SAFE ROUTES TO DOWNTOWN LOS ALTOS ACROSS FOOTHILL EXPRESSWAY

Existing Conditions, Best Practices and Initial Concepts

June 2014

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1 INTRODUCTION

STUDY OVERVIEW

The *Safe Routes to Downtown Los Altos* study was undertaken to:

1. Evaluate access to downtown via crossings of Foothill Expressway at Main Street and West Edith Avenue, with particular attention to current constraints to pedestrian and bicycle circulation across Foothill at those two locations; and
2. Recommend potential access improvements to these intersections and the vicinity to improve connections for walking and bicycling trips between downtown Los Altos and adjacent neighborhoods, schools, and parks.

The two key study intersections are shown in Figure 1-1:

- Foothill Expressway & West Edith Avenue
- Foothill Expressway & Main Street

The study is led by the Passerelle Investment Company with an emphasis on community collaboration between the affected cities, residents and County. The County owns and operates Foothill Expressway and the City of Los Altos owns the land on either side of the Expressway. Passerelle owns commercial property in the downtown triangle and is funding this study in recognition of the fact that the continued success of downtown Los Altos depends on safe and convenient access by visitors of all ages and by all modes.

This study is also intended to complement the County of Santa Clara's *Countywide Expressway Plan 2040 Study*, currently underway. Recommendations from the *Safe Routes to Downtown Los Altos* study that garner support from community residents and merchants, technical staff from the relevant agencies, and civic leadership can serve as input to the larger countywide planning effort. Those recommendations that affect the design or operations of Foothill Expressway would be better positioned for implementation by the local, regional, and state transportation agencies if they are incorporated in and aligned with the Countywide *Expressway Plan 2040*.

PURPOSE OF THIS REPORT

The purpose of this report is to:

- Present an assessment of current bicycling, pedestrian and traffic conditions crossing Foothill Expressway into Downtown Los Altos, focusing on the intersections of West Edith Avenue and Main Street.
- Provide preliminary recommendations, and a toolbox of potential improvement options, to enhance bicycling and pedestrian crossing conditions at these two intersections.

What this Report Contains

This report contains the following:

- **Project overview** including key goals (Chapter 1)
- **Project setting** including, land use context, community priorities, and policy framework (Chapter 2)
- **Existing conditions** assessment for pedestrians, bicyclists, and motorists (Chapter 3)
- Examples of **best practices** for potential improvement options (Chapter 4); and
- **Initial design concepts** for consideration (Chapter 5)

Photo Source: Passerelle Investment Company

A key goal of the study is to identify potential design treatments to improve downtown access across Foothill Expressway, particularly on foot –pedestrians currently must cross seven motor vehicle lanes (including turn lanes) before reaching downtown.

Figure 1-1 Downtown Core & Study Intersections

Source: Passerelle Investment Company, annotated by Nelson\Nygaard

The study focuses on crossings of Foothill Expressway at West Edith Avenue and Main Street – two key gateways to downtown Los Altos that connect neighborhoods, businesses and schools on both sides of the expressway.

Figure 1-2 Foothill Expressway Intersections with West Edith Avenue & Main Street

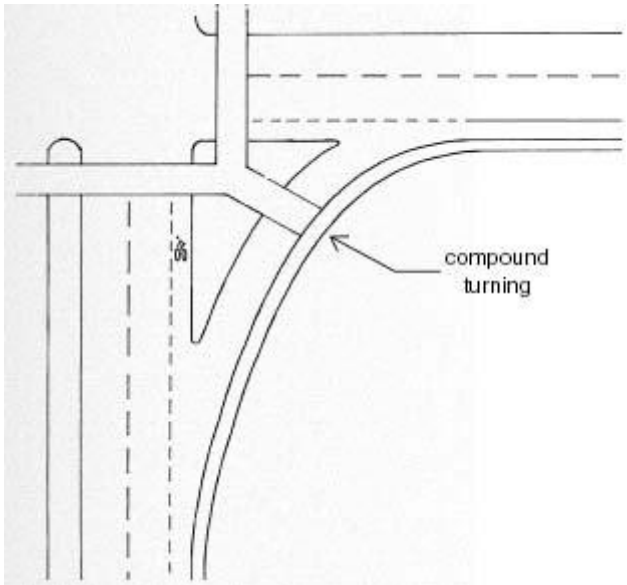
Foothill Expressway & West Edith Ave

Foothill Expressway & Main Street

ISSUES & CHALLENGES

Key access issues and constraints that are the focus of this study are summarized below:

- **Limited access to downtown Los Altos across Foothill Expressway:** Bicycle and pedestrian access, comfort, and perceived safety are compromised by the current design of the intersections of West Edith Ave./Foothill Expressway and Main St./Foothill Expressway. Pedestrian access is affected by a) free right turn slip lanes, b) minimal crosswalk treatments, and c) discontinuous sidewalks.
- **Non-conforming design:** The current design of the Foothill Expressway intersections with West Edith Avenue and Main Street – two key streets that connect adjacent neighborhoods with downtown -- is not in keeping current policy framework or community priorities (based on adopted City policies summarized in Chapter 2) , and does not adhere to current best practices in multimodal street design. Modernized right-turn slip-lane designs provide a compound curve and narrowest possible lane width to reduce speeds through the slip lane, and provide an approach angle that makes it easier for drivers and pedestrians to see each other.



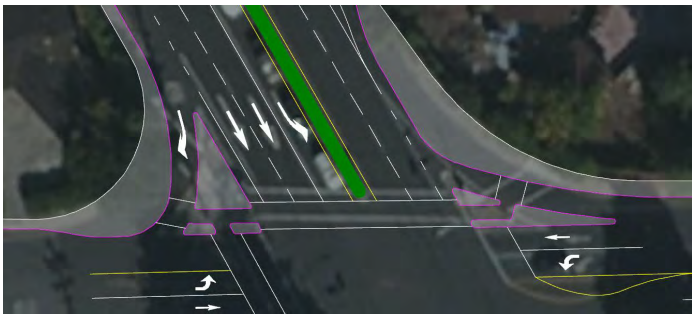
Example of a modernized slip-lane design with a reduced radius, compound curve and narrowest possible lane width - to reduce vehicle speed and provide an approach angle that makes it easier for drivers and pedestrians to see each other.

KEY GOALS

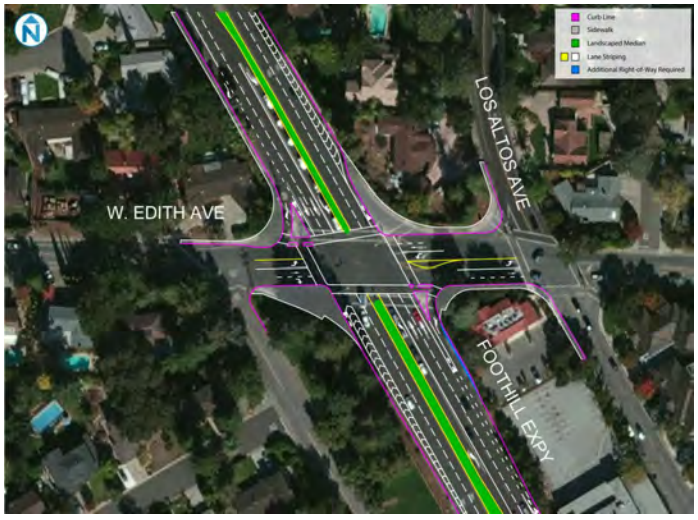
Key goals of this study are to:

- **Identify a range of potential access improvement options for crossing Foothill Expressway:** There are a number of strategies to improve access to downtown across Foothill Expressway that could potentially be implemented,. (See Chapter 3 for best practices and initial concepts).
- **Identification of improvement types and "best practices" that contribute to a wide spectrum of co-benefits:** In addition to primary benefits of improved bike/pedestrian access, potential co-benefits include increased downtown economic activity and reduced downtown auto congestion and parking deficits.

Concept 1 - removal of "free right-turn" slip lanes.



Concept 2 - redesign of right-turn slip-lanes.



Concept 3 – hybrid option with removal of two "free-right-turn" slip lanes and redesign of two right-turn slip-lanes.

2 SETTING & CONTEXT

FOOTHILL EXPRESSWAY CONTEXT

Foothill Expressway is 7.3 mile long arterial that extends from the Oregon Page Mill Expressway in the north to the I-280 in the south.[1] The facility passes through or by the communities of Palo Alto, Los Altos, and Cupertino, as well as unincorporated areas of the County.

- Current (2013) motor vehicle level of service (LOS) at peak periods is generally good, with the exception of the segment from El Monte to San Antonio, which currently experiences LOS F conditions during weekday peak periods.[2]

Figure 2-1 Foothill Expressway Corridor Conditions

Source: County of Santa Clara Foothill Expressway Fact Sheet (February 21, 2014)

[1] Source: Foothill Expressway Fact Sheet, as provided to the Expressway Plan 2040 Policy Advisory Board on 2/21/14.

[2] As part of the Expressway Plan 2040, the County of Santa Clara is conducting analysis of future auto level of service (LOS) during peak periods. At the time this memo was being developed that analysis was pending, but it will be incorporated into our assessment when complete.

- The motor vehicle travel way on Foothill Expressway is generally 4 lanes wide between intersections, increasing to 6 lanes wide at intersections with dedicated left turn lanes, and has approximately 6.5' wide paved shoulders that function as both an auto breakdown lane and an *ad hoc* bike facility.[3]
- VTA provides Express and Local service along other segments of Foothill Expressway, but there is currently no transit service on Foothill Expressway to or through the study intersections.[4]

LAND USE CONTEXT

- Land uses to the west of Foothill Expressway within the study area are primarily residential, and most residential consists of large lot single family homes.
- Land uses to the east of Foothill Expressway are primarily lower density, smaller floorplate "Main Street" type retail and office uses. Current development under construction include projects at 400 Main Street (2-story mixed-use with retail and office, 100 First Street (4-story residential), and redevelopment of an existing grocery store on First Street.
- Since Foothill Expressway divides residential neighborhoods to the west from commercial, school and civic land uses to the east, comfortable and convenient connections across this major arterial are important for all travel modes and all ages.
- The ongoing success of downtown Los Altos can be enhanced with a multi-pronged implementation strategy to improve bicyclist and pedestrian access at the intersections of West Edith Avenue/Foothill Expressway and Main Street/Foothill Expressway. Improving access by multiple modes will increase the customer base for downtown without increasing auto traffic and parking congestion that is beginning to act as a constraint on downtown economic activity especially during peak visitation times.

Source: Passerelle Investment Company

[3] Indicates the approximate width of the paved area of the shoulders usable for bicyclists, as measured from the edge of the lane striping for the #2 (outer) auto travel lane to the edge of the gutter pan. The total width of the shoulder including the approximately 1.5" gutter pan is 8', as measured from the edge of the lane striping for the #2 (outer) auto travel lane to the edge to the curb face.

[4] Source: Transit Map, as provided to the Expressway Plan 2040 Policy Advisory Board on 2/21/14.

COMMUNITY & VISITOR PREFERENCES

Expressway Plan 2040 Outreach

As part of the Countywide Expressway 2040 study, the County of Santa Clara hosted two meetings in Los Altos to discuss the future of Foothill Expressway. Highlights of the relevant feedback received at the 2/21/14 outreach event is summarized below:

- *"Foothill through downtown Los Altos has a different character than the rest of the corridor; the way the road operates must respond and respect that character."*
- *"We hear concerns from our community that Foothill is a barrier for locals living in downtown-adjacent neighborhoods to get to downtown services, for kids to walk or bike to school or parks."*
- *"It's a great road for biking along for long rides as a commuter or recreational rider; it's just hard to bike or walk across it for a short trips."*
- *"I understand that one purpose of the road is regional connectivity and mobility; but through the previous Expressway Studies in 2003 and 2008, as well as local policy documents since then, Los Altos has made it clear that Foothill can't be a barrier that divides our community."*
- *"One of the primary purposes of streets and roads is to promote economic activity through access; but traffic and parking congestion downtown is beginning to harm our economic competitiveness; so Foothill needs to help us grow customers and visitors to downtown via walking and biking."*

Feedback received at this community outreach meeting suggests that Los Altos stakeholders recognized that Foothill Expressway will continue to serve as a "workhorse" in the regional automobile network. At the same time a consensus position has emerged that Foothill Expressway must also help meet local goals for improved bike and pedestrian access to downtown, expanded economic development, and reductions in local auto trips and associated congestion and emissions.

Resident Telephone Survey

In June 2012, the City of Los Altos engaged Godbe Research to conduct a telephone survey of residents focusing on satisfaction with living in Los Altos, including satisfaction with downtown and preferences for future changes in downtown.[5] Several findings from that survey are relevant to this project, including:

- About 50% of residents reported that they "sometimes" or "always" walked to downtown and about 32% of residents surveyed that "sometimes" or "always" bicycled to downtown.
- Of residents who said that they "always" or sometimes" drive downtown, nearly 10% of said that bike lanes would encourage them to bike to downtown and over 5% of said crosswalks or sidewalks would encourage them to walk to downtown.
- While 68% of residents were satisfied with 'quality of life" in Los Altos, only 30% were satisfied with downtown Los Altos.

[5] Source: PowerPoint summary of the *City of Los Altos Downtown Planning Survey*, Godbe Research, June 2012. All percentages reported here have been rounded to the nearest whole number.

- Lack of convenient parking was the second most commonly cited reason for being dissatisfied with downtown. [6] Nearly 30% of respondents said downtown parking was "somewhat inconvenient" or "very inconvenient."

Our analysis of the resident feedback received as part of this survey suggests that many Los Altos residents bike or walk to downtown, and more would do so if walking and cycling conditions were improved on routes used to access downtown. Interestingly, residents' satisfaction with the downtown experience is significantly less than their satisfaction with Los Altos' overall quality of life; a large source of this dissatisfaction is the lack of available convenient parking. This suggests that any initiatives that increase the number of people who visit downtown by bike or on foot will help alleviate parking congestion which is a potential constraint on the continued economic vitality of downtown Los Altos.

Photo Source: Passerelle Investment Company

Visitor Intercept Survey

Passerelle Investment Company contracted with EMC Research to conduct an intercept survey of visitors to the downtown/civic center area of Los Altos in June 2012.[7] Forty-seven percent (47%) of those surveyed were residents of Los Altos, 23% were residents of Los Altos Hills or Mountain View, 18% were residents of other communities in Santa Clara County, 7% were residents of other Bay Area communities outside of Santa Clara County, and 5% were residents of communities outside the Bay Area. Several findings from that survey are relevant to this project, including:

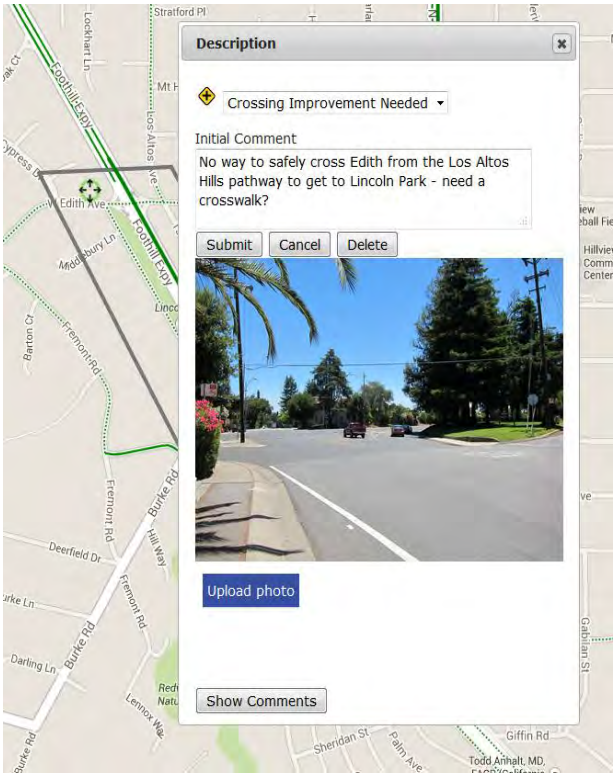
- One in four visitors walked or biked to downtown/civic center the day they were surveyed.

[6] Based on the rest of the survey response, we're interpreting the survey response of "parking" to suggest lack of convenient parking.

[7] Source: PowerPoint summary of the *Intercept Survey of Downtown Los Altos/Los Altos Civic Center Area Visitors,* EMC Research Inc., June 2012. All percentages reported here have been rounded to the nearest whole number.

- Visitors who live closer to downtown were more likely to have walked or biked to downtown: nearly 31% of visitors who lived within 5 miles walked or biked to downtown/civic center the day they were surveyed.[8]
- Of those visitors who walked or biked to downtown/civic center:
  - 32% of all respondents and 38% of older adults (age 50-64) rated bike/pedestrian safety approaching downtown as only "fair" or "poor."
  - 30% crossed Foothill Expressway to get to downtown/civic center, suggesting that is a significant access point for non-auto modes.
- 28% of all visitors surveyed said that they felt unsafe crossing Foothill on foot, and this rose to 33% for visitors with kids in their household.
- An overwhelming 70% of visitors surveyed were in favor of building better/safer pedestrian and bicycle crossings at Foothill Expressway. Again, visitors with kids at home and those from the Primary Service Area were even more strongly in favor of better/safer pedestrian crossings of major access points to downtown/civic center.
- Parking was also cited as an issue in this survey: 30% respondents said that the availability of parking in the downtown/civic center area was only "fair" or "poor."

Visitor feedback received as part of this survey suggests that a significant number of visitors to the downtown/civic center area traveled by bike or on foot, a large number of visitors cross Foothill Expressway, and a large number of visitors feel that crossing Foothill Expressway is unsafe and that better and safer crossings should be implemented. Interestingly, a large number of visitors also expressed dissatisfaction with parking in the downtown/civic center area, suggesting that improving bicycle and pedestrian access to downtown could be a cost-effective strategy for improving parking availability by making it possible for more visitors to walk or bike downtown.



Source: Nelson\Nygaard and WikiMapping

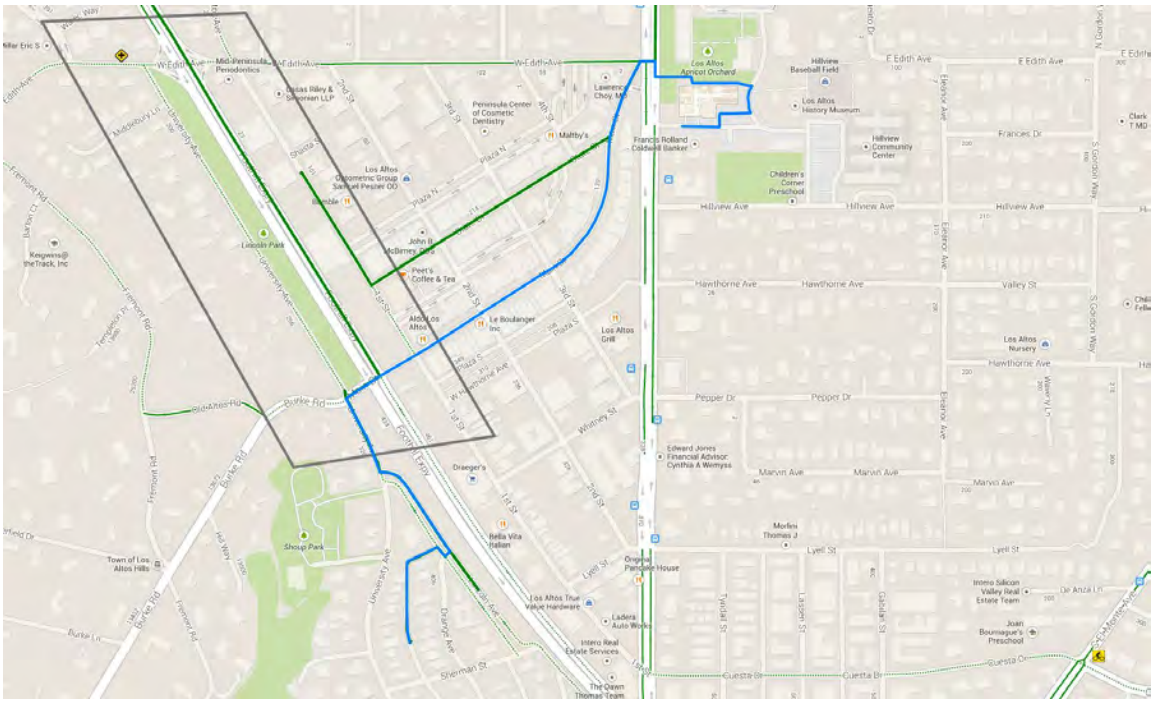
Online Resident Survey

In parallel with the public workshops, a *Safe Routes to Downtown Los Altos* website [9] has been launched to provide information about the study. The website will provide another venue in which to provide their

[8] Survey respondents were disaggregated by whether they were residents of the "Primary Service Area" or the Secondary Service Area." The boundaries of the Primary Service Area was roughly included all of Los Altos, all of Los Altos Hills, and adjacent areas of Mountain View, Portola Valley, and unincorporated portions of Santa Clara County just south of Los Altos.

[9] www.saferoutestodowntown.com went live 2/20/2014.

traveling preferences. For example, the commenter above refers to the difficulty of crossing West Edith Avenue at University.



Source: Nelson\Nygaard & WikiMapping

An example of preliminary web input is shown above – web survey participants indicated their frequent paths of travel. Dark green lines are walking routes, while dark blue lines are bicycling routes. The gray line shows the border of the primary study area.

POLICY FRAMEWORK

Local Policies and Design Guidance

Highlights of relevant policies and design principles from the City of Los Altos' adopted plans include:

- The "*Downtown Zoning Vision and Purpose Statements*"[10] call for "streetscape elements that enhance the pedestrian experience" and "an attractive, pedestrian-oriented shopping environment." Since Foothill Expressway forms the western edge of downtown and for many downtown visitors, the intersections of West Edith Ave. and Main St. with Foothill Expressway serve as the primary "gateway" to downtown. For this reason, policy and design guidance for the downtown can be considered relevant to these two study intersections.
- The Los Altos *Bicycle Transportation Plan*[11] designates West Edith Ave. (from San Antonio to city border) and Lincoln Ave (from El Monte Ave. to West Edith Ave.) as Class III bike routes. The bicycle plan also includes a number of "priorities" to guide transportation investments in the City, including:
  - Priority 1: "Make bicycling for recreation and utilitarian purposes attractive for all ages and skill levels. "
    - "Ensure bikeways connect residents to all community destinations (e.g., shopping, entertainment, schools) within Los Altos and in neighboring communities."
  - Priority 3: "Improve bicycle commute routes and end-of-trip accommodations."
    - "Provide bikeways that access primary employment areas within the City: downtown, Rancho Shopping Center, Loyola Corners and the El Camino corridor."
- The Circulation Element of the Los Altos *General Plan*[12] has a number of policies calling for prioritization of multimodal streets including:
  - Policy 1.1: "Promote improvement and maintenance of all regional highways, expressways, and freeways in the area, consistent with other circulation policies.
  - Policy 2.19: Narrow street segments and intersection approaches at appropriate locations to improve pedestrian safety and reduce travel speeds.
  - Policy 4.2 Provide for safe and convenient pedestrian connections to and between Downtown, other commercial districts, neighborhoods and major activity centers within the City, as well as with surrounding jurisdictions.
  - Policy 4.8: Work with neighboring cities and other jurisdictions to provide safe and adequate pedestrian and bicyclist crossings along major roadways to minimize

[10] Source: Downtown Land use and Economic Revitalization Plans, City of Los Altos, undated. Online at www.losaltosca.gov/sites/default/files/fileattachments/Community%20Development/page/429/downtown_land_use_and_economic_revitalization_plans.pdf.

[11] Source: City of Los Altos Bicycle Transportation Plan, 4/10/12. Available online at www.losaltosca.gov/sites/default/files/fileattachments/Bicycle%20and%20Pedestrian%20Advisory%20Commission/page/460/2012_los_altos_bicycle_transportation_plan.pdf

[12] Source: City of Los Altos General Plan, 11/02. Available online at www.losaltosca.gov/sites/default/files/fileattachments/Community%20Development/page/429/circulationelement.pdf

impediments caused by vehicular traffic, especially along major roadways such as El Camino Real, Foothill Expressway, and San Antonio Road.

County Policies and Design Guidance

During previous updates to the Countywide Expressway Plan, Los Altos' residents and other stakeholders developed a vision statement that Foothill Expressway would be an "[a]ttractive express arterial, *not freeway-like…*"[13]

In addition, the County's General Plan Circulation Element and other policy documents emphasize the importance of providing a safe multimodal transportation network that balances the needs of regional trips and local trips.

State Policies and Design Guidance

Although Foothill Expressway is not a state-owned facility, it does function similar to a limited access highway. For this reason, Caltrans' design guidance in "*Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians*" is relevant for this facility. Highlights of the relevant design principles include:[14]

- "Construct or reconstruct intersections with sidewalks on both sides."
- "Design or reconstruct intersections and interchanges so that roads and ramps meet at a 90-degree angle."
- "Separate the decision to yield to a pedestrian or bicyclist from the decision to merge into traffic by restricting right turns on red or controlling free right-turn only lanes with STOP control or signalization, if warranted."
- "Design or reconstruct intersections to allow maximum motor vehicle turning movement speeds of 20 mph through reducing turning radii and bringing intersections close to a 90-degree angle."
- "Reduce turning radii for motorists."
- "Design crossings so pedestrians can cross in one signal phase."
- "Construct right-turn lane as compound curve that meets intersecting street at close to 90-degree angle."

Complete Streets Act

California's Complete Streets Act of 2008 (AB 1358) requires every city and county in the state of California to ensure that streets accommodate all users (including pedestrians, bicyclists), all ages (including children and the elderly), and persons with disabilities.[15]

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[13] Source: Foothill Expressway Fact Sheet, as provided to the Expressway Plan 2040 Policy Advisory Board on 2/21/14. Emphasis added.

[14] Source: "Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians." (Caltrans, 2010). Online at www.dot.ca.gov/hq/traffops/survey/pedestrian/Complete-Intersections-A-Guide-to-Reconstructing-Intersections-and-Interchanges-for-Bicyclists-and-Pedestirans.pdf. For more information, see Caltrans' Complete Streets Program website at www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets.html.

[15] Source: State of California Government Code Sections 65040.02 and 65302. Available online at www.leginfo.ca.gov/pub/07-08/bill/asm/ab_1351-1400/ab_1358_bill_20080930_chaptered.pdf.

3 EXISTING CONDITIONS

This chapter provides an overview of existing conditions for this study, focusing on the two downtown intersections of Foothill Expressway with West Edith Ave. and Main St. that comprise the project area for this study. The assessment is based on data collection, site visits to observe conditions at these intersections and the vicinity as well as a review of previous and ongoing plans, studies, and data provided by Passerelle, the City of Los Altos, and the County of Santa Clara.

INTERSECTION DESIGN

The existing geometry and lane allocations for each study intersection is shown below. Figure 3-1 shows the West Edith Ave. intersection and Figure 3-2 shows the intersection of Main St.

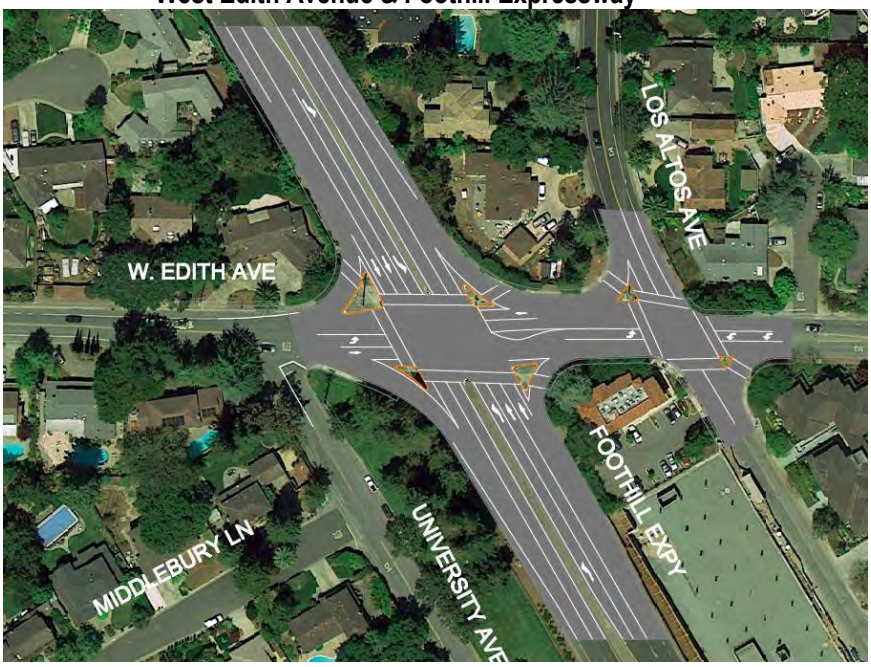
The intersection geometry of Foothill Expressway at the two study intersections is consistent with the typical intersection condition throughout the corridor, as follows:

- On Foothill Expressway there are 4 through auto lanes (2 in each direction), 2 dedicated center-running left turn lanes (1 for each approach), and 2 free right turn "slip lanes" (1 for each approach) with "pork chop" pedestrian islands.
- On both West Edith Ave. and Main St. there are 2 through auto lanes (1 in each direction), 2 dedicated center-running left turn lanes (1 for each approach), and 2 free right turn "slip lanes" (1 for each approach) with "pork chop" pedestrian islands.

At each of these intersections, dedicated left and right turn lanes are created on Foothill Expressway as follows:

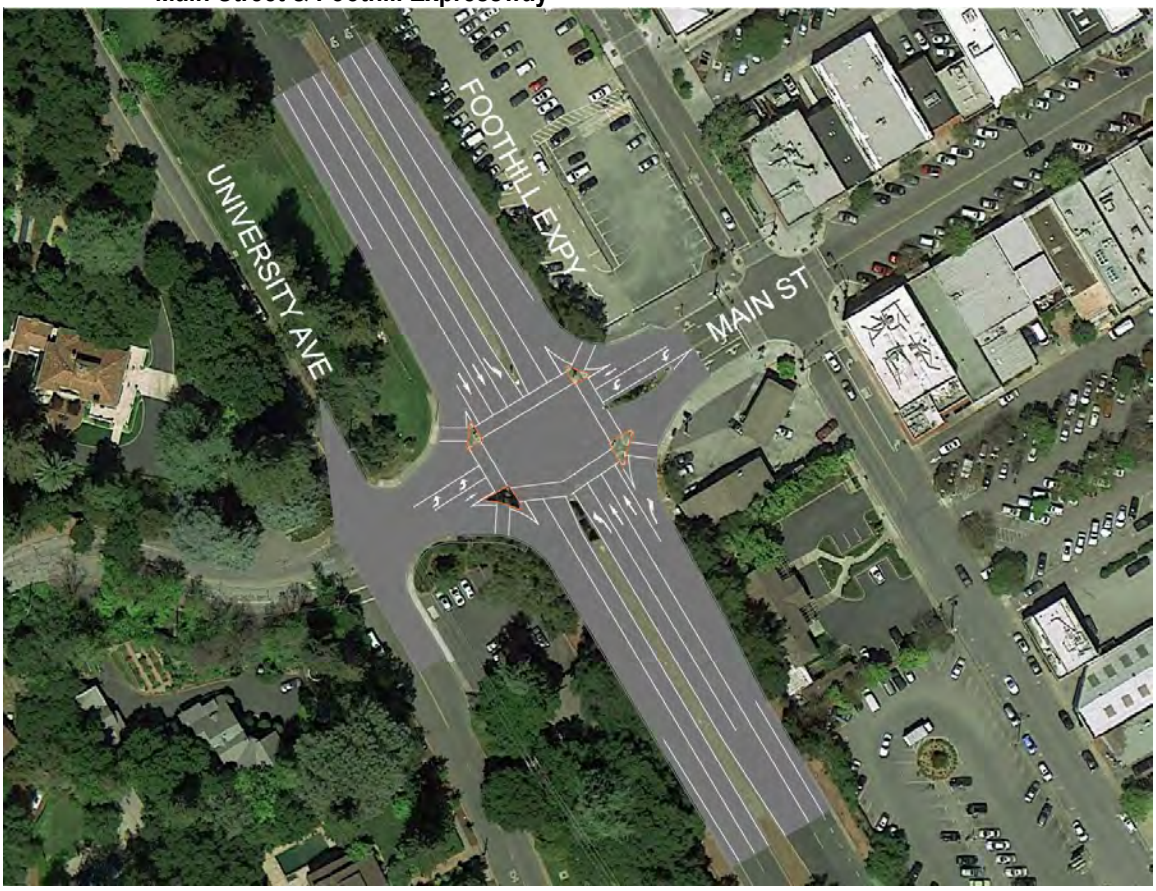
- Signalized left turn lanes: The center median tapers down to create an approximately 11' wide left turn lane. Protected left-turn phases are provided for left-turns from Foothill Boulevard to West Edith Avenue and Main Street. Left-turns from West Edith Avenue and Main Street on to Foothill Boulevard are permitted, but without protected left-turn phases that would require a lengthier signal cycle to accommodate.
- Free right turn lanes with large turning radii are provided on all four corners of both intersections.
- The paved shoulder on Foothill Expressway transitions into an approximately 11' free right turn slip lane and the ad hoc bike facility shifts to a 5' bike lane stub located between the #2 (outer) auto travel lane and the pedestrian pork chop island.

Figure 3-1 Existing Intersection Configuration – West Edith Avenue & Foothill Expressway



Source: Mark Thomas & Company

Figure 3-2 Existing Intersection Configuration – Main Street & Foothill Expressway



Source: Mark Thomas & Company

Right-turn slip-lanes are currently provided on all four corners of both Foothill Expressway intersections. The large turning radius results in faster motor vehicle speeds and reduces the visibility of pedestrians where crosswalks intersect the right-turn lanes.

WALKING CONDITIONS

Pedestrian Facilities

Our observations during several site visits suggest a very low level of amenity for pedestrians crossing Foothill Expressway at both the study intersections. Pedestrian infrastructure at the study intersections and the immediate vicinity is summarized below.

West Edith Ave

- Free right turn slip lanes on every intersection leg at the intersection with Foothill Expressway create conflicts between pedestrians and vehicles, increase pedestrian crossing distance and time, and reduce pedestrians perceived level of comfort.
- Proximity to Foothill Expressway also affects the ability of pedestrians to cross West Edith Avenue at University Avenue.

Photo Source: Passerelle Investment Company

Looking east towards Foothill Expressway from the intersection of West Edith Avenue & University Avenue. Pedestrian and motorist visibility is limited by the large curb radius where right-turns occur.

- Crosswalks are marked with basic striping but no advance limit line or enhanced markings or pavement treatments. Such treatments are for signalized intersections on high volume arterials, particularly given the challenging pedestrian crossings at this location.
- Pedestrian crossings are prohibited on the east leg of the intersection with Foothill Expressway. Prohibiting pedestrian crossings is only recommended if there is an overwhelming reason to do so as the absence of a marked crosswalk generally does not prevent pedestrians from crossing on "desire lines."
- Sidewalks are discontinuous on the south side of West Edith Avenue, to the west of Foothill Expressway.
- On segments of West Edith Ave. with missing sidewalks west of Foothill Expressway, a striped shoulder / curb lane is utilized by pedestrians. But the utility of shoulder/curb lane as a pedestrian path of travel is undermined by a number of factors:
  - The road is signed as bike route encouraging bicyclists to utilize curb lane.
  - Residential garbage bins were observed in the curb lane.
  - The curb lane is not differentiated from the roadway by anything other than a single line of pavement striping,
- The adjacent intersection with Los Altos Ave./First Ave. to the east of Foothill Expressway also has 2 free right turn slip lanes and/or large turning radii, lowering the level of pedestrian comfort at this intersection as well.

Main Street

- As discussed above, the free right turn slip lanes on every intersection leg create conflicts between pedestrians and vehicles, increase pedestrian crossing distance and time, and reduce pedestrians perceived level of comfort.
- Crosswalks are marked only with a simple striping with no advance limit line or enhanced markings or pavement treatments appropriate for signalized intersections on high volume arterials.
- There is only one marked crosswalk at the intersection of Main St./Burke Rd. with University Ave. This is unusual, especially near a park, as the absence of a marked crosswalk generally does not prevent pedestrians from crossing on "desire lines."[16]
- Sidewalks are absent or discontinuous on Burke Rd. to the west of Foothill Expressway.
- On segments of Main St./Burke Rd. with missing sidewalks west of Foothill Expressway, a striped shoulder / curb lane is utilized by pedestrians. But the utility of shoulder/curb lane as a pedestrian path of travel is undermined by a number of factors:
  - On-street parking doesn't appear to be prohibited, so it is likely that parked cars (straddling the rolled curb) fully or partially obstruct the curb lane with some frequency.
  - Residential garbage bins were observed in the curb lane.
  - The curb lane is not differentiated from the roadway by anything other than a single line of pavement striping,

[16] Desire lines" indicate the preferred pedestrian route between two points – often the shortest and most convenient route. One common example is a well-trodden path cutting across a grassy area, showing where many people have taken a shortcut outside paved paths.

Pedestrian Crossing Volumes

Despite the limited pedestrian infrastructure at the two study intersections, pedestrian crossings are relatively frequent. Figures 3-3 and 3-4 provide a comparison of daily pedestrian volumes at various downtown intersections conducted in November 2012.[17] In addition, more recent counts were conducted in March 2014, as summarized in Figures 3-5 and 3-6.

West Edith Avenue & Foothill Expressway intersection

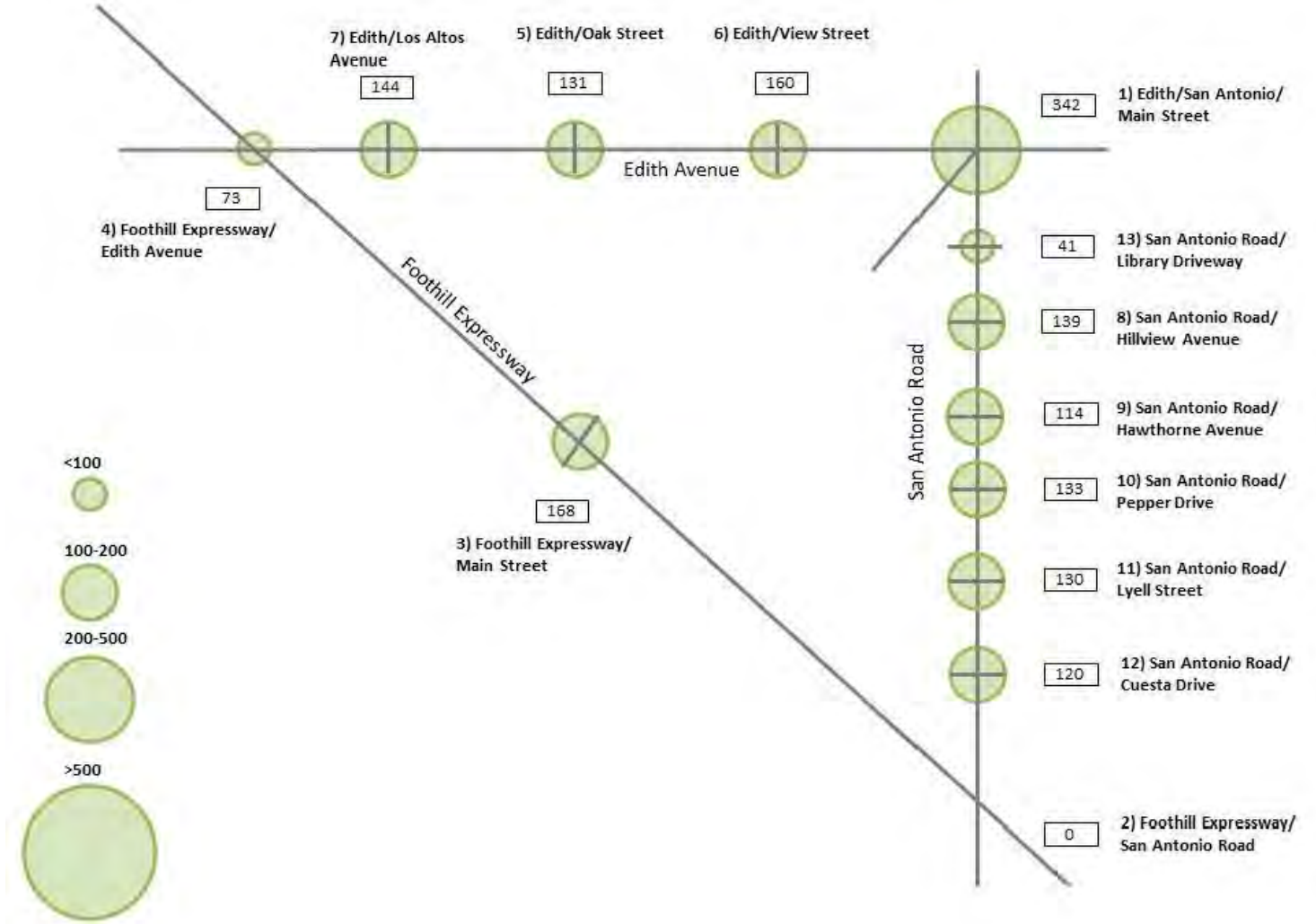
- 2012 12-hour counts:
  - Wednesday: 73 pedestrians
  - Saturday: 148 pedestrians
- 2014 peak-hour counts (Wednesday):
  - AM peak hour: 34 pedestrians crossings
  - Noon hour: 10 pedestrian crossings
  - School dismissal hour (3-4pm): 42 pedestrian crossings
  - PM peak hour: 44 pedestrian crossings

Main Street & Foothill Expressway intersection

- 2012 12-hour counts:
  - Wednesday: 168 pedestrian crossings
  - Saturday: 395 pedestrian crossings
- 2014 peak-hour counts (Wednesday):
  - AM peak hour: 43 pedestrian crossing crossings
  - Noon hour: 40 pedestrian crossings
  - School dismissal hour (3 – 4 pm): 28 pedestrian crossings
  - PM peak hour: 31 pedestrian crossings

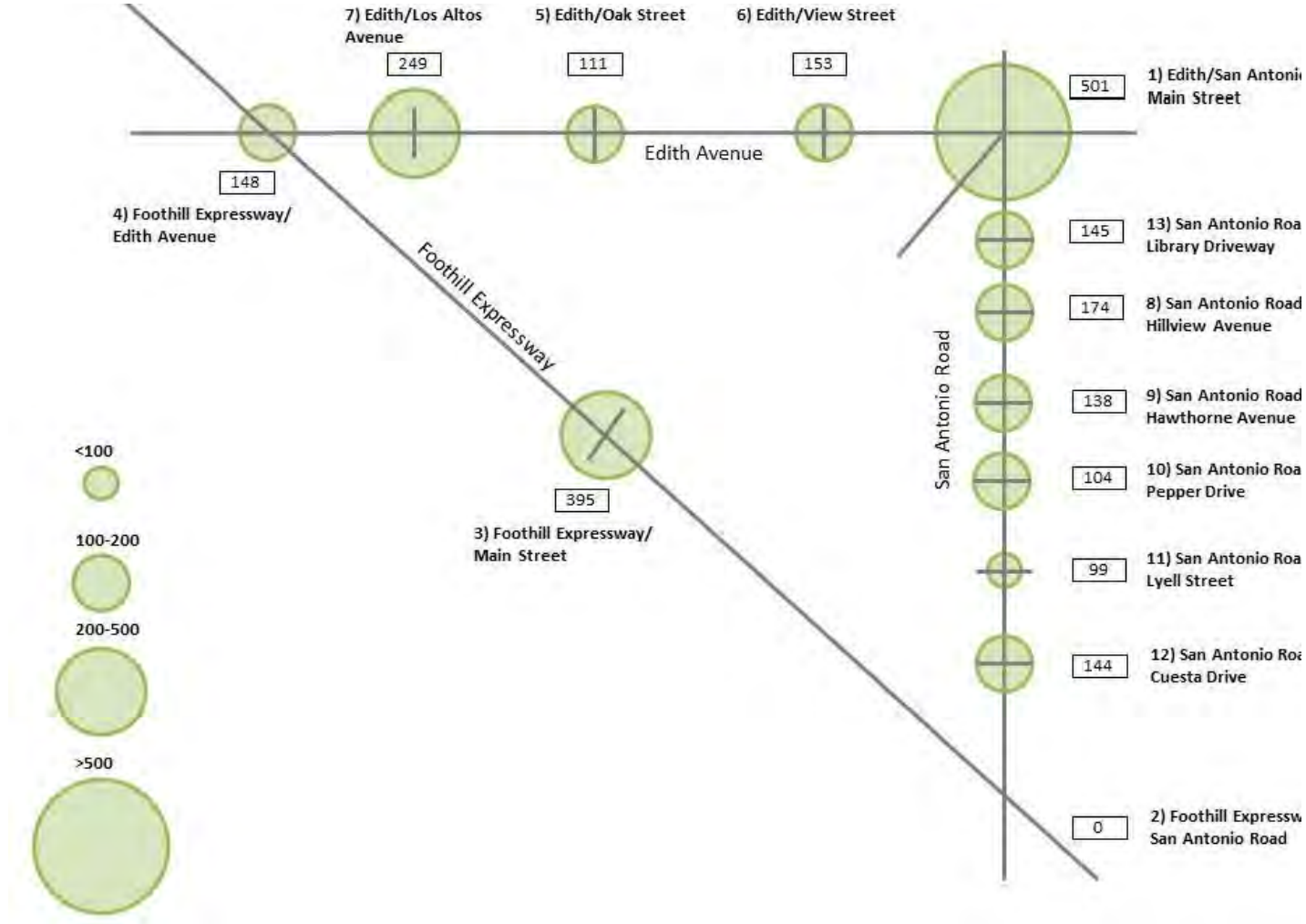
[17] Downtown Los Altos Pedestrian and Bicycle Traffic Analysis, ARUP, 2/22/2013.

Figure 3-3 Pedestrians – Daily Volumes at Downtown Intersections (Weekday)



Source: Wednesday, November 7, 2012 Traffic Counts; ARUP, February 2013 memo

Figure 3-4 Pedestrians – Daily Volumes at Downtown Intersections (Saturday)



Source: Saturday, November 10, 2012 Traffic Counts; ARUP, February 2013 memo

Figure 3-5 Pedestrians- Weekday Peak Hour Crossing Volumes at Foothill & West Edith

HOUR TOTALS Foothill & West Edith PERIOD	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG	TOTAL
7:00-8:00	8	1	9	1	19
7:15-8:15	16	1	8	1	26
7:30-8:30	22	1	4	1	28
7:45-8:45	26	0	5	3	**34**
8:00-9:00	21	0	4	3	28

HOUR TOTALS Foothill & West Edith PERIOD	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG	TOTAL
12:00-1:00 PM	4	1	2	3	10
3:00-4:00 PM	16	4	22	0	**42**
3:15-4:15	9	3	17	0	29
3:30-4:30	9	3	16	0	28
3:45-4:45	9	2	13	0	24
4:00-5:00	10	0	9	0	19
4:15-5:15	13	0	12	2	27
4:30-5:30	21	0	11	5	37
4:45-5:45 PM	27	0	10	7	**44**
5:00-6:00	21	0	8	8	37

Source: Wiltec March 2014 counts

Figure 3-6 Pedestrians- Weekday Peak Hour Crossing Volumes at Foothill & Main

HOUR TOTALS Foothill & Main PERIOD	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG	TOTAL
7:00-8:00 AM	19	5	19	0	**43**
7:15-8:15	19	1	16	0	36
7:30-8:30	16	1	18	1	36
7:45-8:45	17	2	14	1	34
8:00-9:00	13	2	15	1	31

HOUR TOTALS Foothill & Main PERIOD	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG	TOTAL
12:00-1:00 PM	11	2	26	1	**40**
3:00-4:00 PM	5	0	22	1	28
3:15-4:15	7	0	20	2	29
3:30-4:30	10	0	15	2	27
3:45-4:45 PM	14	0	15	2	**31**
4:00-5:00	14	0	12	1	27
4:15-5:15	17	0	13	0	30
4:30-5:30	13	0	14	0	27
4:45-5:45	11	0	14	0	25
5:00-6:00 PM	11	0	20	0	**31**

Source: Wiltec March 2014 counts

BICYCLING CONDITIONS

Bicycle Facilities

Our observations during several site visits indicate a very low level of amenity for bicyclists crossing Foothill Expressway at both the study intersections. Bicycling infrastructure at the study intersections and the immediate vicinity is summarized below. While some expressways have legacy bicycle lanes, County's current policy is not to encourage less experienced cyclists to use the expressways. Consequently the county does not wish to add new bicycle facilities on expressways, despite the expressways' importance to regional bicycle transportation.

West Edith Avenue

- As discussed above, the shoulder of Foothill Expressway functions as a *ad hoc* bike facility. At intersections, however, the shoulder transitions to become the approach for the free right turn slip lane and the bike facility shifts to a stub bike lane positioned between the #2 outer travel lane and the pedestrian pork chop island. However there are no pavement markings, design treatments, and signage to create a "sorting zone" to reduce conflicts as bicyclists approaching the intersection merge left across the free right turn lane and merge right across the free right turn lane as they leave the intersection.
- On Foothill Expressway and West Edith Ave., there are no provisions for bicyclists stopped at intersections (e.g. bike boxes and or a bike-only signal phase) to give bicyclists a head start in order to reduce conflicts and speed differentials with motorized vehicles. However, the County is working on improving signal detection for bicycles.
- On West Edith Ave. west of Foothill Expressway, a striped shoulder / curb lane is present and the road is signed as bike route encouraging bicyclists to utilize this curb lane. But the utility of shoulder/curb lane as a bike route is undermined by a number of factors:
  - As discussed above, pedestrians and joggers use this curb lane due to the absence of sidewalks.
  - On-street parking doesn't appear to be prohibited, so it is likely that parked cars (straddling the rolled curb) fully or partially obstruct the curb lane with some frequency.
  - Residential garbage bins were observed in the curb lane.
  - The curb lane is not differentiated from the roadway by anything other than a single line of pavement striping.

Main Street

- As with the West Edith Ave. intersection, the intersection at Main St./Burke Rd. has no pavement markings, design treatments, and signage to create a "sorting zone" to reduce conflicts as bicyclists approaching the intersection merge left across the free right turn lane and merge right across the free right turn lane as they leave the intersection.
- On Foothill Expressway and Main St./Burke Rd., there are no provisions for bicyclists stopped at intersections (e.g. bike boxes and or a bike-only signal phase) to give bicyclists a head start in order to reduce conflicts and speed differentials with motorized vehicles.

Bicycle Volumes

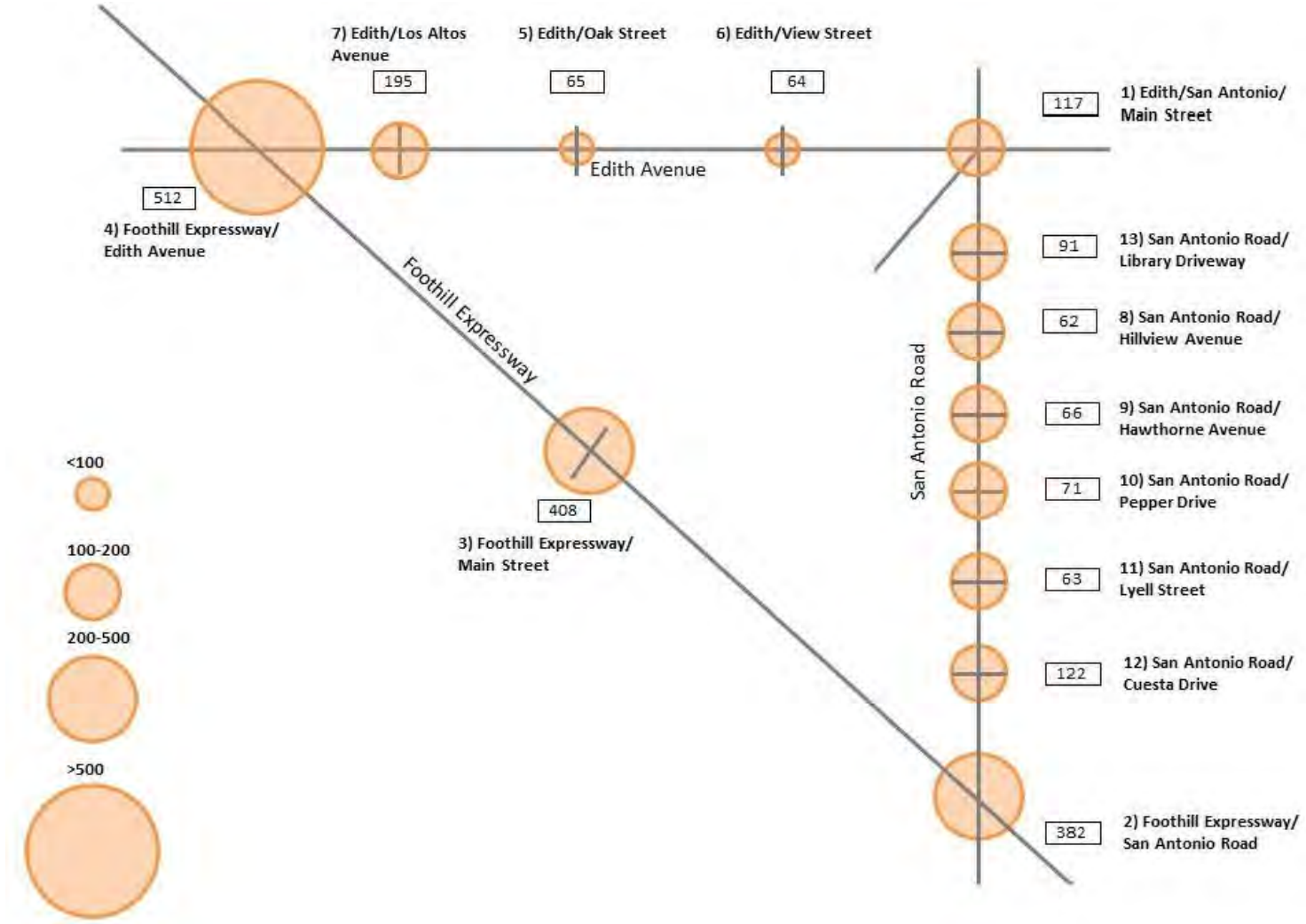
Despite the limited bicycle infrastructure at the two study intersections, bicycle volumes are relatively high –over 60 bicyclists per hour pass through the Foothill & West Edith intersection during the Weekday AM and PM Peak Hours, with Foothill Expressway serving as a key regional bike route providing local access to downtown Los Altos. During off-peak hours on a typical weekday, volumes averaged 40 to 50 cyclists per hour. Recent bicycle traffic counts are summarized below.

Bicycle Volumes at Foothill Expressway & West Edith Avenue

- 12-hour counts[18] conducted in November 2012:
  - Wednesday: 512 bicyclists
  - Saturday: 1,033 bicyclists
- Peak-hour counts (Wednesday) conducted in March 2014:
  - AM peak hour: 65 bicyclists
  - Noon hour: 57 bicyclists
  - School release hour (3-4pm): 42 bicyclists
  - PM peak hour: 60 bicyclists

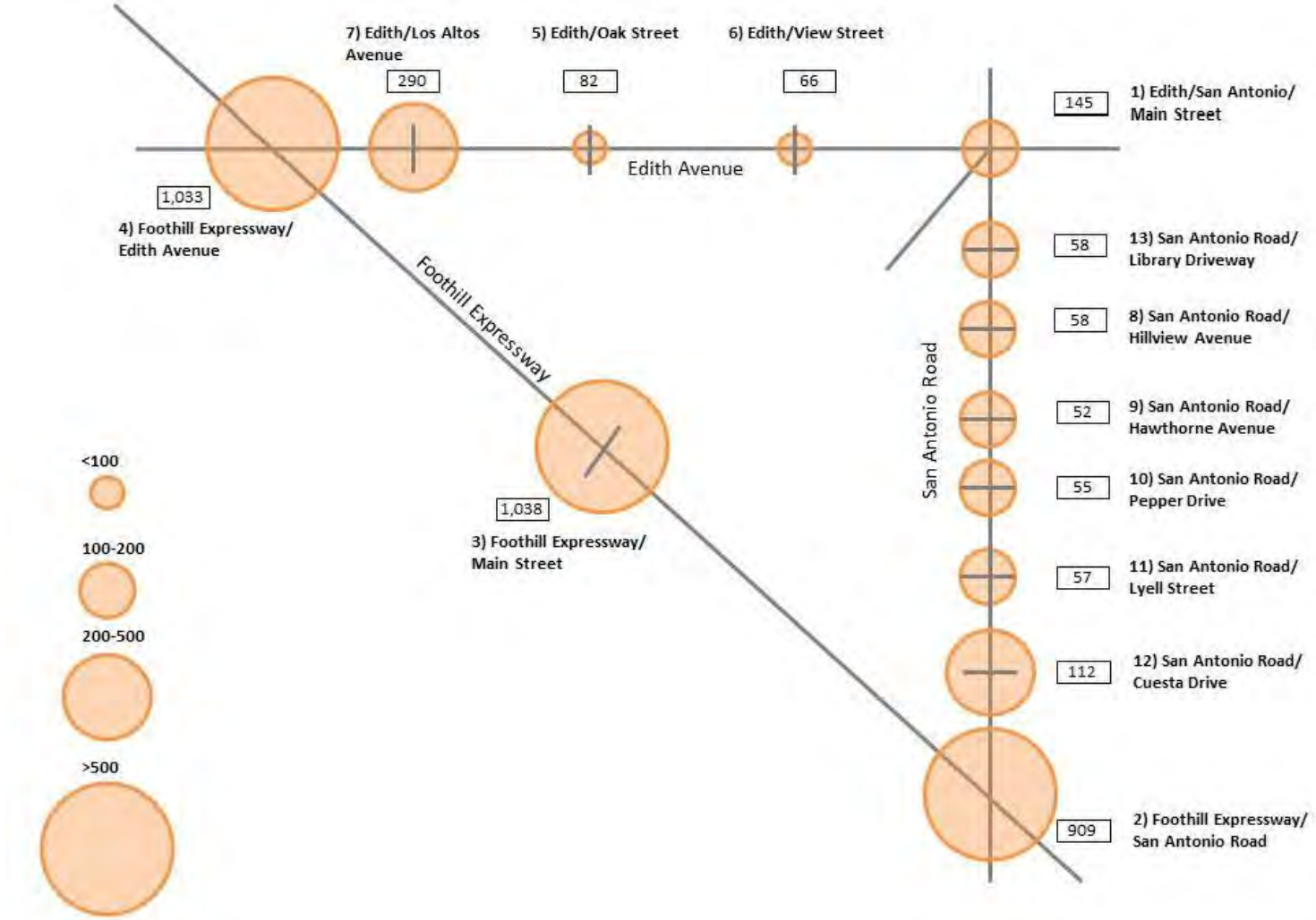
[18] Source for 2012 12-hour counts: Downtown Los Altos Pedestrian and Bicycle Traffic Analysis, ARUP, 2/22/2013.

Figure 3-7 Cyclists – Daily Volumes at Downtown Intersections (Weekday)



Source: Wednesday, November 7, 2012 Traffic Counts; ARUP, February 2013 memo

Figure 3-8 Cyclists – Daily Volumes at Downtown Intersections (Weekend)



Source: Saturday, November 10, 2012 Traffic Counts; ARUP, February 2013 memo

Figure 3-9 Cyclists – Weekday Peak Hour Volumes at Foothill & West Edith

HOUR TOTALS AM PERIOD	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG	TOTAL
7:00-8:00	3	25	9	5	42
7:15-8:15	6	22	9	10	47
7:30-8:30	10	18	8	15	51
7:45-8:45	10	26	13	16	**65**
8:00-9:00	10	29	10	14	63

HOUR TOTALS PM PERIOD	NORTH LEG	EAST LEG	SOUTH LEG	WEST LEG	TOTAL
3:00-4:00	5	16	6	15	42
3:15-4:15	4	9	6	20	39
3:30-4:30	3	8	6	16	33
3:45-4:45	4	9	5	22	40
4:00-5:00	5	10	2	25	42
4:15-5:15	4	14	4	28	50
4:30-5:30	3	14	7	30	54
4:45-5:45	4	16	7	24	51
5:00-6:00	3	17	6	34	**60**

Source: Wiltec March 2014 counts

MOTOR VEHICLE TRAFFIC CONDITIONS

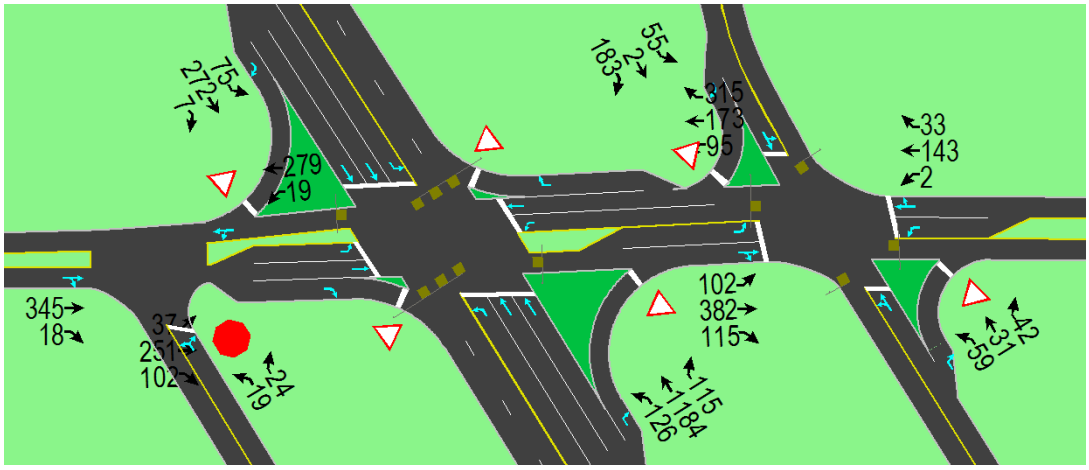
This section describes existing motor vehicle traffic conditions.

Traffic Volumes

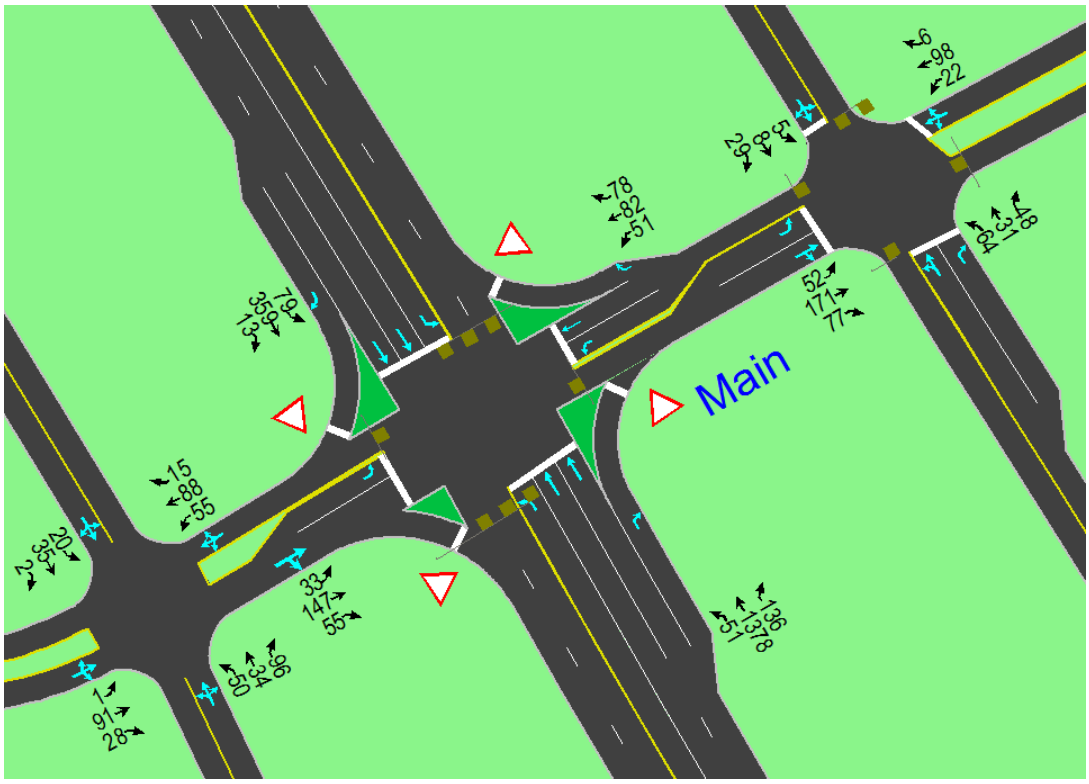
Figures 3-10 and 3-11 show the existing AM and PM Peak Hour turning movements where Foothill Expressway intersects West Edith Avenue and Main Street, as well as the adjacent intersections on both sides of Foothill Expressway (i.e., University Avenue to the west, and First Street to the east).

- Traffic volumes are extremely "peaked" on Foothill Expressway, with the vast majority of vehicles traveling northbound during the AM Peak, and southbound during the PM Peak.
- During the AM Peak Hour: the total 2-way volume on Foothill Expressway between West Edith and Main – approximately 1,900 AM peak-hour motor vehicles– is not particularly high for a 4-lane street. In fact, many 2-lane streets carry a similar 2-way volume, in situations where traffic volumes are balanced in both directions. However, three-fourths of the AM peak-hour traffic volume is traveling in just one direction (northbound during AM).
- During the PM Peak Hour: the total 2-way volume between West Edith and Main increases to approximately 2,200 PM peak-hour motor vehicles– still not particularly high for a 4-lane street. However, 70 percent of the PM peak-hour traffic volume is traveling in just one direction (southbound during PM).
- As a result of the direction imbalance noted above – excess capacity exists in the "reverse-peak" directions.
- Side-street volumes to and from Foothill Expressway (i.e., turning movements to and from West Edith and Main) tend to be concentrated on a few movements – particularly southbound left-turn and northbound right-turn at West Edith Avenue – the remaining right-turn movements have relatively low volumes (averaging just 1 or 2 right-turns per minute – and less than 100 per hour on the eastbound right-turn approaches).
- Through volumes on West Edith and Main – crossing Foothill Expressway – are higher than most of the turning movements, averaging about 200 cars per hour in both directions on West Edith, and 150 to 200 cars in one-direction on Main (inbound to downtown during AM/outbound from outbound during PM).

Figure 3-10 Motor Vehicle Traffic Volumes – AM Peak Hour Turning Movements



West Edith Avenue intersections with University, Foothill & Los Altos Ave / 1st St

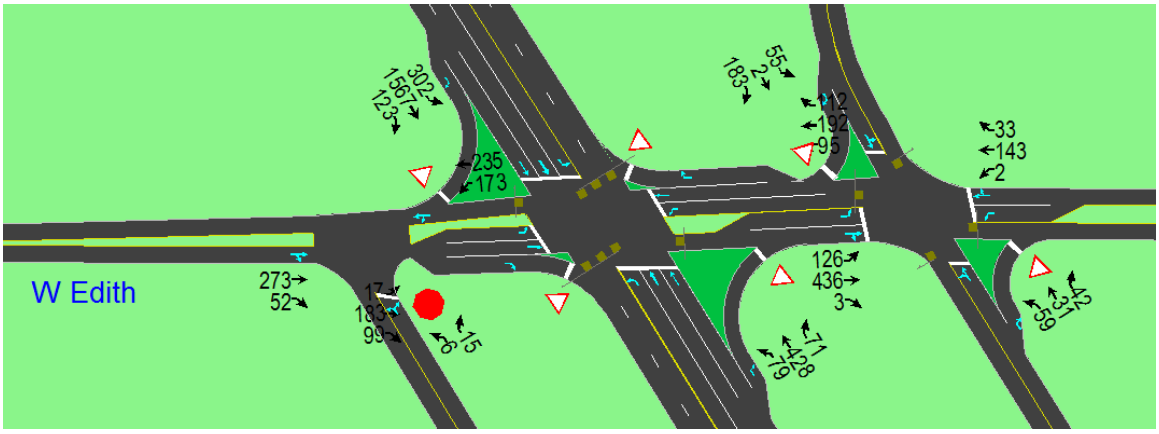


Main Street intersections with University, Foothill & 1st Street

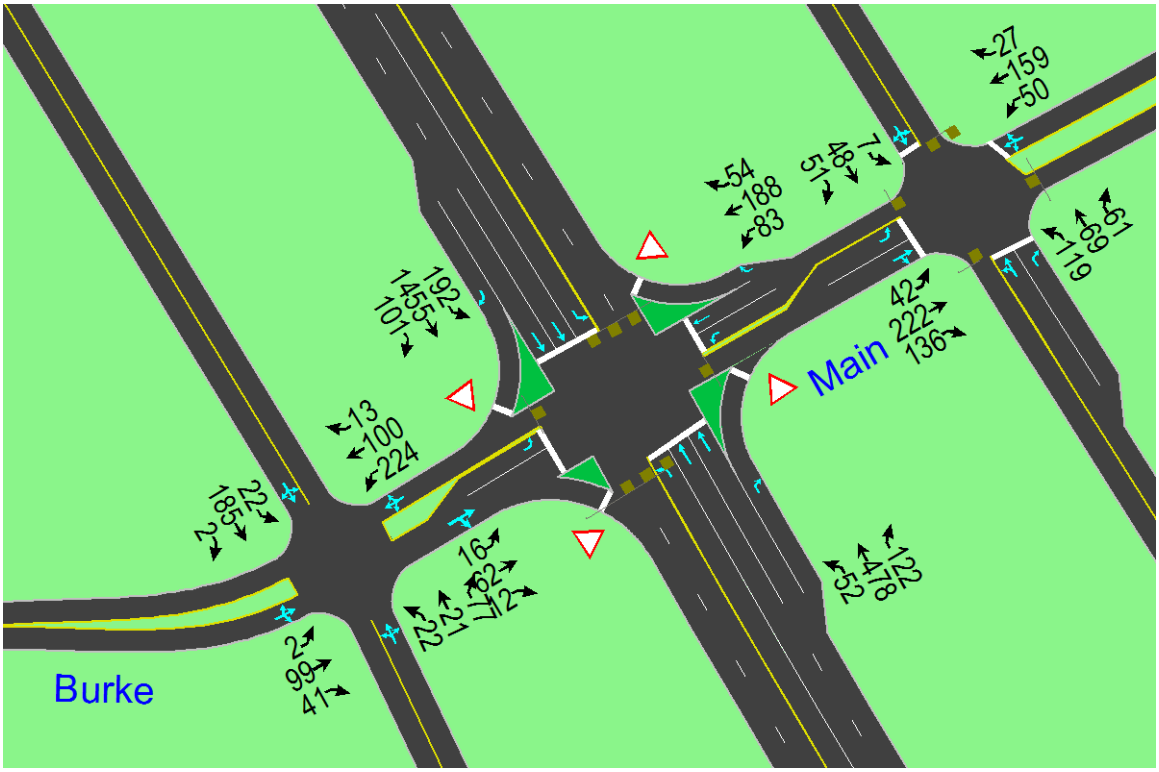
Source: Wiltec counts conducted March 2014.

Foothill Expressway between Edith and Main carries approximately 1,900 AM peak-hour motor vehicles – not a particularly high volume for a 4-lane street. However, three-fourths of the AM peak-hour traffic volume is traveling in just one direction (northbound during AM). AM turning movements are highest for the westbound right-turn at West Edith (entering northbound Foothill).

Figure 3-11 Motor Vehicle Traffic Volumes – PM Peak Hour Turning Movements



West Edith Avenue intersections with University, Foothill & Los Altos Ave / 1st St



Main Street intersections with University, Foothill & 1st Street

Source: Wiltec counts conducted March 2014.

Foothill Expressway between West Edith and Main carries approximately 2,200 AM peak-hour motor vehicles – 70 percent traveling southbound. PM turning movements at both West Edith and Main are highest for the southbound left-turns into downtown.

Traffic Level of Service (LOS)

Traffic operations are typically evaluated based on intersection level of service (LOS) standards précised by methodology described in the Highway Capacity Manual (HCM). LOS is a qualitative measure based on average delay to vehicles.

- Figure 3-12 provides a standard definition for intersection level of service, summarizing the relative delay based on HCM methodology.
- Figure 3-13 shows the existing LOS and average delay during the AM and PM Peak Hours at the intersections of Foothill Expressway with West Edith, Main and San Antonio, and at the adjacent intersections of First Street with West Edith and Main. As shown: each intersection operates at LOS C or better, indicating stable flow and acceptable operations.

Figure 3-12 Intersection Level of Service (LOS) Definitions

LOS	Flow Type	Operational Characteristics	Intersection Control Delay (seconds/vehicle)	
			Signal Control	2-Way-Stop or All-Way Stop Control
A	Stable Flow	Free-flow conditions with negligible to minimal delays. Excellent progression with most vehicles arriving during the green phase and not having to stop at all. Nearly all drivers find freedom of operation.	< 10	0 – 10
B	Stable Flow	Good progression with slight delays. Short cycle-lengths typical. Relatively more vehicles stop than under LOS A. Vehicle platoons are formed. Drivers begin to feel somewhat restricted within groups of vehicles.	> 10 – 20	> 10 – 15
C	Stable Flow	Relatively higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear. The number of vehicles stopping is significant, although many still pass through without stopping. Most drivers feel somewhat restricted.	> 20 – 35	> 15 – 25
D	Approaching Unstable Flow	Somewhat congested conditions. Longer but tolerable delays may result from unfavorable progression, long cycle lengths, and/or high volume-to-capacity ratios. Many vehicles are stopped. Individual cycle failures may be noticeable. Drivers feel restricted during short periods due to temporary back-ups.	> 35 – 55	> 25 – 35
E	Unstable Flow	Congested conditions. Significant delays result from poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures occur frequently. There are typically long queues of vehicles waiting upstream of the intersection. Driver maneuverability is very restricted.	> 55 – 80	> 35 – 50
F	Forced Flow	Jammed or grid-lock type operating conditions. Generally considered to be unacceptable for most drivers. Zero or very poor progression, with over-saturation or high volume-to-capacity ratios. Several individual cycle failures occur. Queue spillovers from other locations restrict or prevent movement.	> 80	> 50

Source: Highway Capacity Manual (HCM) 2010

Figure 3-13 Traffic Level of Service – Existing (Year 2014) Conditions

Intersection	Control	AM Peak Hour		PM Peak Hour	
		LOS	Avg Delay (sec)	LOS	Avg Delay (sec)
Main St & First St	Signal	B	12.2	B	17.7
Main St & Foothill Expressway	Signal	C	23.6	C	23.8
San Antonio Ave & Foothill Expressway	Signal	C	24.1	D	39.5
West Edith Ave & First Street / Los Altos Ave	Signal	B	13.7	B	16.0
West Edith Ave & Foothill Expressway	Signal	C	24.3	C	28.5

Bold indicates unacceptable LOS based on adopted standards (LOS E or better is acceptable on Foothill Expressway, while LOS D or better is acceptable at City of Los Altos intersections).

Source: Nelson\Nygaard Synchro analysis based on March 2014 intersection turning movement counts.

Based on the LOS findings and turning movements described above:

- The Foothill/West Edith and Foothill/Main intersections both operate at LOS C – indicating acceptable operations with stable flow. Downstream delay primarily occurs between San Antonio and El Monte, which occasionally affects peak-direction travel southbound approaching San Antonio.
- This finding is consistent with other studies, which have also identified acceptable LOS C operations at the Foothill/West Edith/ and Foothill/Main intersections.
- Based on these findings – and based on the turning-movements for right-turns in particular: the installation of crosswalk improvements at Foothill/Main and Foothill/West Edith would be unlikely to result in an unacceptable traffic LOS. The movement that would be most affected by a change in the crosswalk configuration would be the westbound right-turn at West Edith (entering northbound Foothill).

Other Operational Considerations Affecting Traffic & Downtown Access

Other operational characteristics are summarized below:

- Figure 3-14 provides a comparison of conflicting movements – right-turning vehicles, bicyclists and pedestrians – at the right-turn slip lane locations at the intersection of Foothill Expressway with West Edith Avenue. As shown, the right-turn slip-lane treatment increases the number of potential conflicting movements, since each right-turn across a slip-lane intersects pedestrian movements on up to two legs.
- Figure 3-15 and 3-16 show the average queue lengths for each of the right-turn movements.

Figure 3-14 Right-turn Volume and Conflicting Bicycle & Pedestrian Movements at Foothill / West Edith

Conflicting approaches at Foothill & West Edith intersection			AM Peak Hour volumes on each conflicting movement			PM Peak Hour volumes on each conflicting movement		
Right-turn approach for motorists	*Cyclists (conflicting movement with right-turning vehicles)*	*Pedestrian Crossings (conflicting movement)*	*Motor vehicles*	*Cyclists*	*Pedestrians*	*Motor vehicles*	*Cyclists*	*Pedestrians*
Southbound Right-turn	Southbound through cyclists	North Leg Crosswalk & Portion of West Leg Crossings	7	16	29 (26 north leg +3 west leg)	123	34	34 (27 north-leg + 7 west-leg crossing)
Eastbound Right-turn	Eastbound through cyclists	West Leg & Portion of South Leg Crossings	102	13	8 (3 west leg + 5 south)	99	6	17 (7 west-leg + 10 south-leg)
Northbound Right-turn	Northbound through cyclists	South Leg Crossings	115	26	0	71	17	10
Westbound Right-turn	Westbound through cyclists	North Leg Crossings	315	10	26	112	3	27
Total conflicting movements			***539 right turns***	***65 cyclists***	***Up to 63 conflicting movement with 34 crossings)***	***405 right-turns***	***60 cyclists***	***Up to 88 conflicting pedestrian crossings with 54 crossings***

Source: Nelson\Nygaard Synchro analysis based on March 2014 intersection turning movement counts.

Figure 3-15 Right-turn Movements at West Edith & Foothill – Volume & Average Delay by Approach

Right-turn approaches at West Edith & Foothill	AM Peak Hour			PM Peak Hour		
	Right-turn Volume (vehicles) during peak-hour	Queue length (peak-hour average)	LOS by right-turn movement (average vehicle delay in seconds)	Right-turn Volume (vehicles) during peak-hour	Queue length (peak-hour average)	LOS by right-turn movement (average vehicle delay in seconds)
Southbound Right-turn (towards University)	7 right-turns (Avg of 0 per minute)	0 feet 0 feet (both 50th and 90th percentile)	B (11 s)	129 right-turns (~2 per minute)	<30 feet *12 feet (50th percentile) to 26 feet (90th percentile)*	A (<10 s)
Eastbound Right-turn (from University/West Edith on to southbound Foothill)	102 right-turns (1-2 per minute)	< 30 feet 0 feet (50th percentile) to 28 feet (90th percentile)	C (28 s)	99 right-turns (1-2 per minute)	<20 feet *0 feet (50th percentile) to 19 feet (90th percentile)*	C (24 s)
Northbound Right-turn (to downtown)	115 right-turns (~2 per minute)	≤70 feet 24 feet (50th percentile) to 70 feet (90th percentile)	C (25 s)	71 right-turns (~1 per minute)	<60 feet *14 feet (50th percentile) to 57 ft (90th percentile)*	**F (>80 s) – see note 1**
Westbound Right-turn (from downtown & West Edith Ave / Los Altos Ave/ Fist St to northbound Foothill)	315 right-turns (5-6 per minute)	<125 feet 51 feet (50th percentile) to 124 feet (90th percentile)	C (28 s)	112 right-turns (~2 per minute)	<30 feet *0 feet (50th percentile) to 26 feet (90th percentile)*	C (25 s)

Notes:

(1) Although the northbound right-turn volume is relatively low (71 vehicles – just over 1 car per minute, and less than 2 percent of the total intersection volume of 3,200 vehicles) the northbound right-turn movement is frequently delayed due to limited capacity of the downstream left-turn pocket from eastbound West Edith Avenue to northbound Los Altos Avenue.

Figure 3-16 Right-turn Movements at Main & Foothill – Volume & Average Delay by Approach

Right-turn approaches	AM Peak Hour			PM Peak Hour		
	Right-turn Volume (vehicles) during peak-hour	Queue length (peak-hour average)	LOS by right-turn movement (average vehicle delay in seconds)	Right-turn Volume (vehicles) during peak-hour	Queue length (peak-hour average)	LOS by right-turn movement (average vehicle delay in seconds)
Southbound Right-turn (exiting Foothill towards University)	13 right-turns (Average of 0 per minute)	1 foot 0 feet (50th percentile) to 1 foot (90th percentile)	A (>10 s)	101 right-turns (1-2 per minute)	≤38 feet 13 feet (50th percentile) to 38 feet (90th percentile)	B (17.6s)
Eastbound Right-turn (from University/Main on to southbound Foothill)	55 right-turns (~1 per minute)		A (>10 s)	54 right-turns (~1 per minute)		A (>10 s)
Northbound Right-turn (exiting Foothill to enter downtown via Main Street)	136 right-turns (~2 per minute)	<75 feet 44 feet (50th percentile) to 73 feet (90th percentile)	B (17.4s)	122 right-turns (~2 per minute)	≤85 feet 27 feet (50th percentile) to 85 feet (90th percentile)	D (53.1s)
Westbound Right-turn (from downtown via Main Street, to northbound Foothill)	78 right-turns (1-2 per minute)	≤ 42 feet 0 feet (50th percentile) to 42 feet (90th percentile)	E (56.3 s)	54 right-turns (~1 per minute)	≤14 feet 5 feet (50th percentile) to 14 feet (90th percentile)	D (38.5s)

Source: Nelson\Nygaard

Figure 3-17 Right-turn Movements at Main & Foothill – Volume & Average Delay by Approach, Proposed Designs

Right-turn approaches	AM Peak Hour			PM Peak Hour		
	Right-turn Volume (vehicles) during peak-hour	Queue length (peak-hour average)	LOS by right-turn movement (average vehicle delay in seconds)	Right-turn Volume (vehicles) during peak-hour	Queue length (peak-hour average)	LOS by right-turn movement (average vehicle delay in seconds)
Southbound Right-turn (exiting Foothill towards University)	13 right-turns (Average of 0 per minute)	1 foot 0 feet (50th percentile) to 1 foot (90th percentile)	A (>10 s)	101 right-turns (1-2 per minute)	≤38 feet 13 feet (50th percentile) to 38 feet (90th percentile)	B (17.6s)
Eastbound Right-turn (from University/Main on to southbound Foothill)	55 right-turns (~1 per minute)		A (>10 s)	54 right-turns (~1 per minute)		A (>10 s)
Northbound Right-turn (exiting Foothill to enter downtown via Main Street)	136 right-turns (~2 per minute)	<75 feet 44 feet (50th percentile) to 73 feet (90th percentile)	B (17.4s)	122 right-turns (~2 per minute)	≤85 feet 27 feet (50th percentile) to 85 feet (90th percentile)	D (53.1s)
Westbound Right-turn (from downtown via Main Street, to northbound Foothill)	78 right-turns (1-2 per minute)	≤ 42 feet 0 feet (50th percentile) to 42 feet (90th percentile)	E (56.3 s)	54 right-turns (~1 per minute)	≤14 feet 5 feet (50th percentile) to 14 feet (90th percentile)	D (38.5s)

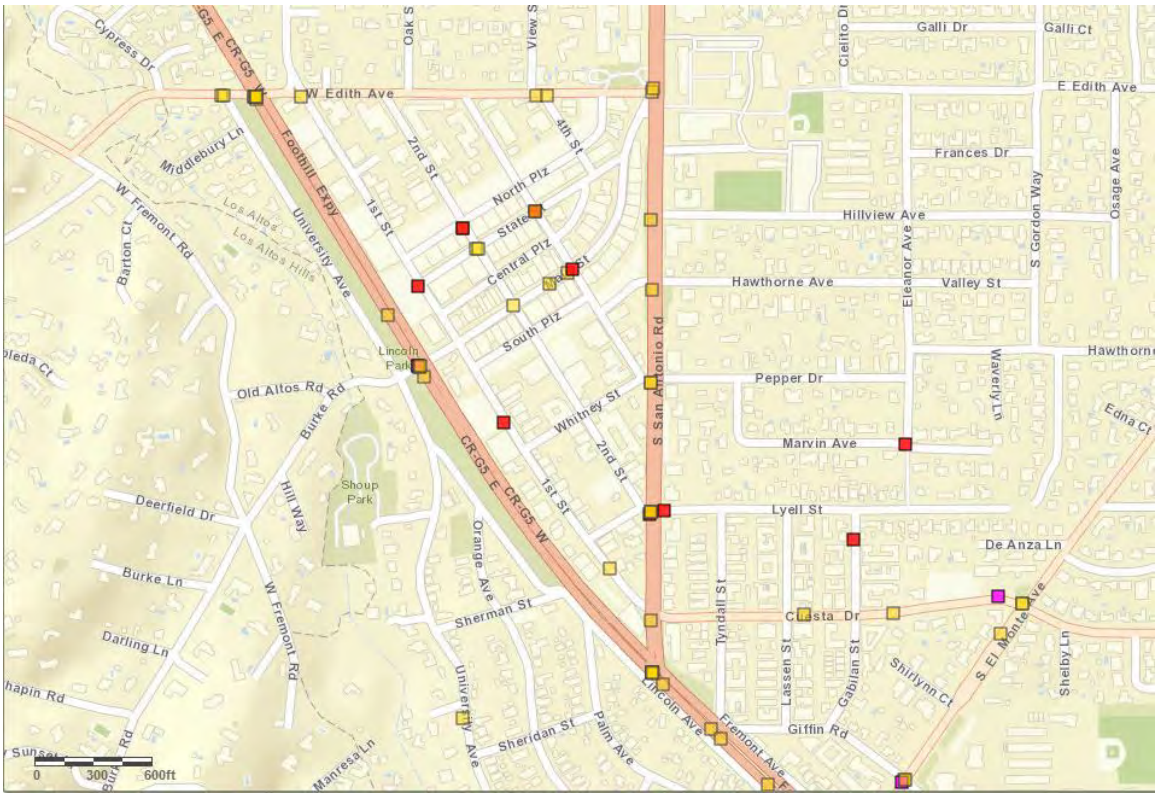
Source: Nelson\Nygaard

COLLISION HISTORY IN THE STUDY AREA

Of the 894 collisions reported to the Statewide Integrated Traffic Records System (SWITRS) as occurring in Los Altos during the latest complete 5 year period, there were eight (8) collisions at the intersection of Foothill Expressway and West Edith Avenue, and eleven (11) collisions at the intersection of Foothill Expressway and Main Street. The SWITRS database incorporates data from local police departments and county sources (e.g. highway patrol).

In the following images, vehicle-on-vehicle collisions are shown as yellow, vehicle-on-pedestrian collisions are shown as red, and vehicle-on-cyclist collisions are shown as pink. SWITRS data does not provide much information about each individual incident, but where fault was assigned it is included below along with the reporting officer's assessment of cause (CVC violation).

Figure 3-18 Collisions in study area, 2008 - 2012



Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, UC Berkeley, 2014.

The most common causes of vehicle-on-vehicle collisions were speeding, following too closely, and turning movements without signaling.

There were no pedestrian collisions recorded at the study intersections. Most pedestrian collisions were caused by drivers violating the pedestrians' right of way, though there were a few instances of the reverse.

Figure 3-19 Summary Statistics within Los Altos, SWITRS 2008 - 2012

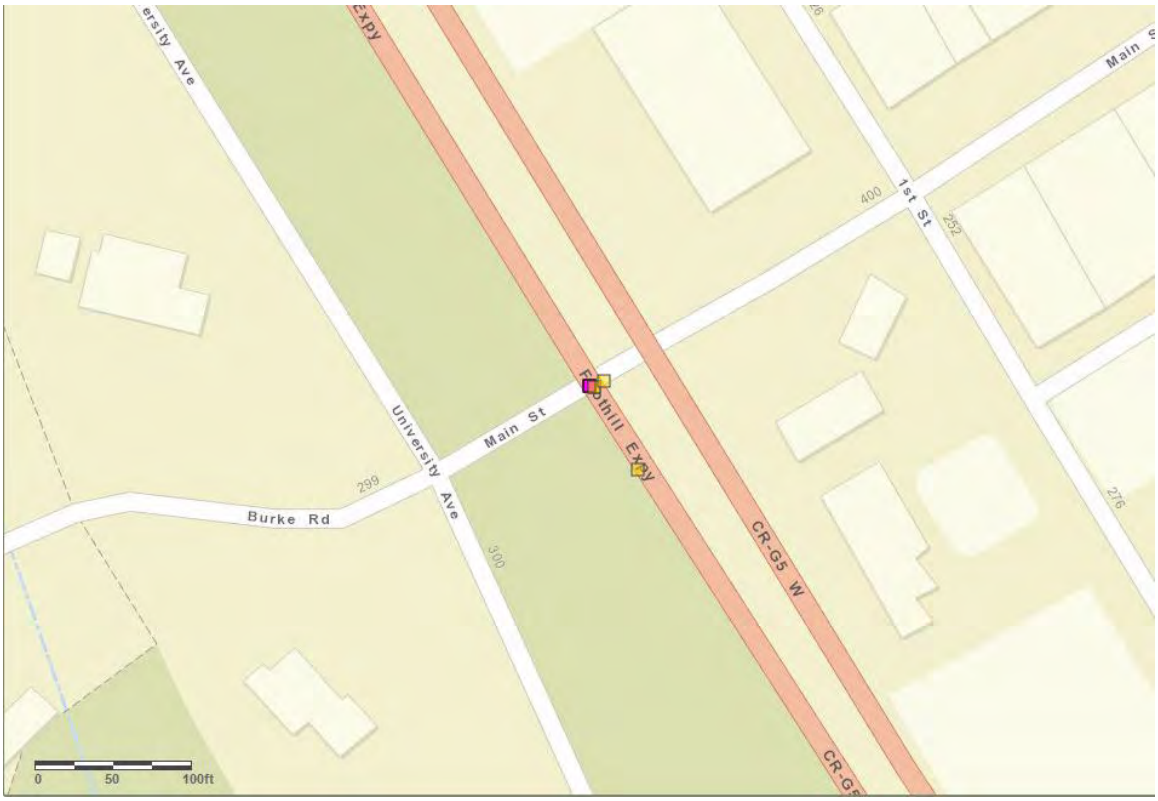
	Count	%
Total number of collisions	894	100%
Alcohol a factor	40	4.5%
Bicycles involved	81	9.1%
Pedestrians involved	25	2.8%
Collisions on FOOTHILL EXPWY as primary street	152	17.0%
Collisions on EL CAMINO REAL as primary street	124	13.9%
Collisions on SAN ANTONIO RD as primary street	82	9.2%
Fatalities	5	0.6%
Collisions with Bicyclist Fatality	1	0.1%
Collisions with Pedestrian Fatality	3	0.3%
Injuries	344	38.5%
Collisions with Bicyclist Injury	75	8.4%
Collisions with Pedestrian Injury	22	2.5%

Figure 3-20 Collisions at W Edith, 2008 - 2012

Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, UC Berkeley, 2014.

There were no bicycle or pedestrian collisions at West Edith Avenue and Foothill Expressway in the study period. The vehicle collisions were caused by a mix of speeding, failure to stay in lane, and failure to stop on red.

Figure 3-21 Collisions at Main, 2008 - 2012



Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, UC Berkeley, 2014.

There were no pedestrian collisions at Main St and Foothill Expressway in the study period, but there were three vehicle-on-cyclist collisions. Two were caused by drivers (passing too close, illegal u-turn) and the last by the cyclist (entry onto highway).

Preliminary Concepts

Preliminary concepts to address the critical issues are summarized below:

- **Engineering & Design**
  - Remove free right turn "slip lanes" to create a normalized four-legged intersection. Right-turn volumes are relatively low on most approaches at Foothill/Main and Foothill/West Edith, with the exception of the westbound right-turn from West Edith on to northbound Foothill.
    - Key challenge will be limited right-of-way width on the southbound right-turn approach to West Edith.
  - Any slip lanes to be retained should be redesigned with a reduced turning radius –in order to increase visibility of pedestrians at crosswalk locations.
  - Regardless of whether slip lanes are eliminated or maintained, implement other bicyclist and pedestrian access improvements, such as completing the sidewalk network on West Edith (the City is currently working to complete the network).
  - Considering creating a "safe kids slow zone" through downtown Los Altos intersections on Foothill Expressway. Given downstream delay on Foothill – between San Antonio and El Monte – a reduction in travel speeds between West Edith and Main may not actually affect travel time for motorists.
- **Enforcement & Operations**
  - Consider additional enforcement of moving violations that create the most impacts for bicyclists and pedestrians.
  - Consider a leading bike/pedestrian interval that would allow bicyclists and pedestrians to have a few seconds' head start crossing Foothill Expressway before other traffic gets a green signal.
  - Consider progressive speed limits that transition downward in 5 mph increments as drivers approach the study area and transition upwards as drivers leave the study area.
  - Consider other operational strategies to reduce conflicts between vehicles and bicyclists/pedestrians, such as crossing guard program.
- **Education & Behavior Change** (in conjunction with design and operational changes above)
  - Conduct a marketing campaign to raise awareness that this segment of Foothill Expressway is a "safe kids slow zone."
  - Consider eliminating the dedicated turn lanes and prohibiting left turns from West Edith Ave. onto Los Altos St. and from Main St. onto 1st St. Where left turns cannot be eliminated, narrow medians may be appropriate to lower turning speeds and reduce turns cutting across the opposite lane.
  - Consider implementing or expanding a "Safe Routes to School" program at schools in the vicinity or encourage those who drive to school to take a route that avoids the intersections of Main/1st and West Edith/Los Altos.

4 BEST PRACTICES

Based on the preceding introduction, analysis, and initial recommendations: best practices for potential improvement options are summarized below.

These best practice examples are drawn from relevant and comparable contexts, based on the assessment of existing conditions, policy framework, community priorities, and key issues in the *Safe Routes to Downtown Los Altos* study area.

It should be emphasized that not all of best practice examples are an exact match with this project or that the peer communities they are drawn from are in any way identical to Los Altos. Nonetheless, these best practices demonstrate a range of improvement options that could be viably be implemented to improve bicycle and pedestrian access, comfort, and perceived safety when traveling to and from downtown Los Altos at these two intersections.

FEDERAL POLICIES AND DESIGN GUIDANCE

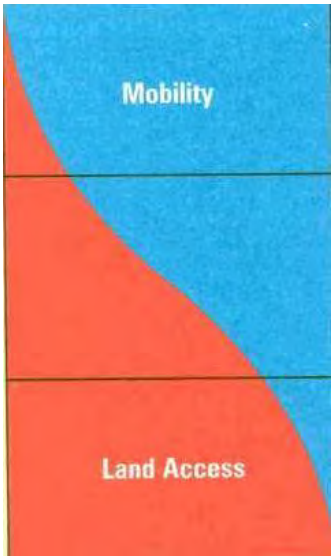
Select FHWA guidance on context-sensitive design solutions generally and slip lanes design specifically is summarized below.

Context-sensitive Design Solutions

Figure 4-1 illustrates the conventional definition of the factors that determine roadway function, based on the binary goals of "access" versus "mobility" that are typically represented as in oppositional and in conflict.

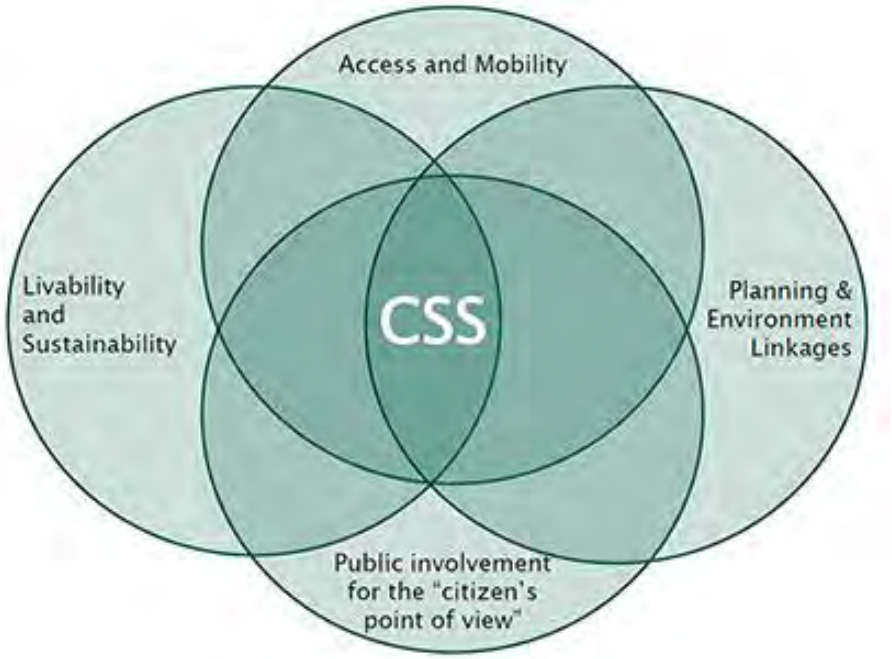
In some contexts, mobility and access may be the two primary factors shaping access management policies (e.g. number of driveways) for highways and major arterials. However more recent guidance from the FHWA suggests that this binary framework isn't sufficiently nuanced for designing a) intersections of local streets with highways or major arterials that bisect communities or b) local multimodal streets. Instead, a "context sensitive solutions" (CSS) approach requires the roadway designer to take into account a number of factors beyond just access and mobility. These other factors could include local planning goals, livability and quality of life, environmental and financial sustainability, and other community priorities. Figure 4-2 below illustrates the best practice Context Sensitive Solutions (CSS) definition of some of the factors that can determine roadway function.

Figure 4-1 Conventional Roadway Design Framework



Source: "Safety Effectiveness of Highway Design Features, Volume I, Access Control," FHWA, 1992, as shown in "Flexibility in Highway Design," FHWA, 2/10/2014. Available online at www.fhwa.dot.gov/environment/publications/flexibility/ch03.cfm.

Figure 4-2 Context-Sensitive Solutions (CSS) Roadway Design Framework



Source: "Advancing the Application of Context Sensitive Solutions: CSS National Dialogue 2," *Success in Stewardship*, FHWA, November 2013. Available online at www.environment.fhwa.dot.gov/strmlng/newsletters/nov13nl.asp.

FHWA Slip Lane Design Guidance

A conventional "free right" slip lane design gives motorists the expectation of free movement and tends to encourage them to focus on approaching traffic from the left rather than on pedestrians in the crosswalk. For this reason, free right slip lanes are generally not recommended where pedestrian activity is desired and pedestrian comfort is a priority.

In those rare cases where a slip lane is perceived as the only available design option, the Federal Highways Administration (FHWA) advises that the slip lane should be designed with:

- A compound curve so that the radius of the turn decreases past the crosswalk
- The narrowest possible lane width through the slip lane.

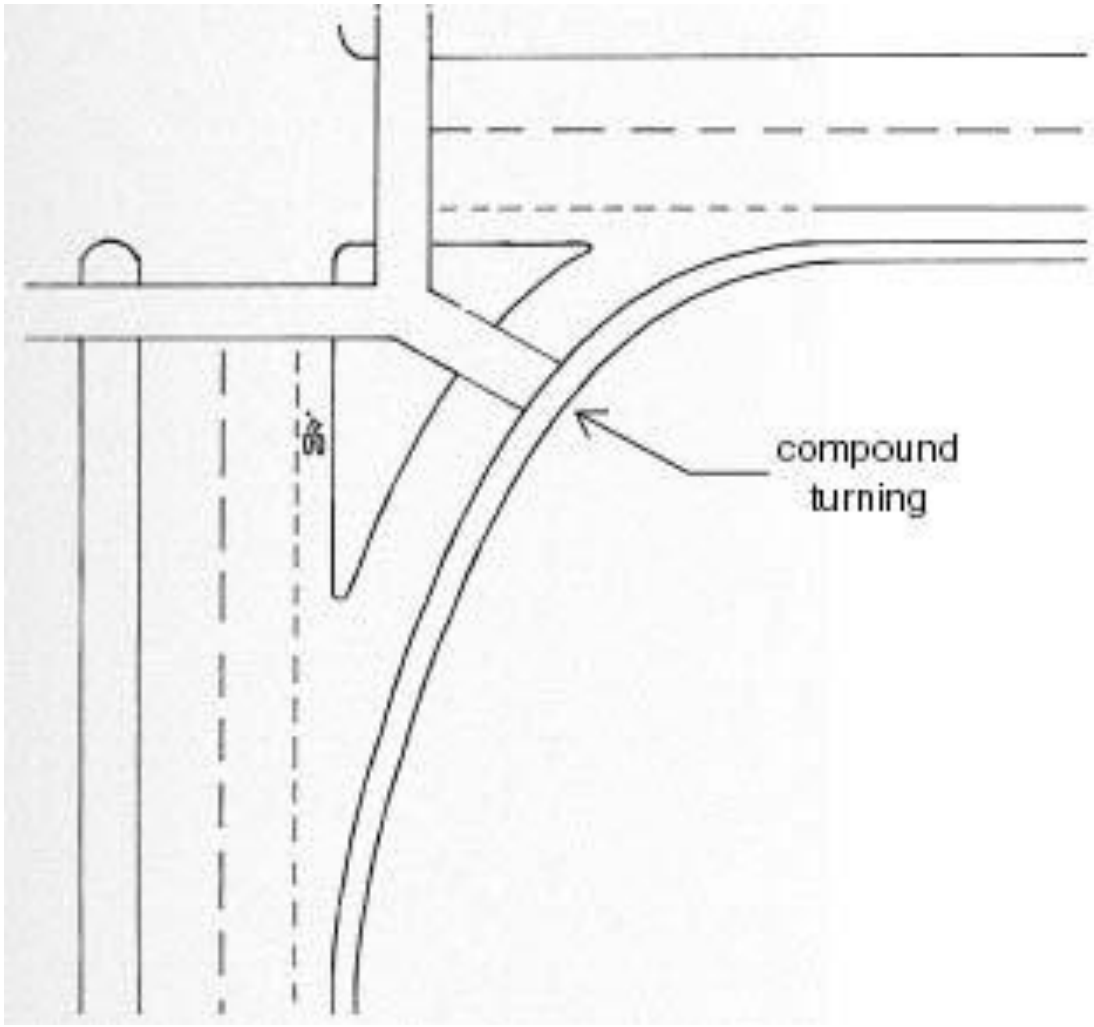
This FHWA design guidance is shown in Figure 4-3.

The combined effects of these design treatments is to reduce speeds of vehicles traveling through the slip lane, which makes it easier for 1) drivers and pedestrians to see each other, 2) gives drivers more time to yield to pedestrians, and 3) increases the safety for turning vehicles merging into the receiving lane.

- It should be noted that even with these improvements, the FHWA still considers slip lanes to be "significant access barriers for pedestrians" and therefore recommends additional mitigations such as raised crosswalks through the slip lane.[19]

[19] Designing Sidewalks and Trails for Access: Part II of II: Best Practices Design Guide, FHWA, 2014. Available online at www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks208.cfm.

Figure 4-3 Preferred Slip Lane Design Approaching Crosswalks



Source: *Designing Sidewalks and Trails for Access: Part II of II: Best Practices Design Guide*, FHWA, February 10th, 2014. Available online at www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks208.cfm.

Preferred right-turn slip-lane design provides a compound curve and narrowest possible lane width to reduce speeds through the slip lane, and provide an approach angle that makes it easier for drivers and pedestrians to see each other.

ENGINEERING & DESIGN BEST PRACTICES

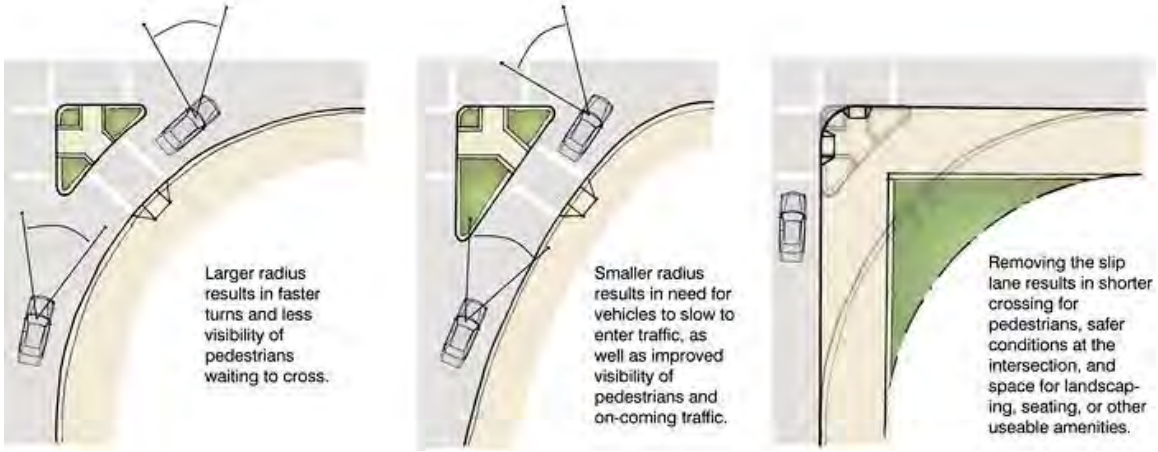
A. Normalize intersections and remove free right turn slip lanes

In keeping with best practices in intersection design, remove free right turn "slip lanes" to create a normalized four-legged intersection with the smallest feasible turning radii. As necessary, accommodate commercial trucks making right turns onto West Edith and Main Avenues with advance limit lines in the opposing lane of traffic. A schematic showing the rationale and conceptual design for slip lane removal is shown in Figure 4-4.

The removal of the free right turn slip lane would require either that the #2 outer through lane allow right turns or that a dedicated right turn lane (or pocket) to be created. If a separate right turn lane is needed, Santa Clara County roadway design standards require that provisions for cyclists are included at all right turn pockets. For example, if the free right turn slip lane is removed and a right turn pocket installed, then a 5' bike lane would need to be implemented to the left of an 11' right turn pocket. This bike lane would need to include appropriate supporting design treatments, such as bike boxes and "sorting zones" before and after each intersection (to facilitate bicyclists merging to and from the paved shoulder).

Depending on whether dedicated right turn lanes are needed and the configuration of the intersection geometry, the removal of the free right turn slip lanes would potentially free up some public right-of-way at each intersection for landscaped pocket parks, art installation, and/or aesthetically-pleasing signage that could create a "gateway" to downtown Los Altos. For Main St. commercial districts, gateway treatments can have both a traffic calming benefit and an economic development benefit.

Figure 4-4 Best Practice: Design Schematic for Slip Lane Redesign and/or Removal



Source: San Francisco Better Streets Plan, City and County of San Francisco, 2009. Available online at www.sfbetterstreets.org.

B. Modernize any slip lanes to be retained

Operational analysis and community priorities may reveal that the benefits of eliminating the slip lanes (including improved access, safety, and economic development) don't outweigh the auto throughput benefits of the slip lanes. If so, any slip lanes to be retained should be redesigned in order to mitigate their impacts on bicyclists and pedestrians. For example: reducing the turning radii to promote compound turning movement, implementing stop or yield in the slip lane, reducing lane widths, implementing special paving materials in the slip lanes, and/or creating a raised bicycle/pedestrian crosswalk across the slip lane (perhaps coupled with a bike/pedestrian only advance signal phase). Creating "kinder, gentler" slip lanes could be done as an interim strategy in advance of complete removal of the slip lanes. A best practice example showing raised crosswalk through a slip lane is shown below.

Figure 4-5 Best Practice Example: Raised Pathway Through Right Turn Slip Lane (Boulder, CO)

Source: Nelson\Nygaard .

C. Pedestrian and bicycle network improvements in the vicinity

Regardless of whether slip lanes are eliminated or maintained, other bicycle and pedestrian access improvements should be implemented in the vicinity, such as completing sidewalk network to the west of these two intersections, adding bike boxes at the intersections and enhanced sharrows through the intersections, and enhancing the crosswalk treatments (with advance limit lines, pigmented pavement or special paving materials, and in-pavement lights to increase pedestrian visibility at night).

- Figure 4-6 shows a best practice example of an intersection bike box in Portland, Oregon.
- Figure 4-7 shows a best practice example of an enhanced sharrow through an intersection in San Francisco.
- Figure 4-8 shows a best practice example of crosswalk in-pavement lights in San Luis Obispo.

Figure 4-6 Best Practice Example: Intersection Bike Box

Source: Bike Portland (www.bikeportland.org).

Figure 4-7 Best Practice Example: High-Visibility Bike Sharrows Through Intersection

Source: "Green-backed Sharrows Installed on Market Street," StreetsBlog SF, 2/25/11 (http://sf.streetsblog.org/2011/05/25/eyes-on-the-street-green-backed-sharrows-installed-on-market-street/).

Figure 4-8 Best Practice Example: In-Pavement Crosswalk Lights

Source: Joe McNally Photography, December 2008 (www.joemcnally.com/blog/2008/12/).

D. Install corner bulb-outs at adjacent skewed intersections on West Edith

Corner bulb-outs at intersection crossings have many benefits including: 1) increasing the visibility of pedestrians to motorists in turning vehicles (by positioning them in the drivers sight line), 2) reducing pedestrians' crossing distance and time (especially helpful for wide or busy arterials that pedestrians perceive as uncomfortable or unsafe to cross), and 3) reducing speeds for vehicles traveling through intersections (by visually narrowing the right-of-way) and turning at intersections (by tightening the turning radius). Eliminating the existing curbed median, narrowing through and turning lanes slightly, or potentially eliminating dedicated turn lanes where feasible could provide enough right-of-way to implement corner bulb-outs. To accommodate bicyclists traveling through the intersections, a "half bulb-out" may be installed and setback behind bike boxes. To accommodate existing drainage sewer grates, trench drains may be incorporated into the bulb-out. Figure 4-9 shows a best practice example of a corner bulb-out at a skewed intersection.

Installation of corner bulb-outs would not feasible at the intersections with Foothill Expressway – since side-to-side crossing distances are already as short as possible given the width and number of travel lanes and de-facto bicycle lane on Foothill -- but may be appropriate for "upstream" and "downstream" intersections, particularly where crossing West Edith Avenue at University or Main Street.

Figure 4-9 Best Practice Example: Corner Bulb-Outs at Skewed Intersections (Portland, OR)

Source: "Portland's Greenstreets Program a Sterling Best Practice Model, StreetsBlog SF, 11/13/09 (http://sf.streetsblog.org/2009/11/13/portlands-greenstreets-program-a-sterling-best-practice-model/).

E.Create a traffic calmed "safe kids slow zone"

Introducing pigmented pavement, special paving materials or markings (e.g. virtual speed bumps), and/or rumble strips in the auto lanes could create a slow zone to signal drivers to reduce their speed through downtown Los Altos, potentially including some speed reductions on the segment of Foothill Expressway as it crosses West Edith Avenue or Main Street. Such measures would not necessarily result in increased total delay to motorists – particularly given proximity to the signal at San Antonio Road. Design measures could be coupled with progressive transition speed limit signage, as discussed below. Figure 4-10 shows several examples of traffic calming using pigmented pavement to create a slow zone on two-lane arterial streets.

Figure 4-10 Traffic Calming Examples Using Pigmented Pavement

Source: "Slowing Traffic with Trompe l'Oeil," New York Times, 2/19/08. (http://wheels.blogs.nytimes.com/2008/06/19/virtual-speed-bumps/?_php=true&_type=blogs&_r=0).

Source: Color Surfacing, Pavement Surface Coatings, 2012 (http://www.pavementsurfacecoatings.com/color-surfacing/).

ENFORCEMENT AND OPERATIONAL BEST PRACTICES

Enforcement of Priority Violations

Consider improved enforcement of moving violations that create the most impacts for bicyclists and pedestrians attempting to cross Foothill Expressway. These include speeding, red-light running, and failure to yield to pedestrians. Not all these strategies require an increase in dedicated law enforcement personnel; for example use of red-light cameras at these intersections could reduce red-light running and yield to pedestrian enforcement stings can be done effectively on a periodic basis.

Signal Priority

Bike/pedestrian only signal phase. As discussed above, consider a bike/pedestrian only advance signal phase that would allow bicyclists and pedestrians to have a head start crossing Foothill Expressway thereby making them more visible to turning vehicles. Figure 4-11 shows a best practice example of a bike/pedestrian only signal phase.

Figure 4-11 Best Practice Example: Bike/Pedestrian Only Signal Phase (San Francisco)

Source: "Meanwhile in NoPa," Upoercasing: The Upper Haight Blog, 5/10/12 (http://uppercasing.com/2012/05/meanwhile-in-nopa.html)

Implement Progressive Transition Speed Limits

In this scheme, the posted speed limit would transition downward in increments of 5 mph on Foothill Expressway as drivers approach the segment containing the West Edith Ave. and Main Ave. intersections, and then transition upward as drivers leave the segment with these intersections. This operational strategy is common in communities where a state highway runs through or adjacent to downtown, and the concept is also seen in "school zones" where communities reduce speed limits near schools.

Other Operational Strategies

Consider other operational strategies to reduce conflicts between vehicles and bicyclists/pedestrians, such as crossing guard program perhaps initially targeted during school hours but ultimately expanding to other times with high volumes of bicyclists and pedestrians.

EDUCATION & BEHAVIOR CHANGE STRATEGIES[20]

Additional "best practices" often focus on educational and behavior-change strategies. Several examples are provided below.

Dynamic Speed Monitoring Signs

Install dynamic speed monitoring signs to alert drivers of their speed relative to posted speed limits.

Marketing and Outreach

Conduct a marketing campaign to make residents and merchants of Los Altos and surrounding communities aware that this segment of Foothill Expressway is a "safe kids slow zone."

Eliminate Turn Pockets on Short Block Lengths

In order to reduce peak loads at the intersections of Main/1st and West Edith/Los Altos (where turning vehicles potentially cause back-ups in the short turning pockets on these blocks) consider eliminating the dedicated turn lanes and prohibiting left turns from West Edith Ave. onto Los Altos Ave. and from Main Ave. onto 1st St.

Expanded Safe Routes to School Program

Consider implementing or expanding a "Safe Routes to School" program at schools in the vicinity to encourage parents and their students to walk/bike to school or, if they drive, to take a different route that avoids the intersections of Main/1st and West Edith/Los Altos.

[20] Should be implemented in conjunction with design and operational changes discussed above.

5 INTERSECTION IMPROVEMENT CONCEPTS

This section presents several concepts for consideration, drawing upon the "best practices" described in the previous section. Potential improvement options will be refined based on input from the public, stakeholders and decision makers.

The two initial concepts for consideration are identified as follows:

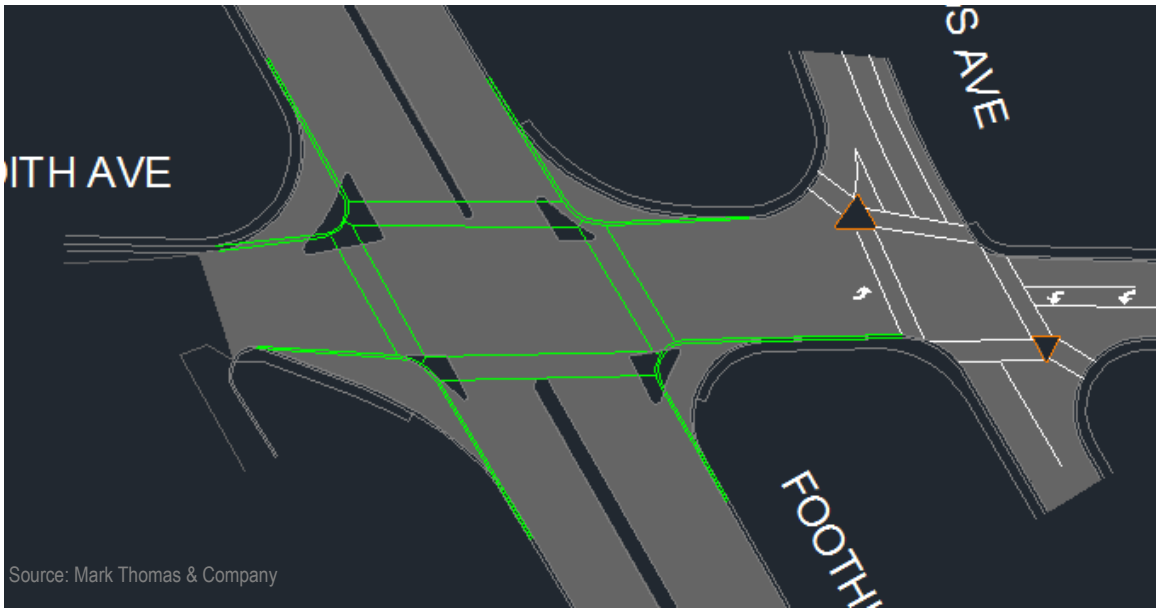
- "Normalized" Intersection with removal of right-turn slip-lanes, including a reduction in turning radius to reduce motorist speed approaching crosswalk locations.
- "Modernized" Slip Lanes – redesigning with reduced turning radius and narrow lane widths to reduce motorist speed and increase pedestrian and driver visibility.

The two concepts are not mutually exclusive, in that a "hybrid" design may provide desirable – potentially retaining slip-lanes on some approaches, and removing them on others.

CONCEPT 1 - NORMALIZED INTERSECTION

Figure 5-1 shows the basic "normalized intersection" concept – removing each of the four "free-right-turn" slip-lanes.

Figure 5-1 Example Sketch - Normalized Intersection with Slip Lane Removal

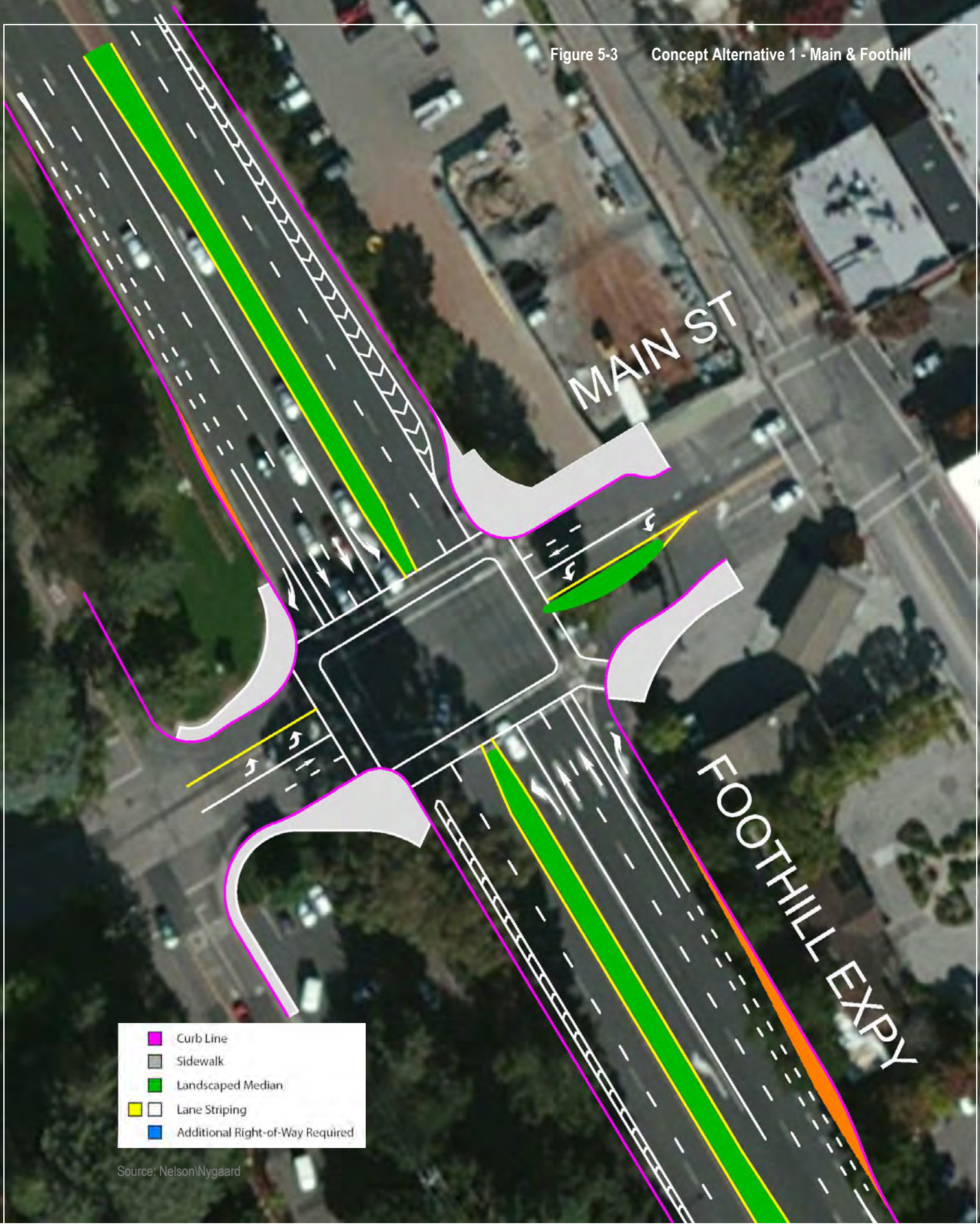


Drawing –Concept Alternative 1

Figures on the following two pages provide a conceptual layout of a standardized intersection treatment – with removal of the right-turn slip lanes at all four corners of both intersections.

Figure 5-2 Concept Alternative 1 - West Edith & Foothill

Figure 5-3 Concept Alternative 1 - Main & Foothill



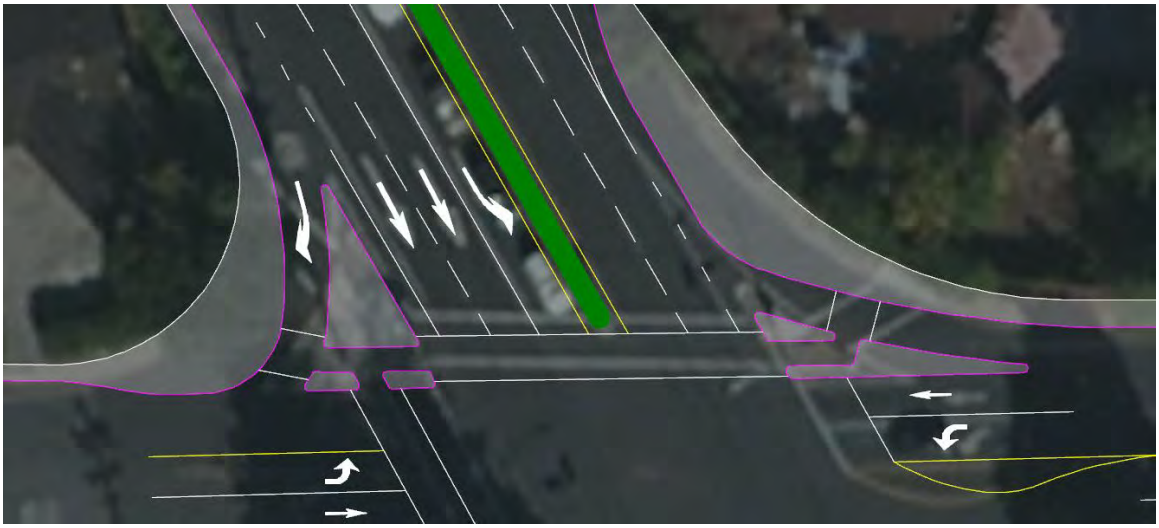
Source: Nelson\Nygaard

CONCEPT 2 - MODERNIZED SLIP LANES

If site design constraints, community priorities and/or regional traffic preferences reveal that the auto throughput benefits of maintaining some or all of the free right turn slip lanes outweigh the benefits of eliminating them, a hybrid design could retain one or more slip lanes.

As discussed in the recommendations section, any slip lanes to be retained should be redesigned in order to mitigate their impacts on bicyclists and pedestrians, such as with a smaller turning radius as shown in Figure 5-4.

Figure 5-4 Example of Modernized Slip-lane Design at West Edith Avenue



Source: Nelson\Nygaard

A preliminary design concept for a traffic calmed intersection concept is shown in Figures 5-5 (West Edith Avenue) and 5-6 (Main Street).

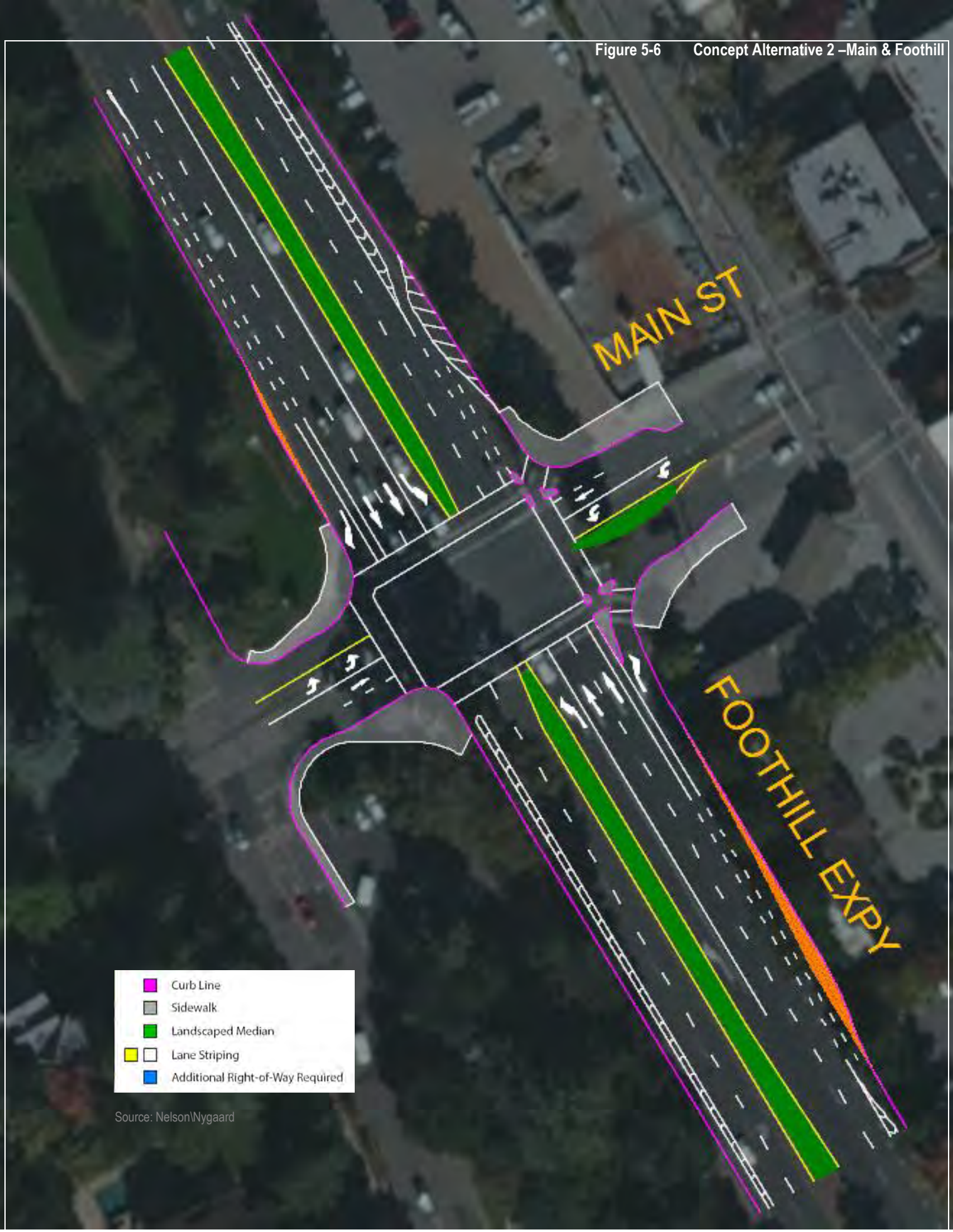
Drawing - Concept Alternative 2

Figures on the following two pages provide a conceptual layout of a "hybrid" intersection treatment with:

- Removal of the right-turn slip lanes on two corners of both intersections. As shown under this concept, slip-lane removal would be limited to the following approaches:
  - Eastbound right-turn approaches at both intersections. Eastbound right-turn traffic volumes are the lowest among the four approaches.
  - Northbound right-turn approach to West Edith Avenue. Northbound right-turn volumes are relatively low on this approach – approximately 120 per hour – while delay to this approach is primarily a function of downstream left-turn capacity at Los Altos Avenue.
  - Southbound right-turn approach to Main Stree
- Modernized slip-lane design on remaining corners.

Figure 5-5 Concept Alternative 2 - West Edith & Foothill

Figure 5-6 Concept Alternative 2 –Main & Foothill



Source: Nelson\Nygaard

CONCEPT 3 – HYBRID OPTION

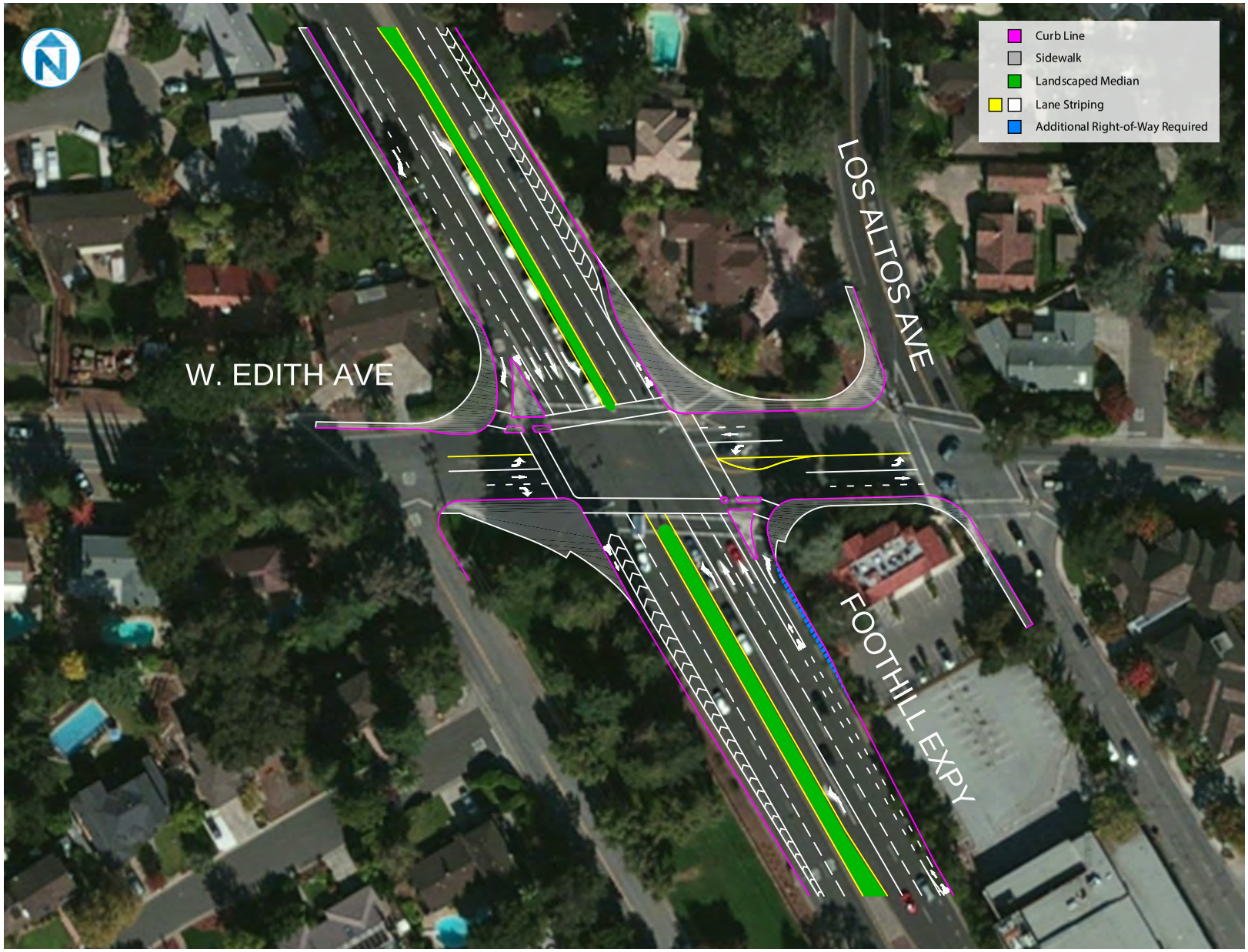
Preliminary input from County staff indicates a preference for maintaining the right-turn slip-lanes for traffic exiting Foothill Expressway. Based on that input, Concept 3 would provide a hybrid option that would modernize the right-turn slip lanes exiting Foothill Expressway, and remove the right-turn slip-lanes on the approaches to Foothill Expressway from West Edith Avenue and Main Street.

Drawing –Concept Alternative 3

Figures on the following two pages provide a conceptual layout of Concept 3 that would include:

- Removal of the right-turn slip lanes on two corners of both intersections. As shown under this concept, slip-lane removal would be limited to the side-street approaches from West Edith Avenue and Main Street towards Foothill Expressway.
- Modernized slip-lane design on two corners of both intersections – under this concept, this would apply to the right-turns exiting Foothill Expressway.

Figure 5-7
Concept Alternative 3 - West Edith & Foothill

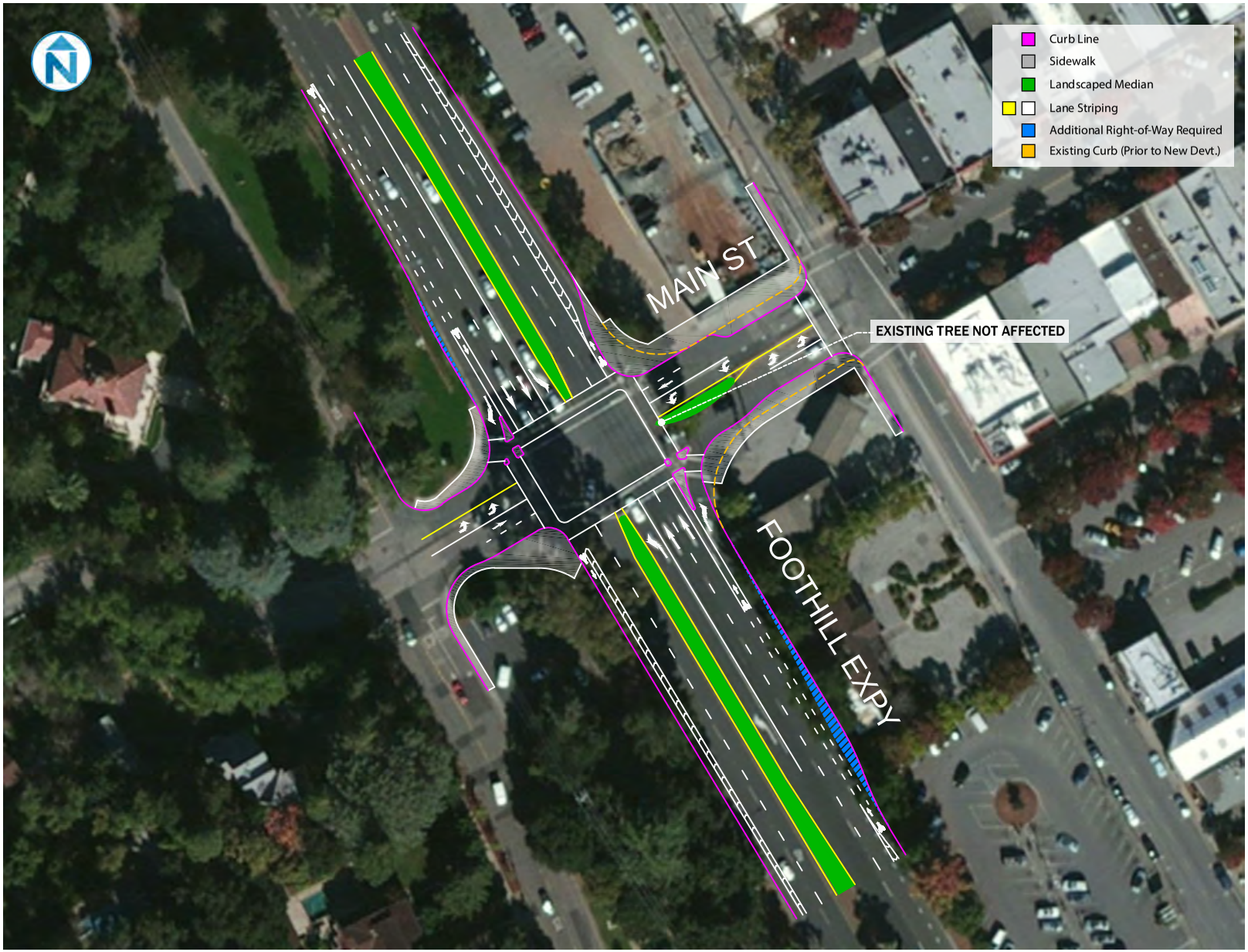


Los Altos Safe Routes to Downtown
Foothill Expressway at West Edith Avenue
Los Altos, California

CONCEPTUAL
NOT FOR CONSTRUCTION
NOT TO SCALE

NELSON NYGAARD

Figure 38
Concept Alternative 3 - Main & Foothill



Los Altos Safe Routes to Downtown
Foothill Expressway at Main Street
Los Altos, California

CONCEPTUAL
NOT FOR CONSTRUCTION
NOT TO SCALE

NELSON NYGAARD

ASSESSMENT OF TRAFFIC OPERATIONS WITH CONCEPT 3

This section provides an assessment of peak-hour traffic operations under Concept 3 in comparison with the existing intersection configuration, based on existing (year 2014) traffic volumes and future (year 2025) forecasted traffic volumes.

Year 2014 Volumes with Concept 3

The Year 2014 operational assessment is based on the March 2014 traffic counts conducted by Wiltec, as described in Chapter 3 of this report.

AM Peak Hour

Figure 5-9 provides a comparison of intersection LOS and average delay at the two key study intersections under Existing Conditions and with Concept 3, and Figure 5-10 provides a comparison of 95th percentile queue lengths and average delay for each of the four key right-turn movements.

Figure 5-9 Traffic Level of Service Comparison with Concept 3 (Year 2014 Volumes) – AM Peak Hour

Intersection	Control	Existing Configuration (Year 2014 AM Peak Hour Volumes)		Proposed Concept 3 (Year 2014 AM Peak Hour Volumes)	
		LOS	Avg Delay (sec)	LOS	Avg Delay (sec)
Main St & Foothill Expressway	Signal	C	23.6	C	21.9
West Edith Ave & Foothill Expressway	Signal	C	24.3	C	24.7

Bold indicates unacceptable LOS based on adopted standards (LOS E or better is acceptable on Foothill Expressway, while LOS D or better is acceptable at City of Los Altos intersections).

Source: Nelson\Nygaard Synchro analysis based on March 2014 intersection turning movement counts.

Figure 5-10 Queue Comparison with Concept 3 (Year 2014 Volumes) – AM Peak Hour

Intersection	Proposed change to right-turn configuration under Concept 3	Existing Configuration (Year 2014 AM Peak Hour Volumes)		Proposed Concept 3 (Year 2014 AM Peak Hour Volumes)	
		95th percentile queue length (ft)	Avg Delay (sec)	95th percentile queue length (ft)	Avg Delay (sec)
Main St & Foothill Expressway					
Eastbound right-turn	Removal of right-turn slip-lane	8’	37.2 s	8’	32.7 s
Westbound right-turn	Removal of right-turn slip-lane	0’	16.0 s	0’	16.3 s
Northbound right-turn	Modification to right-turn slip-lane	53’	10.0 s	53’	9.2 s
Southbound right-turn	Modification to right-turn slip-lane	3’	8.0 s	3’	7.5 s
West Edith Ave & Foothill Expressway					
Eastbound right-turn	Removal of right-turn slip-lane	44’	29.1 s	44’	29.1 s
Westbound right-turn	Removal of right-turn slip-lane	90’	63.8 s	90’	63.7 s
Northbound right-turn	Modification to right-turn slip-lane	0’	0.6 s	0’	0.9 s
Southbound right-turn	Modification to right-turn slip-lane	0’	12.3 s	0’	12.3 s

Bold indicates right-turn queue approaching capacity.

Source: Nelson\Nygaard Synchro analysis.

PM Peak Hour

Figure 5-11 provides a comparison of intersection LOS and average delay at the two key study intersections under Existing Conditions and with Concept 3, and Figure 5-12 provides a comparison of 95th percentile queue lengths and average delay for each of the four key right-turn movements.

Figure 5-11 Traffic Level of Service Comparison with Concept 3 (Year 2014 Volumes) – PM Peak Hour

Intersection	Control	Existing Configuration (Year 2014 AM Peak Hour Volumes)		Proposed Concept 3 (Year 2014 A Peak Hour Volumes)	
		LOS	Avg Delay (sec)	LOS	Avg Delay (sec)
Main St & Foothill Expressway	Signal	C	23.8	C	23.8
West Edith Ave & Foothill Expressway	Signal	C	28.5	C	28.5

Bold indicates unacceptable LOS based on adopted standards (LOS E or better is acceptable on Foothill Expressway, while LOS D or better is acceptable at City of Los Altos intersections).

Source: Nelson\Nygaard Synchro analysis based on March 2014 intersection turning movement counts.

Figure 5-12 Queue Comparison with Concept 3 (Year 2014 Volumes) – PM Peak Hour

Intersection	Right-turn Configuration	Existing Configuration (Year 2014 PM Peak Hour Volumes)		Proposed Concept 3 (Year 2014 PM Peak Hour Volumes)	
		95th percentile queue length (ft)	Avg Delay (sec)	95th percentile queue length (ft)	Avg Delay (sec)
Main St & Foothill Expressway					
Eastbound right-turn	Removal of right-turn slip-lane	0'	32.2 s	0'	30.8 s
Westbound right-turn	Removal of right-turn slip-lane	7'	45.6 s	7'	45.6 s
Northbound right-turn	Modification to right-turn slip-lane	29'	24.9 s	29'	24.9 s
Southbound right-turn	Modification to right-turn slip-lane	33'	17.6 s	33'	17.6 s
West Edith Ave & Foothill Expressway					
Eastbound right-turn	Removal of right-turn slip-lane	37'	31.1 s	37'	31.1 s
Westbound right-turn	Removal of right-turn slip-lane	54'	62.7 s	54'	62.8 s
Northbound right-turn	Modification to right-turn slip-lane	18'	7.6 s	18'	7.6 s
Southbound right-turn	Modification to right-turn slip-lane	58'	10.0 s	58'	10.0 s

Bold indicates right-turn queue approaching capacity.

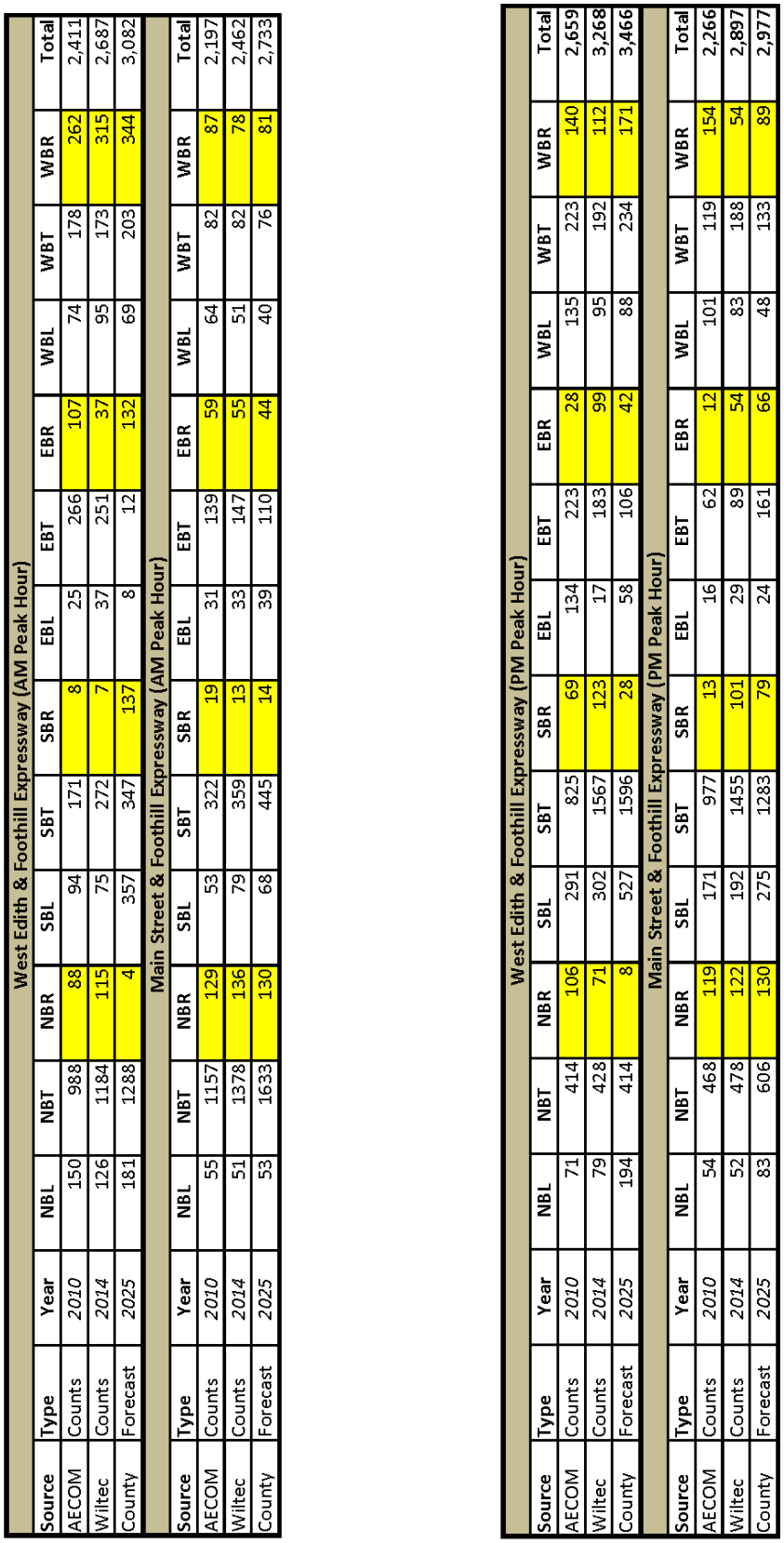
Source: Nelson\Nygaard Synchro analysis.

Year 2025 Traffic Volumes

The assessment of Year 2025 traffic operations described below is based on Year 2025 AM and PM Peak Hour turning-movement forecasts provided by County staff based on recent travel-demand model outputs.

Figure 5-14 provides a comparison of recent traffic counts by movement – conducted in 2010 and 2014 – with the forecasted Year 2025 volume by movement. The right-turn movements that would potentially be affected are highlighted in yellow. As shown, the volume of north/south through movements is forecasted to increase on Foothill Expressway, and the Year 2025 forecast also predicts a significant increase in forecasted southbound left-turns approaching West Edith Avenue during both peak hours. Total right-turn volumes at Foothill & West Edith are forecasted to increase during the AM Peak Hour and decrease during the PM Peak Hour, while total right-turn volumes at Foothill & Main would not change significantly from Year 2014 volumes during either the AM or PM Peak Hour.

Figure 5-13 Peak Hour Traffic Volume Comparison – 2010, 2014 & 2025 (AM & PM Peak Hours)



West Edith & Foothill Expressway (AM Peak Hour)

Source	Type	Year	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total
AECOM	Counts	*2010*	150	988	88	94	171	8	25	266	107	74	178	262	2,411
Wiltec	Counts	*2014*	126	1184	115	75	272	7	37	251	37	95	173	315	2,687
County	Forecast	*2025*	181	1288	4	357	347	137	8	12	132	69	203	344	3,082

Main Street & Foothill Expressway (AM Peak Hour)

Source	Type	Year	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total
AECOM	Counts	*2010*	55	1157	129	53	322	19	31	139	59	64	82	87	2,197
Wiltec	Counts	*2014*	51	1378	136	79	359	13	33	147	55	51	82	78	2,462
County	Forecast	*2025*	53	1633	130	68	445	14	39	110	44	40	76	81	2,733

West Edith & Foothill Expressway (PM Peak Hour)

Source	Type	Year	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total
AECOM	Counts	*2010*	71	414	106	291	825	69	134	223	28	135	223	140	2,659
Wiltec	Counts	*2014*	79	428	71	302	1567	123	17	183	99	95	192	112	3,268
County	Forecast	*2025*	194	414	8	527	1596	28	58	106	42	88	234	171	3,466

Main Street & Foothill Expressway (PM Peak Hour)

Source	Type	Year	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Total
AECOM	Counts	*2010*	54	468	119	171	977	13	16	62	12	101	119	154	2,266
Wiltec	Counts	*2014*	52	478	122	192	1455	101	29	89	54	83	188	54	2,897
County	Forecast	*2025*	83	606	130	275	1283	79	24	161	66	48	133	89	2,977

2025 AM Peak Hour

Figure 5-14 provides a comparison of intersection LOS and average delay at the two key study intersections with forecasted Year 2025 traffic volumes under the existing configuration and with the modified configuration under Concept 3. Figure 5-15 provides a comparison of 95th percentile queue lengths and average delay for each of the four key right-turn movements.

Figure 5-14 Traffic Level of Service with Concept 3 (Year 2025 Volumes) – AM Peak Hour

Intersection	Control	Existing Configuration (Year 2025 AM Peak Hour Volumes)		Proposed Concept 3 (Year 2025 AM Peak Hour Volumes)	
		LOS	Avg Delay (sec)	LOS	Avg Delay (sec)
Main St & Foothill Expressway	Signal	D	39.7	D	37.3
West Edith Ave & Foothill Expressway	Signal	E	56.0	E	56.9

Bold indicates unacceptable LOS based on adopted standards (LOS E or better is acceptable on Foothill Expressway, while LOS D or better is acceptable at City of Los Altos intersections).

Source: Nelson\Nygaard Synchro analysis based on March 2014 intersection turning movement counts.

Figure 5-15 Queue Comparison with Concept 3 (Year 2025 Volumes) – AM Peak Hour

Intersection	Right-turn Configuration	Existing Configuration (Year 2014 AM Peak Hour Volumes)		Proposed Concept 3 (Year 2014 AM Peak Hour Volumes)	
		95th percentile queue length (ft)	Avg Delay (sec)	95th percentile queue length (ft)	Avg Delay (sec)
Main St & Foothill Expressway					
Eastbound right-turn	Removal of right-turn slip-lane	0’	35.8	0’	33.1
Westbound right-turn	Removal of right-turn slip-lane	0’	16.6	0’	16.6
Northbound right-turn	Modification to right-turn slip-lane	47’	7.1	47’	6.9
Southbound right-turn	Modification to right-turn slip-lane	5’	7.5	5’	7.3
West Edith Ave & Foothill Expressway					
Eastbound right-turn	Removal of right-turn slip-lane	42’	30.3	42’	30.3
Westbound right-turn	Removal of right-turn slip-lane	123’	60.0	109’	66.7
Northbound right-turn	Modification to right-turn slip-lane	0’	18.3	0’	18.3
Southbound right-turn	Modification to right-turn slip-lane	38’	13.4	38’	13.4

Bold indicates right-turn queue approaching capacity.

Source: Nelson\Nygaard Synchro analysis.

2025 PM Peak Hour

Figure 5-16 provides a comparison of intersection LOS and average delay at the two key study intersections with forecasted Year 2025 traffic volumes under the existing configuration and with the modified configuration under Concept 3. Figure 5-17 provides a comparison of 95th percentile queue lengths and average delay for each of the four key right-turn movements.

Figure 5-16 Traffic Level of Service with Concept 3 (Year 2025 Volumes) – PM Peak Hour

Intersection	Control	Existing Configuration (Year 2025 AM Peak Hour Volumes)		Proposed Concept 3 (Year 2025 AM Peak Hour Volumes)	
		LOS	Avg Delay (sec)	LOS	Avg Delay (sec)
Main St & Foothill Expressway	Signal	C	27.6	C	26.3
West Edith Ave & Foothill Expressway	Signal	E	74.5	E	75.0

Bold indicates unacceptable LOS based on adopted standards (LOS E or better is acceptable on Foothill Expressway, while LOS D or better is acceptable at City of Los Altos intersections).

Source: Nelson\Nygaard Synchro analysis based on March 2014 intersection turning movement counts.

Figure 5-17 Queue Comparison with Concept 3 (Year 2025 Volumes) – PM Peak Hour

Intersection	Right-turn Configuration	Existing Configuration (Year 2014 AM Peak Hour olumes)		Proposed Concept 3 (Year 2014 AM Peak Hour Volumes)	
		95th percentile queue length (ft)	Avg Delay (sec)	95th percentile queue length (ft)	Avg Delay (sec)
Main St & Foothill Expressway					
Eastbound right-turn	Removal of right-turn slip-lane	13’	40.5	13’	32.7
Westbound right-turn	Removal of right-turn slip-lane	17’	30.0	17’	30.7
Northbound right-turn	Modification to right-turn slip-lane	20’	9.7	20’	9.6
Southbound right-turn	Modification to right-turn slip-lane	26’	33.3	26’	31.5
West Edith Ave & Foothill Expressway					
Eastbound right-turn	Removal of right-turn slip-lane	18’	28.8	18’	28.8
Westbound right-turn	Removal of right-turn slip-lane	75’	52.1	65’	61.8
Northbound right-turn	Modification to right-turn slip-lane	0’	25.1	0’	25.1
Southbound right-turn	Modification to right-turn slip-lane	2’	14.7	2’	14.7

Bold indicates right-turn queue approaching capacity.

Source: Nelson\Nygaard Synchro analysis.

Traffic Operations Findings

As shown in the comparisons provided above on Figures 5-9 through 5-17:

- Removal and/or modifications to the right-turn slip-lanes would not have a significant effect on intersection delay, right-turn approach delay or right-turn queue lengths.
- The potential for queue lengths exceeding the right-turn lane capacity would be limited to the westbound right-turn from West Edith Avenue on to Foothill Expressway during the AM Peak Hour, with a 95th percentile queue length of 90 feet based on 2014 volumes and 109 feet based on 2025 volumes – thus a peak queue of 4 to 5 vehicles.

NEXT STEPS

The best practices and concepts described in this report are intended to provide "food for thought" in considering various options for improving access to downtown Los Altos across Foothill Expressway. This report will reviewed by City of Los Altos, Santa Clara County, members of the public and other stakeholders.