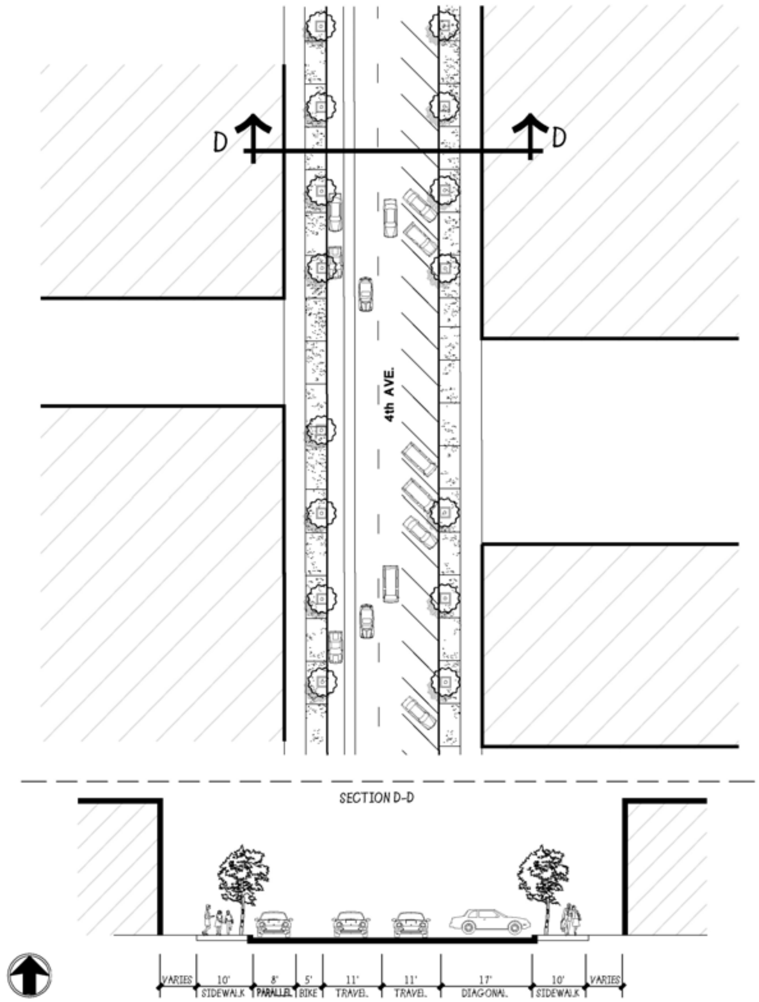


Exhibit 9-13
Cross-Section D-D
Fourth Avenue: Upas Street to Elm Street &
Fifth Avenue: Pennsylvania Street to Elm Street

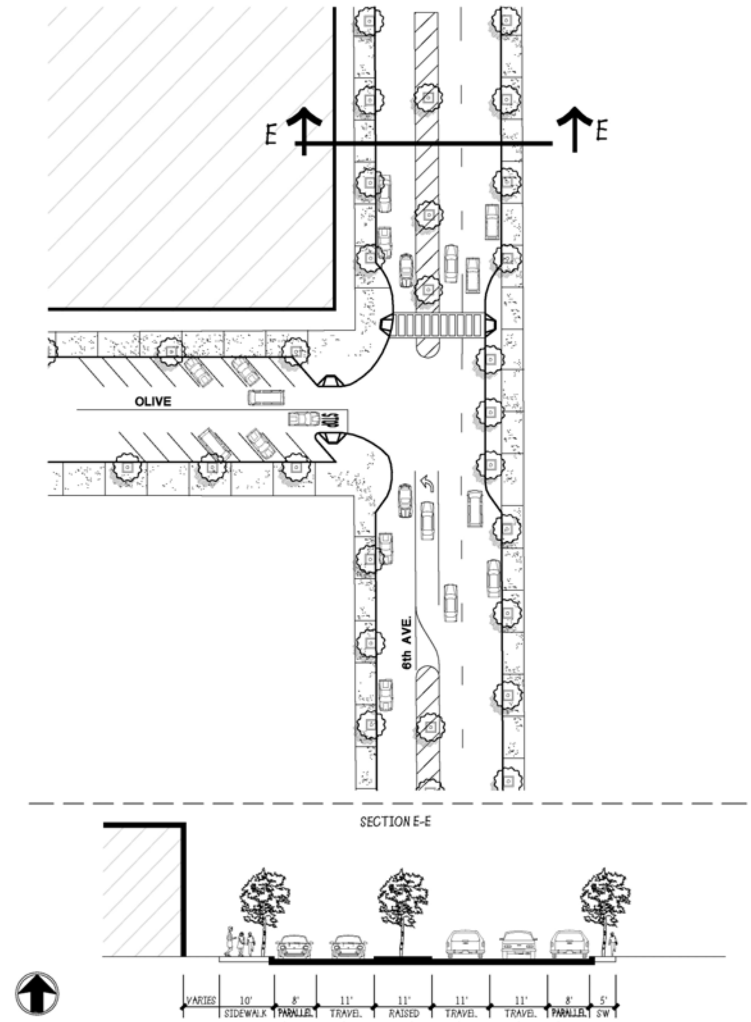


Exhibit 9-12
Cross-Section E-E
Sixth Avenue: Upas Street to Maple Street

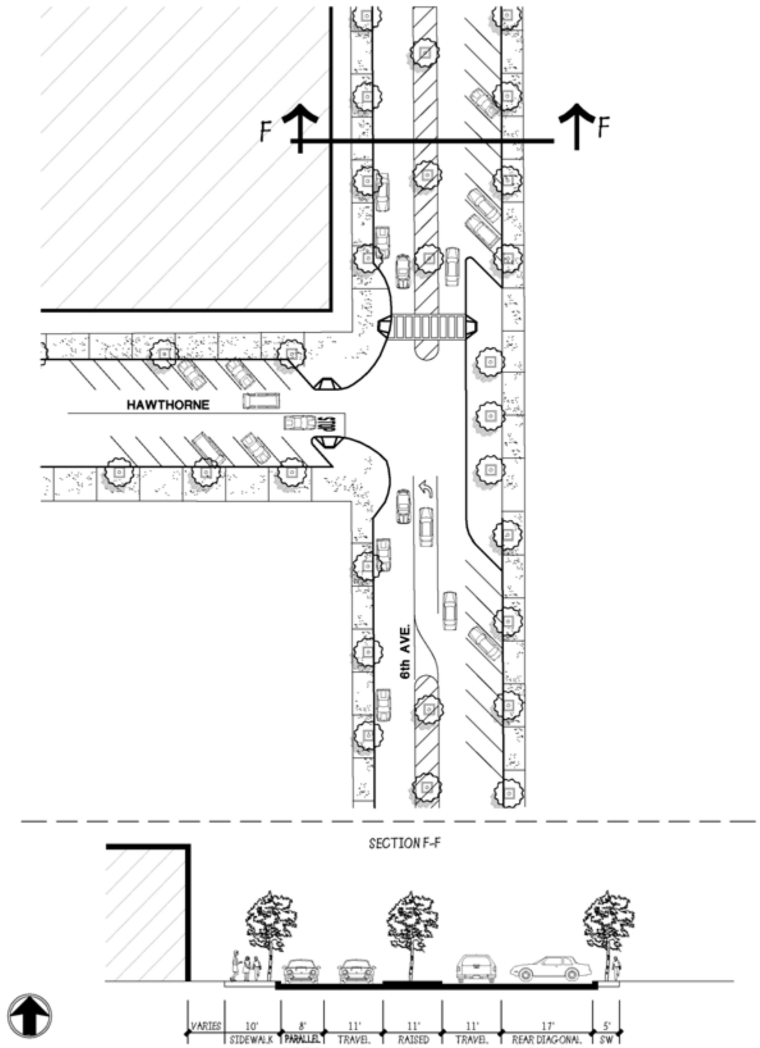


Exhibit 9-10
Cross-Section F-F
Sixth Avenue: Maple Street to Elm Street

9.3 TRAFFIC SIGNAL WARRANT ANALYSIS

Eight new traffic signals are included in the Refined Concept Plan:

- Fourth Avenue / Upas Street
- Fourth Avenue / Quince Street
- Fifth Avenue / Quince Street
- Fourth Avenue / Juniper Street
- Fifth Avenue / Juniper Street
- Sixth Avenue / Juniper Street
- Fifth Avenue / Grape Street
- Sixth Avenue / Grape Street

The locations of these traffic signals are based on intersection operating conditions, traffic signal warrant analysis and spacing. In some cases, the traffic signal warrant analysis shows that the volumes do not warrant a signal. However, it may be desirable to provide a signal to improve pedestrian access east-west to Balboa Park. This section summarizes the results of the traffic signal warrant analysis.

A traffic signal warrant analysis, based on the most recent Manual on Uniform Traffic Control Devices (MUTCD) – California Edition was conducted for each intersection to determine if the traffic signals are currently warranted or would be warranted by the year 2030.

The following traffic signal warrants were prepared:

Warrant 1: Eight-Hour Vehicular Volume. This warrant assesses two conditions during any eight-hour period of an average day: a.) the minimum vehicle volume of intersecting traffic at an intersection and b.) the interruption of continuous traffic between the major and minor street. A signal may be warranted for the first condition (a) where a large volume of intersecting traffic is present or for the second condition (b) if traffic on a minor street suffers excessive delay from traffic on the major street.

Warrant 2: Four-Hour Vehicular Volume. This warrant assesses signal warrant conditions based on the volume of intersecting traffic during any four hours of an average day. A signal may be warranted if the vehicle volumes meet the criteria provided in the MUTCD.

Warrant 3: Peak Hour. This warrant assesses signal warrant conditions based on the volume of intersecting traffic during a minimum of one hour of an average day. The peak hour warrant is typically applied in unusual cases, such as office complexes, or other locations which have high vehicle volumes during a short period of time. A signal may be warranted if the vehicle volumes meet the criteria provided in the MUTCD.

Warrant 6: Coordinated Signal System. This warrant for a coordinated signal system determines the need of installing traffic control signals at locations where they may not otherwise be needed for the purpose of maintaining efficient movement of traffic. This warrant is evaluated based on the distance from the nearest signal and operating conditions of the adjacent signals in moving traffic.

Warrant 8: Roadway Network. This warrant is based on the number of vehicles traveling through the intersection and must be located on a roadway serving a principal network, traveling through a city, or located as planned on an official plan, such as a major street plan in a transportation study. A signal may be warranted if the vehicle volumes meet the criteria provided in the MUTCD.

The traffic signal warrant worksheets are summarized in the Appendix at the conclusion of this report. Table 9-3 summarizes the results of the traffic signal warrant analysis.

Table 9-3
Traffic Signal Warrant Analysis

Intersection	Warrant				
	1	2	3	6	8
Fourth Ave / Upas St	X	X			
Fourth Ave / Quince St				X	
Fifth Ave / Quince St	X			X	
Fourth Ave / Juniper St					
Fifth Ave / Juniper St	X				X
Sixth Ave / Juniper St	X	X			
Fifth Ave / Grape St	X	X			
Sixth Ave / Grape St	X	X			

As shown, all of the intersections meet at least one of the five signals evaluated with the exception of Fourth Avenue at Juniper Street. Installing a traffic signals at this locations would improve side street access/level of service and provide continuous signal controlled pedestrian access along Juniper Street between Fourth Avenue and Balboa Park.

9.4 TRAFFIC CALMING

The existing traffic volumes and 2030 traffic volumes forecast for the study area show that there is sufficient capacity along most of Fourth and Fifth Avenues. In many cases the ratio of traffic volume to capacity is less than 60 percent. This indicates that even with the potential growth identified in the traffic model, the capacity along Fourth and Fifth Avenue will exceed the capacity needed to carry the traffic volume.

A result of the imbalance between traffic volume and available capacity is high speeds of traffic speeds along the corridors. In many cases, traffic speeds exceed this speed limit, which creates an environment that is not conducive to either walking or bicycling. In order to control traffic speeds, either the ratio of volume to capacity needs to increase. This occurs if traffic voumes increase or capacity is reduced. Since forecast 2030 volumes do not reveal a sharp increase in traffic volumes, it is reasonable to assume that a reduction in capacity could be supported along this corridor without negative impacts to parallel streets or highways.

Therefore, the element of traffic calming implemented with the Refined Concept Plan is the reduction in one lane of traffic on both Fourth and Fifth Avenue.

Studies have shown that traffic calming elements are most effective when more than one technique is implemented along a corridor. The City of San Diego Street Design Manual includes potential traffic calming measures, many of which are included in the Refined Concept Plan.

Traffic calming measures are intended to slow traffic, but not divert traffic to parallel routes when applied appropriately. All roads within the project study considered for traffic calming implementation are classified as either collector or local streets, both appropriate for traffic calming projects. Analysis of the alternatives revealed that the implementation of traffic calming throughout the study area would have minimal impact on the surrounding communities.

Traffic calming can provide for horizontal deflection, vertical deflection, and diversion of traffic or channelization of traffic. Traffic calming elements included in the Refined Concept Plan and supported by the City's Street Design Manual include:

- **Modifications to Parking (diagonal parking on one side of the street)** – To increase parking along the Fourth and Fifth Avenues, it is recommended that parallel parking on one side of the street be converted to diagonal parking. Such a conversion would result in a net increase in on-street parking and increase friction which will result in slower traffic speeds.

- **Curb Extensions** – Curb extensions reduce the exposure time for pedestrians along the travel way by extending the curb to the edge of the parking lane. The "neck" of the intersection is reduced from approximately 52 to 56 feet to approximately 28 feet, when coupled with conversion to diagonal parking.

- **Roundabouts** – The average speed through an urban roundabout is approximately 15 mph, which is an appropriate speed for sharing the travel way between bicycles and passenger vehicles. Without combining roundabouts with other traffic calming features, roundabouts are only effective at calming traffic near the intersection. Roundabouts are traffic control devices and can be used as part of a traffic calming plan, but should not be considered as a stand along traffic calming feature. In the Refined Concept Plan, the roundabouts considered at both Juniper Street and Grape Street along Sixth Avenue would be coupled with diagonal parking, reduced capacity (one lane in each direction), and a raised median.

- **Traffic Signals** – Much like the roundabout, traffic signals are not typically considered traffic calming devices, particularly when the side street volume is low. However, in high pedestrian volume areas, the installation of traffic signal coupled with other traffic calming features such as curb extensions and improved crosswalk marking helps pedestrian accessibility and can help to control speeds along roadways.

There are several other traffic calming features included in the City's Street Design Manual that were not included in the Refined Concept Plan such as raised crosswalks and pavement treatments. A brief overview of those features are included below:

Raised Crosswalks – Coupled with the curb extensions, raised crosswalks create a vertical deflection that slows traffic and makes drivers aware of pedestrian crossings. They also minimize the "step down distance" between the crosswalk and the curb. The City of San Diego will allow a maximum raised crosswalk height of 3.5 inches. These were not deployed in the study area due to the impact the raised crosswalks may have on emergency response times. Emergency services do not typically approve of vertical deflections such as raised crosswalks on collector roadways.

Pavement Treatments – Raised crosswalks and road humps are typically not supported by emergency services because such vehicles must slow down significantly to avoid damage, which increases response times. Pavement treatments at unsignalized intersections or midblock locations, which can integrate raised pavement markers or stamped concrete, can effective replace raised pavement crossings and road humps. Pavement treatments result in vibrations within the vehicle and an audible noise that indicate a change through the intersection. Such treatments make drivers aware of a change in conditions. Although this could be very effective in the northern portion of the study area where pedestrian traffic is highest, such treatments can be costly to maintain and are not fully supported by the street maintenance division.

9.5 RIGHT-OF-WAY NEEDS

All street improvements (signing, striping, parking and pop-outs) identified in the Refined Concept Plan can be accommodated within the existing curb-to-curb width. BRT Stations identified in the study corridor will have specially designed stations that may exceed the existing sidewalk width. Design of the BRT corridor may require the modification of right-of-way in some locations. Implementation of queue jumps and transit priority lanes would not affect existing right of way. Therefore, there are no anticipated impacts to right of way.

9.6 UTILITY RELOCATION

With the construction of new curb extensions, some of the existing utilities will need to be relocated as described below. A number of storm water curb inlets would need to be rebuilt to accommodate the new construction. Sewer manholes and water valve cans located in the areas of the new medians will also need adjustment to ultimate finish grade.

The addition and/or modification to the traffic signals may provide enough light based on City standards so that the existing street light can remain in place. The ultimate location of street lighting should be evaluated in final design. Adjustments to dry utilities (SDG&E, SBC, Cable) will be affected with the reconstruction of Fourth and Fifth Avenues associated with the proposed curb extensions. Changes in the vertical elevation of the roadway will require the tops of the affected utility boxes to be adjusted as well.

9.7 CONCLUSIONS

The Refined Concept Plan is a combination of traffic calming features aimed to reduce the speed of traffic along Fourth, Fifth, and Sixth Avenues. The goal of the Refined Concept Plan is to improve the balance of transportation modes along the corridor. Maintaining three through lanes on Fourth Avenue and Fifth Avenue would ensure that excess capacity would be provided for future development and for traffic passing through Uptown to get to and from downtown San Diego. But providing the excess capacity encourages higher traffic speeds.

By reducing the number of lanes and providing the traffic calming features identified, traffic will still flow through Uptown but at speeds more appropriate based on the land use and posted speed limits. The reduction in lanes will result in an overall increase the available parking by converting from parallel to diagonal parking. The reduction in lanes will result in minimal diversion of traffic and pass-through traffic from downtown may be significantly reduced. Overall, the pedestrian and bicycle environment will be greatly enhanced. Bicycle lanes will be provided on Fourth and Fifth Avenue. Pedestrian crossing distances will be reduced by nearly half the existing crossing distance. New traffic signals and/or enhanced pedestrian crosswalks will improve the east-west accessibility through Uptown.

The elements of the Refined Concept Plan identified in this chapter meet the City's design standards and have been discussed with emergency services. Although refinements may be necessary to meet all emergency services requirements, the elements of the plan can be designed to meet City standards. The following chapters outline the costs for the Refined Concept Plan and the Implementation Plan.

Chapter 10: Cost Estimates

10.0 OVERVIEW

This chapter focuses on the probable costs for constructing the improvements identified in the Refined Concept Plan. Cost estimates have been prepared in accordance with City of San Diego Cost Estimating guidelines. In addition to estimating the cost to construct the improvement, environmental costs, design costs, construction costs, administrative costs and other project related costs have been estimated as a percentage of the total construction costs.

Proposed improvements along the corridor can be broken into four categories:

- Pedestrian Improvements
- Roadway Improvements
- Parking Improvements
- Transit Improvements

Each of these four categories incorporates several elements of the design included in the Refined Concept Plan. Bicycle improvements included in the plan are integrated into the Roadway Improvements category (ie. striping and signing of bicycle lanes).

Table 10-1 summarizes the probable costs for the design, construction and administrative costs associated with the project, in year 2008 dollars. Detailed cost estimates are provided as a appendix to this report. Cost estimates provided in this report reflect the estimates reviewed by City of San Diego engineering staff and are based on 2008 cost estimating guidelines, which includes construction related additions, design, and administrative costs.

Construction additions and other additions account for contingencies, field orders, environmental, design and administrative costs based on City of San Diego unit costs for preparing cost estimates. As shown in the table, these overhead costs account for a markup of over 96% of the proposed construction costs. The percentages used in this analysis are consistent with City of San Diego's requirements for estimating probable costs. A description of each of these items is provided below. Percentages provided are the percentage of the total construction cost allocated to each additional cost identified.

- Mobilization is a construction related cost (2%). It is the fee the contractor will charge to the City to get the necessary equipment on-site to do the identified work. Four percent of the probable cost has been included in the estimate to account for mobilization.

- Contingency is a construction related cost (25%). It is a buffer that will offset change in unit costs and quantities as the process transitions from conceptual design to final engineering design. It accounts for elements of the project that are uncovered in final design cannot reasonably be identified in the conceptual design phase.

- **Bond Costs are a construction related cost (2%).** These are the costs associated with bonding for the individual projects.

- **Field Orders are a construction related cost (5%).** It accounts for changes in the field that are necessary to address issues that arise in the field during construction of the project.

- **Design is an additional, non-construction related cost (25%).** It relates to costs associated with final design engineering.

- **Adminstrative cost is an additional, non-construction related cost (25%).** This is the cost associated with plan check fees, inspection services, contract administration and other city related services.

- **Environmental cost is an additional, non-construction related cost (15%).** It relates to the costs associated with preparing and processing the necessary environmental documents for the project. This includes the processing of environmental permits and coordination with the environmental protection agencies.

Table 10-1
Estimate of Probable Costs

	North	Central	South	Construction Cost	Construction Additions 34%	Other Additions 65%	Total
Pedestrian Improvements							
4th Avenue	$491,833	$501,598	$685,547	$1,678,977			
5th Avenue	$472,327	$700,449	$685,862	$1,858,638			
6th Avenue	$177,651	$693,696	$564,196	$1,435,542			
Total Pedestrian Improvements				$4,973,157	$1,690,873	$3,232,552	$9,896,582
Transit Improvements							
4th Avenue	$12,600	$26,350	$24,450	$63,400			
5th Avenue	$13,750	$30,750	$30,850	$75,350			
Total Transit Improvements				$138,750	$47,175	$90,188	$276,113
Roadway Improvements							
4th Avenue	$441,235	$1,031,162	$705,700	$2,178,097			
5th Avenue	$383,149	$556,977	$410,705	$1,350,831			
6th Avenue	$22,245	$572,955	$1,770,368	$2,365,568			
Total Roadway Improvements				$5,894,496	$2,004,129	$3,831,422	$11,730,047
Parking Improvements							
4th Avenue	$4,700	$56,600	$42,150	$103,450			
5th Avenue	$18,000	$50,000	$49,750	$117,750			
6th Avenue	$0	$0	$22,250	$22,250			
Total Parking Improvements				$243,450	$82,773	$158,243	$484,466
Total Corridor Improvements				$11,249,853	$3,824,950	$7,312,404	$22,387,207

10.1 Pedestrian Improvements

Pedestrian improvements in the Refined Concept Plan include pedestrian pop-outs (curb extensions), enhanced crosswalks, pedestrian ramps, pedestrian push buttons and count down signal timers.

ADA pedestrian ramps with truncated domes would be constructed at all intersections where existing pedestrian ramps are not provided. This includes all unsignalized crossing locations. All existing pedestrian ramps should also be modified to the truncated dome design. Breaks in the median would be provided at all unsignalized pedestrian crossings along Sixth Avenue. Therefore, pedestrians would not be required to step up onto the median, but would cross at-grade.

To meet the needs of visually impaired and hearing impaired residents and visitors to the study area, the cost estimate includes audible and countdown technology at each existing and proposed signalized intersection. The estimate of probable cost includes the installation of these systems at all signalized intersections along the corridor. However, not all signalized intersections may be recommended for audible pedestrian signals. Determination of these locations would be done in consultation with the City's Disabilities Services section during the design phase of the project.

Table 10-2 summarizes the probable costs associated with the proposed pedestrian improvements.

Table 10-2
Unit Costs for Pedestrian Improvements

DESCRIPTION	UNITS	UNIT PRICE
Bulbouts - standard[1]		
-Type I	EA	$16,080.00
-Type II	EA	$14,993.00
-Type III	EA	$23,119.00
Bulbouts - challenging[2]		
-Type I	EA	$16,080.00
-Type II	EA	$14,993.00
-Type III	EA	$23,119.00
Pedestrian ramps	EA	$2,500.00
Crosswalks (painted)	LF	$0.65
Crosswalks (lighted)	LF	$35,000.00
Pedestrian push button poles	EA	$5,000.00
Count down timers	EA	$2,000.00

10.2 Transit Improvements

The Refined Concept Plan focuses on several transit improvements:

- Transit Only Lane
- Consolidation or Removal of Transit Stops
- Implementation of Transit Signal Priority Technology and Queue Jumps
- Integration of Bus Rapid Transit Technology
- Enhanced Standard and BRT Transit Stops

At all proposed transit stops, a sign, seating, trash receptacle, concrete bus pad and paved waiting area will be provided. New transit shelters will be constructed at all locations. Design of these shelters will be determined based on the streetscape design for the corridor that will be determined in later design phases of the project.

Table 10-3 summarizes the estimate of probable costs associated with the planned transit improvements along the corridor.

Table 10-3
Unit Cost for Transit Improvements

DESCRIPTION	UNITS	UNIT PRICE
Queue jump lanes		
- Type I (separate right turn)	EA	$2,200.00
- Type II (shared right turn)	EA	$1,150.00
Stop Removal	EA	$1.00
Stop Relocation	EA	$1.00
Stop Enhancements(3)		
-Type I	EA	$1.00
-Type II	EA	$1.00
-Type III	EA	$1.00
Concrete Bus Pad	EA	$6,300.00

A major component of the transit design is the operation of the transit signal priority (TSP) system along the corridor. This system would give priority to transit vehicles at signalized intersections, when the transit vehicle is running behind schedule. A TSP system would require a central control system and transit operation system. The central control system links all the traffic signals to the traffic operations system. The traffic operations system tells the traffic signals what to do when a signal is received from the bus. Since the TSP affects the operations of the traffic signal, it should be located at and operated by the City of San Diego. This would involve linking the communication system to a central computer located within a designated space (Traffic Control System Center) at the City of San Diego offices.

Each bus would require the necessary hardware to send a signal to the traffic signal controller. Typically, this involves mounting a device on the front of the transit vehicle that would most likely be automated, but could be activated by the transit operator, if a manual system is selected. Each traffic signal would be equipped with receiving devices, typically mounted on the mast arm that would receive the transmitted signal.

In addition to the installation of equipment, a team of traffic engineers would also need to be trained to use the system and technicians would need to be trained to maintain the system. Cost for training staff or allocation of space for the system is not included in this cost. The system would not require a dedicated room, but would require a minimum of one designated computer and monitor for monitoring the system.

10.3 Parking Improvements

Through the commercial core of Hillcrest and throughout much of the study area, an increase in parking is necessary to meet the current and future demands. Pedestrian improvements such as pop-outs may result in the loss of one to two parking spaces on each block depending upon the placement and size of the pop-out. To both offset the reduction in parking due to the pop-outs and to meet the existing demand for increased parking, the Refined Concept Plan includes the conversion of parallel parking to diagonal parking. This occurs on Fourth, Fifth and Sixth Avenue as well as along the east-west streets where the distance from curb-to-curb is sufficient to meet City design standards. Conversion of parallel to diagonal parking is recommended on streets with a minimum cross-section width of 52 feet curb-to-curb.

Conversion from parallel to diagonal parking will require the relocation of some existing parking meters, restriping of loading areas, and installation of new parking meters and signs. Table 10-4 summarizes the unit costs associated with potential parking improvements.

Table 10-4
Unit Cost for Parking Improvements

DESCRIPTION	UNITS	UNIT PRICE
New Meters	EA	$250.00
Meter Removal / Relocation	EA	$100.00

10.4 Roadway Improvements

Roadway improvements include all physical modifications such as construction of medians, striping modifications (including parking), bicycle lanes, drainage improvements for pop-outs and traffic signals.

Table 10-5 summarizes the unit costs associated with the proposed roadway improvements included in the Refined Concept Plan.

Table 10-5
Unit Costs for Roadway Improvements

DESCRIPTION	UNITS	UNIT PRICE
Pavement (grind/overlay)- challenging int.	SF	$1.50
Striping Removal	LF	$3.00
Raised Median Removal	SF	$7.00
Signage	EA	$150.00
Striping		
-lanes (yellow stripe)	LF	$0.65
-bike lanes (yellow stripe)	LF	$0.65
-parking (white stripe)	LF	$0.65
Raised medians (curb, gutter)	LF	$20.00
Raised medians (curb, gutter, irrigation)	SF	$22.00
Concrete Driveway	SF	$7.00
Roundabout	EA	$600,000.00
Roadway Drainage Improvements[(4)]	EA	$100,000.00
Traffic Signal	EA	$160,000.00

10.5 Streetscape Improvements

Although not included as part of the Hillcrest Corridor Mobility Study, streetscape improvements will be necessary in future phases of this project to enhance both the pedestrian character of the corridor and to enhance the traffic calming affects of the proposed improvements. Costs associated with such improvements will be identified in future phases of this project. Elements of the streetscape plan should include:

- Signage
- Lighting
- Themed Transit Shelters
- Themed Street Furniture

10.6 Summary

The Refined Concept Plan includes many features that will most likely be implemented over a several years. The costs summarized in this chapter are based on 2008 construction cost estimating practices as outlined by City of San Diego. Refinements to the cost estimates will be made as the project proceeds through the environmental and design stages. The next steps of the project are outlined in Chapter 11 of this report.

Chapter 11: Implementation Plan

11.0 OVERVIEW

This chapter focuses on the establishing the next phase of the Hillcrest Corridor Mobility Strategy, implementation planning for the changes proposed in the Refined Concept Plan and identification of potential funding sources. The next steps to develop the Refined Concept Strategy include:

- Coordination with Emergency Services & MTS
- Continued public outreach,
- Environmental documentation,
- Grant funding pursuits,
- Final design, and
- Construction.

It is possible that the improvements identified would qualify for federal grant funding. If such funding were granted to the corridor, additional environmental studies under National Environmental Protection Act (NEPA) may also be required in addition to the steps identified above. Therefore, moving forward with design and implementation of the changes proposed as part of the Refined Concept Plan would not occur for several years.

11.1 NEXT STEPS

The future of this project will be dependant upon the results of the upcoming Uptown Community Plan Update and the certification of the associated Environmental Impact Report. During the preparation of the Uptown Community Plan Update, elements of the Refined Concept Plan may be further refined, added to, or eliminated as part of the new community plan Mobility Element. Regardless of the elements of the Refined Concept Plan, corridor improvements will need to go through the following steps before implementation can occur.

Coordination with Emergency Services

The Refined Concept Plan was reviewed by Emergency Services as part of the alternatives analysis process. Several comments were received. Not all issues identified were resolved when this project was completed. Therefore, additional coordination with Emergency Services will be required. Key issues will include the raised median on Sixth Avenue and diagonal parking on Fourth and Fifth Avenues.

Environmental Documentation and Continued Public Outreach

Because the Refined Concept Plan would reduce the number of travel lanes of Fourth, Fifth, and Sixth Avenues, it will trigger a Community Plan update and the associated environmental clearance. Several factors will be determined as part of the Community Plan Update that will lead to the decision to process the project with an Environmental Impact Report (EIR) or Mitigated Negative Declaration (MND).

This step will occur as part of the Uptown Community Plan Update. Integration of the Refined Concept Plan into the Community Plan Update also would trigger an addition of the project elements and implementation plan into the City's Capital Improvement Program (CIP).

Project Funding

Following City Council approval of the Community Plan Update, certification of the EIR, and integration of projects into the CIP, the staff would ask the City Council to authorize applications for any grant funding relating to final design and construction.

To complete this process, the City will need to allocate staff and financial resources. This process will include a fully-funded plan for maintenance of all special features including medians, landscaping, signage, and similar items. Once financial resources are allocated to implementing this project, the environmental documentation and Community Plan Update process probably will take two to three years to complete.

Final Design

The concepts presented in this report must be reviewed by the City's Engineering and Capital Projects Department, Fire and Rescue Department and others for feasibility prior to implementation and formal recommendation from the community groups. After this initial review, the City would prepare final design plans. The final design process and development of construction documents will use the Refined Concept Plan, as incorporated into the Community Plan Update process

If all the project impacts cannot be identified during the Community Plan Update or if a significant amount of time elapses between the Update and final design, the City will prepare a second environmental document in conjunction with the final design work.

Construction

The goal of the implementation plan is to schedule capital improvement projects in an efficient manner so that construction in each area occurs only once. Implementation would start with basic striping improvements, which will demonstrate the effectiveness of the proposed traffic calming measures and minimize the initial cost of improvements.

Drainage improvements will be necessary at all intersections where pop-outs are proposed. Due to the existing elevation of some curbs relative to the elevation of the street, some locations will have more challenging drainage-related issues. Those more challenging locations should be dealt with on a case-by-case basis and likely would be constructed during the long-term phase. The design of pop-outs and the timing of the construction will be more cost effective and desirable when a developer installs frontage improvements or when the City of San Diego constructs other CIP projects in the area.

Traffic signals and roundabouts are included in the long-term phase and will be dependant upon meeting traffic signal warrants and available funding. Roundabouts will laterally deflect to slow traffic flow, but should be designed to accommodate the forecasted traffic demand.

11.2 IMPLEMENTATION PROGRAM

The implementation plan phases the construction of the Refined Concept Plan into short-term, medium-term and long-term improvements. Short-term improvements focus on implementing signing and striping improvements, allowing the City to evaluate the operations of the lane changes for the corridor. Following the assessment of the operations and the identification of funding sources, the City may begin constructing medium-term improvements that focus on integrating curb upgrades to the corridor. This phase will allow for landscaping and streetscape improvements that compliment the changes in lane configurations and parking. Improvements identified in long-term phase are primarily those improvements identified in the Refined Concept Plan that are likely to be the most expensive and challenging to construct. Any of these improvements identified in the long-term phase could move to an early phase of development if funding becomes available through development fees, conditions of approval for future projects, or grants.

Cost estimates included in this implementation plan include construction costs, design costs (35% of estimated construction costs) and administrative costs (20% of construction costs). Additional costs for environmental documentation and contingency, as outlined in Chapter 10, are included in the cost estimates presented in this implementation plan. Cost estimates do not include environmental mitigation or right-of-way acquisition. Based on this concept study, the roundabouts on Sixth Avenue might need additional right-of-way along with BRT improvements planned for Fourth and Fifth Avenues.

Estimated time lines for short-term, medium-term and long-term are based on the update of the Community Plan to be completed by Spring 2011.

Based on the anticipated 2011 completion date of the Uptown Community Plan Update. Assuming the environmental clearance for the Refined Concept Plan is obtained as part of the Community Plan Update, the following implementation schedule is proposed:

- Complete immediate improvements before the adoption of the Community Plan Update.
- Complete short-term improvements within a year after Plan Update adoption.
- Complete moderate-term improvements completed within five years of Plan Update adoption.
- Complete long-term improvements after completing medium-term improvements unless special funding is realized.

At the time this report was prepared, no funds had been allocated to improvements along this corridor. Therefore, the implementation plan is a guide for prioritizing elements of the plan. The timing of some improvements may change due to available funds, development driven funding and CIP projects that develop along the corridor.

Immediate Improvements

City of San Diego Traffic Engineering division will review the Refined Concept Plan to determine if improvements in the plan can be completed prior to the Community Plan update. These improvements will focus on current safety and traffic operation concerns within the community. Examples of immediate improvements include flashing or enhanced crosswalks, striping improvements to provide left turn pockets on Sixth Avenue north of Upas, and count-down timers at existing signalized intersections.

It is possible that these improvements could be funded by Annual Capital Improvement Program allocations.

Short-Term Improvements (within a year after adoption of the Community Plan Update)

Short-term improvements include restriping Fourth, Fifth, and Sixth Avenues to reflect the proposed Refined Concept Plan. Following the implementation of the short-term improvements, the City may conduct travel time studies and analyze levels of service. The City also may conduct meetings with community organizations to evaluate the effects of the changes on the community.

Phase S1-a: Sixth Avenue Improvements (Northern Corridor)

- Restripe intersections and modify parking from University Avenue to Upas Street.

Potential Funding Source: Grant Funding and/or City General Fund

Estimated cost: $25,000 – $35,000

Phase S1-b: Sixth Avenue Improvements (Central Corridor)

- Stripe medians
- Restripe to include dedicated turn lanes at intersections, two northbound lanes, one southbound lane and parallel parking

Potential Funding Source: Grant Funding and/or City General Fund

Estimated cost: $32,000 - $50,000

Phase S1-c: Sixth Avenue Improvements (Southern Corridor)

- Stripe medians
- Restripe to include dedicated turn lanes at intersections, one northbound through lane, one southbound through lane and back-in angled parking.

Potential Funding Source: Grant Funding and/or City General Fund

Estimated cost: $40,000 – 50,000

Phase S1-d: Striping Improvements (Fourth & Fifth Avenue)

- Restripe Fourth Avenue from Walnut to Elm for 2 lanes, bicycle lane & angled parking. Stripe queue jumps at identified intersections.

- o Restripe Fifth Avenue from University Avenue to Pennsylvania for 2 lanes and transit lane.
- o Restripe Fifth Avenue from Pennsylvania to Elm for 2 lanes, bicycle lane & angled parking. Stripe queue jumps at identified intersections.
- o Relocate/remove transit stops.
- o Stripe queue jump lanes

Potential Funding Source: Grant Funding and/or City General Fund
Estimated cost: $300,000 - $320,000

Medium Term Improvements (three to eight years after adoption of the Communtiy Plan Update)

Following the assessment of traffic operations in the short-term, medium-term improvements should be initiated. Medium-term improvements include hardscape improvements including the median on Sixth Avenue and pop-outs on all three corridors.

Phase M-1: Construct Median on Sixth Avenue
Construction of median within the striped areas installed in Phase I of the project. Median improvements will occur in the central and southern portions of the corridor.

Potential Funding Source: Development Fees, Grant Funds
Estimated cost: $800,000 - $900,000

Phase M-2: Construct "Non-Challenging" Pop-outs
Non-challenging pop-outs are located at intersections where the existing curb is a standard height above the edge of the travel way. Drainage improvements at such locations are fairly standard and would not require major modifications to either the existing sidewalk or crown of the road.

Phase M-2a: Northern Area - Fourth, Fifth, Sixth Avenue
- o Construct pop-outs
- o Drainage improvements
- o Transit stop enhancements including bus pads

Potential Funding Source: Development Fees, Grant Funds
Estimated cost: $180,000 – $200,000

Phase M-2b: Central Area - Fourth, Fifth, Sixth Avenue
- o Construct pop-outs
- o Drainage improvements
- o Transit stop enhancements including bus pads

Potential Funding Source: Development Fees, Grant Funds
Estimated cost: $1,000,000 - $1,200,000

Phase M-2c: Southern Area - Fourth, Fifth, Sixth Avenue
- o Construct pop-outs
- o Drainage improvements
- o Transit stop enhancements including bus pads

Potential Funding Source: Development Fees, Grant Funds
Estimated cost: $150,000 - $175,000

Phase M-3: Installation of "Themed Bus Stops" & Transit Stop Enhancements

Installation of bus shelters, bus pads and transit stop enhancements at locations where pop-outs are not recommended.

Potential Funding Source: Development Fees, Grant Funds
Estimated cost: $175,000 – $250,000

Long Term Improvements (more than eight years after adoption of the Communtiy Plan Update

Improvements identified as long-term are estimated to be the most expensive. If funding for such improvements becomes available, then many of these improvements could be moved to the medium term.

Phase L-1: Construct "Challenging" Pop-outs (Fourth, Fifth, Sixth Avenues)

Solutions to challenging pop-out locations will be identified on a case-by-case bases. Pop-outs at challenging locations will be constructed as funding for such locations becomes available.

Potential Funding Source: City CIP Projects, Development Fees
Estimated cost: To be determined based on individual drainage improvement projects. ($6-$7M)

Phase L-2: Construct Roundabouts on Sixth Avenue

Potential Funding Source: City CIP Projects, Development Fees
Estimated cost: $750,000 - $1,000,000 per location (2 proposed)

Phase L-3: New Traffic Signals

New traffic signals may be installed along the corridor pending the approval of the City Traffic Engineering department. Decisions to install traffic signals will be based upon operating conditions and ability for the intersection to meet traffic signal warrants. Traffic signal warrants are a set of thresholds that should be evaluated to determine if the conditions at the intersection are such that a traffic signal would be beneficial and provide the appropriate traffic control.

Potential Funding Source: Development Fees, City Traffic Signal Fee Program
Estimated cost: $175,000 - $250,000 per intersection (8 new traffic signals)

Phase L-4: Implementation of BRT (dependant upon SANDAG)

11.3 FUNDING SOURCES

At the time this report was prepared, funding for the proposed improvements had not been identified. City of San Diego and SANDAG, along with the Uptown Partnership, have been successful at acquiring grant funding for the previous study stages of this project. In order to move the project forward, additional grant funding along with possible local matching funds will be needed. This section of the report focuses on the potential funding sources available for the improvements identified in the Refined Concept Plan and listed above in section 11.2 of this the implementation plan.

This section provides a list of potential funding resources in five main categories: Local/Regional (L), State (S), Federal (F), and Private/Non-Profit (P), as summarized in Table 11-1.

11.4 CONCLUSION

Due to the schedule of the Community Plan Update, it is reasonable to assume that the improvements identified in the Refined Concept Plan would not begin to be realized until after 2011. However, immediate traffic safety improvements that do not affect the classification of the corridors could be implemented in the immediate future. The costs of implementing the improvements identified in this plan are not currently earmarked by City of San Diego. It is reasonable to assume that the majority of these improvements will be made through grant funds. As time passes, funding sources may vary. Therefore, city staff should continue to monitor available programs over the coming years and prepare the necessary plans to acquire funding for this project. Wherever possible, future development projects and CIP projects should integrate the concepts identified in this plan to help offset implementation costs realized by the City.

Table 11-1 Potential Financing Mechanisms
Federal (F)
1. Federal Economic Development Administration (EDA) The Federal Economic Development Administration (EDA) is a potential source of grant money for the Hillcrest Mobility Plan. Funds from the EDA can be used to finance construction and rehabilitation of infrastructure and facilities that are necessary to achieve long-term growth and dynamic local economies. Grants to communities for site preparation and construction of water and sewer facilities, access roads, etc.
2. Department of Housing and Urban Development (HUD): Community Development Block Grants (CDBG) Provides partial funding for public infrastructure to support industrial and business expansion. Also downtown revitalization projects, low-income housing, physical infrastructure, low-income jobs, and reduction of blight. Projects must benefit low and moderate income households.
3. U.S. Federal Highway Administration (FHWA) Transportation & Community and System Preservation Pilot Program (TCSP) Comprehensive initiative of research and grants to investigate the relationships between transportation and community and system preservation and private sector-based initiatives. States, local governments, and metropolitan planning organizations are eligible for these discretionary grants. Grants to plan and implement strategies that improve the efficiency of the transportation system; reduce environmental impacts of transportation; reduce the need for costly future public infrastructure investments; ensure efficient access to jobs, services, and centers of trade; and examine private sector development patterns and investments that support these goals.
4. Federal Highway Administration Department of Transportation (DOT) Provides funds to the States to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses.
5. The Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA) SAFETEA is the third iteration of the transportation vision established by Congress in 1991 with the Inter-modal Surface Transportation Efficiency Act (ISTEA) and renewed in 1998 through the Transportation Equity Act for the 21st Century (TEA-21). Also known as the Federal Transportation bill, the $286.5 million SAFETEA bill was passed in 2005. SAFETEA funding will be administered through the state (Caltrans or Resources Agency) and regional planning agencies (OCCOG or

Table 11-1 Potential Financing Mechanisms
OCTA). Most, but not all, of the funding programs are oriented toward transportation versus recreation, with an emphasis on reducing auto trips and providing inter-modal connections. Funding criteria often includes completion and adoption of a bicycle master plan, quantification of the costs and benefits of the system (such as saved vehicle trips and reduced air pollution), proof of public involvement and support, CEQA compliance, and commitment of some local resources. In most cases, SAFETEA provides matching grants of 80 to 90 percent--but prefers to leverage other monies at a lower rate.
6. Transportation Efficiency Act for the 21st Century (H.R. 2400) TEA-21 gives local governments unprecedented flexibility in developing a mix of highway corridor enhancements, with funds for such projects as public transit, bikeways, highway enhancements, recreation, historic preservation, scenic byways, and other alternatives to address transportation and community needs. Contact source for funding amounts. States and localities are permitted to use federal dollars (provided primarily from the gas tax) for more flexibly to meet their transportation needs. More comprehensive planning, taking into account such factors as desired land use patterns and environmental effects, is required as a prerequisite to federal funding.
7. FTA Metropolitan Planning Program Operated by the Federal Transit Administration (FTA), this program provides financial assistance, through the states, to Metropolitan Planning Organizations (MPO) to support the costs of preparing long-range transportation plans required as a condition of obtaining Federal Capital Program and Urbanized Area Formula Program grants for transit projects. Funds can be used for technical studies relating to management, operations, capital requirements, innovative financing opportunities, and economic feasibility; evaluation of previously assisted projects; and other similar or related activities preliminary to and in preparation for the construction, acquisition or improved operation of transportation systems, facilities and equipment including the planning for "livability" features such as improved pedestrian and bicycle access to the station and shops and community services in the station area, incorporating arts and artistic design in stations and surrounding areas, and other improvements that enhance the usability and community-friendliness of the transit system environment. Up to a maximum of 20 percent of the preliminary engineering and design costs for a transportation facility. NOTE: This is a Planning program, not for construction
8. Congestion Mitigation and Air Quality Improvement Program Congestion Mitigation and Air Quality Improvement funds are programmed by the Federal transportation bill for projects that are likely to contribute to the attainment of a national ambient air quality standard, and congestion mitigation. These funds can be used for a broad variety of bicycle and pedestrian projects, particularly those that are developed primarily for transportation purposes. The funds can be used either for construction of bicycle transportation facilities and pedestrian walkways or for non-construction projects related to safe

Table 11-1 Potential Financing Mechanisms
bicycle and pedestrian use (maps, brochures, etc.). The projects must be tied to a plan adopted by the State and SCAG.
State (S)
1. Infrastructure State Revolving Fund Program of the California Infrastructure and Economic Development Bank (CIEDP) This is a loan program that provides low-cost financing to public agencies for a variety of infrastructure programs, including: streets, bridges, drainage, water supply, flood control, environmental mitigation measures, sewage collection and treatment, solid waste collection and disposal, water treatment and distribution, educational facilities and parks and recreational facilities. Funding assistance ranges from $250,000 to $10,000,000. The application process is complicated and slow. There must be a dedicated source for debt service of the loan. Tax increment flowing from redevelopment projects is often favored as a funding source for retiring this debt because it flows for a long time and is steady. The term of the loan can be as long twenty years.
2. California Infrastructure and Economic Development Bank (CIEDB) The CIEDB was created in 1994 to promote economic revitalization, enable future development, and encourage a healthy climate for jobs in California. The CIEDB has broad authority to issue tax-exempt and taxable revenue bonds, provide financing to public agencies, provide credit enhancements, acquire or lease facilities, and leverage State and Federal funds. The Infrastructure Bank's current programs include the Infrastructure State Revolving Fund (ISRF) Program and the Conduit Revenue Bond Program.
3. California Pollution Control Financing Authority Sustainable Communities Loan and Grant Program The SCGL program has been designed to be flexible and encourage creativity. Funding will be awarded to communities that wish to implement policies, programs and projects using sustainable development principles. All Projects must encompass sustainable development principles to be eligible for funding. Examples of eligible Projects include: 1) Specific plans, or portions of specific plans that direct the nature of development and revitalization within the boundaries of a required general plan consistent with sustainable development principles. 2) Alternative transportation studies, urban design studies, finance plans, redevelopment plans and engineering studies that facilitate sustainable development. 3) Projects such as a community center, park enhancements, or infrastructure improvements that are key elements of a comprehensive community or neighborhood sustainable development plan. 4) Funding for local communities to hire individuals at various stages of planning depending on the needs of the community. An example would be hiring a new staff member or consultant to assist an individual community with the design and/or implementation of a particular plan for development or revitalization using sustainable development principles. 5) Funding for communities to hire technical experts to identify, assess, and complete applications for state, federal and private economic assistance programs that fund sustainable development and sound environmental policies and programs.

Table 11-1 Potential Financing Mechanisms
4. Bicycle Transportation Account The State Bicycle Transportation Account (BTA) is an annual statewide discretionary program that is available through the Caltrans Bicycle Facilities Unit (define?) for funding bicycle projects. Available as grants to local jurisdictions, the emphasis is on projects that benefit bicycling for commuting purposes. The local match must be a minimum of 10% of the total project cost. This program funding is allocated through SANDAG. NOTE Please verify this supposed to be the "SANDAG Bike" program.
5. Environmental Enhancement and Mitigation Program Environmental Enhancement and Mitigation Program Funds are allocated to projects that offset environmental impacts of modified or new public transportation facilities. Bicycle paths, bicycle lanes, and other facilities that encourage alternative transportation are eligible. State gasoline tax monies fund this program.
6. Safe Routes to School (SR2S) The Safe Routes to School program is a state program using funds from the Hazard Elimination Safety program. This program is meant to improve school commute routes by eliminating barriers to bicycle and pedestrian travel through rehabilitation, new projects, and traffic calming. This program requires a 10% local match.
Local and Regional (L)
1. General Fund The City's General Fund is used to support ongoing City operations and services, including general government operations, development services, public safety and community services. Primary revenue sources for the General Fund include property taxes, sales taxes and intergovernmental revenues. It is not uncommon for cities that are seeking to improve their community to commit a certain amount of the General Fund to the effort over a period of years. Improvements and ongoing projects or programs should have general community-wide benefits.
2. General Obligation Bonds (G.O. Bonds) General Obligation bonds may be used to acquire, construct and improve public capital facilities and real property. However, they may not be used to finance equipment purchases, or pay for operations and maintenance. G.O. Bonds must be approved by two-thirds of

Table 11-1 Potential Financing Mechanisms
the voters throughout the Issuer's jurisdiction in advance of their issuance and typically require the issuing jurisdiction to levy a uniform ad valorem (property value) property tax on all taxable properties to repay the annual debt service.
3. Revenue Bonds Debt undertaken wherein payback is tied to specific revenue streams. This form of debt does not require a public vote. Common uses for funds include housing and social services.
4. Development Incentive Programs Incentives encourage the private sector to provide the desired public improvement.
5. Business Improvement District (BID) Business Improvement Areas (BIA) Self-taxing business districts. BIAs include Business Improvement Districts (BIDs), Local Improvement Districts (LIDs) and other such financial districts. Business and property owners pay for capital improvements, maintenance, marketing, parking, and other items as jointly agreed to through systematic, periodic self-assessment. The Hillcrest Association is the BID covering the northern portion of the Hillcrest Corridor. Districts can undertake a wide variety of programs, including but not limited to the following: o Fountains, benches and trash receptacles and integrated signing o Street lighting o Security services that are supplemental to those normally provided by the municipality o Special cleaning operations, graffiti removal, and waste management o Decorations and public art o Promotions of public events benefiting area o Furnishing music to any public place in the area o Promotion of tourism within the area (only businesses benefiting from tourist visits can be assessed for this type of benefit) o Any other activities which benefit businesses located in the area

Table 11-1 Potential Financing Mechanisms
6. Landscape and Lighting Maintenance District (LMDs) The Landscaping and Lighting Act of 1972 enables assessments to be imposed in order to finance the maintenance and servicing of landscaping, street lighting facilities, ornamental structures and park and recreational improvements.
7. Special Benefit Assessments Special Benefit Assessment Districts (AD) are formed for the purpose of financing specific improvements for the benefit of a specific area by levying an annual assessment on all property owners in the district. Each parcel of property within an AD is assessed a portion of the costs of the public improvements to be financed by the AD, based on the proportion of benefit received by that parcel. The amount of the assessment is strictly limited to an amount that recovers the cost of the "special benefit" provided to the property. Traditionally, improvements to be financed using an AD include, but are not limited to, streets and roads, water, sewer, flood control facilities, utility lines and landscaping. A detailed report prepared by a qualified engineer is required and must demonstrate that the assessment amount is of special benefit to the parcel upon which the assessment is levied. Prior to creating an assessment district, the City, county or special district must h a public hearing and receive approval from a majority of the affected property owners casting a ballot. Ballots are weighted according to the proportional financial obligation of the affected property. There are many assessment acts that govern the formation of assessment districts, such as the Improvement Act of 1911, Municipal Improvement Act of 1913, Improvement Bond Act of 1915 and the Benefit Assessment Act of 1982, as well as other specific facility improvement acts.
8. Development Impact Fees Dedications of land and impact fees are exactions that lessen the impacts of new development resulting from increased population or demand on services.
9. In-Lieu Parking Fee The use of a parking in-lieu fee to construct and fund common parking facilities serving the commercial businesses has been used successfully in other downtown revitalizations. Potential funding sources range from in-lieu fees for spaces to parking revenues from monthly parking and short-term parking fees. City will need secure, accessible, well-signed and reasonably priced off-street parking, in addition to on-street parking.
10. Parking Meter Revenues

Table 11-1 Potential Financing Mechanisms
11. County of San Diego Community Projects Funding
12. SANDAG Smart Growth Funding Program In 2009, SANDAG began awarding grants to encourage Smart Growth projects. Grant funding is part of the TransNET sales tax program. Grants will be awarded annually to projects within San Diego County that are located in RTP Smart Growth identified areas. Details of the grant program are available on the SANDAG website.
13. Community Development Block Grant (CDBG) Funding Not available in the Hillcrest Corridor Census tract.
14. Tax Increment Redevelopment Funds The Hillcrest Corridor is not in a City Redevelopment Area.
Private/Non-Profit (P)
1. Private Donations Private donations for a variety of different types of projects are generally available from foundations, institutions and corporations that have major interests in these areas.
2. Donor Programs Some of the proposed improvements may lend themselves to a public campaign for donor gifts. Donor programs have been used very successfully in many cities in the United States for providing funds for streetscape and community design elements. Such programs can be tailored to solicit contributions from individuals, corporations, local businesses and community and business associations. Many improvements could be funded by donor gifts for items such as: benches, trash receptacles, street trees, street tree grates, public art elements and information kiosks. Donors could be acknowledged with a plaque on the element itself or other prominent display, such as a "wall of fame" with donor names.

Chapter 12: Transit Report
(Prepared by IBI Group)

12.0 OVERVIEW

The Hillcrest Corridor Mobility Study is a multimodal analysis of travel demands and facilities in the Fourth, Fifth, and Sixth Avenue corridor between I-5 in Downtown San Diego and Washington Street in Hillcrest. The travel modes addressed in the study include automobile, walking, bicycling, and transit. The analysis considered existing travel conditions as well as alternatives for 2030 future travel facilities and services. The study process included close collaboration with a working group of community representatives, extensive public outreach, and detailed technical analysis.

The transit portion of the study included the review of existing and future conditions, development and analysis of improvements to transit operations and facilities, and recommendations for transit facilities and services in the Hillcrest Corridor Mobility Strategy. Key elements of this report are included in the overall project report.

Following this overview, the transit report includes the following sections:

- Existing Conditions, including descriptions of the existing services, an inventory of stops, and identification of problem areas.
- Future Service Plan, including improvements from the previous Concept Plan and the Regional Transportation Plan, future service plan options, interaction between high capacity and local services, and transit priority measures.
- Implementation Plan, covering phasing for capital and service improvements based on need and funding availability.

The following appendices are also provided:

- Bus Stop Inventory
- Capital Cost Estimate
- Operating Cost Estimate
- Transit Priority Treatments

12.1 EXISTING CONDITIONS

Travel in the Hillcrest Corridor has been well served by transit for decades, with current service provided primarily by Metropolitan Transit System (MTS) Routes 3 and 120. A detailed description of these services is presented in this section.

Existing Services

Two routes currently serve the full length of the Hillcrest Corridor study area between I-5 on the south and Washington Street on the north. Routes 3 and 120 connect Downtown and central Hillcrest via Fourth and Fifth Avenues. Route 3 terminates north of Washington Street while Route 120 continues to Mission Valley and Kearny Mesa. Several east/west routes operate on University Avenue at the northern edge of the study area. Routes 1, 10, 11, and 83 connect with Routes 3 and 120 at the stops in central Hillcrest near Fifth Avenue and University Avenue.

Route 3

Route 3 provides local service on the Fourth and Fifth Avenue couplet, between downtown San Diego and its northern terminal located north of Washington Street near the UCSD Medical Center, serving Bankers Hill and central Hillcrest. South and east of downtown, the route serves Sherman Heights, Logan Heights, Mountain View, Valencia Park and Lincoln Park. The route map is show in Exhibit 12-1. The overall distance of the route is 9.4 miles, with 3.5 miles in the study area. Route 3 operates every 15 minutes on weekdays until 6:00 p.m., when it transitions to 30-minute service until midnight, providing 60 outbound and 60 inbound trips per day. On weekends and holidays, it runs every 30 minutes between 5:30 a.m. and 11:00 p.m., with 30 inbound trips and 31 outbound trips.

Route 120

Route 120 provides limited stop service on Fourth and Fifth Avenues in the study area. It connects Hillcrest with Downtown to the south and Mission Valley, Linda Vista, and Kearny Mesa to the north as shown in Exhibit 12-2. The overall length of the route is 12.5 miles, with 3.5 miles in the study area. Within the corridor, Route 120 serves stops at University Avenue, Walnut Street, Laurel Street and Elm Street, immediately north of Interstate 5. It operates every 15 minutes between Downtown and Fashion Valley between 5:30 a.m. and 6:30 p.m., with 30-minute service between Fashion Valley and Kearny Mesa during those hours. Evening service is provided every 30 minutes for the entire route. Weekend and holiday service is operated between Downtown and Kearny Mesa, with 30-minute frequency between 5:30 a.m. and 11:00 p.m. A total of 60 trips are provided in each direction on weekdays, with 32 trips provided on weekends and holidays.

Other Routes

Four routes operate near or within the northern part of the study area. Route 1, which operates between La Mesa and Hillcrest, runs along University Avenue and portions of Fourth and Fifth Avenues to reach its terminal at Evans Place. Route 10 operates between the Old Town Transit Center and Rolando, with a portion of the alignment running along University Avenue and Washington Street in the study area. Route 11 operates between San Diego State University and

Exhibit 12-1 Route 3 Alignment

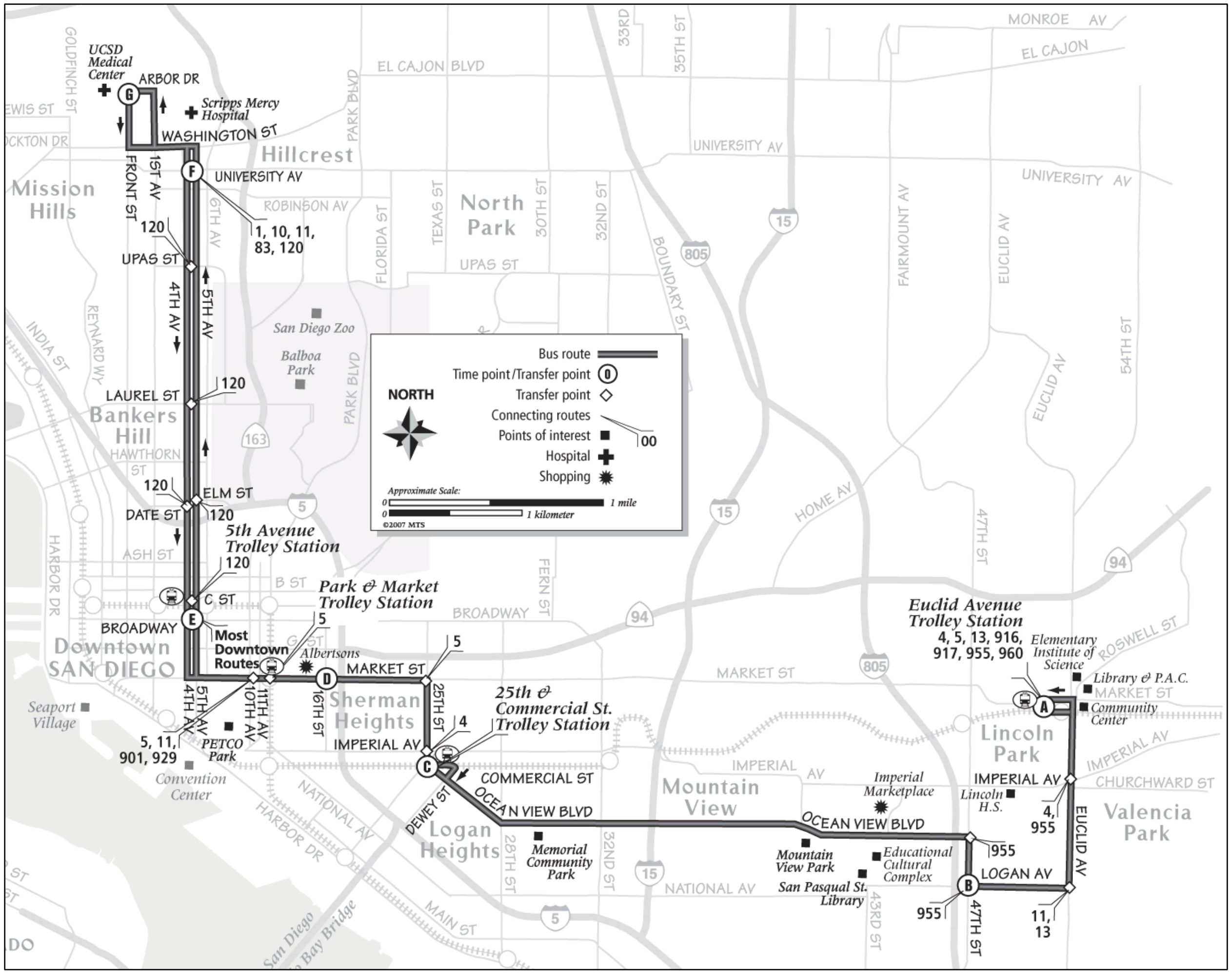
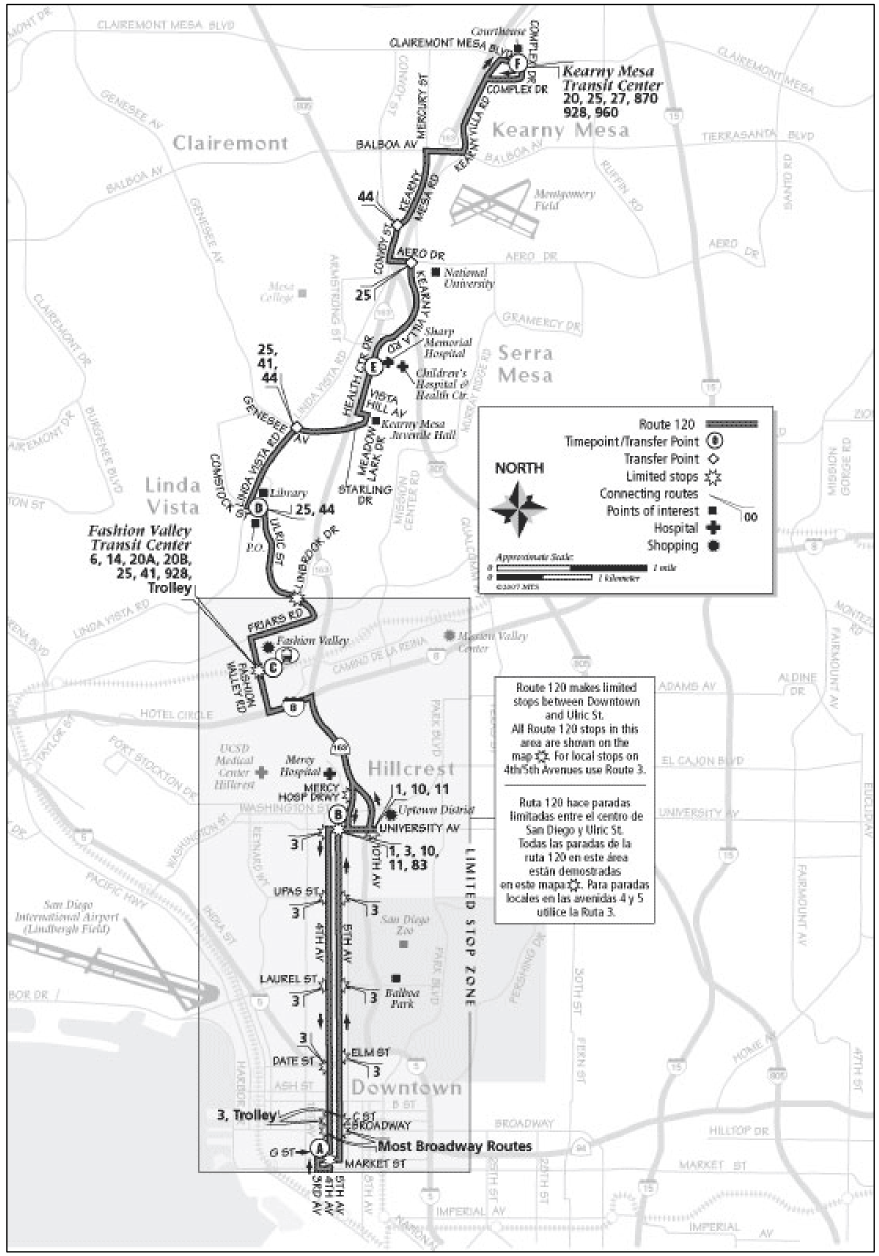


Exhibit 12-2 Route 120 Alignment



Skyline via Hillcrest and Downtown. It runs along University Avenue in the study area. Finally, Route 83 provides community circulator service between Mission Hills, the Hillcrest Hospitals, central Hillcrest, and Downtown. In the study area, it serves stops on University Avenue. All four of these routes connect with Routes 3 and 120 at stops near Fifth and University Avenues.

Ridership Counts

To assess the operating conditions of transit along the corridor, boarding and alighting data was reviewed for Routes 3 and 120, and the other four routes serving the study area. Ridership data was provided by MTS and SANDAG for weekdays in FY 2006 and 2007. It is summarized in Table 12-1. The table provides the daily passenger boardings (ons) and alighting (offs) for each of the transit stops in the study area.

Route 3 ridership is heavier in the corridor than Route 120, due in part to the larger number of stops it has. Northbound ons and offs are 1,039, while southbound ons and offs total 916. For both directions of Route 3, there are over 1,900 ons and offs each day. Route 120 has 1,338 ons and offs per day. The two routes together have over 3,200 riders getting on and off buses in the study area each day. For both routes, the northbound and southbound ons are comparable, while there are significantly more northbound offs than southbound offs. This imbalance in offs is likely due to the higher demand to Hillcrest from Downtown compared to the demand to Hillcrest from Mission Valley and Kearny Mesa. The other routes serving the study area (Routes 1, 10, 11, and 83) have over 1,800 daily ons and offs. Taken together, the corridor has over 5,000 riders getting on and off each day.

The transit stops in the corridor with the highest daily ridership activity (ons and offs) are: Fifth & University (805), University and Sixth (655), University and Fifth (593), Fourth and University (561), and Fifth & Elm (352). The least used stops are located at Fifth and Evans (36), Fourth and Pennsylvania (31), and Fourth and Redwood (18).

Corridor Bus Stops

Currently 28 transit stops are located within the study area as shown in Exhibit 12-3. The study area has 12 stops serving northbound transit vehicles, 14 stops serving southbound transit vehicles, with one stop each in the eastbound and westbound directions. A detailed inventory of stop amenities and types of adjacent land uses is provided in Appendix A.

Route 3 is a local route and the distance between its stops is relatively small. It averages 700 feet on Fourth Avenue, with a maximum of 950 feet, and 825 feet on Fifth Avenue, with a maximum of 1,200 feet. Route 120 is a limited stop service with few stops by design. Its average stop spacing is 2,700 feet on Fourth Avenue and 3,000 feet on Fifth Avenue, with a maximum of 3,300 feet on both streets.

SANDAG and MTS do not have standards for distances between transit stops in the city's urbanized areas. These distances are typically based on activity centers, travel needs, and requests. Nationally, typical spacing for similar type transit stops is from 750 to 800 feet in urban areas not associated with central downtowns. Thus, the distances between transit stops along Fourth and Fifth Avenues are about average. These distances are acceptable in the Hillcrest Corridor considering the density of development and numerous trip generators served.

Table 12-1 Existing Hillcrest Ridership by Route and Stop

Route	Stop	Ons	Offs	Sum	Stop	Ons	Offs	Sum
3		Northbound				Southbound		
(FY 06)					Fourth & Date	49	15	64
	Fifth & Elm	27	124	151				
	Fifth & Fir	15	29	44	Fourth & Fir	20	19	39
	Fifth & Grape	5	24	29				
	Fifth & Hawthorn	9	37	46	Fourth & Hawthorn	36	12	48
	Fifth & Juniper	9	25	34	Fourth & Juniper	36	12	48
	Fifth & Laurel	14	65	79	Fourth & Laurel	61	12	73
	Fifth & Nutmeg	19	22	41	Fourth & Nutmeg	18	12	30
	Fifth & Palm	9	65	74	Fourth & Palm	51	24	75
	Fifth & Redwood	7	36	43	Fourth & Redwood	15	3	18
	Fifth & Spruce	5	25	30	Fourth & Spruce	25	9	34
	Fifth & Upas	15	43	58	Fourth & Upas	40	18	58
	Fifth & Brookes	2	19	21	Fourth & Brookes	21	8	29
	Fifth & Pennsylvania	4	37	41	Fourth & Pennsylvania	20	1	21
	Fifth & Evans	5	2	7	Fourth & Robinson	93	10	103
	Fifth & University	37	304	341	Fourth & University	230	46	276
	Totals	182	857	1,039	Totals	715	201	916
120		Northbound				Southbound		
(FY 07)	Fifth & Elm	76	125	201	Fourth & Date	47	85	132
	Fifth & Laurel	57	87	144	Fourth & Laurel	52	52	104
	Fifth & Upas	38	62	100	Fourth & Upas	37	29	66
	Fifth & University	135	243	378	Fourth & University	182	31	213
	Totals	306	517	823	Totals	318	197	515
Subtotal		488	1,374	1,862		1,033	398	1,431
1		Northbound				Southbound		
(FY 06)	Fifth & Evans	14	15	29	University & Sixth	5	90	95
	Fifth & University	86	0	86	Fourth & University	5	67	72
					Fourth & Robinson	0	11	11
					Fourth & Pennsylvania	0	10	10
					Fourth & Brookes	0	7	7
					Fourth & Upas	0	0	0
					Fifth & Upas	0	0	0
					Fifth & Brookes	0	3	3
					Fifth & Pennsylvania	0	3	3
	Totals	100	15	115	Totals	10	191	201
10		Westbound				Eastbound		
(FY 07)	University & Fifth	240	132	372	University & Sixth	127	223	350
	Fifth & Washington				University & Fifth	45	84	129
	Washington & Fourth							
	Totals	240	132	372	Totals	172	307	479
11		SDSU to Spring Valley (WB)				Spring Valley to SDSU (EB)		
(FY 06)	University & Sixth	86	124	210	University & Fifth	139	82	221
	University & Fourth	70	82	152				
	Totals	156	206	362	Totals	139	82	221
83		Northbound				Southbound		
(FY 07)	(no northbound stops)				Washington & Fourth	2	8	10
					University & Sixth	0	0	0
					Washington & Fifth	4	6	10
	Totals				Totals	6	14	20
Subtotal		496	353	849		327	594	921
TOTAL		984	1,727	2,711		1,360	992	2,352

Source: SANDAG and MTS ridership counts

The existing transit stops are made up of midblock, nearside, and farside locations. At a nearside transit stop, the transit vehicle stops prior to entering the intersection. At a farside transit stop, the transit vehicle passes through the intersection, then stops when it reaches the other side. It should be noted that from an operational standpoint, farside stops are preferred by most transit agencies including SANDAG and MTS. For the northbound routes on Fifth Avenue, there are six nearside locations and six farside locations. For the southbound routes on Fourth Avenue, there are four nearside, eight farside locations, and two midblock locations. There are also one nearside eastbound stop and one nearside westbound stop on University Avenue.

Stop and Operations Deficiencies

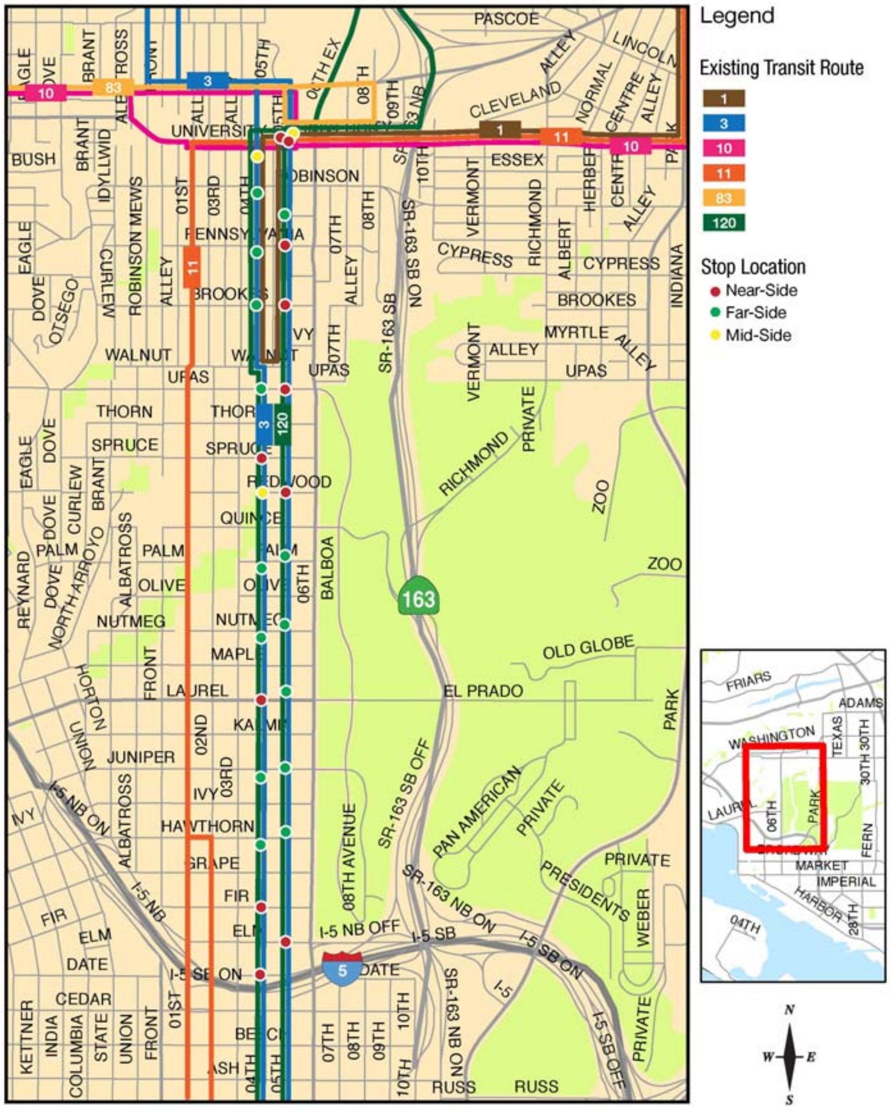
Bus Stops

The primary deficiency for bus stops in the study area is the inconsistency of amenities. The bus stop inventory found several stops do not have benches, shelters, lighting, and/or trash cans. The stops with the highest number of boardings, such as Fifth Avenue and University Avenue, and Fifth Avenue and Laurel Street, have the highest number of amenities, but it would be desirable to provide the full range of amenities at all stops. This approach would ensure comfort and convenience for all transit riders and raise the profile of transit in the community, especially if coupled with a consistent design theme for the corridor.

Transit Operations

Due to the relatively low levels of congestion in the central and southern portions of the corridor, buses are able to move effectively and do not experience significant delays. Delays are encountered in the northern portion due to the high levels of congestion, especially in peak periods. Bus speeds on Fifth and University Avenues are slowed considerably as they navigate through the area in mixed traffic. Transit priority treatments could help this situation, but there is little room available for queue jumps. The most significant delays are encountered on Fifth Avenue. A transit lane between Pennsylvania and University Avenues could reduce bus travel time substantially. In addition, moving the existing stop at Fifth Avenue and University Avenue south 50 to 100 feet could lessen the conflicts between buses and right turning vehicles at this key intersection. However, this shift would eliminate several parking spaces.

Exhibit 12-3 Existing Transit Stops



Hillcrest Existing Transit

Source: SANDAG, SANGIS

0 1,250 2,500 Feet

12.3 FUTURE SERVICE PLAN

Concept Plan and Regional Transportation Plan Improvements

The "Fourth, Fifth and Sixth Avenues Traffic Calming Study" completed in 2005 recommended a Traffic Calming Strategy ("Preferred Strategy") which was the starting point for the current study. The Preferred Strategy contained several transit improvements, including exclusive transit lanes on Fourth and Fifth Avenues as then-proposed in the SANDAG Transit Concept. As shown in the regional study, these exclusive lanes would extend south of I-5 into Downtown and north into Mission Valley. The Preferred Strategy proposed that these lanes be used by both existing transit services and a proposed bus rapid transit (BRT) route. Bus stop relocations and consolidations were also included in the Preferred Strategy.

Since the Preferred Strategy was proposed, local service in the corridor has been simplified, with Route 3 providing 15-minute local service and a new limited-stop Route 120 added, also providing 15-minute service. The recently adopted 2030 Regional Transportation Plan: Pathways for the Future (RTP) includes improving the frequency of the full length of Route 120 to 10 minutes all day (from its existing 15 minutes between Downtown and Fashion Valley, and 30 minutes between Fashion Valley and Kearny Mesa). The RTP also includes improving Route 10 frequency to 10 minutes and Route 11 to 15 minutes.

The RTP also includes Route 640 BRT service between San Ysidro and Kearny Mesa, with service to Centre City and Hillcrest (see Exhibit 12-4). The service would operate on a transit guideway through the Hillcrest Corridor (currently designated as Fourth/Fifth/SR163). BRT service is the highest level of bus service to be provided in the region. It will have high performance vehicles outfitted with comfortable interiors and amenities, and stops with upgraded amenities such as next bus displays, travel information, upgraded seating, bicycle racks, and enhanced lighting. The vehicles and stations will be tied together with unique branding elements that will identify the service as part of the region's BRT system. Both Route 120 and 640 would operate on the Fourth/Fifth/SR 163 Corridor Guideway. Future studies will determine the design and location of the proposed corridor guideway.

The planned future services for the Hillcrest Corridor are shown in Exhibit 12-5 and future ridership levels from the RTP forecasts are summarized in Table 12-2. The significant increases in frequency and the introduction of Route 640 BRT service will substantially increase ridership in the study area. The RTP forecasts study area boardings and alightings to more than double by 2030, from 5,063 to 11,966.

Exhibit 12-4 Future BRT Network inc. Route 640

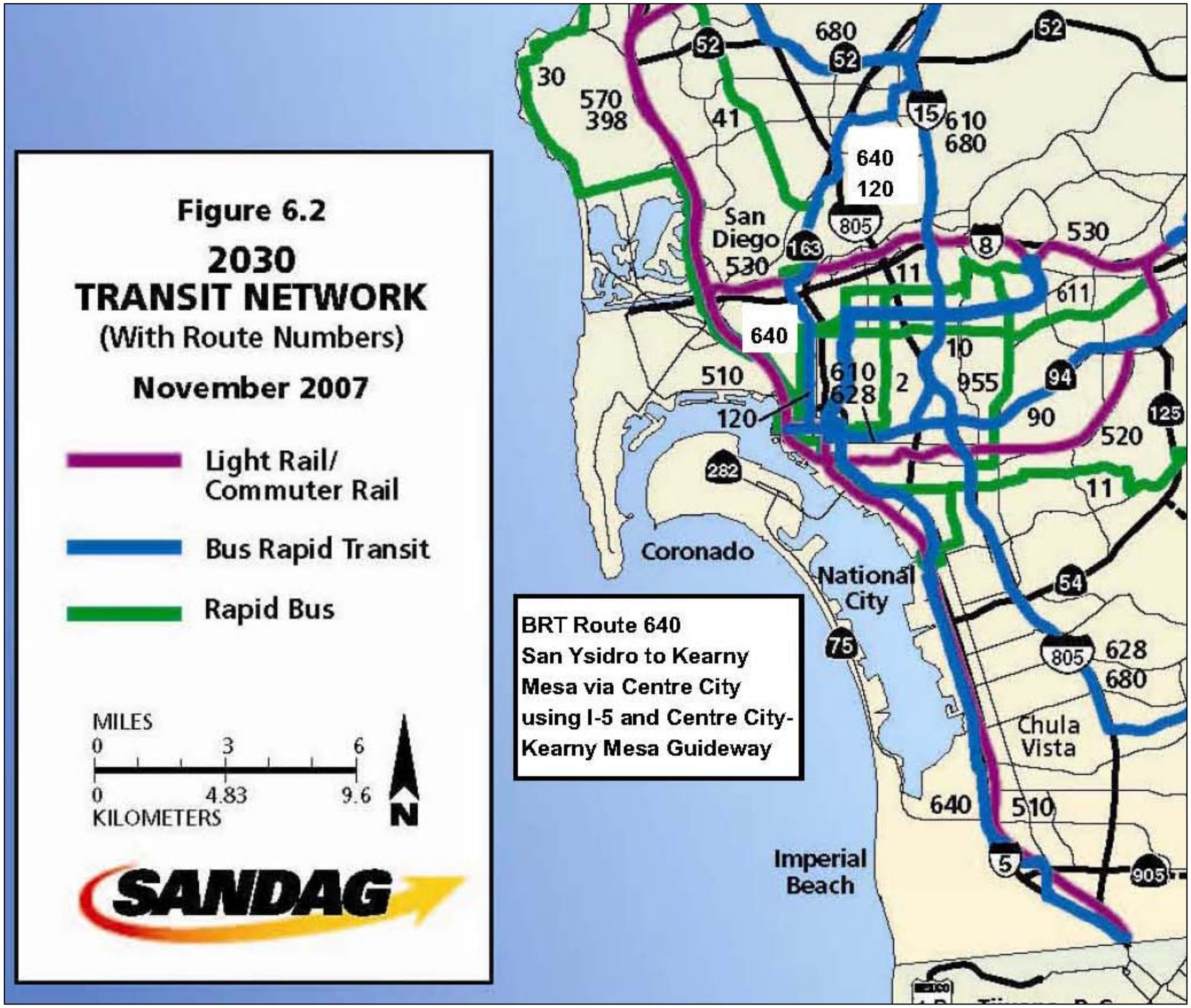
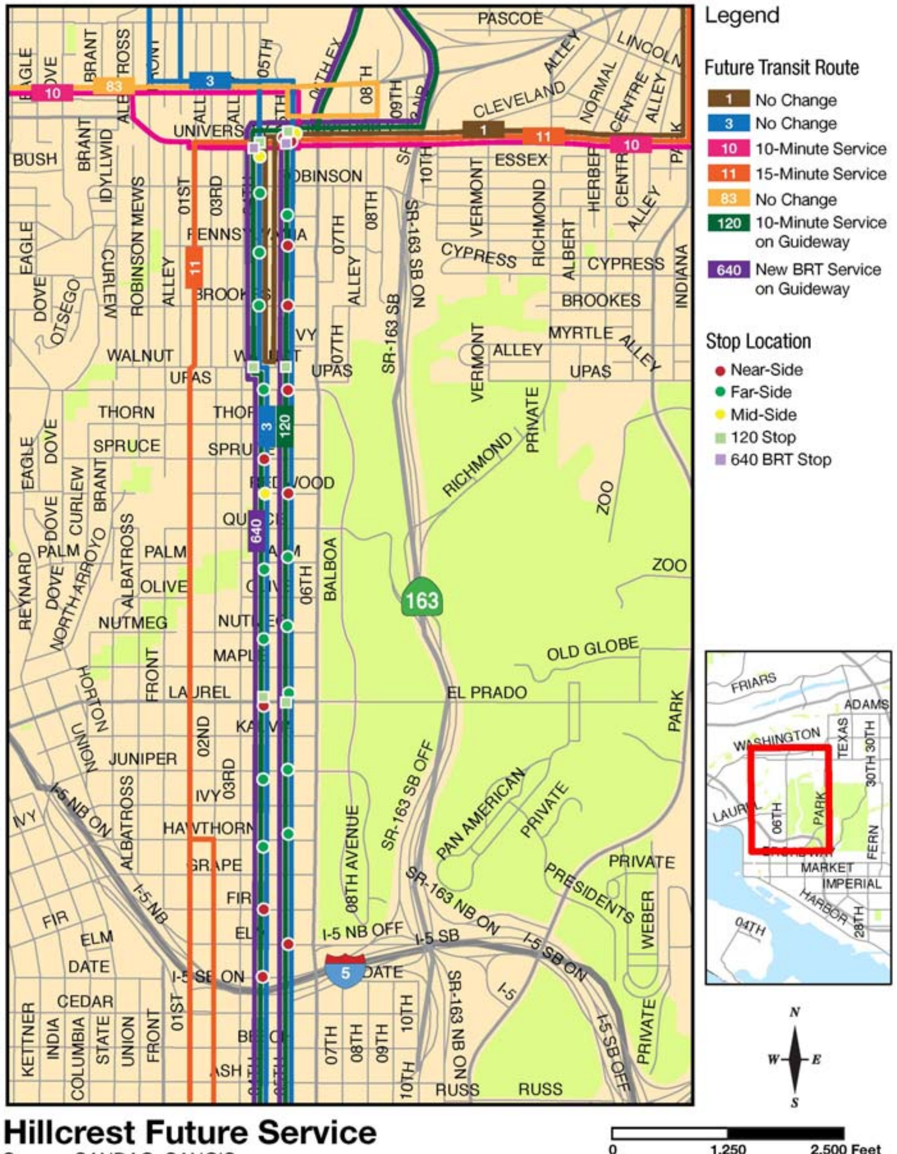


Exhibit 12-5 Hillcrest Corridor Future Transit Service



Hillcrest Future Service

Source: SANDAG, SANGIS

Table 12-2 2030 Forecast Transit Ridership for Hillcrest Corridor

Route	Stop	Ons	Offs	Total	Stop	Ons	Offs	Total
3		Northbound				Southbound		
	Fifth & Elm	39	28	67	Fourth & Cedar	21	10	31
	Fifth & Grape	8	83	91	Fourth & Date	134	9	143
	Fifth & Hawthorn	12	33	45	Fourth & Fir	0	3	3
	Fifth & Laurel	35	100	135	Fourth & Hawthorn	92	30	122
	Fifth & Palm	24	118	142	Fourth & Juniper	1	2	3
	Fifth & Upas	20	88	108	Fourth & Laurel	90	15	105
	Fifth & University	14	260	274	Fourth & Palm	72	12	84
					Fourth & Upas	90	15	105
					Fourth & University	208	1	209
	Totals	152	710	862	Totals	708	97	805
120		Northbound				Southbound		
	Fifth & Laurel	286	188	474	Fourth & Laurel	615	138	753
	Fifth & Upas	224	191	415	Fourth & Upas	427	102	529
	Fifth & University	684	285	969	Fourth & University	792	175	967
	Totals	1,194	664	1,858	Totals	1,834	415	2,249
640 (BRT)		Northbound				Southbound		
	Fifth & University	0	420	420	Fourth & University	271	1	272
Subtotal		1,346	1,794	3,140		2,813	513	3,326
1		Northbound				Southbound		
	Fifth & Elm	49	11	60	Fifth & University	30	359	389
	Fifth & Grape	10	32	42	Fourth & University	177	210	387
	Fifth & Hawthorne	12	10	22	Fourth & Upas	78	112	190
	Fifth & Laurel	51	40	91	Fourth & Palm	59	70	129
	Fifth & Palm	37	62	99	Fourth & Laurel	78	98	176
	Upas & Fifth	33	38	71	Juniper & Fourth	1	2	3
	Fifth & University	67	113	180	Hawthorn & Fourth	80	135	215
					Fourth & Fir	0	7	7
					Fourth & Date	109	27	136
	Totals	259	306	565	Totals	612	1,020	1,632
10		Westbound				Eastbound		
	University & Fifth	393	398	791	University & Fifth	151	300	451
	Fifth & Washington	76	739	815				
	Washington & Fourth	150	258	408				
	Totals	619	1,395	2,014	Totals	151	300	451
11		SDSU to Spring Valley (WB)				Spring Valley to SDSU (EB)		
	University & Fifth	45	131	176	University & Fourth	34	24	58
	University & Fourth	38	158	196	University & Fifth	56	73	129
	Totals	38	158	196	Totals	56	73	129
83		Northbound				Southbound		
	Washington & Fourth	7	36	43	Washington & Fourth	7	13	20
	Fifth & Washington	3	74	77	Fifth & Washington	3	40	43
	University & Fifth	33	69	102	University & Fifth	93	38	131
	Fifth & Washington	4	14	18	Fifth & Washington	15	14	29
	Washington & Fourth	6	5	11	Washington & Fourth	34	5	39
	Totals	53	198	251	Totals	152	110	262
Subtotal		969	2,057	3,026		971	1,503	2,474
TOTALS		2,315	3,851	6,166		3,784	2,016	5,800

Source:
SANDAG Regional Transportation Plan Forecast

Future Service Plan Options

The current operating budget constraints limit the ability to make near-term service improvements, and the shortage of funding may even require service cutbacks. However, long term plans for the region call for significant improvements to transit service. During the course of the Hillcrest Corridor Mobility Study, SANDAG completed an update to the RTP. The effort included detailed analysis of transit improvement options for the region and extensive public involvement in the process. The RTP's Reasonably Expected improvements include increased Route 120 frequency and BRT service on the Fourth/Fifth/SR 163 Guideway. Improvements in frequency are also included for Routes 10 and 11. (No improvements for the study area are included in the Revenue Constrained Option, and no additional improvements were included in the Unconstrained Option.) With these future plans in mind, this study evaluated three alternative transit improvement options for the corridor.

- Budget Constrained – Routes 3 and 120 maintained at current service levels. Minimal bus stop improvements.

- Early Implementation – All stops upgraded and transit priority treatments (queue jumps and transit lane) implemented. No new services.

- RTP Reasonably Expected – Frequency increased on Route 120 plus the implementation of the RTP BRT Service on the Fourth/Fifth/SR 163 Guideway (Route 640).

Estimated operating cost, capital cost, ridership, travel time improvements, and parking impacts are summarized in Table 12-3. Key assumptions include:

- Hours of Operation – Route 120: 530am-1130pm, Route 640: 600am-1000pm
- Average speed – Route 120: 13.4 mph, Route 640: 20.0 mph
- Frequency – Route 120: 10 minutes, Route 640 7.5 minutes
- Fully loaded cost per hour – $195
- Farebox recovery – 35%
- Passengers per hour – 30

Details regarding the cost estimates are provided in the Transit Report Technical Appendices.

Table 12-3 Summary of Transit Improvement Options

Option	Improvements	Capital Cost	Operating Cost	Ridership	Travel Time Improvements	Parking Impacts
Budget Constrained	Route 3 and 120 service maintained. Minimal stop improvements.	$50,000	No change from current cost.	Minimal ridership change.	Increases in travel time as congestion increases.	Minimal change due solely to stop relocations or eliminations.
Early Implementation	Stop upgrades, queue jumps, Fifth Avenue transit lane.	$2,150,450	No change	Some increase likely due to reduced travel time and better stop amenities.	Significant travel time savings from queue jumps and transit lanes. Model results indicate 5.5 minutes can be saved with the queue jumps and transit lane on Fifth Avenue.	Parking to remain on Fifth Avenue with transit lane. Planned diagonal parking would minimize parking losses related to queue jumps.
RTP Reasonably Expected	Route 120 frequency improved to 10 minutes. New Route 640 BRT service with new stations and transit signal priority. Both services operated on new guideway.	$2,415,000	<u>Route 120</u> Operating Cost Total - $5.11 million Hillcrest - $1.71 million Subsidy Total - $3.32 million Hillcrest - $1.11 million <u>Route 640</u> Operating Cost Total -$25.96 million Hillcrest $3.19 million Subsidy Total - $16.88 million Hillcrest $2.07 million	<u>120 (Annual)</u> Total – 786,000 Hillcrest - 263,000 <u>640 (BRT) (Annual)</u> Total – 2,790,000 Hillcrest – 343,000	Travel time savings of 5-10 minutes for both 120 and 640 due to the exclusive guideway and limited number of stops.	To be determined. RTP designates guideway as Fourth/Fifth/SR 163. Alignment Studies to be conducted to determine alignment.

Interaction of Future Higher Capacity Services with Local Services

Route 3, the corridor's local service, will continue to operate on Fourth and Fifth Avenues for the length of the corridor. The highest passenger activity would occur on Fourth Avenue at Date Street, Hawthorn Street, Laurel Street, Upas Street, and University Avenue; and on Fifth Avenue at Laurel Street, Palm Street, and University Avenue. Ridership on Route 120, the corridor's express (or limited-stop) service, will grow substantially at all three of its stops on Fourth and Fifth Avenues, at Laurel Street, Upas Street, and University Avenue. Route 640, the new BRT service, will have only two stops in the corridor at Fourth and University and Fifth and University. Ridership at the most heavily used stops summarized in Table 12- 4.

Table 12-4
2030 Daily Passenger Activity at Key Stops in Hillcrest Corridor

Stop	Routes	Ons	Offs	Total
Northbound				
Fifth & University	1,3,120, 640	765	1,078	1,843
Fifth & Laurel	1,3,120	372	328	700
Fifth & Washington	10,83	80	753	833
Fifth & Upas	3,120	244	279	523
Washington & Fourth	10	156	263	419
Southbound				
Fourth & University	1,3,11,120,640	1,448	387	1,835
Fourth & Laurel	1,3,120	783	251	1,034
Fourth & Upas	1,3,120	595	215	810
Eastbound				
University & Fifth	10,11,83	471	598	1,069
Westbound				
University & Fifth	10,11,83	300	411	711

Source: 2030 RTP Forecast

The Fourth and University, and the Fifth and University stops are projected to have the highest volumes in the study area, and sufficient space will be needed to provide the stop amenities and the unique branding elements of BRT service.

Generally, it is desirable to separate the BRT stations and other bus stops to ensure the maintenance of the higher speed of the BRT service. Local buses, with potentially longer dwell times, can slow BRT vehicles. However, two considerations weigh on this question in the Hillcrest Corridor. Space limitations at these locations may not allow the provision of separate stops due to impacts to parking and other concerns. If stops are shared, there should be separate signing for the services, and local and express buses should stop at the far end of the stop. With this approach, the BRT buses can stop and leave without being affected by delays in local or express boarding. It also allows the BRT's shelters and amenities to be provided separately to identify it as an upgraded service.

The other consideration is the location and the nature of the planned guideway. This facility could be separated in a physical way that would preclude local and express buses from operating in it. For example, the guideway could be located in the SR163 freeway right-of-way. If it is separated, separate stops would be provided for the BRT and local/express services.

3.4 Bus Stop Improvements

Improvements are recommended to bus stops throughout the corridor. Basic amenities such as shelters, benches, and trash cans are to be provided at all of the local stops. These improvements are expected to be provided within the existing right of way. In addition, MTS has removed some of the lower volume stops in the corridor. Adequate spacing has been maintained between stops to minimize inconvenience for passengers. No further stop consolidations are planned at this time.

Routes 120 and 640 will have additional amenities typical of BRT and Rapid type services such as next bus displays, transit information, enhanced lighting, and branding treatments. These stops may require additional space on the sidewalk and/or right of way. Additional engineering analysis will be conducted to determine the space requirements for the six upgraded stops along Fourth and Fifth Avenues at Laurel, Upas, and University.

3.5 Transit Priority Measures

Using the Preferred Strategy as a starting point, the study initially focused on exclusive transit lanes on Fourth and Fifth Avenues between Upas Street and I-5. The traffic analysis and modeling found only small travel time savings due to the low level of congestion in the central and southern portions of the corridor. The significant congestion on Fifth and University Avenues in the northern part of the corridor, and the lack of exclusive transit lanes in this area, led to a rethinking of the transit priority treatments. While the transit lanes would provide limited travel time improvements, the key sources of delays are at intersections. Queue jumps for transit vehicles would provide priority for transit at congested intersections, without the need to reduce general purpose lanes throughout the corridor. As a result, the consultant team evaluated the design and operation of queue jumps at all of the signalized intersections in the corridor.

In addition, the team found the segment of Fifth Avenue between Pennsylvania and University Avenue to have high levels of congestion that significantly delay transit travel. A transit lane with traffic signal priority is recommended for this segment to address this situation. This improvement would enable a faster travel time for buses by bypassing long queues and slow moving traffic. (Additional information regarding transit priority is provided in Appendix D.)

Both of these transit improvement proposals were discussed extensively with City, SANDAG, and MTS staff. The recommendations in this report reflect the general consensus of these study partners with this approach.

Each queue jump location was evaluated for its effect on parking, the nature of surrounding uses, and the need for separate or shared right turn lanes. Intersections with less than 100 right turns per hour from Fourth or Fifth Avenue to the cross street were found to be suitable for queue jumps shared by transit and private vehicles. Separate queue jump and right turn lanes were needed at intersections with more than 100 right turns per hour. The recommended locations and separate or shared right turns are summarized in Table 12-5.

Table 12-5 Recommended Queue Jump Intersections

Intersection	Separate or Shared Right Turns
Fourth & Elm	Separate
Fifth & Elm	Shared
Fourth & Grape	Shared
Fifth & Grape	Shared
Fourth & Juniper	Shared
Fifth & Juniper	Shared
Fourth & Laurel	Separate
Fifth & Laurel	Separate
Fourth & Nutmeg	Shared
Fifth & Nutmeg	Shared
Fourth & Quince	Shared
Fifth & Quince	Shared
Fourth & Upas	Shared
Fifth & Upas	Separate
Fifth & Pennsylvania	Separate

Two schematics of the layout of queue jumps at a typical intersection are shown below. Exhibit 12-6 shows separated right turns and Exhibit 12-7 shows shared right turns.

Exhibit 12-6
Typical Queue Jump with Separate Right Turns

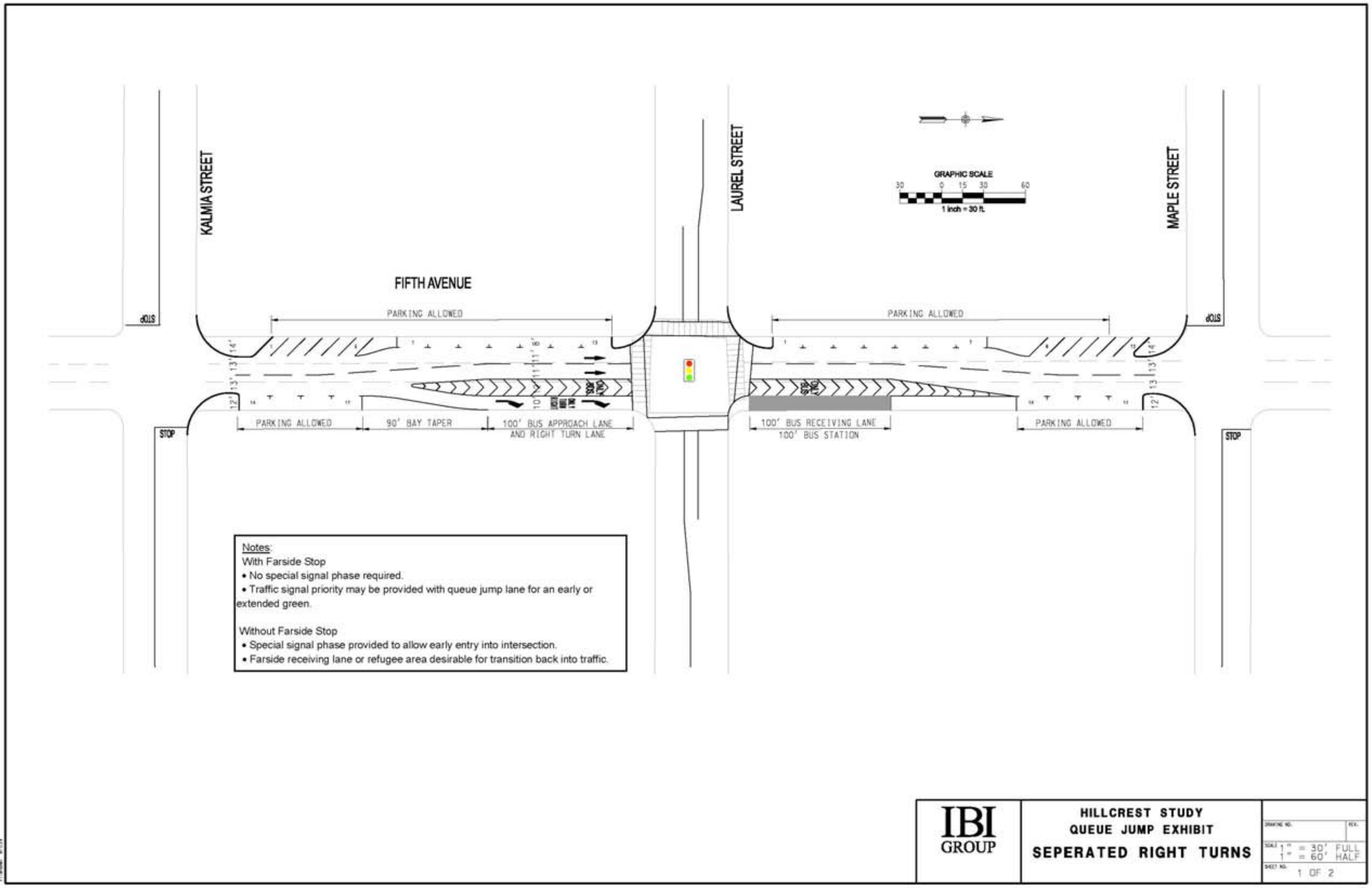
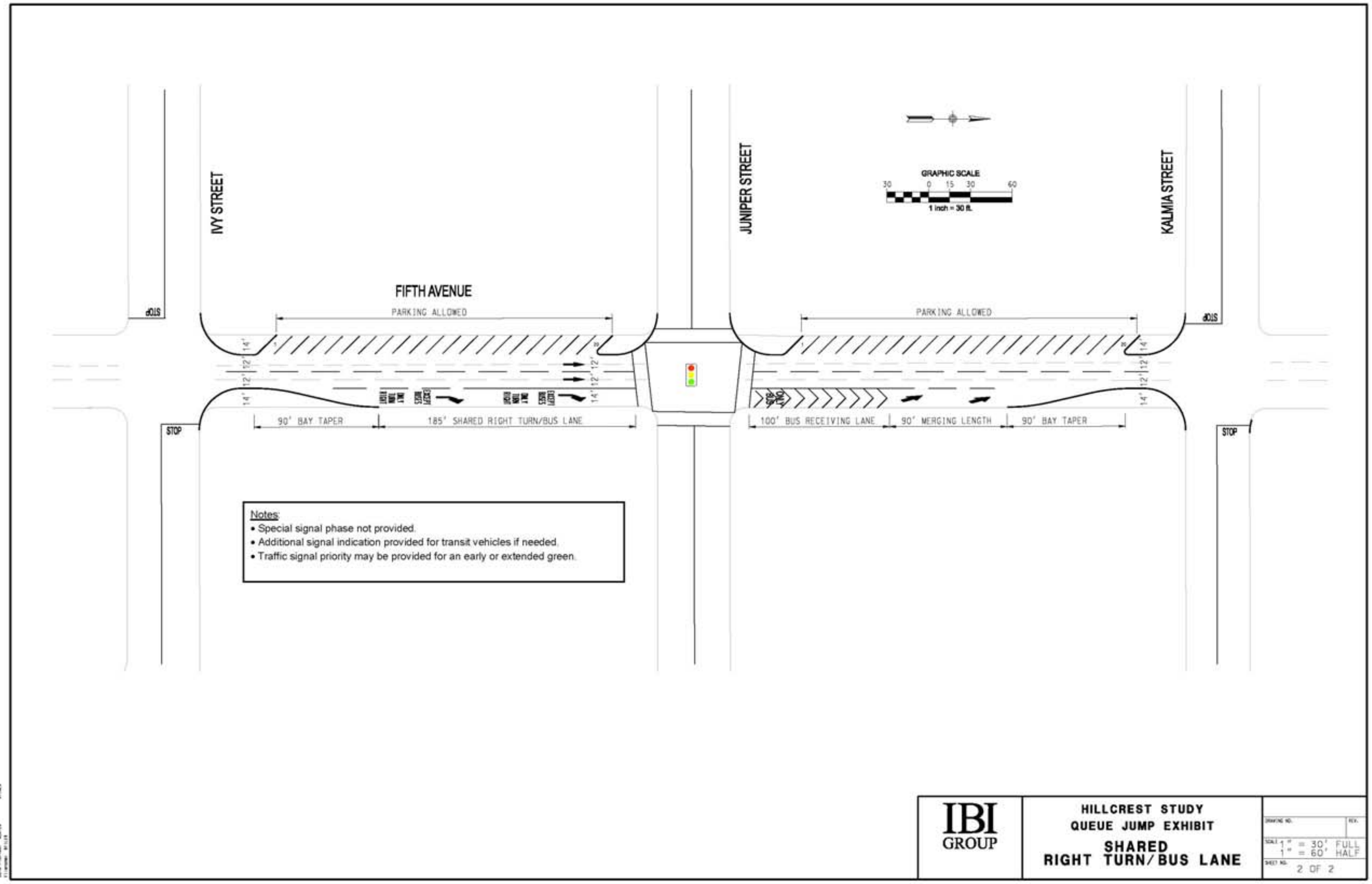
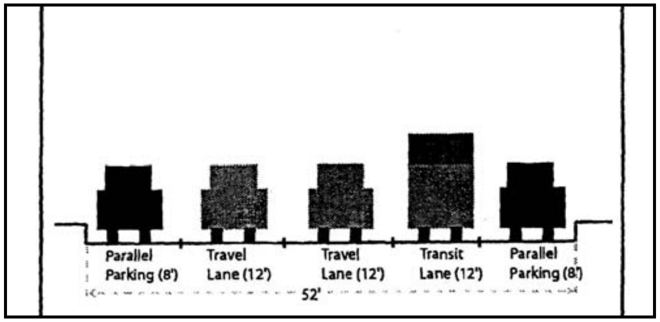


Exhibit 12-7
Typical Queue Jump with Shared Right Turns



The cross section for the transit lane on Fifth Avenue is shown in Exhibit 12-8.

Exhibit 12-8 Fifth Avenue Transit Lane



The layout reflects the provision of two general purpose lanes, the transit lane, and parallel parking on both sides of the street.

12.4 IMPLEMENTATION PLAN

Implementation of the transit improvements is part of the broader implementation plan for all of the transportation improvements in the Hillcrest Corridor, which includes short-term, medium-term and long-term improvements. The proposed phasing of the transit improvements is summarized in Table 12-6.

Table 12-6
Proposed Transit Service Phasing

Phase	Transit Improvement
Short Term (2-3 Years)	Stripe queue jumps at identified intersections. Restripe Fifth Avenue from University Avenue to Pennsylvania for two lanes and transit lane. Stripe queue jumps at identified intersections. Relocate/remove transit stops.
Medium Term (3-8 Years)	Transit stop enhancements including bus pads. Installation of bus shelters, bus pads and transit stop enhancements at locations where pop-outs are not recommended.
Long Term (8+ Years)	Fourth/Fifth/SR 163 Guideway and Route 640 BRT Service (This project is pending refinement and funding through SANDAG & MTS.)

Estimated time lines for short-term, medium-term and long-term are based on the update of the Community Plan, scheduled to begin in 2008 and be completed by Spring 2010. As a result, the minimum time before short term improvements could be completed is two years, The timing of the transit improvements may be modified though the Community Plan Update process, the availability of transportation funding, the sequencing of frequency improvements, and refinements to the Route 640 BRT project as part of the RTP implementation process.

TRANSIT REPORT
APPENDIX A – BUS STOP INVENTORY

Existing Stop	Shelter	Bench	Lighting	Trash	Concrete Pad	Stop Location on Bock	Route(s) Served
Fifth at Elm		X				Nearside	3,120
	**Adjacent Land Uses:** • Moderate-Density Residential • Community Center • Commercial						
Fifth at Hawthorn		X		X	X	Farside	3
	**Adjacent Land Uses:** • Moderate-Density Residential • Commercial • Some Vacant Office Space • Near Sharp-Rees-Stealy Medical Center						
Fifth at Juniper		X		X		Farside	3
	**Adjacent Land Uses:** • Moderate-Density Residential • Salvation Army Divisional Headquarters • Restaurants						

Existing Stop	Shelter	Bench	Lighting	Trash	Concrete Pad	Stop Location on Bock	Route(s) Served
Fifth at Laurel		X				Farside	3,120
	**Adjacent Land Uses:** • High-Density Residential • Commercial and Office Space • Sidewalk Seating / Cafés • Bank • Near western entrance to Balboa Park						
Fifth at Nutmeg		X		X		Farside	3
	**Adjacent Land Uses:** • Moderate-Density Office / Commercial • St. Paul's Cathedral • Restaurants						
Fifth at Palm						Farside	3
	**Adjacent Land Uses:** • Moderate-Density Commercial / Office • Health Care Facility						

Existing Stop	Shelter	Bench	Lighting	Trash	Concrete Pad	Stop Location on Bock	Route(s) Served
Fifth at Redwood		X				Nearside	3
	**Adjacent Land Uses:** • High-Density Residential • Moderate-Density Commercial / Office						
Fifth at Upas	X	X	X	X		Nearside	3,120
	**Adjacent Land Uses:** • San Diego Blood Bank / Healthcare Facility • Blood Bank Parking Lot • Moderate-Density Residential						
Fifth at Brookes						Nearside	1,3
	**Adjacent Land Uses:** • Moderate-Density Commercial Office • Medium-Density Residential						

Existing Stop	Shelter	Bench	Lighting	Trash	Concrete Pad	Stop Location on Bock	Route(s) Served
Fifth at Pennsylvania						**Nearside**	**1,3**
	**Adjacent Land Uses:** • Commercial • High-Density Mixed Use (Under Construction)						
Fifth at Evans		**XX**				**Farside**	**1**
	**Adjacent Land Uses:** • Moderate-Density Commercial • Large Drug Store • Low-Density Residential						
Fifth at University	**X**	**X**	**X**	**X**		**Nearside**	**1,3,120**
	**Adjacent Land Uses:** • High-Density Commercial • Restaurants • Outdoor Seating / Cafés						

Existing Stop	Shelter	Bench	Lighting	Trash	Concrete Pad	Stop Location on Bock	Route(s) Served
University at Sixth (WB)		XX		XX	X	MB/Farside	1,10,11, 120,83
	**Adjacent Land Uses:** • High-Density Commercial • Restaurants • Outdoor Seating / Cafés						
University at Fifth (EB)		XX		X		Nearside	10,11
	**Adjacent Land Uses:** • High-Density Commercial • Restaurants • Outdoor Seating / Cafés						
Fourth at University	X	X	X	X	X	Midblock	1,3,120
	**Adjacent Land Uses:** • Moderate-Density Commercial • Restaurants • Outdoor Seating / Cafés						

Existing Stop	Shelter	Bench	Lighting	Trash	Concrete Pad	Stop Location on Bock	Route(s) Served
Fourth at Robinson	**X**	**X**	**X**	**X**	**X**	**Farside**	**1,3**
	**Adjacent Land Uses:** • Low / Moderate-Density Residential • Restaurants • Convenience Store						
Fourth at Pennsylvania						**Farside**	**1,3**
	**Adjacent Land Uses:** • Moderate-Density Residential • Medical Facility						
Fourth at Brookes				**X**	**X**	**Farside**	**1,3**
	**Adjacent Land Uses:** • High-Density Commercial • Restaurants • Outdoor Seating / Cafés						

Existing Stop	Shelter	Bench	Lighting	Trash	Concrete Pad	Stop Location on Bock	Route(s) Served
Fourth at Upas		X		X		Farside	3,120
	**Adjacent Land Uses:** • Low-Density Office / Residential						
Fourth at Spruce		X		X		Nearside	3
	**Adjacent Land Uses:** • Moderate-Density Office • Low-Density Residential						
Fourth at Redwood		X		X		Midblock	3
	**Adjacent Land Uses:** • Mix of Low / High-Density Residential • Canyon Frontage						

Existing Stop	Shelter	Bench	Lighting	Trash	Concrete Pad	Stop Location on Bock	Route(s) Served
Fourth at Palm		**X**		**X**		**Farside**	**3**
	**Adjacent Land Uses:** • Medium-Density Office • Medical Facility						
Fourth at Nutmeg		**X**		**X**	**X**	**Farside**	**3**
	**Adjacent Land Uses:** • Low-Density Office / Commercial • Low-Density Residential • Community Center • Church						
Fourth at Laurel		**X**		**X**		**Nearside**	**3,120**
	**Adjacent Land Uses:** • Moderate-Density Mixed Use • Bank						

Existing Stop	Shelter	Bench	Lighting	Trash	Concrete Pad	Stop Location on Bock	Route(s) Served
Fourth at Juniper	X	X	X	X		Farside	3
	**Adjacent Land Uses:** • Medium-Density Residential • Medium-Density Office						
Fourth at Hawthorn	X	X	X	X		Farside	3
	**Adjacent Land Uses:** • Sharp Rees-Stealy Medical Center • Medium-Density Residential / Office						
Fourth at Fir			X	X		Nearside	3
	**Adjacent Land Uses:** • Low-Density Residential • Several Surface Parking Lots						

Existing Stop	Shelter	Bench	Lighting	Trash	Concrete Pad	Stop Location on Bock	Route(s) Served
Fourth at Date		XX				Nearside	3,120
	**Adjacent Land Uses:** • Moderate-Density Residential • Freeway-Adjacent • Church / Religious Facility						

RANSIT REPORT
APPENDIX B – TRANSIT CAPITAL COST ESTIMATES

HILLCREST TRANSIT IMPROVEMENT CAPITAL COST ESTIMATES

June 30, 2008

Item	Quantity	Unit Cost	Estimated Cost
FACILITIES FOR EXISTING ROUTES			
Bus Stops			
Shelters with Bench & Lighting	27	$12,000	$324,000
Trash Cans	27	$350	$9,450
Dynamic Message Signs/Next Bus Display	27	$7,500	$202,500
Concrete Bus Pad	21	$30,000	$630,000
Stop Relocation	1	$5,000	$5,000
Subtotal			$1,170,950
Queue Jumps			
Type 1 Separate Right Turn Lane Signals and Striping	5	$65,000	$325,000
Type 2 Shared Right Turn Lane Signals and Striping	10	$60,000	$600,000
Signal Timing Configuration	15	$1,500	$22,500
Subtotal			$947,500
Transit Lane - Restriping (feet)	1,280	$25	$32,000
Total Existing Services & Facilities			$2,150,450
FUTURE BRT GUIDEWAY FACILITIES			
BRT Stations	6	$350,000	$2,100,000
BRT Transit Signal Priority			
Signal Modifications	18	$10,000	$180,000
On Board Equipment	8	$5,000	$40,000
Signal Timing Labor	18	$2,500	$45,000
System Equipment (Lump Sum)	1	$50,000	$50,000
Subtotal			$315,000
Total Future BRT Guideway Facilities			$2,415,000
TRANSIT TOTAL			$4,565,450

<u>Key Assumptions</u>

Queue Jumps - includes rewiring, loop detection installation, and signal modification. No physical improvements.

BRT Stations - includes shelters, benches, lighting, trash cans, dynamic message signs/next bus displays

BRT Signal Modification - includes new phase selectors, firmware, some existing Opticon or similar in place, with only occasional controller replacement and/or rewiring.

BRT On Board Equipment - RTMS and AVL in place.

Estimates do not include design and/or contingency, which are included in the overall program budget.

TRANSIT REPORT
APPENDIX C –TRANSIT OPERATING COST ESTIMATES

Hillcrest Operating Cost and Ridership Estimates
June 30, 2008

COST ESTIMATE

Route	Days of Operation	Hours of Operation	Freq (minutes)	Trips/ Day	Existing Trips/ Day	Added Trips/ Day	Trip Length (Miles)	Average Speed (mph)	Hours/ Trip	Hours/ Day	Days/ Year	Annual Hours	Cost/ Hour	Annual Cost	Farebox Recovery	Subsidy	Hillcrest Portion Cost	Hillcrest Portion Subsidy
120	M-F	530am-1130pm	10	216	120	96	12.5	13.4	0.93	89.6	255	22,848	$195	$4,455,360	0.35	$2,895,984	$1,247,501	$810,876
	M-F	600-900am-300-600pm	10	36	0	36	5	13.4	0.37	13.2	255	3,366	$195	$656,370	0.35	$426,641	$459,459	$298,648
Total				252	120	132						26,214		$5,111,730		$3,322,625	$1,706,960	$1,109,524
640	M-F	600am-1000pm	7.5	256	0	256	28.5	20.0	1.43	364.8	255	93,024	$195	$18,139,680	0.35	$11,790,792	$2,227,680	$1,447,992
	Sat, Sun, Holidays	600am-1000pm	7.5	256	0	256	28.5	20.0	1.43	364.8	110	40,128	$195	$7,824,960	0.35	$5,086,224	$960,960	$624,624
Total											365	133,152		$25,964,640		$16,877,016	$3,188,640	$2,072,616

RIDERSHIP ESTIMATE

Route	Pass/ Hour	Annual Hours	Total Pass	Hillcrest Pass
120	30	26,214	786,420	262,609
640	30	93,024	2,790,720	342,720

TRANSIT REPORT
APPENDIX D –TRANSIT PRIORITY TREATMENTS

TRANSIT PRIORITY TREATMENTS

This appendix provides background information on the various types of priority treatments considered for the Hillcrest Corridor.

1.0 Types of Priority Treatments

Transit priority treatments are generally unique to their environment and are directly influenced by factors such as:

- Types of transit services being implemented;
- Commuter/local
- Higher/lower ridership potential
- Vehicle types
- Availability of right-of-way;
- Type of environment in which the priority treatments are deployed:
- Suburban/Downtown
- Urban design features
- Availability of supporting systems; and
- Precedence for priority treatments in the region.

While there are many different ways to categorize transit priority treatments for purposes of Hillcrest Corridor Mobility Plan, three basic categories prove useful:

- Localized physical priority treatments – Consist of smaller scale physical improvements to the roadway network to improve transit mobility in localized areas. Usually these treatments are focused on queue jump lanes at intersection approaches or short runs of transit lanes in key areas of traffic congestion. Other localized treatments would include special access to transit centers or special signage and regulatory allowances for transit. Another example would be allowing buses to use right-turn pockets to travel through to a farside receiving lane and bypass traffic queues at intersection approaches.

- Arterial physical priority treatments – Are defined by longer stretches of dedicated transit right-of-way which are usually associated with higher frequency and ridership BRT services. There are several possible configurations such as curbside running transit lanes, median running transit lanes, and exclusive or separate transit lanes. Such treatments are often seen as a bus-based replacement or option for Light Rail Transit (LRT), and the focus is on providing a higher speed lower friction option for transit when compared with parallel auto traffic. The planned Fourth/Fifth/SR 163 Guideway is an example of this approach.

- Transit signal priority treatments – Whereas physical priority treatments are focused on bypassing areas of traffic congestion and queuing, signal priority seeks to reduce traffic signal induced delay on transit operations. Such delay is often a significant percentage of the overall delay faced by transit service in areas such as Hillcrest where persistent traffic queuing may not be present at all intersections. Transit signal priority uses information provided by systems on the buses in integration with the traffic signal system to provide some advantage to transit vehicles. Such applications are being widely planned and designed throughout San Diego, and transit signal priority has been applied on a wide scale throughout North America and the world. It should no longer be considered "cutting edge" or risky, but it does imply certain operations and maintenance commitments as with any transportation infrastructure investment.

The specifics of each of these categories are discussed in greater detail throughout the remainder of this appendix, along with the potential applicability of these treatments to the transit service improvements.

It is important to note that the implementation of transit priority treatments can offer substantial benefits as summarized in Table 1. If properly planned and implemented, transit priority treatments can provide these benefits without significant impacts to auto vehicular flows.

7

Table 1 Summary of Transit Priority Benefits by Category

Transit Priority Treatment Category	Summary of Benefits
Localized Physical Treatments	Even single physical improvements can offer substantial reductions in transit travel times during peak periods when traffic congestion and queuing is the heaviest. In general benefits include: Reduced transit travel times by reducing waiting in traffic queues; More reliable transit schedule adherence; and Improved public perception of transit as the bus receives a visible "advantage" over normal traffic.
Arterial Physical Treatments	Similar benefits to localized physical treatments but on a larger scale. In addition, arterial physical treatments provide additional benefits such as: Greater isolation of the transit operation from other traffic generates increased consistency of travel times over localized treatments due to limited impact from abnormal congestion, incidents, or cross-traffic. Provides perception of an exclusive higher level of transit service which can be similar to LRT. Allows for the extension of higher level regional services, such as highway running BRT into the local street network. Demonstrates more of permanent commitment to transit service along a particular corridor, allowing for the promotion of transit-oriented development.
Transit Signal Priority	Signal system transit priority relies on implementation across numerous signalized intersections to provide cumulative benefits, resulting in: Reduced transit travel times by reducing signal delays, and More reliable transit schedule adherence. Reduced transit operating costs in conjunction with appropriate transit service adjustments based on travel time savings.

The specifics of each of these categories are discussed in greater detail throughout the remainder of this appendix.

2.0 Localized Physical Priority Treatments

Types of Localized Physical Priority Treatments

Localized physical priority treatments vary based on the specifics of each location in which they are deployed. Often times, localized treatments are constructed in established areas where traffic congestion issues have developed which impact the mobility and travel times of transit services. This means that there are frequently right-of-way or pre-existing conditions which constrain the implementation of localized priority treatments.

Separate queue jump lanes (see Exhibit 12-6 in the main body of the report) - Most queue jump lanes are implemented as specially striped traffic lanes on one or more approaches of an intersection that allow the bus to bypass the traffic queues to reach the stop limit line. Queue jumpers are excellent applications for key areas of congestion, as they allow the bus to avoid queues at signalized intersections. A queue jumper is implemented by restriping or modifying the approach to a signalized intersection to allow for a special bus lane up to the intersection stop line. The length of the lane varies depending on the specific location, but the lane should be at least 150 feet long and 12 foot wide.

It is a three-step process:

> *Step One*: Vehicle traffic queues up at the intersection due to stop signal delay. The bus driver determines whether it is appropriate to use the queue jump lane depending on the status of the signal and level of queue.
>
> *Step Two*: The bus uses the queue jump lane (if appropriate) to move to the front of the vehicle queue and stops at the signal if red.
>
> *Step Three:* The bus receives a special indication (usually only visible to the bus in the queue jumper lane) to proceed. As a part of this special signal phase, the bus is given anywhere from a 3-5 second "jump" to proceed prior to the remaining traffic receiving a green light.

Implementation of a special receiving lane on the farside of the intersection where there is a farside stop. This usually means that the bus does not receive a "jump" from the signal, but the lane allows the bus to bypass traffic queues at the intersection.

Some regional examples:

- Queue jump in City of San Diego at Broadway and Third Avenue (existing),
- Queue jump in City of San Diego at Friars Road/Frazee Drive (existing),
- Queue jump in City of San Diego at Old Town (existing),
- Queue jumps in UTC (in design for Super Loop project), and
- Queue jump on westbound Valley Parkway/Centre City Parkway (in design for Escondido Rapid Bus project).

Queue jump from right turn lanes (see Exhibit 12-7 in the main body of the report) – Queue jump from a shared right turn lane can be implemented where very low right turn volumes are present in the dedicated right turn lane. This assumes sufficient curb-to-curb on the farside of the intersection to allow the bus to safely merge into traffic. Often times the bus will jump from the right turn lane and enter a small receiving area where a station platform exists. Also, this assumes that the right turn lane is sufficiently long enough to allow the bus to enter the right turn lane and bypass the traffic queue on the thru lanes. This physical treatment is widely applied throughout North America, but it has not been implemented in San Diego County. Generally, this approach works well where the legal requirement is for traffic to yield to the bus, such as is the case in New York City.

Some regional examples:

- No regional examples exist or are currently in design.

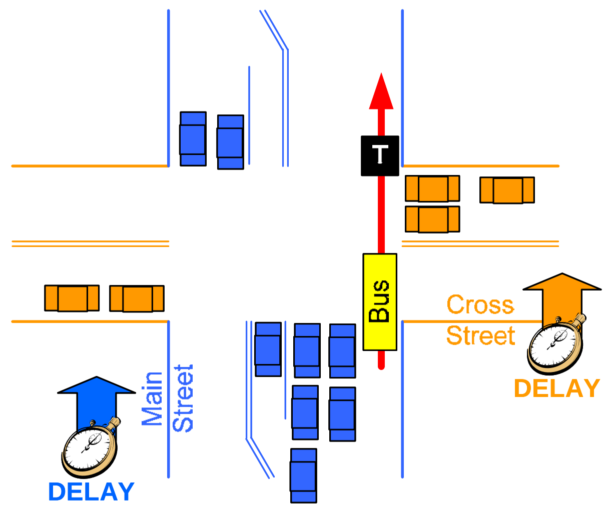
Queue jumps from right turn lanes have been in operation for several years in York Region, ON, and Vancouver, BC Canada. In addition, such measures have been implemented in U.S. cities such as Portland.

Short transit lanes – Short transit lanes are very similar to longer curbside running transit lanes, but as the name implies they only exist over a short segment of roadway. These lanes are frequently used to provide transit priority over a block or series of blocks where traffic queues are prominent and the end of the transit lane would provide access to benefit the bus. For example, short transit lanes frequently are used on approaches to freeway ramps or direct access ramps to speed transit movements onto specialized transit freeway facilities. These short lanes can be implemented as extensions of upstream queue jumps. For example, the transit lane currently in design for the Escondido Rapid Bus runs from a westbound queue jump on Valley Parkway between Centre City Parkway and Quince Street. This short lane will provide priority access for buses as they approach the Escondido Transit Center. This kind of lane is proposed for Fifth Avenue between Pennsylvania and University Avenues.

Some regional examples:

- SR 163 NB from Eleventh Avenue in Downtown San Diego (existing).
- Escondido Rapid Bus between Centre City Parkway/Valley Parkway (in design).

Special transit access – Similar to queue jump lanes in many cases, special localized transit lanes or access is often provided to ease transit mobility and bus movements into and out of transit centers and transit guideways. These kind of treatments may be included in the planned Fourth/Fifth/SR



163 Guideway.

Some regional examples:

- o Eastbound Rosecrans Street to Old Town Transit Center (existing).
- o South Bay BRT median station access points at various Village Centers (existing).

All of the localized priority treatments fall into one of two types of interactions at intersections:

- o No special phases – Where the bus receives only the traditional green indication with the thru traffic. This assumes a sufficient receiving lane is available on the farside of the intersection to allow the bus to move safely through the intersection and merge on the far side. Under this scenario there is no additional delay to traffic on the main or cross street.

- o Special signal queue jump phase – Where the bus receives a few second jump (usually 3-5 seconds) over the other thru traffic. This jump allows the bus to get in front of the other thru traffic and merge safely on the farside of the intersection. This is demonstrated in the small exhibit above, and such an implementation does result in a slight increase in delay to both the cross-street (due to the addition of a conflicting signal phase) and to the thru traffic.

Overall, as traffic impacts tend to be minimal and occur only across a single signal cycle, transit priority measures should not significantly impact normal traffic flow if properly designed and configured. When compared with transit signal priority, the potential traffic impacts of physical treatments are substantially less; however, the cost and other implementation impacts of queue jump implementation are more substantial than TSP.

Other potential traffic issues and impacts related to localized physical treatments are quite location and design specific; however, they include such issues as:

<u>Driveway access issues and potential conflicts</u> – Sometimes queue jump lanes represent a visual and striped barrier to driveway access wishing to reach thru lanes. This issue can be dealt with in design through determination of the specific striping and signage for the queue jump lane, as well as assessing the most effective length of the lane in balancing the extent of potential conflicts and the length of traffic queues.

<u>Accommodation of right-turn lane access near queue jump lanes</u> – Similar to driveway access conflicts, queue jump lanes can sometimes generate barriers to thru traffic wishing to reach right-turn lanes or vice versa. Proper striping and design can mitigate these concerns. Sometimes it is appropriate to start a longer queue jump lane with broken striping and work towards more solid striping with chevrons as you approach the intersection. This can be combined with "bus and local access traffic only" markings early in the queue jump lane followed by bus only lane closer to the intersection.

Potential for parking impacts and conflicts – In some urban areas queue jump lanes may exist in proximity to on-street parking. A balance must be achieved between providing on-street parking and ensuring reduced conflict potential with vehicles that may be entering/exiting on-street parking spaces. On-street parking maneuvers have the potential to significantly limit the benefit of a queue jump lane in high parking turnover areas. It is suggested that on-street parking not be allowed adjacent to queue jump lanes, except where no other viable options exist (e.g., the queue jump lane is a shared right-turn lane).

Accommodation of bicycle lanes in conjunction with queue jumps – In areas where curb-to-curb widths or right-of-way is constrained, there is increasing potential conflict between desired bicycle lanes/facilities and transit priority treatments. Some cities such as Portland and Vancouver have been experimenting with shared bicycle/transit lanes to avoid this conflict. In general, such lanes should be 14 feet wide and should only be placed along slower speed streets (less than 35 mph). In higher speed areas, it is recommended that bicycle lanes be maintained separate from transit lanes or queue jumps.

Ensuring clear signage, striping, and visibility – Many queue jumps look like traditional lanes of traffic and are simply marked as bus only. Such markings are often overlooked by motorists, and it is suggested that chevrons and other barrier style markings be used to clearly define bus only lanes. Where carpool lanes are shared with transit, the lanes should be marked with the traditional "diamond" along with "buses and carpools ok". Overhead signage should be included on intersection mast arms were appropriate to reinforce pavement markings. Raised pavement markings may be appropriate in some circumstances, but bollards have not proven effective as they are frequently knocked down. As shown in Exhibit 1 of this Appendix, the latest version of MUTCD has called for a more traditional "rail bar" signal indication for queue jump lanes. This will replace the more commonly used "T" signal indication. To limit the potential for motorist confusion, the queue jump indication should only be visible to buses in the queue jump lane, and it should be white to avoid confusion with other signal indications.

Maintenance of queue jump loops and equipment – The implementation of a queue jump lane does require the construction of additional loops, and in some cases replacement of the controller firmware. Loops in the queue jump lane should be set to only recognize larger vehicles. Experience indicates that queue jump lanes represent very minimal additional maintenance, but queue jump signal indications and loops should be checked when all other signal indicators are checked as part of the regular maintenance audit cycle.

2.1 Arterial Physical Priority Treatments

Types of Arterial Physical Priority Treatments

Arterial physical priority treatments represent a much more substantial investment in transit priority. They can be generally categorized into three types:

Curbside running transit lanes –Curbside running transit lanes are at least 12 feet wide (sometimes 14 feet wide if right-of-way permits). On-street parking is sometimes allowed during off-peak periods in transit lanes, or sometimes on-street parking existing curbside adjacent to the transit lanes. The configuration shown in Exhibit 5 is for example purposes only, but it can also be applied to short transit only lanes discussed in Section 2.2. Local access and sometimes right turn traffic is allowed to enter the transit lanes for a short period.

Some regional examples:

- o Curbside transit lanes are proposed for the South Bay BRT in the Eastern Urban Center with adjacent on-street parking lanes.

<u>Median running transit lanes</u> –Median running transit lanes approximate an at-grade LRT system. Usually such lanes are combined to create a separate median transitway which is fully separated from normal traffic by a raised barrier or landscaped median. Such lanes are typically 12 feet wide, although narrower lanes have been utilized in some cases. Ten foot wide lanes are possible should some form of automated guidance be in place, however the region has not made a determination on using such guidance so a minimum of 11 feet is recommended.

Some regional examples:

- o Median running transit lanes are proposed for the South Bay BRT along Palomar Street.

<u>Transit only facilities or transit promenades</u> – Several examples of transit only facilities (some mixed with pedestrian or bicycle facilities) are illustrated in Appendix A. Transit only facilities or transit promenades allow transit direct access to the heart of activity centers, similar to LRT, without many of the traffic conflicts associated with other arterial physical priority treatments. Transit promenades represent an excellent opportunity to generate excellent connectivity between Village 9, the university site, and the planned research/technology park. Such a facility could generate an environment conducive to non-auto mobility in the university which is well suited to the high pedestrian volumes and also to internal university circulators.

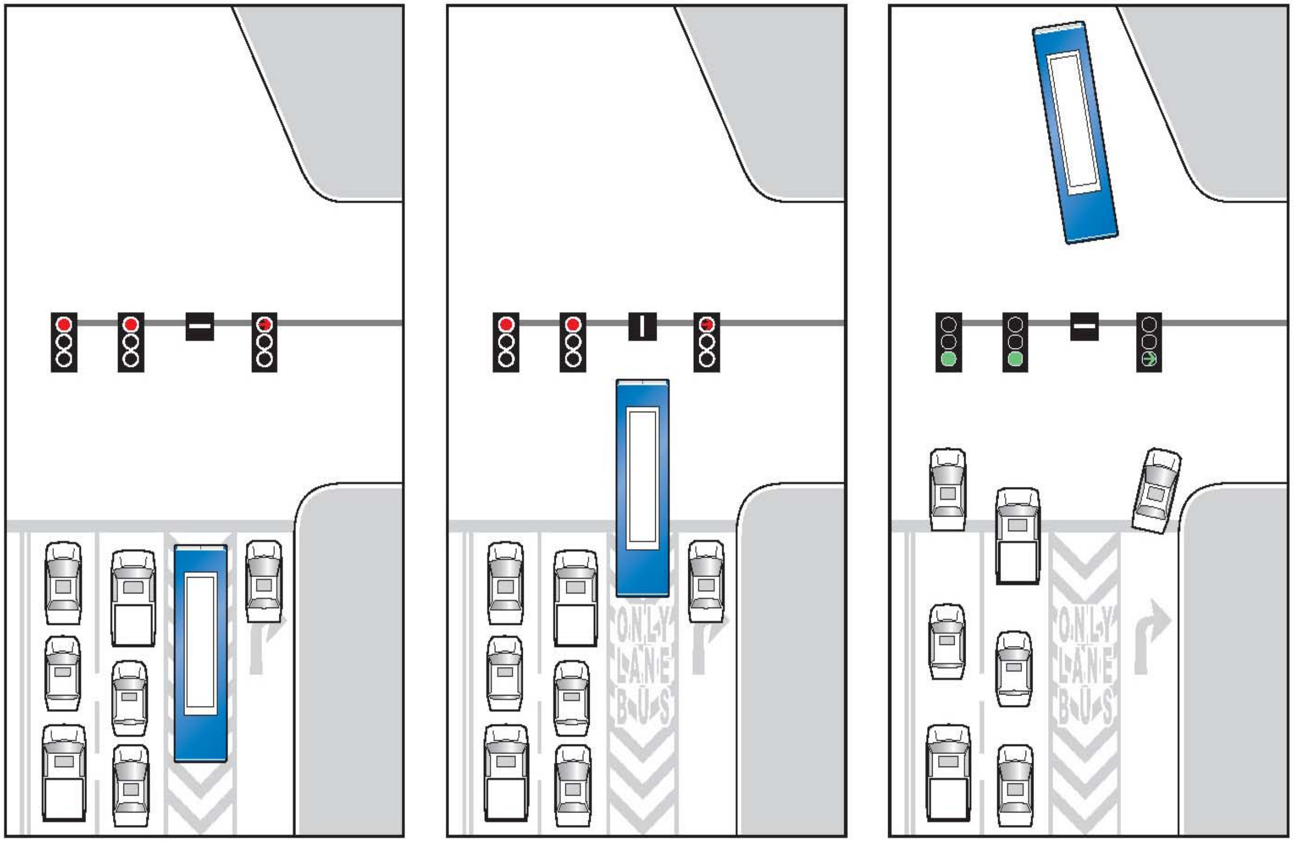
Some regional examples:

- o Transit only lanes/guideway are planned for the Fourth/Fifth/SR 163 Guideway and South Bay.

The potential traffic issues and impacts related to arterial physical priority treatments are similar to localized priority treatments except that they occur over a greater potential distance. In summary these potential impacts include:

- o Driveway access issues and potential conflicts.
- o Accommodation of right-turn lane access for curbside running lanes.
- o Potential for parking impacts and conflicts for curbside running lanes.
- o Accommodation of bicycle lanes in conjunction with curbside running lanes or in light of the curb-to-curb requirements of median running lanes.
- o Ensuring clear signage, striping, and visibility.
- o Maintenance of lanes and equipment including traditional activities such as lane detector loop maintenance and street sweeping.

Figure 1 Queue Jump Process



Stage 1: Arrival "Bypass the Queue"   Stage 2: Jump "Get a Head Start"   Stage 3: Resume "Back to Normal"

Not to Scale

2.3 Transit Signal Priority

After much analysis and discussion with the project working group, it was decided to focus the transit improvements in the Hillcrest Corridor on queue jumps and a short transit lane on Fifth Avenue. Though not included in the short and medium term recommendations, transit signal priority is likely with the Fourth/Fifth/SR 163 Guideway. This section addresses the potential methods and application of transit signal priority (TSP) treatments for this facility.

Regional Approach and Supporting Systems

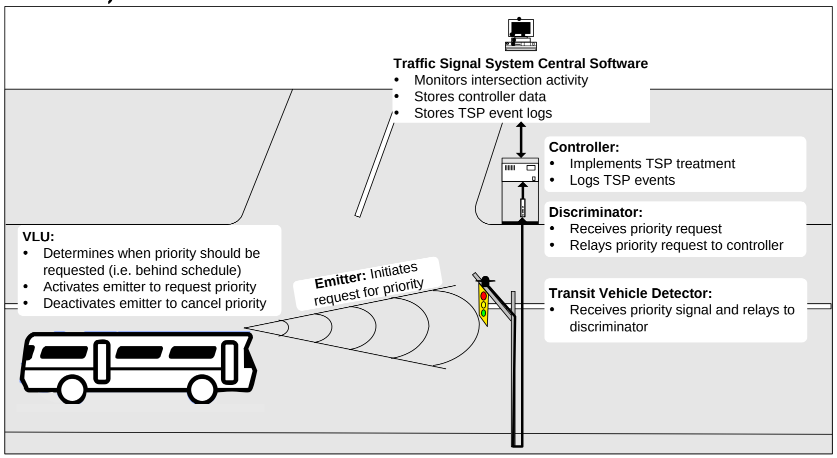
The implementation of TSP in Hillcrest has the advantage of other BRT and Rapid Bus projects having promoted a regional decision regarding implementation methods for TSP. The TSP system selected by the region includes three main components:

- Transit Management System (TMS), which includes the Vehicle Logic Unit (VLU) – In San Diego this system is called the Regional Transit Management System (RTMS) and all San Diego Transit Corporation buses are deployed with this system (as will be any new buses for BRT or Rapid Bus services).
- Traffic Signal Control System (TSCS), including central software and local controller.
- Transit vehicle detection system – The region has selected to use an optical based priority emitter to communicate between the bus and the signal.

In the distributed traffic signal control system model selected by the San Diego region for TSP (as presented in Exhibit 2) all TSP functionality resides in the local controller, with the central software acting as a database for TSP parameters, event logging, and monitoring purposes. The traffic signal control system architecture does not dictate the performance of the TSP. Rather the TSP performance is dictated by the TSP functionality offered by a particular vendor, in this case McCain.

With respect to transit vehicle detection a traditional optical priority emitter (Opticom or Tomar) has been selected to support communications from the bus to the signal. This is consistent with the emergency pre-emption system utilized in the City, and the addition of TSP does not require additional equipment. It is recommended that TSP enabled intersections be converted or deployed with Series 700 phase selector cards, receivers, etc.

Exhibit 2 Overview of a TSP System (Distributed Traffic Signal Control)



TSP involves permanent (passive) or temporary (active) modifications to the operation of a traffic control signal in order to provide priority to transit vehicles at an intersection. These two techniques are described below.

Passive Transit Priority – is a low-tech transit signal priority solution that does not adjust the signal settings in response to the presence of a transit vehicle. Signal settings (i.e. offset and green split) are developed to favor transit vehicles by considering the operating characteristics of the transit vehicle. Geometric treatments (i.e., bus stop relocation, taper length modifications, parking/stoppage restrictions, queue jump lanes, etc.) can also provide "passive" priority to buses.

Passive transit priority strategies do not require monitoring and/or detection of transit vehicles, and can therefore be implemented anywhere – when warranted. This approach to transit priority produces consistent signal operation for vehicle traffic while increasing the efficiency of transit operations for the given traffic constraints. However, changes in regular signal timing plans can be of limited value because transit vehicles can still arrive during the red interval due to variations in travel time, while the priority based green phases can delay the cross-street vehicles regardless of the presence of a transit vehicle.

Active Transit Priority –Active transit priority causes regular operation of traffic signals to be altered temporarily in response to the presence of transit vehicle. A transit vehicle detection system is used to identify the transit vehicle in mixed traffic.

The application of active transit priority on a regular basis can be disruptive to competing traffic movements. For this reason, active priority for transit vehicles has been divided into two categories, namely unconditional or conditional.

Generally, signal priority is unconditional if it is granted every time a transit vehicle is detected approaching a signalized intersection. Signal priority is conditional if only granted when additional conditions are met, such as schedule adherence, passenger load, etc. Conditional active transit priority requires increased system sophistication in order to determine whether the additional conditions have been met prior to granting priority. The regionally selected method for establishing TSP will support either approach.

Specific Transit Signal Priority Options and Considerations
TSP is based on a basic "request/grant" approach where the transit vehicle requests priority (this is termed "check-in") and the signal determines whether or not to grant priority. Once the transit vehicle clears the intersection, the emitter vehicle signal is no longer detected and the request for priority to the signal controller is dropped (this is termed "check-out"). The ultimate decision of whether or not to grant signal priority is always maintained on the signal side of the system.

As a transit vehicle approaches a signalized intersection, "Check-In" occurs, which begins the TSP Sequence. There are many TSP Sequences that may be used, and are implemented on a site-specific application. The TSP Sequence functionality required for a specific application is driven by several factors including:

- The TSP functionality offered by the traffic signal control system;
- The transit vehicle detection functionality;
- The VLU functionality;
- The position of the transit stop, nearside, farside, or upstream of the signalized intersection;
- The use of passive priority techniques such as queue jump lanes.

It is important to note that condition TSP is controlled by a number of factors, some of which are set on the bus and others which are controlled from the signal:

- Vehicle location – The bus requesting priority must be traveling on its assigned route.
- Schedule adherence – The bus must be behind schedule by a pre-configured amount of time (usually 2-3 minutes).
- Time of day/day of week – Sometimes specific times of day will be configured to either allow for greater or more restricted transit priority.
- Duration since last priority request granted – Signal controllers may be set to only grant a request if it has been a pre-configured time since the last request was granted. Sometimes this is stated as the number of cycles, and other times as a set time limit.
- Phase of the signal – The signal must be at an appropriate location to grant the priority request. For example, a request for an early green will not be granted if the signal is about to turn green in any event. In addition, very short cycle lengths and/or frequent pedestrian activations can limit the opportunities for granting transit signal priority.
- Presence of emergency vehicles – Emergency vehicles requesting "emergency pre-emption" always take priority over transit priority requests.

Each of the above factors can be influenced by specific conditions at individual intersections, as well as overall policy

regarding transit signal priority. At particularly busy intersections, these factors can be used in combination to limit the potential for transit priority having a noticeable impact on vehicular traffic.
In most applications the TSP sequence operates on a first-come, first-serve basis. TSP Sequences include: coordinated (maintain the main-street start of green offset and cycle length, or start main-street green early, but maintain the cycle length), free-mode operations (no offset or cycle length) and real-time control strategies. Possible TSP Sequences include:

- Green Extension;
- Early Phase Activation;
- Lift Strategy;
- Special Transit Phase;
- Phase Rotation;
- TSP in the non-coordinated phase (phases 4 and 8); and
- Free Mode TSP operation.

The controller firmware to be utilized by the region (BITran 233 RV2F and 233 RV3) is currently undergoing bench testing to determine which of these functions that it will support. It is known that these firmwares will support green extension and early phase activation (or early green). It is important to note that the following provides a general description of the functionality. Exhibit 3 presents a coordinated TSP sequence where the basic pattern (i.e., cycle length, offset and phase splits) is not interrupted, since the transit vehicle Check-In and Check-Out occurs within the coordinated main street green phase (i.e., phase 2 and 6) and transit vehicle phase.

Exhibit 8 also presents the minimum duration, extensible portion and clearance duration for phases 1 through 8 for a typical 8-phase dual ring configuration. This basic exhibit will be used to depict the remaining coordinated active priority TSP Sequences.

Exhibit 3 No Modifications to Green Splits

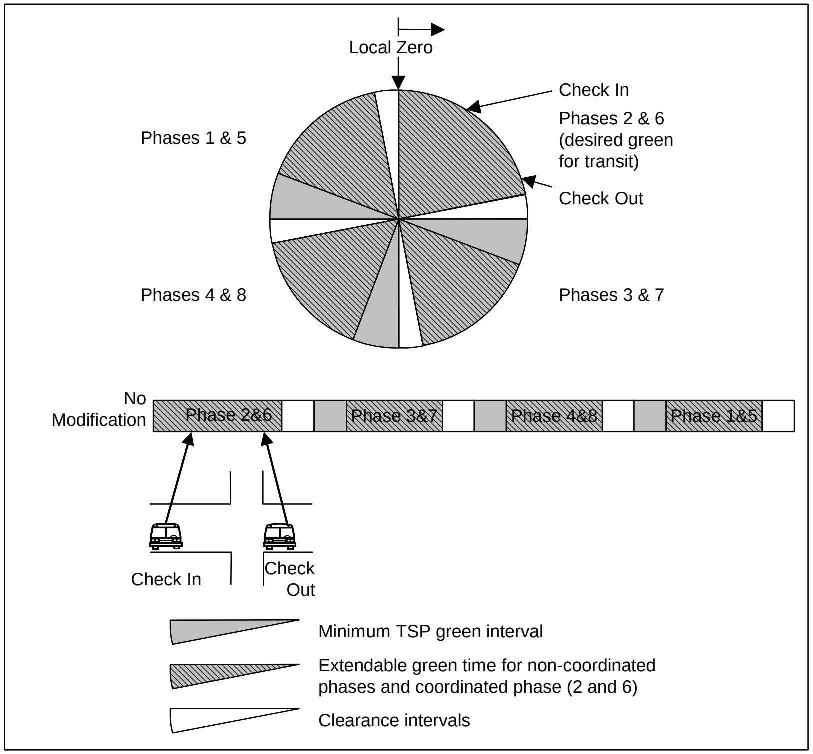
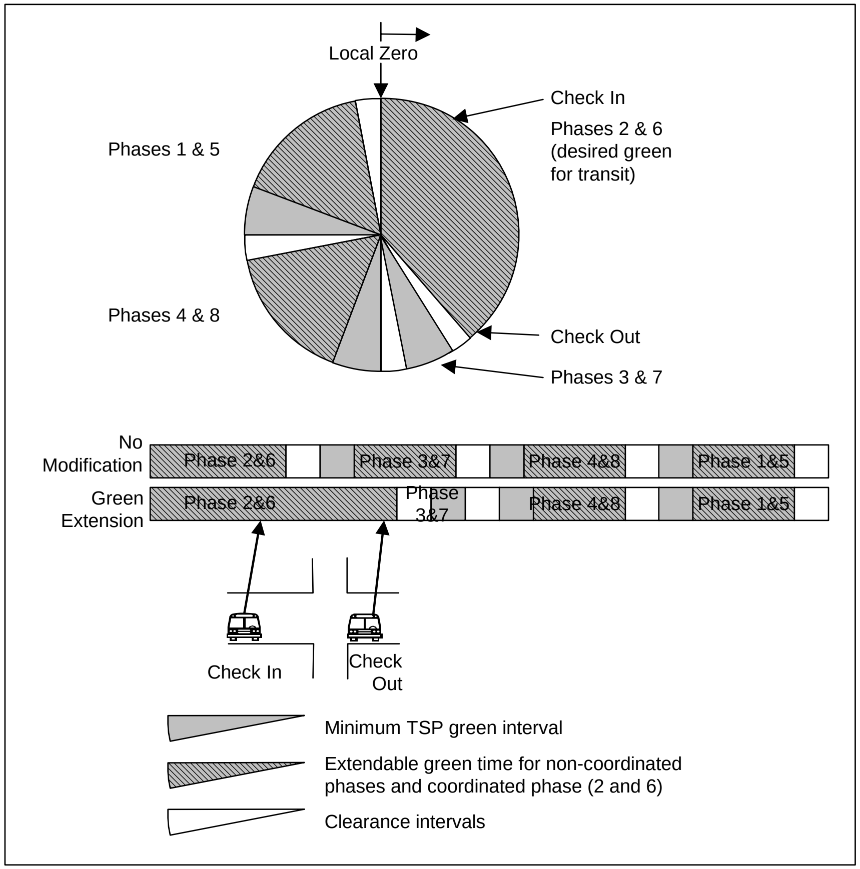


Exhibit 4 presents a green extension coordinated TSP sequence where the cycle length and offset are maintained, but the transit phase (phases 2 and 6) is extended to progress the transit vehicle through the signalized intersection. This is one of the more commonly used TSP sequences. Under the green extension coordinated TSP sequence, all non-transit phases must be serviced based on their minimum TSP green duration. The minimum TSP green duration is independent of the minimum green duration entered in the controller, but must be equal to or greater than the minimum green duration. As a result, the maximum permissible transit phase extension is the sum of the extensible portion of the non-transit phase minimum TSP green duration and clearance duration. Typically a maximum TSP sequence duration is programmed that will timeout the TSP sequence in order to service the non-transit phases within their programmed minimum TSP green durations. When the transit phase is extended less than its maximum permissible duration, time is removed from the following non-transit phases. Typically each successive phase operates at its minimum TSP green duration until the regular sequence is established.

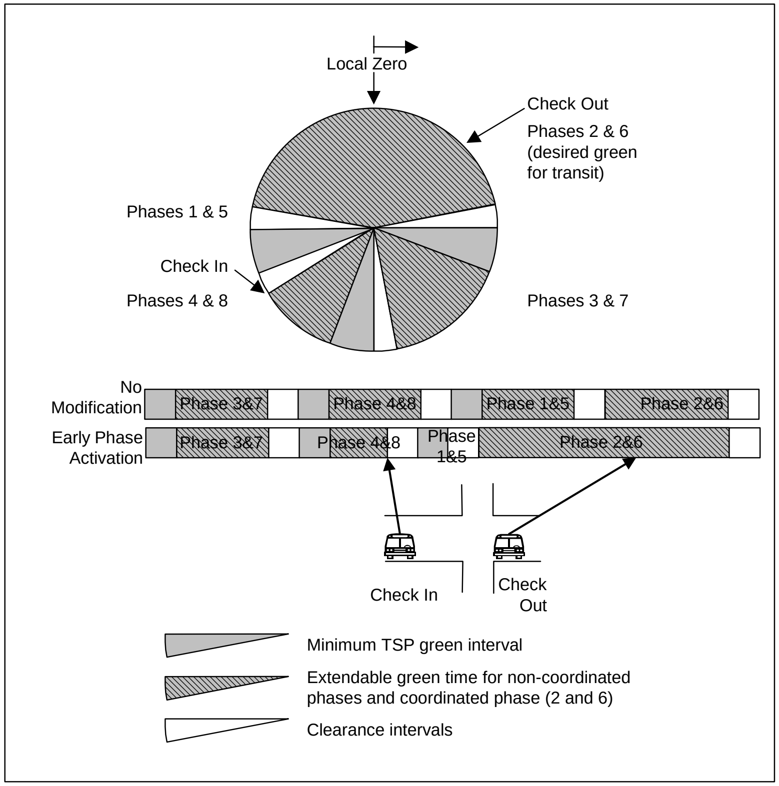
Exhibit 4 Green Extension



An important consideration with the green extension sequence is the recovery from the TSP to reach the local zero. As presented in Exhibit 4, the maximum extensible time is removed from each phase following the transit phase until the extension time is made up. A more elegant recovery approach distributes a portion of the extensible time from all the remaining phases. The exact method of recovery for the regionally selected controller firmware is currently being assessed.

Exhibit 5 presents an early phase activation coordinated TSP sequence where the cycle length is maintained, but the transit phase for the current cycle starts early. This is one of the more commonly used TSP sequences. Under this scenario the non-transit green phases may be truncated to their minimum TSP green duration in order to return to the transit green phase as early as possible (not unlike a cycle with early termination of actuated phases). Once the transit vehicle is serviced, the transit green phase will terminate at its normal point in the cycle, and the following non-transit phases will be serviced according to there programmed split durations, returning into coordination in the following cycle.

Exhibit 5 Early Phase Activation



Stop Locations in Relation to TSP Enabled Signals

The following describes the specific TSP strategy that are used at signalized intersections without transit stops, with far side stops and with near side stops. Green extension and early green are the TSP strategies that are implemented. Typically the TSP green extension will occur in a green and don't walk display, which will follow the green and walk, and green and flashing don't walk display.

No Stop - Green extension and red truncation strategies are applied to signalized intersections without transit stops. The transit vehicle priority request is determined by the VLU based on schedule adherence.

The objective of the green extension strategy is to progress the transit vehicle through the signalized intersection without stopping. The green extension duration is translated into a check-in distance upstream from the signalized intersection, based on a peak period transit vehicle operating speed. Check-in distance is adjusted by setting the signal strength at which the signal phase selector will consider the TSP request valid.

Far Side Stop - The TSP strategy at far side stop locations mirrors the TSP strategy at no stop signalized intersections.

Without transit priority, near side stops are more efficient for transit operations since a portion of the transit vehicle stop time at the signalized intersection is combined with passenger boarding and alighting. The uncertainty of the transit vehicle stopping at near side bus stops complicates the TSP process. For this reason, the request for TSP at signalized intersections with far side stops should not be controlled by the schedule adherence calculation in the VLU, but rather be actively implemented for the approaching transit vehicle.

Near Side Stop - At signalized intersections with near side stops the underlying assumption is that the transit vehicle will stop. The stop point will be used as the check-in location for priority request. On the controller side the green extension time should be sufficient (e.g. 5 seconds) to allow enough time for the transit vehicle to accelerate and clear the signalized intersection. However the early green time should be maximized to the extent possible to return of green to the transit vehicle. Should it be determined that the transit vehicle most frequently does not stop at the near-side stop, then implementing TSP as in a no-stop situation should be considered in order to maximize benefits.

Potential Impacts to Traffic Operations

Generally the potential for traffic impacts due to TSP have proven to be far lower than was originally anticipated. While it was not possible to analyze the specific traffic impacts for the Fourth/Fifth/SR 153 Guideway, it is possible to speak to the potential for impacts under different circumstances. It should be noted that given the regional model for TSP implementation it is always possible to reduce or even eliminate any impacts of TSP by adjusting the TSP configuration on the signal side of the system.

The data required to assess the potential for traffic impacts for TSP at signalized intersections are as follows:

- o Intersection location information;
- o Transit stop details (location far, near, no stop);
- o Signal timing information by time of day/timing period;
- o Pedestrian volumes by time of day/timing period;
- o Signal operations analysis results by time of day/timing period; and
- o Number of transit vehicles likely to pass thru the intersection within one hour (not that under condition priority that many of these buses may not request priority).

The potential factors influencing impacts are (in order from highest order to lowest order):

a. AM or PM

The traffic flow during the AM peak period can be quite different from during the PM peak period, particularly on routes traveling to/away from urban core.

b. Bus Thru Movement or Turning Movement

If the bus is turning at an intersection then the TSP strategy must be developed specific for this movement.

c. Bus Route (Eastbound/Westbound or Northbound/Southbound)

It is important to identify the bus routes for the major corridors. The reason for this being each direction has different characteristics during different time periods, and at stop locations may have different stop treatments.

d. Intersection Classification

If the intersection cross street has two or more through lanes, then it is classified as a major cross street (i.e. major/major intersection). If the intersection cross street has only one through lane, then it is classified as a minor cross street (i.e. major/minor intersection). For the intersections that have transit turning movements, this factor is omitted.

e. Stop Locations (Near side, Far side, or No stop)

Stop locations vary at each intersections, by direction. It is necessary to determine whether it is a near side stop, far side stop, or simply no stop.

f. Intersection Level of Service

The intersection Level of Service (LOS) is divided into two categories: equal to or better than LOS C and equal to and worse than LOS D. Poorer levels of service indicate that these intersections are likely to be more difficult when applying TSP as there is less flexibility in extending/shifting signal times.

Given the above factors, Table 2 provides an example of what levels of TSP may be applied (in seconds). This should only be viewed as a starting point, as volumes on cross-streets and the specific of existing signal timing can have a substantial influence on how impactful TSP may be. For example, if cross-street volumes are very low, green extensions can be much longer without any significant impact to overall intersection operations. It is important to understand that as with signal timing and coordination efforts, that TSP is a process of model, implement, observe, and refine. Experience has shown that if TSP is properly refined it can provide substantial benefits to transit without noticeable impacts to other traffic given the sorts of parameters identified in Table 4.

Table 2 Example TSP Guidelines and Parameter Settings

TSP Guideline	Decision	Green Extension		Early Green		TSP Re-service (minutes)
		Low	High	Low	High	
Intersection Classification	Major/Major	Max 10	Max 15	Max 10	Max 15	5
	Major/Minor	15	20	15	20	2
Intersection LOS	C or Better	-	-	-	-	2
	D or Worse	5	10	5	10	5
Transit Stop	Far Side	-	-	-	-	Unconditional
	Near Side	5	5	-	-	Conditional
	No Stop	-	-	-	-	Conditional

While the specific quantitative impacts are difficult to assess for the study area, a qualitative assessment for transit priority measures is relatively straight-forward. The diagrams presented below provide an overview of the traffic impacts typically associated with standard TSP.

TSP On Through Movement – Where the bus is traveling along the major street (with the greater volume of traffic) and moving with this traffic thru a signalized intersection with TSP activated. Under this situation, traffic delay for the major street thru movements tends to drop somewhat, while the side-street traffic delay increases. This is because the extra green time received by the bus to clear the intersection also helps a few more cars on the major street get through. It is not uncommon for the overall average delay at the intersection to improve slightly when TSP is active if the side-street volumes are significantly lower than the major street volumes.

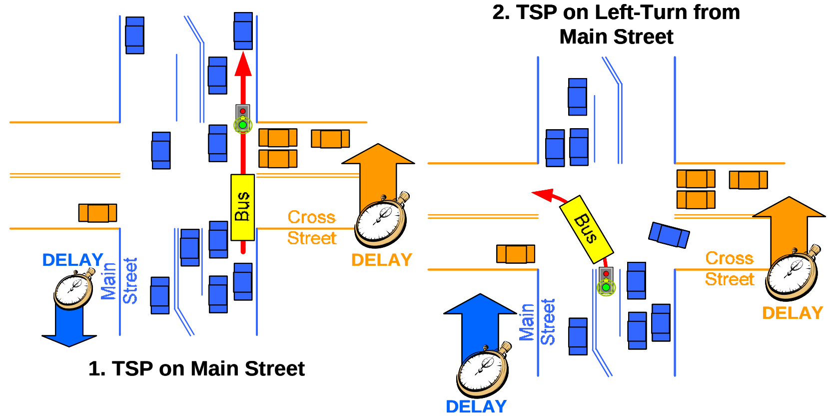
TSP On Left-Turn Movement – Where the bus is making a left-turn from the major street to the side-street with TSP active. In this situation, the extra green time provided to the bus generates minor increases in delay for major and side-street traffic. In general, this will cause modest increases in average intersection delay for those signal cycles when the bus is granted priority.

Given operational experience over the past couple of years, confidence is extremely high that TSP can prove very effective with limited impacts.

Maintenance and Operations Considerations for TSP Enabled Intersection

Many agencies become concerned about the maintenance and traffic signal operations implications of TSP. SANDAG has undertaken a regional coordination effort to assess policies and approaches that are best suited to dealing with BRT and Rapid Bus implementations in the region. It is recommended that the findings of this effort be used as appropriate for the Fourth/Fifth/SR 163 Guideway when it is implemented. Generally, the local agency requirements for maintenance of TSP operations are not excessive and include:

Regular signal monitoring and maintenance – Already part of the City of San Diego's signal operations and maintenance efforts.



Monitoring and maintenance of the TSP receivers, phase selectors, etc. – As the City of San Diego already uses this system for emergency pre-emption, this does not represent additional maintenance activity.

Ensuring TSP settings are maintained if controllers are swapped or adjusted – When timings are adjusted or settings changed in the controller, the City would need to ensure that any TSP settings are maintained or re-entered. Usually the TSP settings are included right in the controller cabinet for ease of re-entry.

Communications and coordination with the transit operator – It is useful to work closely with the transit operator to address issues as they may arise and provide occasional reports on TSP requests and activations. It is also anticipated that they transit operator would share their settings and information with the City. Such coordination should require only an hour or two of staff time per month once processes are in place.
\
Initial TSP setup and configuration – Generally, the initial setup of TSP is done as part of the transit service and priority treatments implementation. This work is generally contracted out, however it is usually the local city that inputs any TSP settings into the actual controllers. Also there is staff time involved in participating in the project, overseeing contractor activities, etc, but these efforts are generally over a shorter period of time.

3.0 Recommendations for the Hillcrest Corridor

The Hillcrest Corridor is relatively short at 3.5 miles and the transit routes serving it are parts of longer regional and local services. As a result, spot treatments are the most appropriate to reduce travel time at specific congested locations. Two types of priority treatments are recommended for the Hillcrest Corridor.

Queue Jumps – these facilities will enhance transit travel through congested intersections. They will be provided at numerous locations on Fourth and Fifth Avenues.

Fifth Avenue Transit Lane – this two plus block long exclusive transit lane between Pennsylvania and University Avenues will provide a significant decrease in travel time through this congested segment. It will enable quick access for buses to the key stop at Fifth and University Avenues.


HILLCREST