SAN RAFAEL

Third and Hetherton Traffic Study
Final Report | June 2018

CITY OF SAN RAFAEL
Mission City of Marin
CALIFORNIA

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INTRODUCTION

The intersection of 3rd Street and Hetherton Street is one of the most heavily congested locations in both San Rafael and Marin County. This is due in part to its proximity to major traffic generators such as the northbound and southbound ramps for US-101, Downtown San Rafael, Montecito Shopping Center, and San Rafael High School. During peak periods, drivers often experience significant delays approaching this intersection, generating long queues that in turn, add to the congestion at nearby intersections.

3rd Street and Hetherton Street is also highly traversed by pedestrians traveling between the Montecito neighborhood, Downtown San Rafael, the Caltrans Park-and-Ride lots, and the San Rafael Transit Center. During peak hours, this intersection handles over 3,500 vehicles and 200 pedestrians per hour, with several points of conflict between vehicles and pedestrians. With the recent opening of the adjacent Downtown San Rafael SMART Station, it is anticipated that pedestrian traffic at this intersection will continue to increase.

In the last five years, there have been pedestrian-involved collisions at 3rd Street and Hetherton Street, including two pedestrian fatalities which occurred in 2014 and 2016. Both fatalities involved vehicles making a westbound left turn from 3rd Street to Hetherton Street.

In an effort to improve vehicular delay and pedestrian safety, the City of San Rafael initiated this study to identify potential alternatives which would enhance the intersection of 3rd Street and Hetherton Street for both vehicles and pedestrians. A number of intersection improvement concepts were developed and analyzed, examining the effects of modifying intersection geometrics, signal operations, and signal infrastructure. The numerous concepts were screened down to a set of five intersection improvement concepts for further development and conceptual design.

Each of the intersection concepts were then evaluated based on traffic impacts, safety impacts, and cost. This evaluation informed the recommended concept, which is described below.

RECOMMENDED CONCEPT

The recommended intersection concept, as depicted in **Figure E-1**, includes the following modifications to the study intersection:

- **Signal phasing:** This concept maintains the current signal phasing with slight modifications to signal timing. A Leading Pedestrian Interval (LPI) would be implemented for the north and south leg crosswalks, where most of the recorded pedestrian collisions have occurred. The LPI begins the pedestrian walk phase prior

to the start of the vehicle phase, extending the all-red time at the signal. This increases pedestrian visibility for autos and emphasizes the pedestrian right-of-way. This concept includes a 5-second LPI for the east-west pedestrian phase. The 5 seconds for the LPI are shifted from the vehicle green time.

- **Signal infrastructure:** A second mast arm for the westbound approach signal would be installed to provide an additional signal head for westbound left-turn traffic with a "Yield to Pedestrians" blankout sign facing the westbound approach.
- **Geometrics:** The westbound approach would be narrowed to provide one shared through/left lane and two through lanes. This eliminates one of the two left-turn lanes, further benefiting pedestrian safety by eliminating the turning movement with the least amount of pedestrian visibility. The southbound approach would maintain the same configuration as exists today. The curb radius for the southeast corner of the intersection would also be tightened to slow turning vehicles and shorten the crossing distances for pedestrians, and a bulbout would be constructed at the northwest corner of the intersection.

Figure E-2 is a visual representation of how this concept would look from the perspective of the southeast corner of the intersection.

Traffic

Table E-1 displays the traffic analysis results for the recommended concept. Results shown include the delay and level of service for the overall intersection and the two approaches, and the increase or decrease in delay relative to existing conditions as a result of the improvements.

Table E-2 displays the queuing analysis results. Results include the 95th percentile queue lengths for southbound and westbound through and turning movements, and the increase or decrease in queue length relative to baseline conditions as a result of the improvements.

Detailed Synchro analysis worksheets are provided in **Appendix C**.

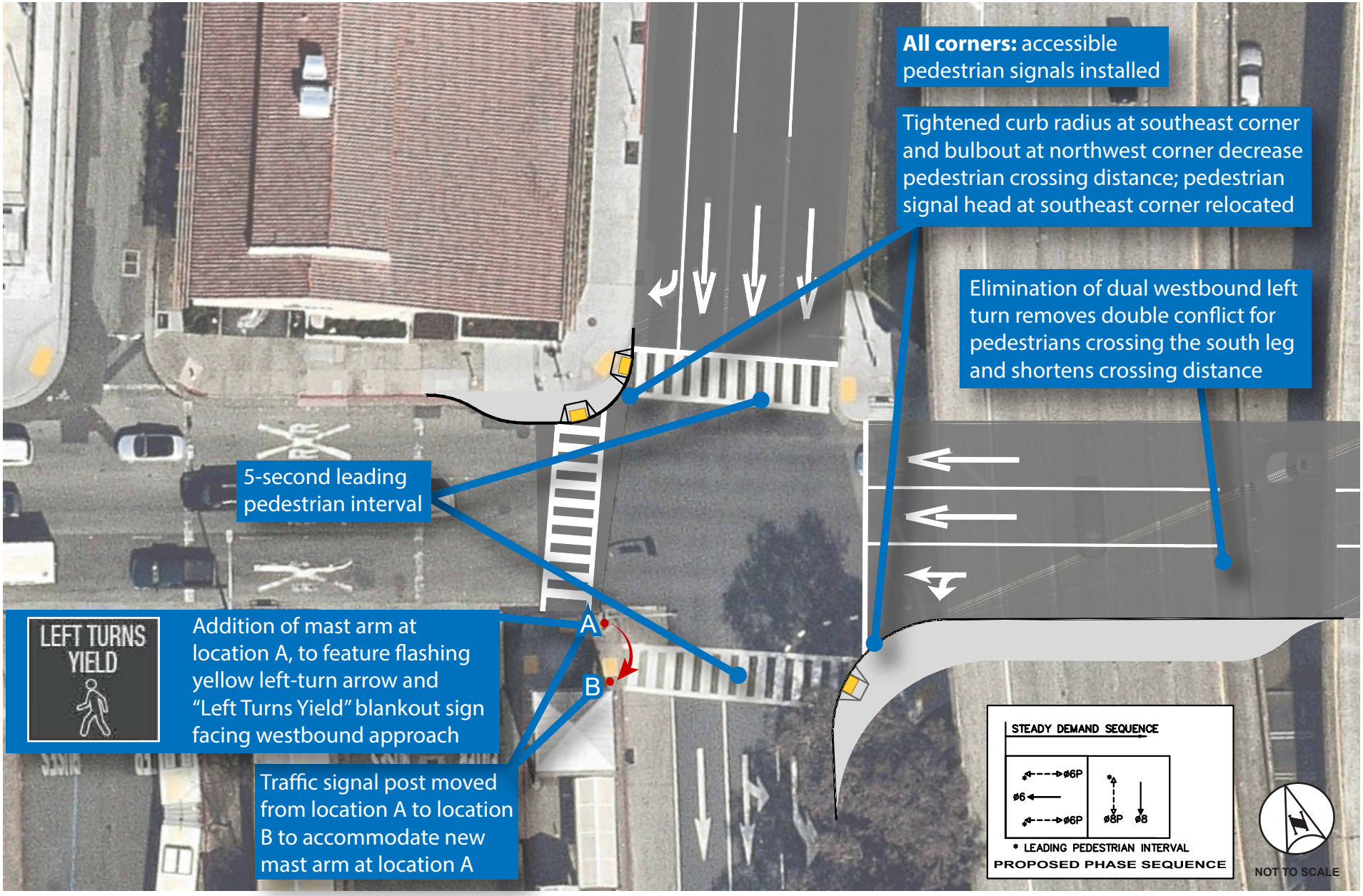

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Figure E-1
Recommended Concept

Existing Conditions

With Improvements

Figure E-2
Recommended Intersection Concept Photo-Simulation

Table E-1: Recommended Concept LOS Analysis Results

Period	Intersection Delay	Intersection LOS	WB Approach Delay	WB Approach LOS	SB Approach Delay	SB Approach LOS
AM	24.6	C	19.4	B	33.6	C
Δ	*3.1*	-	*4.0*	-	*1.6*	-
PM	19.1	B	17.2	B	21.9	C
Δ	*2.3*	-	*4.1*	-	*-0.5*	-

WB = Westbound; SB = Southbound; LOS = Level of Service

Table E-2: Recommended Concept Queuing Analysis Results

Period	WB LT/TH Queue 95th Percentile (ft)	SB TH Queue 95th Percentile (ft)	SB RT Queue 95th Percentile (ft)
AM	**400**	153	**336**
Δ	*114*	*-1*	*-11*
PM	**298**	68	**373**
Δ	*54*	*0*	*-28*

WB = Westbound; SB = Southbound
LT = Left-turn; TH = Through; RT = Right-turn
Note: Queue lengths in bold exceed lane capacity

The results show that the addition of a LPI and modifications to the westbound lane geometry results in a 2-3 second increase in delay at the intersection. Most of the delay increases occur at the westbound approach, while the southbound approach would only be slightly affected.

The concept would increase queuing for westbound movements; this is a result of the reduction of turning capacity by removing the existing left-turn pocket. The analysis shows 95th percentile queues will increase to approximately 400 feet in the AM peak hour and 300 feet in the PM peak hour. The analysis may be overestimating the effect of the elimination of the dedicated left-turn lane. Due to the very short length of the existing left-turn only lane (limited by the US-101 overpass column), it provides limited benefit to intersection operations as only the first few vehicles of the cycle are queued to make left-turns simultaneously from both left-turn lanes.

Safety

The addition of a leading pedestrian interval for the north and south leg crosswalks of the study intersection allows pedestrians to begin crossing the street before vehicles are permitted to turn; this head-start increases pedestrian visibility and gives pedestrians priority, as vehicles must yield to pedestrians already in the crosswalk.

In addition to the LPI, the elimination of the dual westbound left-turn removes the double conflict that pedestrians currently have crossing the south leg while also shortening the south leg crossing distance from 62 feet to 49 feet. The addition of a bulbout at the northwest corner reduces the west leg crossing distance from 47 feet to 41 feet. The additional signage would also increase pedestrian visibility.

Cost

The estimated cost of this concept is $283,700. A breakdown of this cost estimate is shown in **Table E-3**. The primary cost contributor is the tightening of the curb radius at the southeast corner of the intersection.

Table E-3: Recommended Concept Cost Estimate

Item	Total ($)
Mobilization	$14,328
Traffic Control	$21,491
SWPPP/Drainage	$7,164
Design	$28,655
Construction Admin	$21,491
Traffic Signal Modification	$60,400
Civil Improvements	$76,570
Signing and Striping	$6,305
Subtotal	$236,404
Contingency (20%)	$47,281
Total	**$283,700**

The option of implementing interim treatments, which would implement the recommended concept with the use of striping and flexible posts or channelizers instead of reconstructing curb, could be implemented if a nonpermanent solution is desired. The estimated cost of implementing the recommended concept using interim treatments is $118,500. A breakdown of this cost estimate is shown in **Table E-4**.

Table E-4: Recommended Concept Cost Estimate – Interim Treatments

Item	Total ($)
Mobilization	$6,173
Traffic Control	$9,260
SWPPP/Drainage	$0
Design	$12,346
Construction Admin	$9,260
Traffic Signal Modification	$50,800
Civil Improvements	$0
Signing and Striping	$10,930
Subtotal	$98,768
Contingency (20%)	$19,754
Total	**$118,500**

Detailed cost estimates are provided in **Appendix E**.

FINDINGS AND RECOMMENDATION

The recommended concept was selected based on completion of a traffic analysis, cost estimate, conceptual design, and an assessment of safety benefits for pedestrians. This concept was selected for the following reasons:

- **LPIs increase the visibility of pedestrians.** By allowing pedestrians a head start over vehicles, it gives them priority, firmly establishes the pedestrian with the right-of-way, and makes them more visible to vehicles.
- **It eliminates the double-conflict between westbound left-turns and pedestrians.** The existing intersection has two westbound left-turn lanes; these are given a green light at the same time as the pedestrian walk signal. Line of sight from the current second left-turn lane to pedestrians in the crosswalk may be limited by an adjacent turning vehicle. Reduction of left-turning traffic to one lane improves pedestrian visibility and reduces the number of conflict points between pedestrians and vehicles and improves visibility.
- **Curb extensions, also known as bulb-outs, create a safer pedestrian environment at the intersection.** Curb extensions enhance pedestrian safety by increasing pedestrian visibility, decreasing pedestrian exposure to vehicles by shortening crossing distances, slowing turning vehicles, and providing more pedestrian space.
- **The resulting traffic impacts are estimated to be minor.** Traffic analysis results showed that implementation of the recommended concept results in average delay increases 2-3 seconds in both the AM and PM peak hours.

The recommended concept would require both physical and operational modifications. If a nonpermanent solution is desired, interim treatments using striping and bollards could be used. The capital cost for construction of permanent treatments is estimated at $283,700; the cost for interim treatments is an estimated $118,500.

The assessment of the five concepts considered, and the evaluation process which resulted in the selection of the recommended concept, is described in the body of this report.

1 Introduction

1.1 PROJECT NEED AND BACKGROUND

The intersection of 3rd Street and Hetherton Street is one of the most heavily congested locations in both San Rafael and Marin County. This is due in part to its proximity to major traffic generators such as the northbound and southbound ramps for US-101, Downtown San Rafael, Montecito Shopping Center, and San Rafael High School. During peak periods, drivers often experience significant delays approaching this intersection, generating long queues that in turn, add to the congestion at nearby intersections.

3rd Street and Hetherton Street is also highly traversed by pedestrians traveling between the Montecito neighborhood, Downtown San Rafael, the Caltrans Park-and-Ride lots, and the San Rafael Transit Center. During peak hours, this intersection handles over 3,500 vehicles and 200 pedestrians per hour, with several points of conflict between vehicles and pedestrians. With the recent opening of the adjacent Downtown San Rafael SMART Station, it is anticipated that pedestrian traffic at this intersection will continue to increase.

In the last five years, there have been pedestrian-involved collisions at 3rd Street and Hetherton Street, including two pedestrian fatalities which occurred in 2014 and 2016. Both fatalities involved vehicles making a westbound left turn from 3rd Street to Hetherton Street.

In an effort to improve vehicular delay and pedestrian safety, the City of San Rafael initiated this study to identify potential alternatives which would enhance the intersection of 3rd Street and Hetherton Street for both vehicles and pedestrians

1.2 PROJECT GOALS

This project's goal is to identify feasible solutions to improve pedestrian safety and traffic throughput for the intersection of 3rd Street and Hetherton Street. The outcome of this project will be the selection of a recommended intersection design concept which can then proceed into design and construction through the use of the City's Highway Safety Improvement Program (HSIP) grant and other funds.

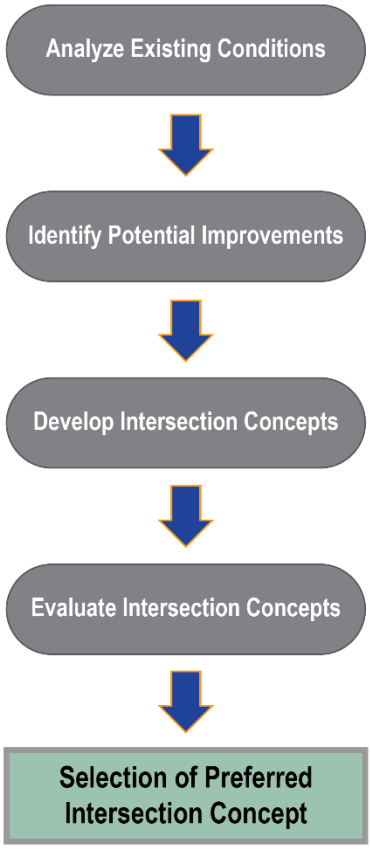
1.3 STUDY INTERSECTION AND PROJECT PROCESS

The study intersection is shown in **Figure 1-1**. 3rd Street is a three-lane westbound arterial which couples with 2nd Street to act as a major throughway for vehicles traveling into and through Downtown San Rafael. Hetherton Street is a three-lane southbound road which stretches from the Highway 101 southbound off-ramp at Mission Avenue to the Highway 101 southbound on-ramp at 2nd Street. Approximately 40,000 vehicles travel through this intersection per day.

Figure 1-1: Project Vicinity Map

The project was completed following the general process shown in **Figure 1-2**.

Figure 1-2: Project Flow Chart



The project team analyzed existing conditions at the study intersection to determine current operations, needs, and potential areas of improvement. Data used to inform this analysis included collision records from the years 2011-2016 from California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS), and peak hour intersection turning movement volumes collected in February 2017. This data is provided in **Appendix A** and **Appendix B**, respectively.

Based on this analysis, an initial list of potential intersection improvements was developed. Fourteen distinct improvement options were initially developed and reviewed with City staff. These improvement options included variations of improved signage and signaling, phase changes, striping/lane geometric changes, and pedestrian infrastructure changes. From that list, seven alternative intersection geometric configurations and five alternative signal phasing operations were identified. Traffic analysis was performed on all of the geometric and phasing alternatives to assess impacts on the circulation network. From this analysis and in conjunction with City staff, the set of intersection modifications was screened to a short list of five potential improvement concepts for further analysis and concept development.

For each of the five screened concepts, conceptual layouts drawn over aerial imagery were prepared to assess feasibility, define the configuration of the concept, and develop planning-level cost estimates.

Each of the intersection concepts were further evaluated based on traffic impacts, safety impacts, and cost. This evaluation informed the selection of the recommended concept. Traffic impacts were analyzed by modeling the intersection using Synchro traffic software and HCM 2000 methodology.

2 Existing Conditions

Figure 2-1 depicts existing peak hour vehicle, bicycle, and pedestrian volumes at the intersection, as well as the history of bicycle and pedestrian-related collisions at the intersection from 2011 to 2016.

2.1 CRASH HISTORY

Based on SWITRS records, a total of 70 collisions were recorded within 150 feet of the study intersection between January 1, 2011 and December 31, 2016. Eleven of these recorded collisions involved a pedestrian or bicyclist. Of these 11 pedestrian/bicycle collisions, six resulted in a complaint of pain, four resulted in injury, and one resulted in a fatality. An additional pedestrian fatality occurred in 2014 which had not been recorded in SWITRS. Eight of the pedestrian- or bicyclist-involved collisions (including the 2014 fatality) occurred at the crosswalk across the south leg of the intersection and involved a vehicle making a left-turn from westbound 3rd Street onto southbound Hetherton Street. The remaining three bicycle/pedestrian collisions occurred at the crosswalk across the north leg of the intersection and involved a vehicle making a through movement on southbound Hetherton Street. One sideswipe collision occurred just west of the intersection between a vehicle and a bicyclist.

2.2 TRAFFIC AND CIRCULATION

The existing intersection was modeled using Synchro traffic modeling software and HCM 2000 methodology. **Table 2-1** shows the delay and level of service (LOS) analysis results from the model. **Table 2-2** shows the 95th percentile queues for all intersection movements as calculated in Synchro. Detailed Synchro analysis worksheets are provided in **Appendix C**.

Table 2-1: Existing LOS Analysis Results

Period	Intersection Delay	Intersection LOS	WB Approach Delay	WB Approach LOS	SB Approach Delay	SB Approach LOS
AM	21.5	C	15.4	B	32.0	C
PM	16.8	B	13.1	B	22.4	C

WB = Westbound; SB = Southbound; LOS = Level of Service

High volume of right-turns on red on southbound Hetherton.

High-visibility ladder-style crosswalks have been recently striped.

Dual westbound left-turn lanes on 3rd Street.

Two fatalities have occurred since 2011 at the crosswalk across the south leg of the intersection.

Buses turn left from westbound 3rd Street to approach curbside bays at San Rafael Transit Center Platform A

NOT TO SCALE

Hetherton Street

3rd Street

419(434)
669(670)
6(1)
10’
46’
4’
19(48)
10’-13’
46’
69(74)
10’
50’
4(5)
7’
1330(1393)
440(402)
16(41)
47’
1034(921)
252(324)

CALIFORNIA US 101

Legend

- XX(YY) — AM(PM) Peak Hour Vehicle Turning Movement Volumes
- XX(YY) — AM(PM) Peak Hour Bicycle Approach Volumes
- XX(YY) — AM(PM) Peak Hour Pedestrian Volumes

Collisions

- Vehicle
- Bicyclist
- Pedestrian
- Party at Fault
- Complaint of Pain
- Injury
- Fatality

Notes:
Collisions shown are all bicycle and pedestrian-related collisions documented in SWITRS from 2011 to 2016.
One fatality is shown which was not documented in SWITRS
2nd/Hetherton approach volumes are from 9/21/2011. All other counts were taken 2/28/2017.
All locations of reported collisions are approximate.

Table 2-2: Existing Queuing Analysis Results

Period	WB LT Queue 95th Percentile (ft)	WB TH Queue 95th Percentile (ft)	SB TH Queue 95th Percentile (ft)	SB RT Queue 95th Percentile (ft)
AM	477	286	154	**347**
PM	176	244	68	**401**

WB = Westbound; SB = Southbound; LOS = Level of Service
LT = Left-turn; TH = Through; RT = Right-turn
Note: Queue lengths in bold exceed lane capacity

The results indicate that the existing intersection operates at least at a level of service C in both peak hours, which is considered acceptable. However, because HCM methodology does not account for traffic spillback from downstream intersections when assessing delay, these results do not necessarily reflect actual conditions. The close spacing of the intersections in the Downtown grid network causes queues at one intersection to impact operations at upstream intersections. Field observations show that current delays and congestion at this intersection are worse than indicated by the model. However, HCM results provide a baseline to determine the change (increase or decrease) in delay that results from each proposed modification.

The results also indicate that delay for the southbound approach is worse than it is for the westbound approach. Southbound right-turns experience more delay than any other movement at the intersection. Analysis also shows that queues for southbound right-turns exceed the capacity of the existing southbound right-turn lane.

2.3 KEY CHALLENGES AND CONSTRAINTS

A number of factors create constraints or challenges to potential improvements at this intersection:

- Signals along 3rd Street are coordinated, including the study intersection; changes to signal timing may impact the coordination of the signals along this corridor
- All signals in Downtown operate on the same cycle length; changes to the cycle length at the study intersection would potentially affect all Downtown signals
- The length of the existing westbound left-turn only pocket is constrained by the location of Highway 101 support columns
- Some buses which berth at the bus bays on the east side of Platform A at San Rafael Transit Center make left-turns from westbound 3rd Street to southbound Hetherton when approaching the transit center. Since these buses must pull into the westernmost lane on southbound Hetherton, they make wide left-turns. Any proposed improvements must account for the space needed to accommodate the wide left-turns that buses make in order to serve these bus bays. Additionally, buses

traveling southbound on Hetherton Street must also be able to access these bays and pull approximately parallel with the curb.
- Pedestrian activity is high along all three legs currently with a crosswalk, likely as a result of the San Rafael Transit Center
- There is a high volume of southbound right-turns at the study intersection, including numerous right-turns on red
- With the construction of SMART Phase 2, queue cutter signals are anticipated to be introduced at the at-grade rail crossings on 2nd and 3rd Streets
- Right-of-way on the east side of Hetherton Street, north of 3rd Street, is constrained by Erwin Creek

These challenges were taken into consideration when developing and evaluating potential intersection improvements.

2.3.1 Projects in the Area

In addition to the key constraints and challenges at the study intersection, a number of nearby projects are in progress and may have effects on the study intersection. These projects include the following:

- The Golden Gate Bridge, Highway, and Transportation District is undergoing a joint effort with the City of San Rafael, Marin Transit, SMART, and TAM to identify a new location for the San Rafael Transit Center. Since the transit center is a major generator of pedestrian activity, its relocation will likely increase pedestrian flows at the nearest intersections.
- The existing crosswalks at the intersection of 2nd Street and Irwin Street will be relocated from the north and east legs of the intersection to the south and west legs. The relocation of these crosswalks will affect some pedestrian paths of travel result in changes to pedestrian activity at other intersections. For instance, pedestrians who previously walked to United Markets from the transit center via 2nd Street would potentially be rerouted through the intersection of 3rd Street and Hetherton Street.
- The extension of SMART service to Larkspur may increase pedestrian activity in the vicinity of the SMART station, including the intersection of 3rd Street and Hetherton Street.
- The Third Street Rehabilitation Project is an effort by the City of San Rafael to rehabilitate Third Street in the downtown area, including the study intersection. Improvements recommended in this study will need to integrated into the plans developed as part of that project.
- The City of San Rafael is planning to implement Adaptive Traffic Control Systems (ATCS) Projects in Central San Rafael; this would include 3rd Street & Hetherton Street.

- A new mid-block crosswalk is planned to be installed on 3rd Street between Union Street and Embarcadero Street. This could have a minor effect on the travel patterns of pedestrians traversing the 3rd Street & Hetherton Street Intersection.
- The City of San Rafael Downtown Parking/Wayfinding Study includes the recommendation to improve pedestrian connections between the Caltrans Park & Ride lots and San Rafael Transit Center; the study's recommendations are noted to be subject to revision based on the results of this study.
- The City of San Rafael is currently updating its Bicycle and Pedestrian Master Plan. The plan aims to guide investments in bicycle and pedestrian facilities in the next 5 to 10 years. Recommendations from this study will need to be coordinated with this Plan update.

3 Intersection Concepts

After analysis of the existing conditions of the intersection and surrounding street network, a number of geometric, signal, and pedestrian infrastructure alternatives were identified for consideration and preliminary assessment. From an initial set of 14 distinct improvement alternatives, seven geometric alternatives and five pedestrian phasing alternatives were quantitatively analyzed for traffic operations. The list of potential improvements was screened based on this traffic analysis, geometric constraints, impacts to surrounding intersections, and pedestrian safety implications. The list of potential improvements was screened down to five comprehensive improvement concepts based on input from City staff. Each concept was evaluated to assess the potential impacts to vehicular traffic and pedestrians, and the potential cost for implementation. More detailed drawings of these configurations can be found in **Appendix D**.

3.1 ALTERNATIVES CONSIDERED AND ELIMINATED

Prior to developing specific intersection concept configurations, a number of potential solutions were identified and underwent a preliminary evaluation. Traffic impacts were analyzed using Synchro; this analysis focused primarily on the relative change in delay, LOS, and queuing associated with each option.

3.1.1 Geometric Improvements

As the intersection is comprised of two one-way streets, the following breaks down each approach to discuss the options for geometric configurations presented in the first phase of analysis before being deemed infeasible.

3rd Street – Westbound approach:

One (1) westbound left and two (2) westbound through lanes: This change would eliminate the existing westbound left-turn pocket and convert the existing westbound through/left lane to an exclusive left turn lane. The positive impact of this option would be a shortened crossing distance across the south leg of the intersection, a shortened crossing distance across the intersection diagonal (if a pedestrian scramble was selected), and increased visibility between drivers and pedestrians resulting from the reduction of two turn lanes to one. This geometry change would result in minor increases in intersection delay. However, the loss of a through lane would lead to significant increases in queuing for the westbound through movement.

One (1) westbound left and three (3) westbound through lanes: This option would convert the existing westbound through/left lane to an exclusive through lane. The benefit of this option would be increased safety resulting from the elimination of the dual left-turns. The traffic analysis found that this option resulted in negligible changes in delay/LOS for the

intersection. It is noted though, that the queuing for left-turns would frequently spill over into the adjacent through lane and preclude through movement in that lane because of the short length of the turn pocket, which is not captured by the HCM methodology.

Hetherton Street – Southbound approach*:*

Two (2) southbound right and two (2) through lanes: This option would convert one existing southbound through lane to an exclusive right turn lane. Similar to the previous option, this would increase capacity for southbound right turns, but increase conflicts and worsen visibility for pedestrians unless combined with a phasing modification. Traffic analysis found that this improvement resulted in similar improvements in delay and LOS as the previous option. This option would also result in an uneven lane utilization of the two through lanes, as only one of the southbound through lanes would lead to the US-101 southbound on-ramp south of 2nd Street. This would result in minor additional impacts in the AM Peak.

Other Geometric Modifications:

Provide a bulb-out in the southwest corner: This option would reduce the crossing distance across the south leg of the intersection. It was removed from consideration because it would impact the ability of buses accessing the transit center from getting into position parallel and adjacent to the curb on Hetherton Street.

Raise the intersection or crosswalks: Raising an intersection or raising crosswalks has been shown to reduce vehicle speeds and improve pedestrian visibility. However, emergency vehicles and buses may have challenges with these raised configurations. Vehicle speeds and volumes, as well as bus volumes, make this location undesirable for such a treatment.

Remove the south leg crosswalk and add an east leg crosswalk: This would remove the pedestrian crossing leg with the largest number of pedestrian-involved collisions at the intersection. However, this crosswalk serves the natural pedestrian flow from the Montecito area to the transit center. Removal of the crosswalk would require pedestrians making this movement to cross three legs of the intersection, including 3rd Street twice. It is likely that it would encourage jaywalking, leading to a less safe condition. It also may worsen auto congestion by increasing number of pedestrian-auto conflicts if pedestrians were required to cross three legs of the intersection instead of just one.

Remove the south leg crosswalk only: Similar to the above concept, this would remove the pedestrian crossing leg with the largest number of pedestrian-involved collisions at the intersection. Removal of the crosswalk would force pedestrians to find a different path of

travel, either by crossing the west and north legs of the intersection or utilizing different intersections. Removal of this crosswalk would encourage jaywalking, leading to a less safe condition. It also may worsen auto congestion at this intersection by increasing number of pedestrian-auto conflicts if pedestrians who currently cross the south leg of the intersection were forced to cross the west and north legs instead. .

3.1.2 Timing improvements

In addition to the physical configuration of the intersection, alternatives to modifying the signal timing or phasing of the intersection were evaluated; these primarily involved the implementation of a pedestrian scramble. For the following timing solutions considered, delay, LOS, and queueing were determined using HCM 2000 methodology.

Pedestrian Scramble (with existing geometry): In analyzing this solution, the intersection was modeled assuming the minimum required 5 seconds “Walk” time and 26 seconds “Flashing Don’t Walk” time (governed by the NW-to-SE diagonal crossing distance). The intersection splits were then adjusted until the volume to capacity ratios (v/c ratio) of all vehicle movements were below 1.0. This exercise essentially determined the minimum required cycle length needed to accommodate the pedestrian scramble. In this configuration, a 120-second cycle length would be needed in both AM and PM peaks to accommodate a pedestrian scramble. The combination of the pedestrian scramble and the longer cycle length resulted in a change from LOS B in existing conditions to LOS E in both AM and PM peak hours. For these reasons, the implementation of a pedestrian scramble with the existing geometry of the intersection is not recommended.

Pedestrian scramble in Oakland Chinatown. Source: CommunityCommons.org

Pedestrian Scramble (with one (1) westbound left and two (2) westbound through lanes: This option was considered to see how shortening the diagonal crossing distance would impact the required signal timing and the resulting traffic impacts. The elimination of the left-turn pocket reduced the required “Flashing Don’t Walk” time by three (3) seconds, resulting in a 30-second split for the pedestrian phase. However, since this reduces the capacity of the intersection, this configuration would require longer cycle lengths (higher than 120 seconds) to keep v/c ratios below 1.0. It also resulted in a LOS E in both peak

hours. The implementation of a pedestrian scramble with these geometric changes is not recommended for this intersection.

Pedestrian Scramble (with one (1) westbound through/left and two (2) westbound through lanes): This option was considered to see if the performance of the previous option could be improved by adding capacity for through movements. The required cycle lengths for this configuration are still greater than 120 seconds. Traffic analysis found that this resulted in slightly less overall delay than the one (1) westbound left and two (2) westbound through lanes option, but would maintain a LOS E and is subsequently not recommended.

Pedestrian Scramble (no diagonal crossing): In this configuration, there would be an exclusive pedestrian phase, but pedestrians would not be allowed to cross diagonally. This solution reduces the required split for the pedestrian phase, and still separates vehicle and pedestrian traffic. However, it would require pedestrians to wait through two cycles to cross diagonally. The required split for the pedestrian phase was 5 seconds “Walk” time, 17 seconds “Flashing Don’t Walk” time (governed by the south leg crossing), and two (2) seconds of yellow time. The impact to pedestrian crossing time removed this concept from further consideration.

3.1.3 Other Signal Modifications

In addition to signal timing or geometric improvements, other signal modifications were considered as well.

Flashing Yellow Left-turn Arrow: This would replace the green ball for left-turn movements with a flashing yellow arrow. It would potentially help emphasize to vehicle that they need to yield to pedestrians. This was not considered further because many drivers may not know how to navigate it and the benefit would likely be limited.

Eliminate “No Left-Turn on Red” sign: Allowing for left-turns on red would potentially reduce the number of vehicles turning in conflict with pedestrians. However, this turn restriction is limited to a few hours a day and heavy queuing on Hetherton Street would likely limit the impact of this change.

3.2

3.2 RECOMMENDED CONCEPT

The recommended concept, as depicted in **Figure 3-1**, includes the following modifications:

- **Signal phasing:** This concept maintains the current signal phasing with slight modifications to signal timing. A Leading Pedestrian Interval (LPI) would be implemented for the north and south leg crosswalks, where most of the recorded pedestrian collisions have occurred. The LPI begins the pedestrian walk phase prior to the start of the vehicle phase, extending the all-red time at the signal. This increases pedestrian visibility for autos and emphasizes the pedestrian right-of-way. This concept includes a 5-second LPI for the east-west pedestrian phase. The 5 seconds for the LPI are shifted from the vehicle green time.
- **Signal infrastructure:** A second mast arm for the westbound approach signal would be installed to provide an additional signal head for westbound left-turn traffic with a "Yield to Pedestrians" blankout sign facing the westbound approach.
- **Geometrics:** The westbound approach would be narrowed to provide one shared through/left lane and two through lanes. This eliminates one of the two left-turn lanes, further benefiting pedestrian safety by eliminating the turning movement with the least amount of pedestrian visibility. The southbound approach would maintain the same configuration as exists today. The curb radius for the southeast corner of the intersection would also be tightened to slow turning vehicles and shorten the crossing distances for pedestrians, and a bulbout would be constructed at the northwest corner of the intersection.

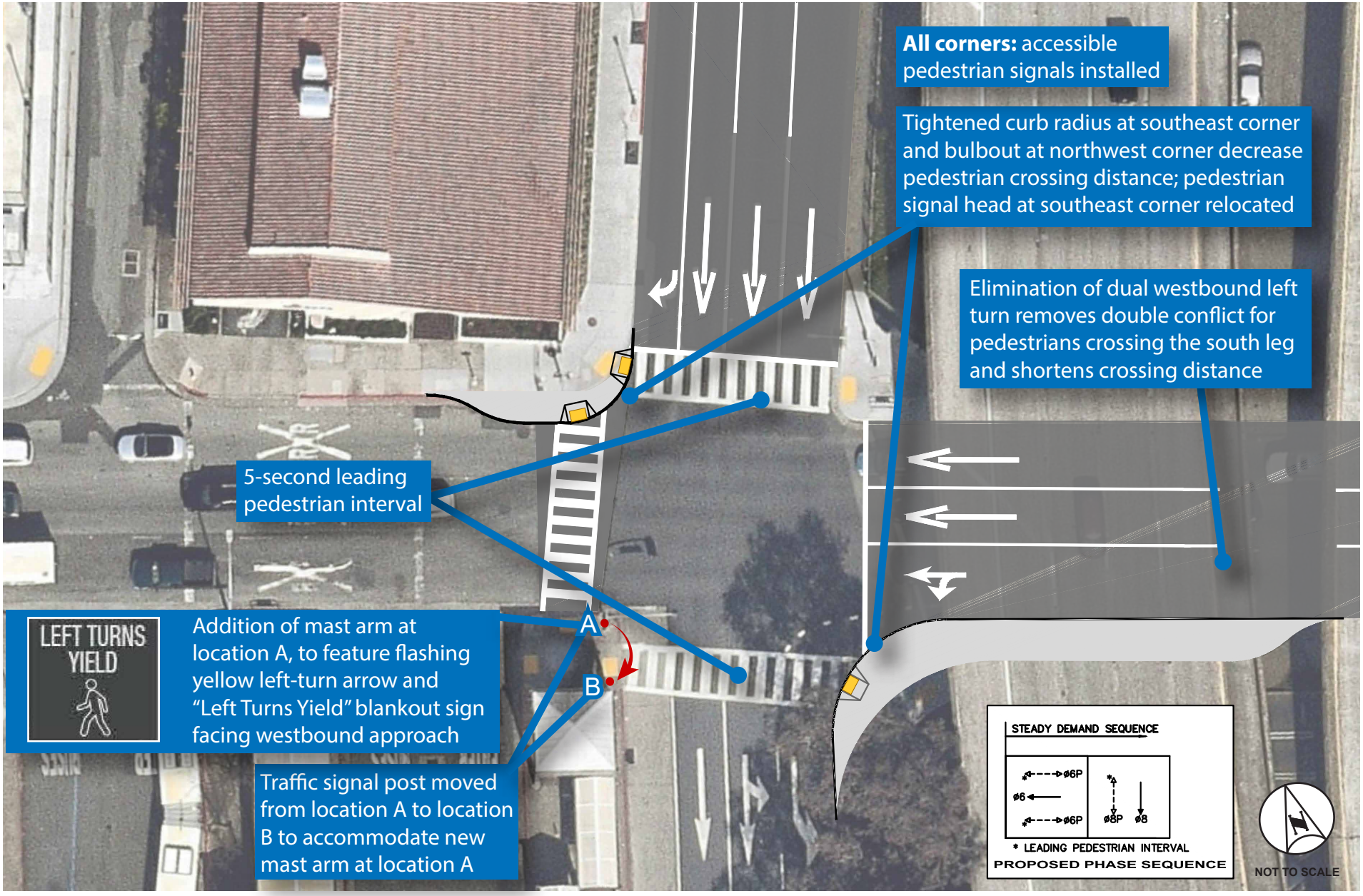
Figure 3-2 is a visual representation of how this concept would look from the perspective of the southeast corner of the intersection.

3.2.1 Traffic

Table 3-1 displays the traffic analysis results for the recommended concept. Results shown include the delay and level of service for the overall intersection and the two approaches, and the increase or decrease in delay relative to existing conditions as a result of the improvements.

Table 3-2 displays the queuing analysis results. Results include the 95th percentile queue lengths for southbound and westbound through and turning movements, and the increase or decrease in queue length relative to baseline conditions as a result of the improvements.

Detailed Synchro analysis worksheets are provided in **Appendix C**.



Kimley»Horn

Figure 3-1
Recommended Concept

Existing Conditions

With Improvements

Figure 3-2
Recommended Intersection Concept Photo-Simulation

Table 3-1: Recommended Concept LOS Analysis Results

Period	Intersection Delay	Intersection LOS	WB Approach Delay	WB Approach LOS	SB Approach Delay	SB Approach LOS
AM	24.6	C	19.4	B	33.6	C
Δ	*3.1*	-	*4.0*	-	*1.6*	-
PM	19.1	B	17.2	B	21.9	C
Δ	*2.3*	-	*4.1*	-	*-0.5*	-

WB = Westbound; SB = Southbound; LOS = Level of Service

Table 3-2: Recommended Concept Queuing Analysis Results

Period	WB LT/TH Queue 95th Percentile (ft)	SB TH Queue 95th Percentile (ft)	SB RT Queue 95th Percentile (ft)
AM	**400**	153	**336**
Δ	*114*	*-1*	*-11*
PM	**298**	68	**373**
Δ	*54*	*0*	*-28*

WB = Westbound; SB = Southbound
LT = Left-turn; TH = Through; RT = Right-turn
Note: Queue lengths in bold exceed lane capacity

The results show that the addition of a LPI and modifications to the westbound lane geometry results in a 2-3 second increase in delay at the intersection. Most of the delay increases occur at the westbound approach, while the southbound approach would only be slightly affected.

The concept would increase queuing for westbound movements; this is a result of the reduction of turning capacity by removing the existing left-turn pocket. The analysis shows 95th percentile queues will increase to approximately 400 feet in the AM peak hour and 300 feet in the PM peak hour. The analysis may be overestimating the effect of the elimination of the dedicated left-turn lane. Due to the very short length of the existing left-turn only lane (limited by the US-101 overpass column), it provides limited benefit to intersection operations as only the first few vehicles of the cycle are queued to make left-turns simultaneously from both left-turn lanes.

3.2.2 Safety

The addition of a leading pedestrian interval at the study intersection allows pedestrians to begin crossing the street before vehicles are permitted to turn; this head-start increases pedestrian visibility and gives pedestrians priority, as vehicles must yield to pedestrians already in the crosswalk.

In addition to the LPI, the elimination of the dual westbound left-turn removes the double conflict that pedestrians currently have crossing the south leg while also shortening the south leg crossing distance from 62 feet to 49 feet. The addition of a bulbout at the northwest corner reduces the west leg crossing distance from 47 feet to 41 feet. The additional signage would also increase pedestrian visibility.

3.2.3 Cost

The estimated cost of the recommended concept is $283,700. A breakdown of this cost estimate is shown in **Table 3-3**. The primary cost contributor is the tightening of the curb radius at the southeast corner of the intersection.

Table 3-3: Recommended Concept Cost Estimate

Item	Total ($)
Mobilization	$14,328
Traffic Control	$21,491
SWPPP/Drainage	$7,164
Design	$28,655
Construction Admin	$21,491
Traffic Signal Modification	$60,400
Civil Improvements	$76,570
Signing and Striping	$6,305
Subtotal	$236,404
Contingency (20%)	$47,281
Total	**$283,700**

The option of implementing interim treatments, which would implement the recommended concept with the use of striping and flexible posts or channelizers instead of reconstructing curb, could be implemented if a nonpermanent solution is desired. The estimated cost of implementing the concept using interim treatments is $118,500. A breakdown of this cost estimate is shown in **Table 3-4**.

Table 3-4: Recommended Concept Cost Estimate – Interim Treatments

Item	Total ($)
Mobilization	$6,173
Traffic Control	$9,260
SWPPP/Drainage	$0
Design	$12,346
Construction Admin	$9,260
Traffic Signal Modification	$50,800
Civil Improvements	$0
Signing and Striping	$10,930
Subtotal	$98,768
Contingency (20%)	$19,754
Total	**$118,500**

Detailed cost estimates are provided in **Appendix E**.

3.3 ELIMINATED CONCEPT #1

This concept, shown in **Figure 3-3**, results in the greatest change in the geometric configuration of the intersection. This concept includes the following modifications:

- **Signal phasing:** The westbound left-turns and southbound right-turns would be served concurrently with their own exclusive phase, separate from the westbound and southbound through movements. These turning movements would be precluded (red arrow) during the through movements. Pedestrian movements would occur only with the through vehicular movements. This eliminates any conflict or yielding between pedestrians and autos.
- **Signal infrastructure:** A second mast arm for the westbound approach signal would need to be installed to support signal heads for the westbound left-turn movement. This concept includes in the installation of a “No Left Turn” blankout sign facing the westbound approach and a “No Right Turn” blankout sign facing the southbound approach to further emphasize the signal operation.
- **Geometrics:** The westbound approach would be designated as two left-turn lanes and two through lanes. Due to the alteration in signal phase described above, the current shared (through and through-left) lane is not feasible. The southbound approach would be widened to provide an additional right-turn lane to reduce auto delay and congestion. The widening would require a reduction in the sidewalk width on the west side of Hetherton Street north of 3rd Street. Additionally, the curb radius at the southeast corner of the intersection would be tightened to shorten the distance of the pedestrian crossing, and bulbouts would be constructed at the northwest corner of the intersection.

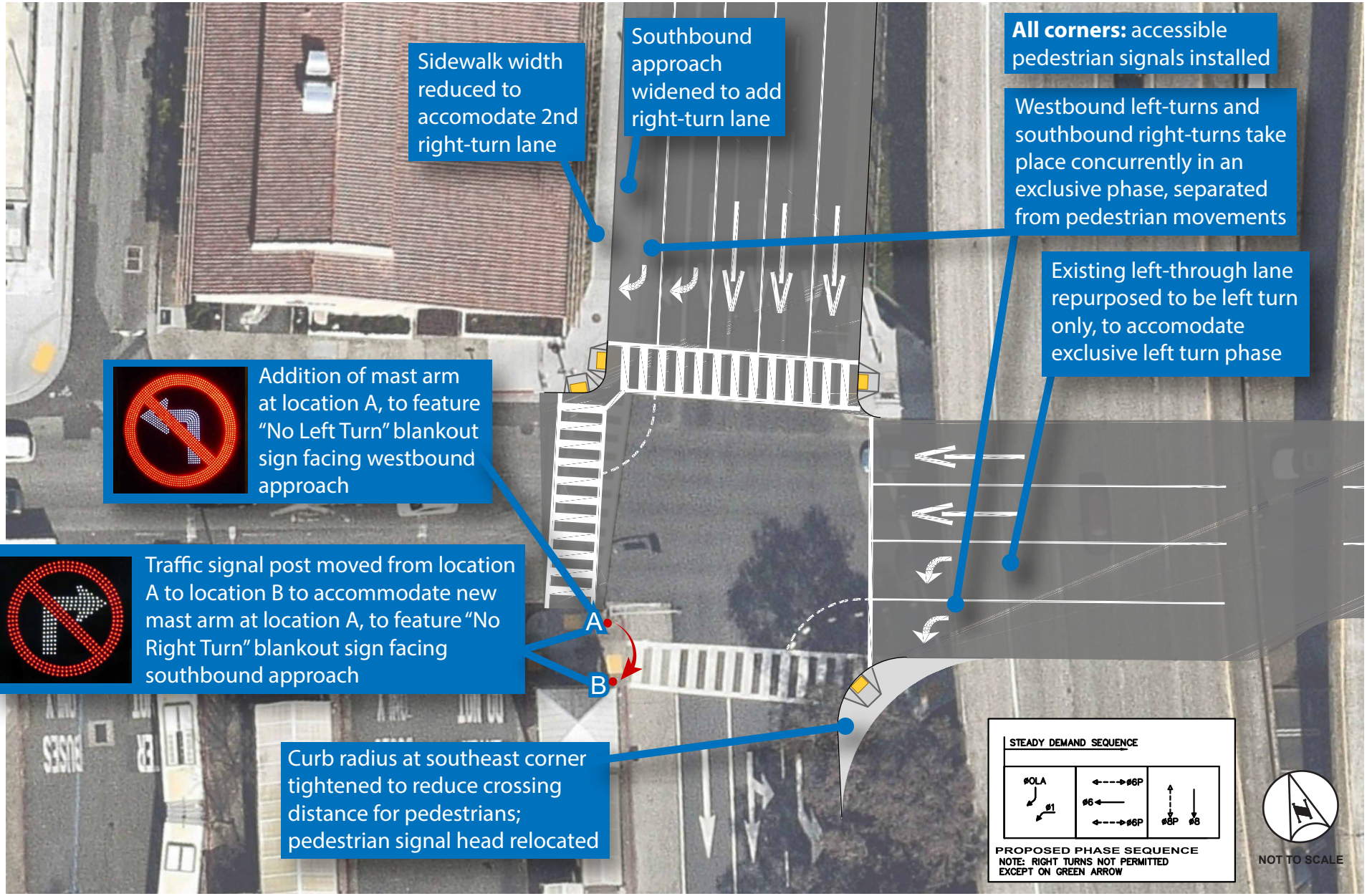
Figure 3-4 is a visual representation of how this concept would look from the perspective of the southeast corner of the intersection.

3.3.1 Traffic

Table 3-5 displays the traffic analysis results for Eliminated Concept #1. Results shown include the delay and level of service for the overall intersection and the two approaches, and the increase or decrease in delay relative to baseline conditions as a result of the improvements.

Table 3-6 displays the queuing analysis results. Results include the 95th percentile queue lengths for southbound and westbound through and turning movements, and the increase or decrease in queue length relative to baseline conditions as a result of the improvements.

Detailed Synchro analysis worksheets are provided in **Appendix C**.


Sidewalk width reduced to accomodate 2nd right-turn lane
Southbound approach widened to add right-turn lane
All corners: accessible pedestrian signals installed
Westbound left-turns and southbound right-turns take place concurrently in an exclusive phase, separated from pedestrian movements
Existing left-through lane repurposed to be left turn only, to accomodate exclusive left turn phase
Addition of mast arm at location A, to feature "No Left Turn" blankout sign facing westbound approach
Traffic signal post moved from location A to location B to accommodate new mast arm at location A, to feature "No Right Turn" blankout sign facing southbound approach
A
B
Curb radius at southeast corner tightened to reduce crossing distance for pedestrians; pedestrian signal head relocated
STEADY DEMAND SEQUENCE
ØOLA
Ø1
Ø6P
Ø6
Ø6P
Ø8P
Ø8
PROPOSED PHASE SEQUENCE
NOTE: RIGHT TURNS NOT PERMITTED EXCEPT ON GREEN ARROW
NOT TO SCALE

Existing Conditions

With Improvements

Figure 3-4
Eliminated Concept #1 Photo-Simulation

Table 3-5: Eliminated Concept #1 LOS Analysis Results

Period	Intersection Delay	Intersection LOS	WB Approach Delay	WB Approach LOS	SB Approach Delay	SB Approach LOS
AM	63.1	E	70.7	E	50.0	D
Δ	*41.6*	-	*55.3*	-	*18.0*	-
PM	50.3	D	48.0	D	53.9	D
Δ	*33.5*	-	*34.9*	-	*31.5*	-

WB = Westbound; SB = Southbound; LOS = Level of Service

Table 3-6: Eliminated Concept #1 Queuing Analysis Results

Period	WB LT Queue 95th Percentile (ft)	WB TH Queue 95th Percentile (ft)	SB TH Queue 95th Percentile (ft)	SB RT Queue 95th Percentile (ft)
AM	356	**607**	169	**251**
Δ	*-121*	*321*	*15*	*-96*
PM	290	573	173	**269**
Δ	*114*	*329*	*105*	*-132*

WB = Westbound; SB = Southbound
LT = Left-turn; TH = Through; RT = Right-turn
Note: Queue lengths in bold exceed lane capacity

The results show that the separation of westbound left-turn and southbound right-turn movements into a separate phase result a 30-40 second increase in intersection delay at the intersection. Queuing analysis shows that the most substantial effect would be on queuing for westbound through movements; the analysis shows queues will increase to over 600 feet in both AM and PM peak hours. Given that the distance between the study intersection and the next upstream intersection for this movement (3rd Street & Irwin Street) is approximately 300 feet, an increase in queuing by this amount would impact congestion at the upstream intersection as well. This concept would, however, reduce queuing for most turning movements because of the separate turn phase and the addition of turn lane capacity.

3.3.2 Safety

By separating turning movements from pedestrian movements, the conflict between the two would be removed. Pedestrians would cross the north and south legs concurrently with westbound through movements, and the west leg concurrently with southbound through movements. The addition of “No Left Turn” and “No Right Turn” blankout signs would further protect pedestrian movements. Eliminated Concept #1 would also reduce the sidewalk width on the west side of Hetherton Street in order to accommodate the added southbound right-turn lane, bringing cars closer to pedestrians on the sidewalk.

In addition to the separation of turning movements from pedestrian movements, the tightening of the curb radius at the southeast corner would reduce the crossing distance across the south leg of the intersection from 62 feet to 50 feet. The reduced crossing distance increases safety and comfort for pedestrians. It is noted that the widening of Hetherton Street on the north leg to create room for the additional right-turn lane increases the crossing distance on the north leg.

3.3.3 Cost

The estimated cost of Eliminated Concept #1 is $380,500. A breakdown of this cost estimate is shown in **Table 3-7**. Primary cost contributors are the widening of southbound Hetherton Street and the tightening of the curb radius at the southeast corner of the intersection. Detailed cost estimates are provided in **Appendix E**.

Table 3-7: Eliminated Concept #1 Opinion of Probable Cost

Item	Estimated Cost
Mobilization	$19,218
Traffic Control	$28,826
SWPPP/Drainage	$9,609
Design	$38,435
Construction Admin	$28,826
Traffic Signal Modification	$69,500
Civil Improvements	$116,670
Signing and Striping	$6,005
Subtotal	$317,089
Contingency (20%)	$63,418
Total	**$380,500**

3.4

3.4 ELIMINATED CONCEPT #2

Eliminated Concept #2, as depicted in **Figure 3-5**, is an alternate version of the recommended concept. It is the same as the recommended concept in all aspects, except for those listed below:

- **Signal Phasing:** This concept maintains the current signal phasing with slight modifications to signal timing. A Leading Pedestrian Interval (LPI) would be implemented, which begins the pedestrian walk phase prior to the start of the vehicle phase, extending the all-red time at the signal. This increases pedestrian visibility for autos and emphasizes the pedestrian right-of-way. This concept includes a 5-second LPI for each of the two pedestrian phases, resulting in 10 seconds of cycle time in total for the LPIs. The 5 seconds for each LPI are shifted from each of the vehicle green times.
- **Geometrics**: For the southbound approach, convert one of the three through lanes to a shared through/right lane (the existing southbound right lane would remain). This would provide additional capacity for the southbound right-turn movement, but would introduce a new conflict for pedestrians using the west leg of the intersection.

Figure 3-6 is a visual representation of how this concept would look from the perspective of the southeast corner of the intersection.

3.4.1 Traffic

Table 3-8 displays the traffic analysis results for Eliminated Concept #2. Results shown include the delay and level of service for the overall intersection and the two approaches, and the increase or decrease in delay relative to baseline conditions.

Table 3-9 displays the queuing analysis results. Results include the 95th percentile queue lengths for southbound and westbound through and turning movements, and the increase or decrease in queue length relative to baseline conditions as a result of the improvements.

Detailed Synchro analysis worksheets are provided in **Appendix C**.

Table 3-8: Eliminated Concept #2 LOS Analysis Results

Period	Intersection Delay	Intersection LOS	WB Approach Delay	WB Approach LOS	SB Approach Delay	SB Approach LOS
AM	35.3	D	32.1	C	40.7	D
Δ	*13.8*	-	*16.7*	-	*8.7*	-
PM	17.6	B	19.2	B	15.1	B
Δ	*0.8*	-	*6.1*	-	*-7.3*	-

WB = Westbound; SB = Southbound; LOS = Level of Service

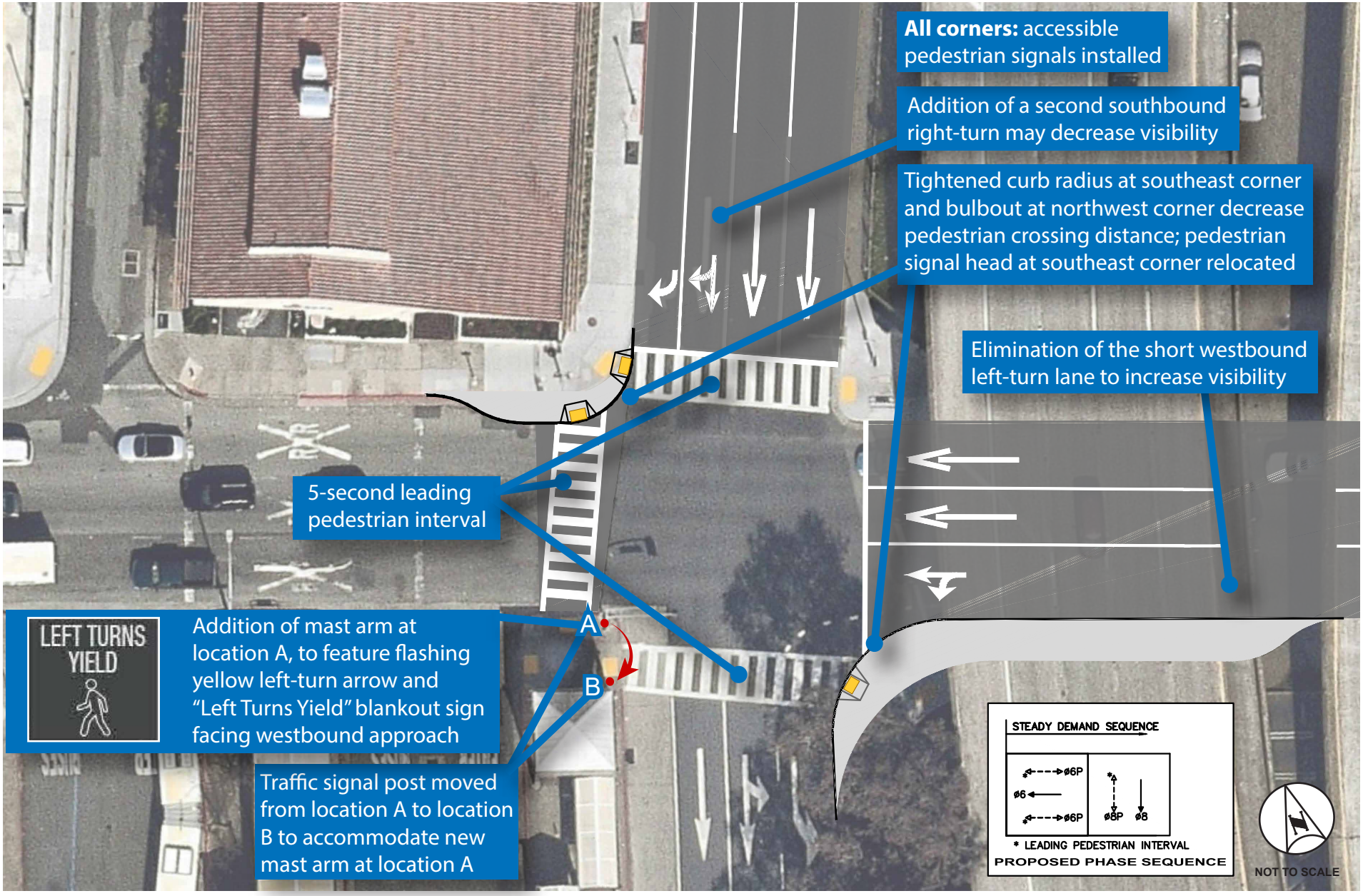


Figure 3-5
Eliminated Concept #2

Existing Conditions

With Improvements

Figure 3-6
Eliminated Concept #2 Photo-Simulation

Table 3-9: Eliminated Concept #2 Queuing Analysis Results

Period	WB LT/TH Queue 95th Percentile (ft)	SB TH Queue 95th Percentile (ft)	SB RT Queue 95th Percentile (ft)
AM	**457**	166	**374**
Δ	*171*	*12*	*27*
PM	**319**	78	32
Δ	*75*	*10*	*-369*

WB = Westbound; SB = Southbound
LT = Left-turn; TH = Through; RT = Right-turn
Note: Queue lengths in bold exceed lane capacity

The results show that the addition of a LPI and modification of the southbound lane geometry result in a moderate increase in delay at the intersection in the AM peak hour (approximately 16 seconds) and minor increase in delay in the PM peak hour (approximately 2 seconds). Most of the delay increases occur at the westbound approach, while the southbound approach would be mildly impacted.

The concept would increase queuing for westbound movements; this is a result of the reduction of turning capacity by removing the existing left-turn pocket. The analysis shows 95th percentile queues will increase to approximately 450 feet in the AM peak hour and 320 feet in the PM peak hour. The analysis may be overestimating the effect of the elimination of the dedicated left-turn lane. Due to the very short length of the existing left-turn only lane (limited by the US-101 overpass column), it provides limited benefit to intersection operations as only the first few vehicles of the cycle are queued to make left-turns simultaneously from both left-turn lanes.

Additionally, the conversion of a southbound through lane to a combined through/right-turn lane results in a small queuing increase in the AM peak hour and substantial queue reduction in the PM peak hour.

3.4.2 Safety

The addition of a leading pedestrian interval at the study intersection allows pedestrians to begin crossing the street before vehicles are permitted to turn; this head-start increases pedestrian visibility and gives pedestrians priority, as vehicles must yield to pedestrians already in the crosswalk.

In addition to the LPI, the elimination of the dual westbound left-turn removes the double conflict that pedestrians currently have crossing the south leg while tightening the turn radius also shortens the crossing distance from 62 feet to 49 feet. The addition of a bulbout at the northwest corner reduces the west leg crossing distance from 47 feet to 41 feet.

However, the addition of a second southbound right-turn lane creates a new double conflict with pedestrians crossing the west leg of the intersection. The new conflict would be similar to the conflict at the south leg of the intersection, which has a comparatively higher collision rate.

The concept also includes signage improvements designed to increase vehicle yielding to pedestrians.

3.4.3 Cost

The estimated cost of Eliminated Concept #2 is $279,100. A breakdown of this cost estimate is shown in **Table 3-10**. The greatest cost contributors to this total are the signal modifications needed to accommodate the leading pedestrian interval, and the tightening of the curb radius at the southeast corner of the intersection. Detailed cost estimates are provided in **Appendix E**.

Table 3-10: Eliminated Concept #2 Cost Estimate

Item	Estimated Cost
Mobilization	$14,328
Traffic Control	$21,491
SWPPP/Drainage	$7,164
Design	$28,655
Construction Admin	$21,491
Traffic Signal Modification	$61,100
Civil Improvements	$76,570
Signing and Striping	$1,785
Subtotal	$232,584
Contingency (20%)	$46,517
Total	**$279,100**

3.5 ELIMINATED CONCEPT #3

Eliminated Concept #3, as depicted in **Figure 3-7**, is another alternate version of the recommended concept. It is the same as the recommended concept in all of its treatments, except for those listed below.

- **Signal phasing:** This concept maintains the current signal phasing with slight modifications to signal timing. A Leading Pedestrian Interval (LPI) would be implemented, which begins the pedestrian walk phase prior to the start of the vehicle phase, extending the all-red time at the signal. This increases pedestrian visibility for autos and emphasizes the pedestrian right-of-way. This concept includes a 5-second LPI for each of the two pedestrian phases, resulting in 10 seconds of cycle time in total for the LPIs. The 5 seconds for each LPI are shifted from each of the vehicle green times.
- **Geometrics**: The curb radius at the southeast corner of the intersection would be tightened to shorten the distance of the pedestrian crossing, and a bulbout would be constructed at the northwest corner of the intersection.

Figure 3-8 is a visual representation of how this concept would look from the perspective of the southeast corner of the intersection.

3.5.1 Traffic

Table 3-11 displays the traffic analysis results for Eliminated Concept #3. Results shown include the delay and level of service for the overall intersection and the two approaches, and the increase or decrease in delay relative to baseline conditions as a result of the improvements.

Table 3-12 displays the queuing analysis results. Results include the 95th percentile queue lengths for southbound and westbound through and turning movements, and the increase or decrease in queue length relative to baseline conditions as a result of the improvements.

Detailed Synchro analysis worksheets are provided in **Appendix C**.

Table 3-11: Eliminated Concept #3 LOS Analysis Results

Period	Intersection Delay	Intersection LOS	WB Approach Delay	WB Approach LOS	SB Approach Delay	SB Approach LOS
AM	27.1	C	22.9	C	34.5	C
Δ	*5.6*	-	*7.5*	-	*2.5*	-
PM	20.0	C	18.2	B	22.9	C
Δ	*3.2*	-	*5.1*	-	*0.4*	-

WB = Westbound; SB = Southbound; LOS = Level of Service

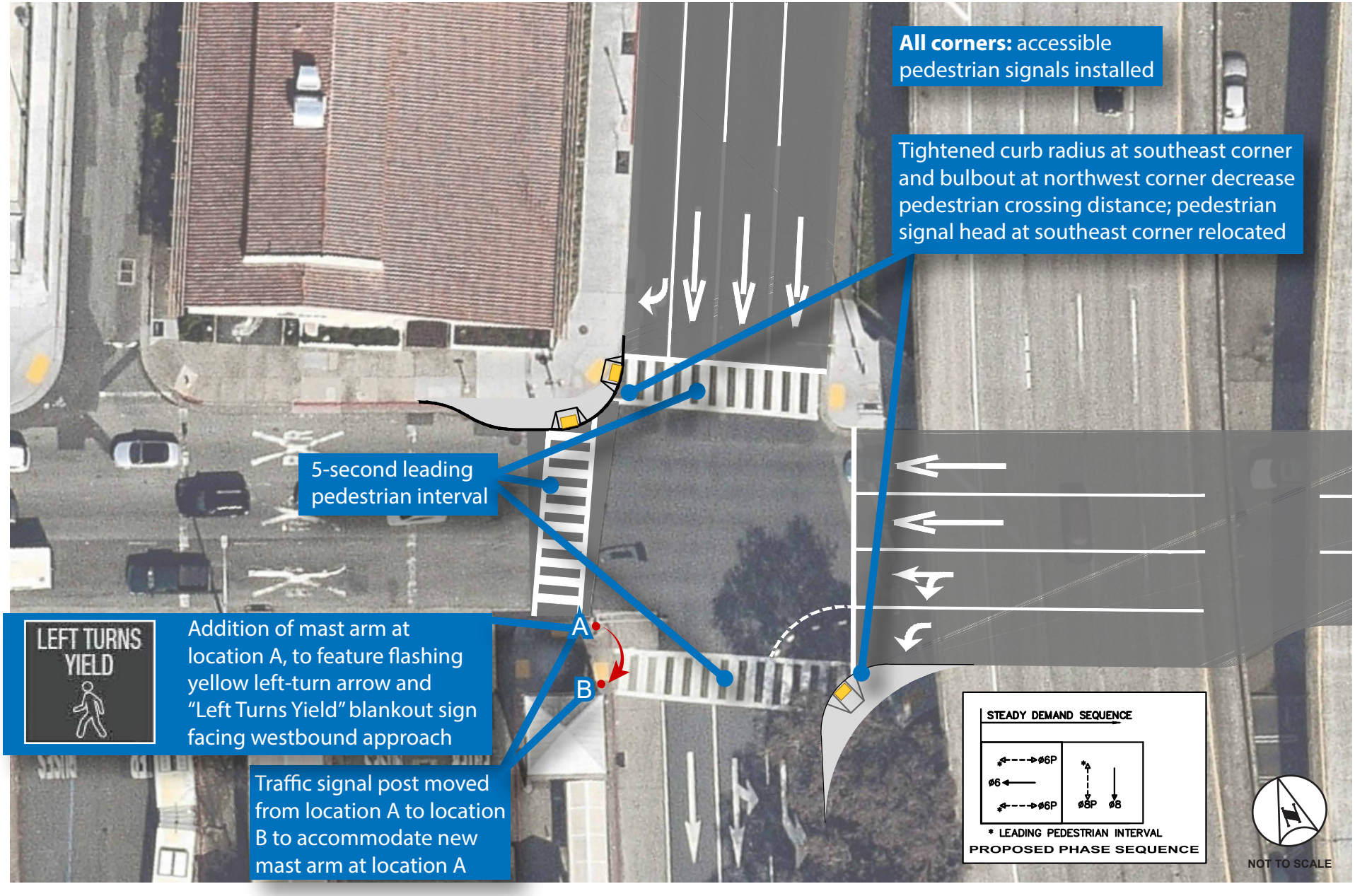
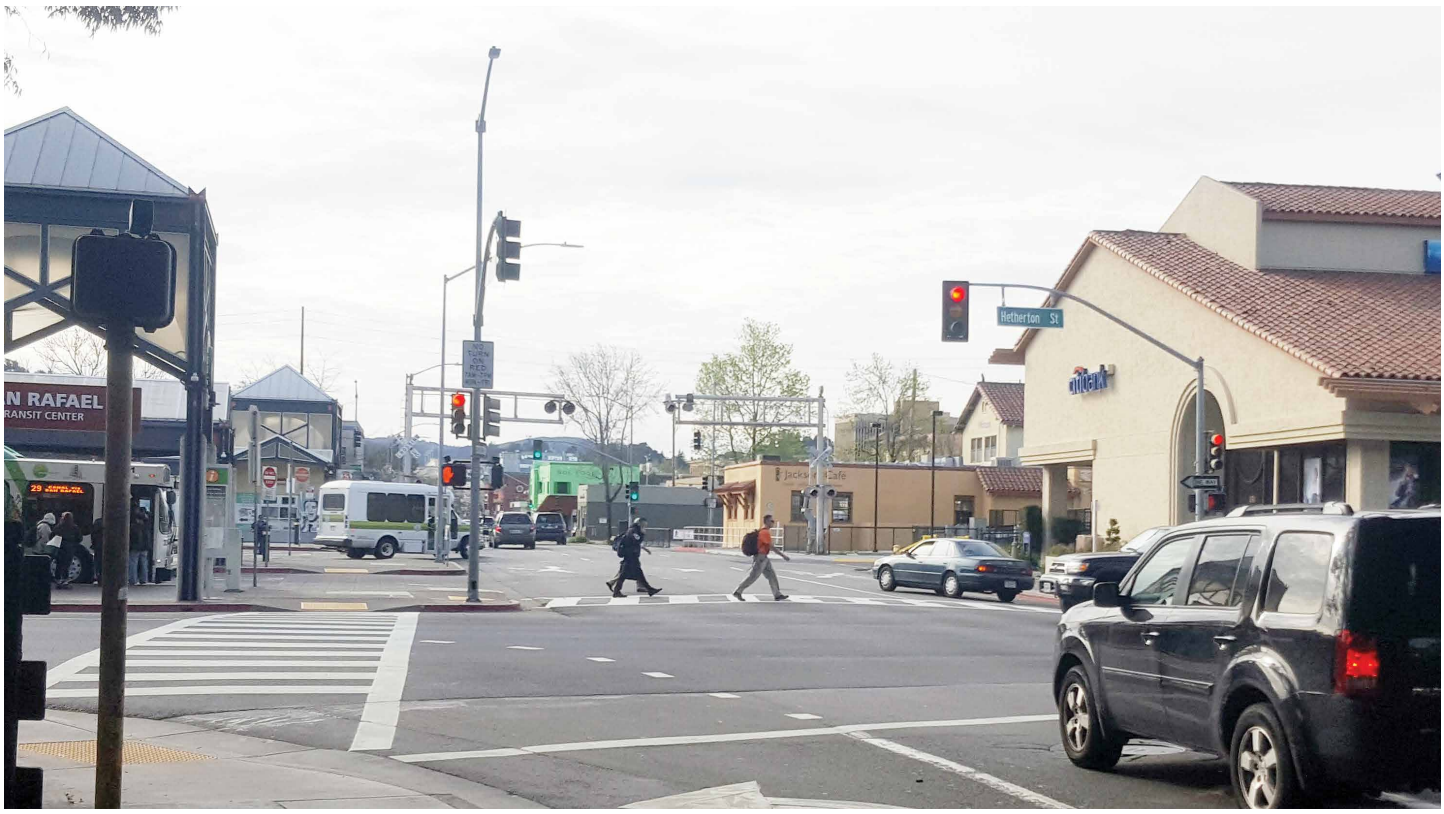
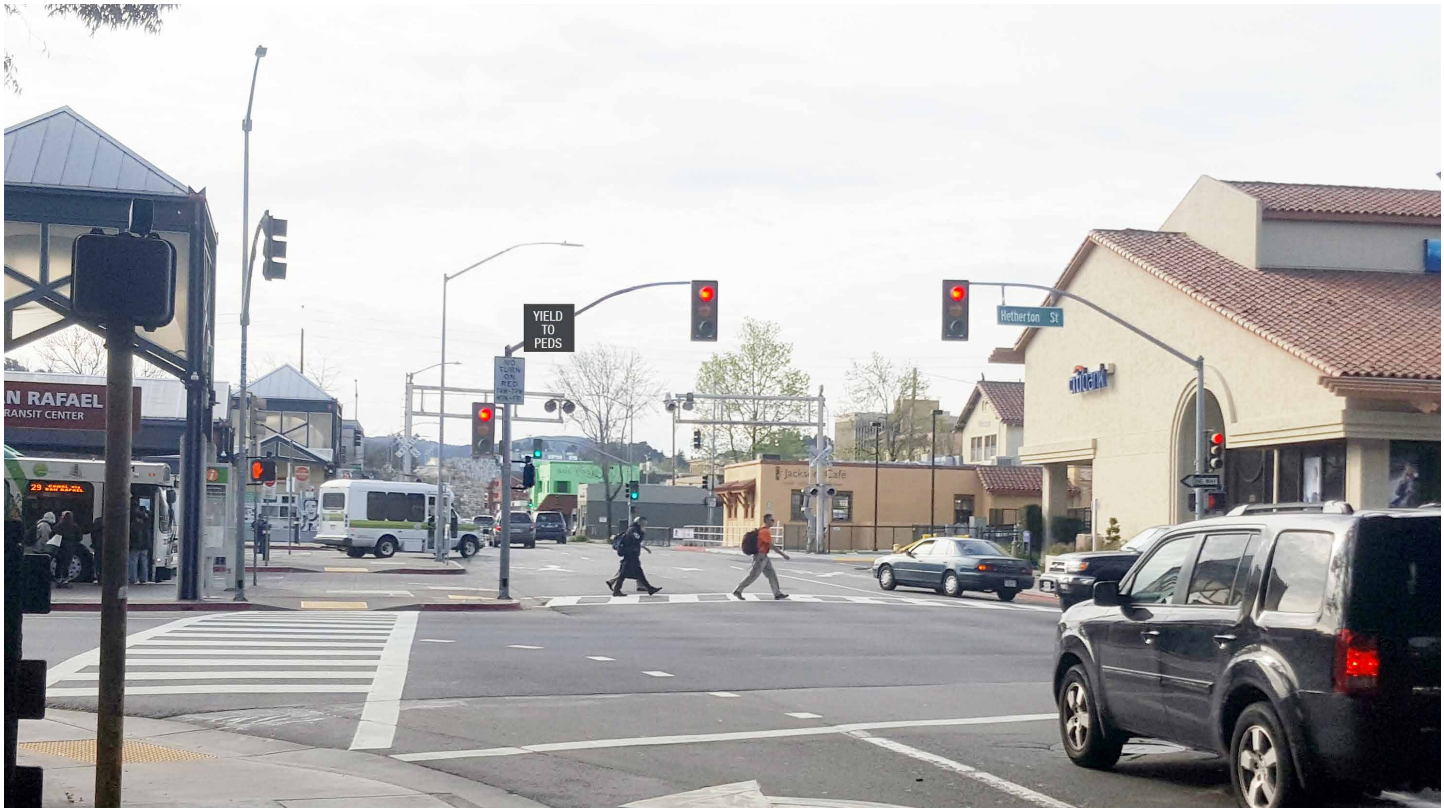


Figure 3-7
Eliminated Concept #3



Existing Conditions



With Improvements

Figure 3-8
Eliminated Concept #3 Photo-Simulation

Table 3-12: Eliminated Concept #3 Queuing Analysis Results

Period	WB LT Queue 95th Percentile (ft)	WB TH Queue 95th Percentile (ft)	SB TH Queue 95th Percentile (ft)	SB RT Queue 95th Percentile (ft)
AM	539	**412**	156	**290**
Δ	*128*	*41*	*2*	*-57*
PM	218	**302**	94	**353**
Δ	*31*	*43*	*26*	*-48*

WB = Westbound; SB = Southbound
LT = Left-turn; TH = Through; RT = Right-turn
Note: Queue lengths in bold exceed lane capacity

The results show that the addition of a LPI onto the existing intersection lane configuration results in a moderate increase in delay at the intersection in the AM peak hour (approximately 6 seconds) and minor increase in delay in the PM peak hour (approximately 3 seconds). Most of the delay increases occur at the westbound approach, while the southbound approach would be mildly impacted.

The concept would increase queuing for westbound movements. The analysis shows 95th percentile queues will increase to approximately 540 feet in the AM peak hour and 220 feet in the PM peak hour.

3.5.2 Safety

The addition of a leading pedestrian interval at the study intersection allows pedestrians to begin crossing the street before vehicles are permitted to turn; this head-start increases pedestrian visibility and gives pedestrians priority, as vehicles must yield to pedestrians already in the crosswalk.

The added signage would increase pedestrian visibility, and a shortened pedestrian crossing on the south leg would increase safety by reducing the crossing distance from 62 feet to 50 feet. The addition of a bulbout at the northwest corner reduces the west leg crossing distance from 47 feet to 41 feet.

3.5.3 Cost

The estimated cost of Eliminated Concept #3 is $205,500. A breakdown of this cost estimate is shown in **Table 3-13**. The greatest cost contributors to this total are the signal modifications needed to accommodate the leading pedestrian interval, and the tightening of the curb radius at the southeast corner of the intersection. Detailed cost estimates are provided in **Appendix E**.

Table 3-13: Eliminated Concept #3 Cost Estimate

Item	Estimated Cost
Mobilization	$10,378
Traffic Control	$15,566
SWPPP/Drainage	$5,189
Design	$20,755
Construction Admin	$15,566
Traffic Signal Modification	$60,400
Civil Improvements	$41,980
Signing and Striping	$1,395
Subtotal	$171,229
Contingency (20%)	$34,246
Total	**$205,500**

3.6 ELIMINATED CONCEPT #4

Eliminated Concept #4, as depicted in **Figure 3-9**, represents a set of minor improvements to the intersection described below:

- **Signal phasing:** None
- **Signal infrastructure:** A second mast arm for the westbound approach signal would be installed to provide an additional signal head for westbound left-turn traffic with a "Yield to Pedestrians" blankout sign facing the westbound approach.
- **Geometrics:** The curb radius at the southeast corner of the intersection would be tightened to shorten the distance of the pedestrian crossing, and a bulbout would be constructed at the northwest corner of the intersection.

Figure 3-10 is a visual representation of how this concept would look from the perspective of the southeast corner of the intersection.

3.6.1 Traffic

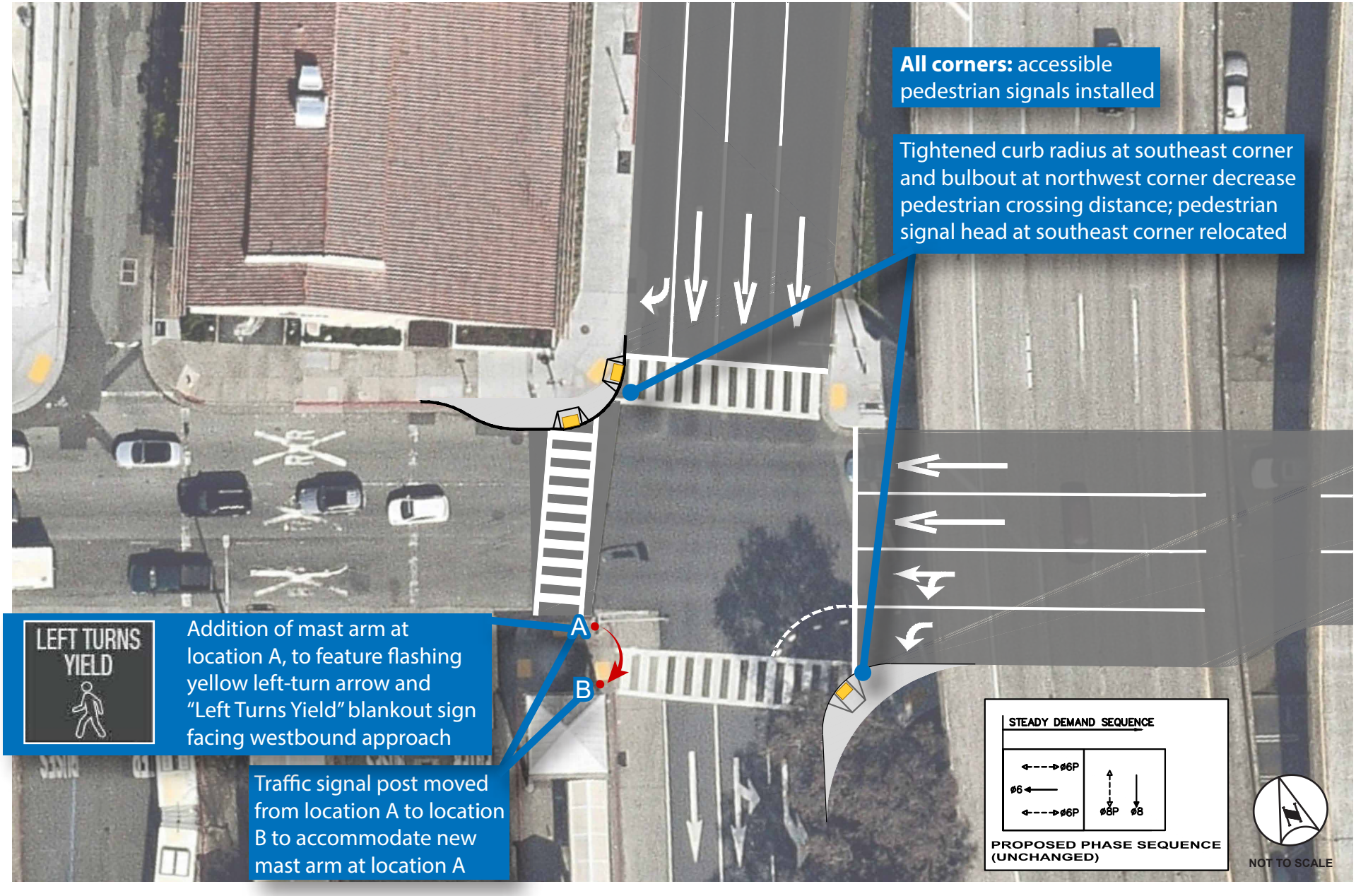
Since this concept does not alter the geometry or signal timing of the intersection, there are no expected delay or queuing effects for Eliminated Concept #4.

3.6.2 Safety

Minor safety improvements would be created under this concept. The added signage would increase pedestrian visibility, and a shortened pedestrian crossing on the south leg would increase safety by reducing the crossing distance from 62 feet to 50 feet.

3.6.3 Cost

The estimated cost of Eliminated Concept #4 is $205,500. A breakdown of this cost estimate is shown in **Table 3-14**. The greatest cost contributors to this total are the signal modifications needed to accommodate the blankout sign and the tightening of the curb radius at the southeast corner of the intersection. Detailed cost estimates are provided in **Appendix E**.


All corners: accessible pedestrian signals installed
Tightened curb radius at southeast corner and bulbout at northwest corner decrease pedestrian crossing distance; pedestrian signal head at southeast corner relocated
LEFT TURNS YIELD
Addition of mast arm at location A, to feature flashing yellow left-turn arrow and "Left Turns Yield" blankout sign facing westbound approach
A
B
Traffic signal post moved from location A to location B to accommodate new mast arm at location A
STEADY DEMAND SEQUENCE
ø6P
ø6
ø6P
ø8P
ø8
PROPOSED PHASE SEQUENCE (UNCHANGED)
NOT TO SCALE

Existing Conditions

With Improvements

Figure 3-10
Eliminated Concept #4 Photo-Simulation

Table 3-14: Eliminated Concept #4 Cost Estimate

Item	Total ($)
Mobilization	$10,378
Traffic Control	$15,566
SWPPP/Drainage	$5,189
Design	$20,755
Construction Admin	$15,566
Traffic Signal Modification	$60,400
Civil Improvements	$41,980
Signing and Striping	$1,395
Subtotal	$171,229
Contingency (20%)	$34,246
Total	**$205,500**

4 Conclusions and Recommendation

4.1 COMPARISON OF INTERSECTION CONCEPTS

There are various advantages and disadvantages associated with each of the five proposed concepts. All five concepts represent an improvement to existing conditions regarding pedestrian safety, but range in the magnitude of their safety impact, cost, and traffic impacts. Eliminated Concept #1 provides the greatest benefits for pedestrian safety, but also results in the largest queuing and delay detriment and is the costliest. Eliminated Concept #4 generates the least benefit to pedestrian safety, but does not generate any traffic impacts and costs the least. The recommended concept and its alternate versions (Eliminated Concepts #2 and #3) provide a similar set of improvements, and lie in a middle ground between Eliminated Concepts #1 and #4 in terms of safety benefits, cost, and traffic ramifications. Eliminated Concepts #2 and #3 provide lesser pedestrian safety benefits in comparison to the recommended concept, but have slightly lesser traffic impacts.

4.1.1 Safety

Eliminated Concept #1 is the most effective at eliminating conflict between vehicles and pedestrians; with a separate turning phase, pedestrians cross the north and south legs concurrently with westbound through movements, and the west leg concurrently with southbound through movements. Additionally, “No Left Turn” and “No Right Turn” blankout signs would alert drivers to the presence of pedestrians. While it includes a second southbound right-turn lane, that traffic movement is fully separated from pedestrian movements. However, it does reduce the width of the sidewalk along Hetherton Street approaching the intersection.

The recommended concept and Eliminated Concepts #2 and #3 do not separate vehicle and pedestrian movements, but they do give pedestrians priority in the intersection by providing a leading pedestrian interval. They would also have “Left Turns Yield to Pedestrians” blankout signs to alert drivers to the presence of pedestrians. In contrast with the recommended concept, Eliminated Concepts #2 and #3 either maintain or add conflicts between dual turn lanes and pedestrians. In the case of Eliminated Concepts #2, a second southbound right-turn would be added through the conversion of one southbound through lane to a through/right, which creates the same double conflict that currently exists for the south leg. Eliminated Concept #3 maintains the dual left-turn lanes on the westbound approach. Eliminated Concepts #2 and #3 provide leading pedestrian intervals for both north-south and east-west pedestrian movements, providing the safety benefit of that improvement to all pedestrians at the intersection, whereas the recommended concept provides a leading pedestrian interval for east-west pedestrian movements only.

Eliminated Concept #4 provides minor safety improvements in comparison to the other concepts. It includes a "Left Turns Yield to Pedestrians" blankout sign to alert drivers to the presence of pedestrians.

All concepts reducing the crossing distance across the south leg of the intersection to approximately 50 feet and reduce the turn radius for the westbound left-turn movement, reducing turning speed and increasing pedestrian visibility.

4.1.2 Cost

Table 4-1 shows a comparison of the estimated cost of each intersection concept. Eliminated Concept #1 has the highest estimated cost at $380,500. Eliminated Concepts #3 and #4 have the lowest estimated cost at $205,500. The recommended concept and Eliminated Concept #2 have essentially the same cost; the difference between the two estimates is caused by differences in pavement striping between the two concepts. Detailed cost estimates are provided in **Appendix E**.

Table 4-1: Concept Cost Estimate Comparison

Scenario	Estimated Cost ($)
Recommended Concept: 1 WB TH+LT, 2 WB TH; Leading Pedestrian Interval	$283,700
Eliminated Concept #1: 2 WB LT, 2WB TH; 3 SB TH, 2 SB RT; Separated Turn Phasing	$380,500
Eliminated Concept #2: 1 WB TH+LT, 2 WB TH; 2 SB TH, 1 SB TH+RT, 1 SB RT; Leading Pedestrian Interval	$279,100
Eliminated Concept #3: Existing Lane Geometry with Leading Pedestrian Interval	$205,500
Eliminated Concept #4: Minor improvements; no changes to signal phasing or timing	$205,500

4.1.3 Traffic Effects

Eliminated Concept #1 has the greatest effect on traffic flow, increasing intersection delay by over 30 seconds in both AM and PM peak hours. The recommended concept generates minor increases in delay: approximately 3 seconds in the AM peak hour and 2 seconds in the PM peak hour. Eliminated Concept #2 generates moderate increases in delay, adding 14 seconds in the AM Peak and 1 second the PM Peak. Eliminated Concept #3 also results

in moderate increases in delay: approximately 6 seconds in the AM peak hour and approximately 3 seconds in the PM peak hour. Eliminated Concept #4 would generate no measurable changes in delay or level of service. All concepts would still result in an acceptable intersection level of service in both peak hours.

Table 4-2 shows an intersection-level comparison of level of service and delay results for existing conditions and the three proposed intersection concepts. **Table 4-3** shows level of service and delay results by approach.

Table 4-4 shows a comparison of queuing analysis results. All concepts except Eliminated Concept #4 (which has no traffic impacts) increase queuing for westbound through movements. Eliminated Concept #1 would reduce queuing for turning movements (as it provides a separate turning movement phase). For the recommended concept and Eliminated Concept #2, which eliminate the exclusive westbound left-turn lane, analysis results may be overestimating the effect of the lane elimination. Due to the very short length of the existing turn lane (limited by the US-101 overpass column), it provides limited benefit to intersection operations as only the first few vehicles of the cycle are queued to make left-turns simultaneously from both left-turn lanes.

Table 4-2: LOS Analysis Results – Overall Intersection

Scenario	AM Peak Hour			PM Peak Hour		
	Delay	LOS	Δ	Delay	LOS	Δ
Existing	21.5	C	-	16.8	B	-
Recommended Concept: 1 WB TH+LT, 2 WB TH, Leading Pedestrian Interval	24.6	C	*3.1*	19.1	B	*2.3*
Eliminated Concept #1: 2 WB LT, 2WB TH; 3 SB TH, 2 SB RT; Separated Turn Phasing	63.1	E	*41.6*	50.3	D	*33.5*
Eliminated Concept #2: 1 WB TH+LT, 2 WB TH; 1 SB RT, 1 SB TH+RT, 2 SB TH; Leading Pedestrian Interval	35.3	B	*13.8*	17.6	B	*0.8*
Eliminated Concept #3: Existing lane geometry with Leading Pedestrian Interval	27.1	C	*5.6*	20.0	C	*3.2*
Eliminated Concept #4: Geometric improvements; no changes to signal phasing or timing	21.5	C	-	16.8	B	-

LOS = Level of Service

Table 4-3: LOS Analysis Results – By Approach

Scenario		AM Peak Hour			PM Peak Hour		
		Delay	LOS	Δ	Delay	LOS	Δ
Existing	Westbound	15.4	B	-	13.1	B	-
	Southbound	32.0	C	-	22.4	C	-
Recommended Concept: 1 WB TH+LT, 2 WB TH, Leading Pedestrian Interval	Westbound	19.4	C	*4.0*	17.2	B	*4.1*
	Southbound	33.6	C	*1.6*	21.9	C	*-0.5*
Eliminated Concept #1: 2 WB LT, 2WB TH; 3 SB TH, 2 SB RT; Separated Turn Phasing	Westbound	70.7	E	*55.3*	48.0	D	*34.9*
	Southbound	50.0	D	*18.0*	53.9	D	*31.5*
Eliminated Concept #2: 1 WB TH+LT, 2 WB TH; 1 SB RT, 1 SB TH+RT, 2 SB TH; Leading Pedestrian Interval	Westbound	32.1	C	*16.7*	19.2	B	*3.4*
	Southbound	40.7	D	*8.7*	15.1	B	*-7.3*
Eliminated Concept #3: Existing Lane Geometry with Leading Pedestrian Interval	Westbound	22.9	C	*7.5*	18.2	B	*5.1*
	Southbound	34.5	C	*2.5*	22.9	C	*0.4*
Eliminated Concept #4: Minor improvements; no changes to signal phasing or timing	Westbound	15.4	B	-	13.1	B	-
	Southbound	32.0	C	-	22.4	C	-

LOS = Level of Service

Table 4-4: Queuing Analysis Results – Overall Intersection

Scenario	Queue	AM Peak Hour		PM Peak Hour	
		Queue (ft)	Δ	Queue (ft)	Δ
Existing	WB LT	477	-	176	-
	WB TH	286	-	244	-
	SB TH	154	-	68	-
	SB RT	**347**	-	**401**	-
Recommended Concept: 1 WB TH+LT, 2 WB TH, Leading Pedestrian Interval	WB LT	-	-	-	-
	WB TH	**400**	*114*	**298**	*54*
	SB TH	153	*-1*	68	*0*
	SB RT	**336**	*-11*	**373**	*-28*
Eliminated Concept #1: 2 WB LT, 2WB TH; 3 SB TH, 2 SB RT; Separated Turn Phasing	WB LT	356	*-121*	290	*114*
	WB TH	**607**	*321*	**573**	*329*
	SB TH	169	*15*	173	*105*
	SB RT	**251**	*-96*	**269**	*-132*
Eliminated Concept #2: 1 WB TH+LT, 2 WB TH; 1 SB RT, 1 SB TH+RT, 2 SB TH; Leading Pedestrian Interval	WB LT	-	-	-	-
	WB TH	**457**	*171*	**319**	*75*
	SB TH	166	*12*	78	*10*
	SB RT	**374**	*27*	32	*-369*
Eliminated Concept #3: Existing Lane Geometry with Leading Pedestrian Interval	WB LT	539	*128*	218	*31*
	WB TH	**412**	*41*	**302**	*43*
	SB TH	156	*2*	94	*26*
	SB RT	**290**	*-57*	**353**	*-48*
Eliminated Concept #4: Geometric improvements; no changes to signal phasing or timing	WB LT	477	-	176	-
	WB TH	286	-	244	-
	SB TH	154	-	68	-
	SB RT	**347**	-	**401**	-

WB = Westbound; SB = Southbound
LT = Left-turn; TH = Through; RT = Right-turn
Note: Queue lengths in bold exceed lane capacity

4.2 PUBLIC AND STAKEHOLDER FEEDBACK

Following the development of concepts, the City sought feedback from various stakeholder and neighborhood groups, including the San Rafael Bicycle and Pedestrian Advisory Committee, Federation of San Rafael Neighborhoods, and the Point San Pedro Road Coalition. The following are some of the most frequently raised points during this phase of outreach:

Addition of a Southbound Right-Turn Lane on Hetherton

This was requested by some groups to improve traffic conditions at the intersection. While it is acknowledged that the addition of a southbound right-turn (either through the conversion of a through lane to a combined through/right, or the addition of a new right-turn lane) would produce a minor decrease in intersection delay, it would also introduce an additional conflict between right-turns and pedestrians on the west leg crosswalk. Given that the west leg of the intersection has higher pedestrian volumes than the south leg, it was determined that the improved traffic conditions was not worth the trade-off of increasing pedestrian risk on the west leg crosswalk.

Embedded Pavement Crosswalk Lights

It was suggested that flashing warning lights be embedded into the south leg crosswalk to increase the visibility of pedestrians. The trade-offs of this type of improvement is that it has the potential to increase the likelihood of vehicles yielding to pedestrians, but is expensive to maintain. Embedded pavement lights are also known to be more effective at night or in inclement weather. Per the Manual on Uniform Traffic Control Devices (MUTCD) Section 4N.02, these types of warning lights shall not be used at signalized intersections; this improvement was thus not considered.

Pedestrian Bridge

Grade-separation of the pedestrian crossing, either at the south leg or the west leg crosswalk, has been proposed. This kind of improvement was ruled out due to its high cost. A pedestrian bridge would also require ramping to comply with the Americans with Disabilities Act (ADA) requirements. The right-of-way needed to accommodate these ramps would preclude this improvement, in addition to the high cost. Additionally, a pedestrian bridges are considered more effective over longer crossing distances; at this intersection, the increased crossing time that would come from the pedestrian bridge could incentivize jaywalking.

Pedestrian Scramble

The project team studied the potential of implementing a pedestrian scramble (i.e. the allowance of all pedestrian crossings, including diagonal crossings, in one phase) before the development of the proposed concepts. It was found that the intersection cycle lengths would need to be increased to at least 120 seconds to accommodate this, and it would significantly deteriorate traffic conditions at the intersection. Because of these impacts, a pedestrian scramble was removed from consideration.

Removal of South Leg Crosswalk

It was proposed by the public that removal of the south leg crosswalk, and thus elimination of the double conflict between pedestrians and vehicles, would ultimately improve safety. The project team studied this concept further. Pedestrians utilizing the south leg crosswalk were surveyed to determine their origin and destination. **Figure 4-1** shows respondents' points of origin/destination on the west side of the crosswalk; **Figure 4-2** shows respondents' points of origin/destination on the east side of the crosswalk.

Figure 4-1: Intercept Survey Western Points of Origin/Destination

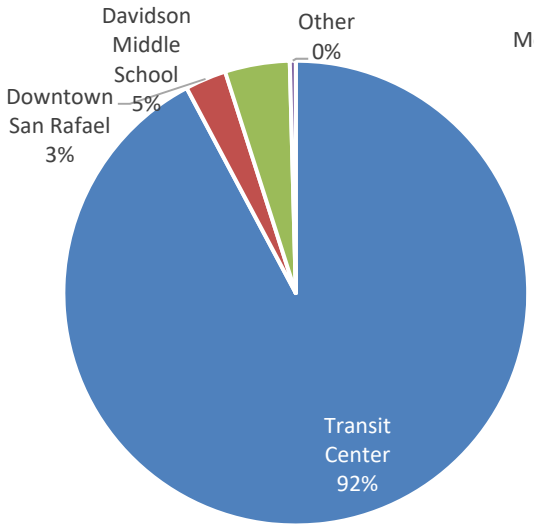
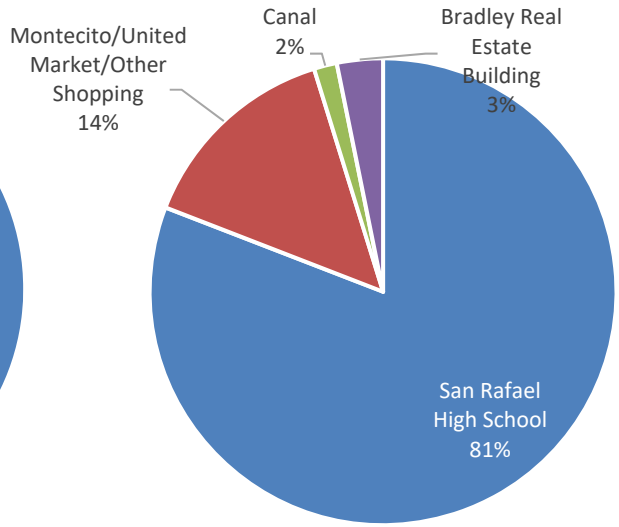


Figure 4-2: Intercept Survey Eastern Points of Origin/Destination



As evidenced by the survey results, the major pedestrian flow through the south leg crosswalk is between the transit center and San Rafael High School. This flow would be rerouted through the west and north leg crosswalks if the south leg crosswalk were removed. This would eliminate pedestrian-vehicle conflicts at the south leg, but would

introduce additional pedestrian – vehicle conflicts on the north and west legs. This would increase conflicts between pedestrians and vehicles making a southbound right-turn from Hetherton Street to 3rd Street, potentially increasing vehicle delay and queuing for this movement.

Pedestrians traveling to and from United Markets, or the Shell and Valero gas stations, would also see increased walking times with the removal of the south leg crosswalk. Pedestrians who currently cross at 3rd Street & Hetherton Street to reach these locations would have to find longer, alternate routes instead. The planned relocation of crosswalks at 2nd Street & Irwin Street would create additional challenges for pedestrians traveling to these locations.

Because of the above considerations, removal of the south leg crosswalk was not considered viable.

Traffic Impact Concerns Due to the Removal of the Westbound Left-Turn Lane

Some community members expressed concerns about the traffic impacts of removing the westbound left-turn lane. Before the development of concepts, the project team analyzed the impacts of various potential lane geometry changes, and found that the removal of the westbound left-turn pocket resulted in, at most, a 5 to 8 second increase in overall intersection delay. The westbound left-turn pocket is very short (approximately 70 feet), limiting its use to the two to three vehicles that initially queue at the signal at a red light. Once those two to three vehicles are served on a green light, the westbound left-turn lane does not provide any value, as overall throughput is determined by the three approach lanes on 3rd Street. The traffic delay computational tools do not consider the limited utility of the short pocket, and thus the effect on delay for removal of the westbound left-turn lane is likely less than the stated 5 to 8 seconds.

However, with the concerns regarding the left-turn lane removal in mind, the project team developed an “interim” version of the recommended concept, which utilizes striping and flexible posts or channelizers to create bulb-outs without the demolition of existing curb. The interim version of the recommended concept would allow for improvements to be implemented at a lower cost and act as a trial run for the improvements before they are permanently implemented. The interim treatments would also allay concerns that improvements at this intersection may be less needed if the transit center is relocated north of 3rd Street, as part of the ongoing efforts to find a permanent, long-term location for the transit center.

4.3 RECOMMENDATION AND NEXT STEPS

The recommended concept has been selected based on completion of a traffic analysis, cost estimate, conceptual design, and an assessment of safety benefits for pedestrians. This concept improves pedestrian safety by eliminating the double conflict between westbound left-turning vehicles and pedestrians on the south leg of the intersection and reduces the crossing distance of that leg. It is noted that the south leg is where both pedestrian fatalities occurred. The addition of a leading pedestrian interval for east-west pedestrian movements gives pedestrians priority and improves visibility on the north and south leg crosswalks. This concept does not create new pedestrian safety issues and has a limited impact on traffic in terms of delay. The other concepts were eliminated for the following reasons:

- **Eliminated Concept #1**: This is the worst performing concept for traffic operations. Intersection delay would significantly increase, as would vehicle queuing in the westbound direction. In addition, it reduces the recently constructed sidewalk width on the west side of Hetherton Street to a comparatively narrow 5 feet (from 10 feet today). While this concept does fully separate the pedestrian movement, the additional impact to congestion that would impact 3rd Street, Hetherton Street, and Irwin Street and the reduction in sidewalk width does not justify the marginal pedestrian benefit relative to the recommended concept.
- **Eliminated Concept #2**: The addition of a 2nd right-turn on the southbound approach creates a new double conflict between southbound right turns and pedestrians crossing the west leg of the intersection, similar to the main safety issue that exists today at the south leg crosswalk. While PM intersection delay and southbound queuing is reduced, AM intersection delay and queuing increases by converting one southbound through lane to a shared through/right lane. The limited benefit to traffic operations does not outweigh the impact to pedestrian safety.
- **Eliminated Concept #3**: The primary difference between Eliminated Concept #3 and the recommended concept is that it maintains the existing westbound left-turn pocket. The limited benefit of preserving this left-turn pocket was outweighed by the opportunity to eliminate the double conflict between the westbound left-turns and pedestrians.
- **Eliminated Concept #4:** While this concept does not impact traffic operations, improvements compared to existing conditions are relatively minor. The pedestrian benefits associated with the recommended concept are deemed much more beneficial in addressing project objectives.

The recommended concept would require both construction of intersection modifications and signal operations modifications. The option of implementing interim treatments, which would implement the recommended concept with the use of striping and flexible posts or

channelizers instead of reconstructing curb, could be implemented if a nonpermanent solution is desired. The capital cost for construction of permanent treatments is estimated at $283,700; the cost for interim treatments is an estimated $118,500. Detailed cost estimates are provided in **Appendix E**.

Appendices

Appendix A: Turning Movement Counts

Appendix B: SWITRS Collision History

Appendix C: Synchro Analysis Worksheets

Appendix D: Intersection Concept Drawings

Appendix E: Intersection Concept Cost Estimates

Appendix A: Turning Movement Counts

Public Works

City of San Rafael

Traffic Engineering

HETHERTON and THIRD

7:00 to 9:00

502

HETHERTON

						Bik	Pe					SB	NB	Total	%
717	G12-11	☑	8:00	5/21/2008	Wed	1	34	0	375	667	0	1042	0	2,813	100%
859	G12-13	☑	7:30	4/20/2010	Tue	1	23	0	441	741	0	1182	0	3,041	108%
997	XXX	☑	7:45	9/20/2011	Tue	1	14	0	369	795	0	1164	0	3,155	112%
1244	XXX	☑	7:30	10/10/2013	Thu	4	52	0	379	757	0	1136	0	3,128	111%
1435	XXX	☑	7:15	6/2/2016	Thu	4	26	0	385	738	0	1123	0	3,025	108%
1504	XXX	☑	8:00	2/28/2017	Tue	6	19	0	419	669	0	1088	0	2,858	102%

1697	1759	1869	1877	1830	1749	WB
0	0	0	0	0	0	EB
0	0	2	0	2	0	Bike
61	69	84	120	95	69	Ped
0	0	0	0	0	0	
0	0	0	0	0	0	
0	0	0	0	0	0	
0	0	0	0	0	0	

0	0	0	0	0	0	
0	0	0	0	0	0	
1330	1445	1498	1500	1318	1322	
440	457	494	491	541	449	
1	0	1	5	3	3	Pe
4	9	4	8	10	4	Bik
1770	1902	1992	1991	1859	1771	WB
0	0	0	0	0	0	EB

THIRD

Sunny/clear	2/28/2017	1109	0	0	0	0	0	16	0	City	THIRD		
unknown	6/2/2016	1195	0	0	0	0	0	52	1	FP			
Sunny/clear	10/10/2013	1251	0	0	0	0	0	64	0	City			
unknown	9/20/2011	1286	0	0	0	0	0	27	0	Pass			
Cloudy/Occasional light rain	4/20/2010	1282	0	0	0	0	0	32	0	City			
Sunny/clear	5/21/2008	1116	0	0	0	0	0	30	0	City			
		SB	NB					Pe	Bik				

HETHERTON

1504 1. Occasional queue on 3rd St, WB between Irwin St and Tamalpais Ave. from 7:45 a.m to 8:15 a.m.
2. Approximately 11 cars on Hetherton St, SB made a right turn to Third St, WB from the through lane.

1244 1. Traffic moved well. Occasional queue on Third St between Hetherton and Irwin from 7:40 a.m. to 8:15 a.m.
2. Five people jaywalked crossing on the e-leg of intersection. There is no crosswalk on the east leg of intersection.

717 1. Constant queue on Hetherton, SB, between 2nd & 3rd Sts. from 7:30 to 8:10 a.m. backing up traffic on 3rd St, WB, LT. and Hetherton, SB, thru.

296 1. Solid queue on Hetherton, SB, between SB 101 on-ramp and Third backing up traffic on Third, WB, LT pockets and Hetherton from 8:15 to 8:45 a.m.

142 1. 6 cars on Hetherton SB made right turn to 3rd from the 3rd lane.
2. Occasional queue on 3rd due to buses getting out of Transit Ctr between 7:45 to 8:15AM

Public Works

City of San Rafael

Traffic Engineering

HETHERTON and THIRD

16:00 to 18:00

502

HETHERTON

						Bik	Pe					SB	NB	Total	%
143	G12-9	☑ 16:45	3/19/2003	Wed	1	45	0	486	825	0		1311	0	3,355	100%
297	G12-10	☑ 16:30	5/25/2005	Wed	0	32	0	422	754	0		1176	0	3,042	91%
716	G12-11	☑ 17:00	5/20/2008	Tue	4	34	0	359	596	0		955	0	2,674	80%
858	G12-12	☑ 16:30	4/8/2010	Thu	0	65	0	402	691	0		1093	0	3,174	95%
999	XXX	☑ 16:30	9/20/2011	Tue	5	47	0	438	875	0		1313	0	3,583	107%
1505	XXX	☑ 16:45	2/28/2017	Tue	1	48	0	434	670	0		1104	0	2,899	86%

1978	1770	1720	1997	2169	1827	WB
0	0	0	0	0	0	EB
0	0	0	0	4	0	Bike
81	92	87	71	85	74	Ped
0	0	0	0	0	0	
0	0	0	0	0	0	
0	0	0	0	0	0	
0	0	0	0	0	0	

0	0	0	0	0	0	
0	0	0	0	0	0	
1393	1731	1595	1361	1348	1492	
402	539	486	358	518	552	
0	4	2	5	4	2	Pe
5	13	6	9	5	9	Bik
WB 1795	2270	2081	1719	1866	2044	
EB 0	0	0	0	0	0	

THIRD

		SB	NB									
Sunny/clear	2/28/2017	1072	0	0	0	0	0	41	0	City	THIRD	
unknown	9/20/2011	1414	0	0	0	0	0	40	2	Pass		
Sunny/clear	4/8/2010	1177	0	0	0	0	0	51	0	City		
Sunny/clear	5/20/2008	954	0	0	0	0	0	46	0	City		
Sunny/clear	5/25/2005	1272	0	0	0	0	0	34	0	City		
Sunny/rain 5:15PM	3/19/2003	1377	0	0	0	0	0	52	0	City		

HETHERTON

Pe Bik

1505 1. Approximately 26 cars on Hetherton St, SB made a right turn to Third St, WB from the through lane.

858 1. Farmers Market opened this day.
2. Occasional queue on Third St, WB, between Lincoln and Irwin backing up traffic on Hetherton, SB, RT pocket from 5:20 p.m. to 5:45 p.m.

716 1. Constant queue on Hetherton, SB, between 2nd & 3rd Sts. due to heavy traffic on SB 101 on ramp from 4:00 to 6:00 p.m. Traffic was backed up on Third, WB, LT pocket. At one point, no cars going SB nor WB can get through intersection in one cycle.
2. Some cars on Third, WB, made left turns on lane #3 (thru lane).
3. One car observed came from Tamalpais Ave. made a LT to Third and right turn to Hetherton.

143 1. Occasional queue on Hetherton between 2nd & 3rd between 5:20-5:45pm
2. 20 cars on Hetherton made RT on 3rd lane (see count)
3. 10 cars 3rd made RT on red (see count)

Appendix B: SWITRS Collision History

SWITRS Report

INTERSECTION: HETHERTON & THIRD:502 LOCATION: * DATE: 1/1/2011 TO 1/3/2017 TIME: 0 TO 9999 DISTANCE: 150 ☐ Or ☑ And

COLLISION SEGMENT

*	*	*	☐ Or ☑ And	*	*	*	

PARTY SEGMENT

*	*	*	☐ Or ☑ And	*	*	*	

VICTIM SEGMENT

*	*	*	☐ Or ☑ And	*	*	*	

Total Records: 70 **out of** 70

Id#	Date	Time	Primary Road	Secondary Road	DS	Dr.	Collision Severity	Primary Collision Factor			Violation Category	Collision Type	Surface	Weather
7032325	8/15/2015	1412	*3RD ST*	*HETHERTON*	100	E	Injury (Complaint of Pain)	V.C Violation	21202	A	Wrong Side of Road	Broadside	Dry	Clear
→	Party	1 : Travel	EB	Not Stated			At Fault	BICYCLIST		Male	25years old	BICYCLE	HNBD-HAD NOT BEEN DRINKING	
	BICYCLIST				Male		25years old	COMPLAINT OF PAIN			POSITION UNKNOWN	DRIVER, MOTORCYCLE HELMET	NOT EJECTED	
↓	Party	2 : Travel	SB	Proceeding Straight				DRIVER (INCLUDING HIT AN		Male		PICKUP OR PANEL TRUCK	HNBD-HAD NOT BEEN DRINKING	
	PASSENGER (INCLUDES NON-OPERATOR				Male		17years old	NO INJURY			PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
	PASSENGER (INCLUDES NON-OPERATOR				Male		17years old	NO INJURY			PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
	PASSENGER (INCLUDES NON-OPERATOR				Male		17years old	NO INJURY			PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
8026440	4/12/2016	1809	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	V.C Violation	22107		Improper Turning	Sideswipe	Dry	Clear
↑	Party	1 : Travel	WB	Making Right Turn			At Fault	DRIVER (INCLUDING HIT AN		Male	51years old	OTHER BUS	HNBD-HAD NOT BEEN DRINKING	
↑	Party	2 : Travel	WB	Making Right Turn				DRIVER (INCLUDING HIT AN		Female	29years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
6262632	10/5/2013	1804	*3RD ST*	*HETHERTON ST*	10	S	Injury (Other Visible)	V.C Violation	21950	A	Pedestrain Right-of-Way	Vehicle/Pedestri	Dry	Clear
↱	Party	1 : Travel	WB	Making Left Turn			At Fault	DRIVER (INCLUDING HIT AN		Male	38years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
→	Party	2 : Travel	EB	Not Stated				PEDESTRIAN		Male	14years old	PEDESTRIAN	HNBD-HAD NOT BEEN DRINKING	
	PEDESTRIAN				Male		14years old	OTHER VISIBLE INJ			OTHER OCCUPANTS	NOT REQUIRED	NOT EJECTED	
5224507	6/11/2011	1425	*3RD ST*	*HETHERTON ST*	0		Injury (Other Visible)	V.C Violation	21950	A	Pedestrain Right-of-Way	Head-On	Dry	Clear
↱	Party	1 : Travel	WB	Making Left Turn			At Fault	DRIVER (INCLUDING HIT AN		Male	59years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
→	Party	2 : Travel	EB	Not Stated				PEDESTRIAN		Male	69years old	PEDESTRIAN	HNBD-HAD NOT BEEN DRINKING	
	PEDESTRIAN				Male		69years old	OTHER VISIBLE INJ			POSITION UNKNOWN		UNKNOWN	
5817127	10/5/2012	1115	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	V.C Violation	21658	A	Unsafe Lane Change	Sideswipe	Dry	Clear
↱	Party	1 : Travel	WB	Making Left Turn			At Fault	DRIVER (INCLUDING HIT AN		Male	59years old	PICKUP OR PANEL TRUCK	HNBD-HAD NOT BEEN DRINKING	
	PASSENGER (INCLUDES NON-OPERATOR				Male		998years old	NO INJURY			PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
↱	Party	2 : Travel	WB	Making Left Turn				DRIVER (INCLUDING HIT AN		Male	31years old	TRUCK OR TRUCK TRACTOR	HNBD-HAD NOT BEEN DRINKING	
7190568	6/9/2016	1313	*3RD ST*	*HETHERTON ST*	0		Fatal	V.C Violation	21950	A	Pedestrain Right-of-Way	Vehicle/Pedestri	Dry	Clear
↱	Party	1 : Travel	WB	Making Left Turn			At Fault	DRIVER (INCLUDING HIT AN		Male	60years old	TRUCK OR TRUCK TRACTOR	HNBD-HAD NOT BEEN DRINKING	
←	Party	2 : Travel	WB	Not Stated				PEDESTRIAN		Female	77years old	PEDESTRIAN	HNBD-HAD NOT BEEN DRINKING	
	PEDESTRIAN				Female		77years old	KILLED (DIED NO L			POSITION UNKNOWN		NOT EJECTED	
6417155	3/12/2014	1530	*HETHERTON ST*	*3RD ST*	4	S	Injury (Complaint of Pain)	V.C Violation	21950	A	Pedestrain Right-of-Way	Vehicle/Pedestri	Dry	Clear
↱	Party	1 : Travel	WB	Making Left Turn			At Fault	DRIVER (INCLUDING HIT AN		Female	31years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party	2 : Travel	WB	Not Stated				PEDESTRIAN		Female	18years old	PEDESTRIAN	HNBD-HAD NOT BEEN DRINKING	
	PEDESTRIAN				Female		18years old	COMPLAINT OF PAIN			POSITION UNKNOWN		NOT EJECTED	

Id#	Date	Time	Primary Road	Secondary Road	DS	Dr.	Collision Severity	Primary Collision Factor			Violation Category	Collision Type	Surface	Weather
6224519	9/26/2013	1733	*3RD ST*	*HETHERTON AV*	0		PDO (Property Damage Only)	V.C Violation	22107		Improper Turning	Sideswipe	Dry	Clear
	Party 1 : Travel WB	Making Left Turn				At Fault	DRIVER (INCLUDING HIT AN	Female	37years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
	Party 2 : Travel WB	Proceeding Straight					DRIVER (INCLUDING HIT AN	Male	34years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
6057148	4/25/2013	728	*3RD ST*	*HETHERTON ST*	0		Injury (Complaint of Pain)	V.C Violation	21950	A	Pedestrain Right-of-Way	Vehicle/Pedestri	Dry	Cloudy
	Party 1 : Travel WB	Making Left Turn				At Fault	DRIVER (INCLUDING HIT AN	Female	52years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
	Party 2 : Travel WB	Not Stated					PEDESTRIAN	Male	13years old	PEDESTRIAN		HNBD-HAD NOT BEEN DRINKING		
	PEDESTRIAN			Male	13years old	COMPLAINT OF PAIN		POSITION UNKNOWN				UNKNOWN		
5466592	1/10/2012	1611	*3RD ST*	*HEATHERTON AV*	0		Injury (Complaint of Pain)	V.C Violation	21950	A	Pedestrain Right-of-Way	Vehicle/Pedestri	Dry	Clear
	Party 1 : Travel WB	Making Left Turn				At Fault	DRIVER (INCLUDING HIT AN	Female	32years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
	Party 2 : Travel WB	Not Stated					PEDESTRIAN	Male	50years old	PEDESTRIAN		HNBD-HAD NOT BEEN DRINKING		
	PEDESTRIAN			Male	50years old	COMPLAINT OF PAIN		POSITION UNKNOWN		NONE IN VEHICLE		NOT EJECTED		
6686782	10/20/2014	812	*HEATHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	22107		Improper Turning	Broadside	Dry	Cloudy
	Party 1 : Travel WB	Making Left Turn				At Fault	DRIVER (INCLUDING HIT AN	Male	74years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
	PASSENGER (INCLUDES NON-OPERATOR			Female	73years old	NO INJURY		PASSENGER		LAP/SHOULDER HARNEDD USED		NOT EJECTED		
	Party 2 : Travel SB	Proceeding Straight					DRIVER (INCLUDING HIT AN	Male	44years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
6263541	10/26/2013	1442	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	22107		Improper Turning	Sideswipe	Dry	Clear
	Party 1 : Travel WB	Making Left Turn				At Fault	DRIVER (INCLUDING HIT AN	Female	40years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
	Party 2 : Travel SB	Proceeding Straight					DRIVER (INCLUDING HIT AN	Female	74years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
5385811	9/11/2011	1653	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	21453	B	Automobile Right-of-Way	Broadside	Dry	Clear
	Party 1 : Travel WB	Making Left Turn				At Fault	DRIVER (INCLUDING HIT AN	Male		PASSENGER CAR/STATION WAGON		IMPAIRMENT UNKNOWN		
	Party 2 : Travel SB	Proceeding Straight					DRIVER (INCLUDING HIT AN	Male	37years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
	PASSENGER (INCLUDES NON-OPERATOR			Female	39years old	NO INJURY		PASSENGER		LAP/SHOULDER HARNEDD USED		NOT EJECTED		
	PASSENGER (INCLUDES NON-OPERATOR			Male	4years old	NO INJURY		PASSENGER		CHILD RESTRAINT IN VEHICLE		NOT EJECTED		
	PASSENGER (INCLUDES NON-OPERATOR			Male	12years old	NO INJURY		PASSENGER		LAP/SHOULDER HARNEDD USED		NOT EJECTED		
6961534	5/14/2015	1330	*3RD ST (N 50)*	*3RD ST PARK AND RIDE*	75	E	PDO (Property Damage Only)	V.C Violation	22106		Unsafe Starting or Backing	Other	Dry	Clear
	Party 1 : Travel WB	Parking Maneuver				At Fault	DRIVER (INCLUDING HIT AN	Female	30years old	PASSENGER CAR/STATION WAGON		IMPAIRMENT UNKNOWN		
	PASSENGER (INCLUDES NON-OPERATOR			Male	3years old	NO INJURY		PASSENGER		NOT REQUIREDCHILD		NOT EJECTED		
	PASSENGER (INCLUDES NON-OPERATOR			Female	1years old	NO INJURY		PASSENGER		NOT REQUIREDCHILD		NOT EJECTED		
	Party 2 : Travel EB	Parked					PARKED VEHICLE			PASSENGER CAR/STATION WAGON		NOT APPLICABLE		
8170309	11/10/2016	1616	*3RD ST*	*HETHERTON ST*	40	E	PDO (Property Damage Only)	V.C Violation	22107		Improper Turning	Sideswipe	Dry	Clear
	Party 1 : Travel WB	Other Unsafe Turning				At Fault	DRIVER (INCLUDING HIT AN	Female	31years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
	Party 2 : Travel WB	Proceeding Straight					DRIVER (INCLUDING HIT AN	Female	50years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
	PASSENGER (INCLUDES NON-OPERATOR			Female	12years old	NO INJURY		PASSENGER		AIR BAG NOT		NOT EJECTED		
	PASSENGER (INCLUDES NON-OPERATOR			Male	9years old	NO INJURY		PASSENGER		AIR BAG NOT		NOT EJECTED		
6709317	11/11/2014	1051	*3RD ST*	*HETHERTON*	70	W	PDO (Property Damage Only)	V.C Violation	22350		Unsafe Speed	Rear-End	Dry	Cloudy
	Party 1 : Travel WB	Proceeding Straight				At Fault	DRIVER (INCLUDING HIT AN	Female	57years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
	Party 2 : Travel WB	Stopped					DRIVER (INCLUDING HIT AN	Female	18years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
6706046	11/2/2014	952	*3RD ST*	*3RD ST 666*	84	W	Injury (Other Visible)	V.C Violation	22107		Improper Turning	Hit Object	Dry	Clear
	Party 1 : Travel WB	Proceeding Straight				At Fault	BICYCLIST	Male	63years old	BICYCLE		HNBD-HAD NOT BEEN DRINKING		
	BICYCLIST			Male	63years old	OTHER VISIBLE INJ		DRIVER		DRIVER, MOTORCYCLE HELMET		PARTIALLY EJECTED		
	Party 2 : Travel WB	Proceeding Straight					DRIVER (INCLUDING HIT AN	Female	48years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
	PASSENGER (INCLUDES NON-OPERATOR			Male	12years old	NO INJURY		PASSENGER		LAP/SHOULDER HARNEDD USED		NOT EJECTED		
6618895	8/13/2014	1514	*3RD ST*	*HETHERTON ST*	25	E	PDO (Property Damage Only)	V.C Violation	22107		Improper Turning	Sideswipe	Dry	Clear
	Party 1 : Travel WB	Merging				At Fault	DRIVER (INCLUDING HIT AN	Male	20years old	PASSENGER CAR/STATION WAGON		HNBD-HAD NOT BEEN DRINKING		
	Party 2 : Travel WB	Proceeding Straight					DRIVER (INCLUDING HIT AN	Male	26years old	OTHER BUS		HNBD-HAD NOT BEEN DRINKING		

Id#	Date	Time	Primary Road	Secondary Road	DS	Dr.	Collision Severity	Primary Collision Factor			Violation Category	Collision Type	Surface	Weather
6525722	6/10/2014	1314	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	V.C Violation	21658	A	Unsafe Lane Change	Sideswipe	Dry	Clear
←	Party 1 : Travel WB		Changing Lanes				At Fault	DRIVER (INCLUDING HIT AN	Male		18years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
←	Party 2 : Travel WB		Proceeding Straight					DRIVER (INCLUDING HIT AN	Female		66years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
6504791	5/27/2014	1708	*3RD ST*	*HETHERTON ST*	30	E	PDO (Property Damage Only)	V.C Violation	22350		Unsafe Speed	Rear-End	Dry	Clear
←	Party 1 : Travel WB		Proceeding Straight				At Fault	DRIVER (INCLUDING HIT AN	Male		27years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
	PASSENGER (INCLUDES NON-OPERATOR				Female		6years old	NO INJURY			PASSENGER	CHILD RESTRAINT IN VEHICLE	NOT EJECTED	
	PASSENGER (INCLUDES NON-OPERATOR				Female		27years old	NO INJURY			PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
	PASSENGER (INCLUDES NON-OPERATOR				Female		3years old	NO INJURY			PASSENGER	CHILD RESTRAINT IN VEHICLE	NOT EJECTED	
←	Party 2 : Travel WB		Stopped					DRIVER (INCLUDING HIT AN	Female		25years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
6499385	4/24/2014	1052	*3RD ST*	*HETHERTON ST*	10	E	Injury (Complaint of Pain)	V.C Violation	22350		Unsafe Speed	Rear-End	Dry	Clear
←	Party 1 : Travel WB		Proceeding Straight				At Fault	DRIVER (INCLUDING HIT AN	Male		18years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party 2 : Travel WB		Proceeding Straight					DRIVER (INCLUDING HIT AN	Female		58years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
	DRIVER				Female		58years old	COMPLAINT OF PAIN			DRIVER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
6435993	4/8/2014	1510	*3RD ST*	*HETHERTON AV*	0		PDO (Property Damage Only)	V.C Violation	21703		Following Too Closely	Rear-End	Dry	Clear
←	Party 1 : Travel WB		Proceeding Straight				At Fault	DRIVER (INCLUDING HIT AN	Female		59years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party 2 : Travel WB		Stopped					DRIVER (INCLUDING HIT AN	Male		41years old	PICKUP OR PANEL TRUCK	HNBD-HAD NOT BEEN DRINKING	
6332840	12/17/2013	755	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	V.C Violation	22107		Improper Turning	Sideswipe	Dry	Clear
←	Party 1 : Travel WB		Changing Lanes				At Fault	DRIVER (INCLUDING HIT AN	Male		54years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party 2 : Travel WB		Changing Lanes					DRIVER (INCLUDING HIT AN	Female		63years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
5821143	9/19/2012	755	*3RD ST*	*HETHERTON AV*	50	E	PDO (Property Damage Only)	V.C Violation	21658	A	Unsafe Lane Change	Sideswipe	Dry	Clear
←	Party 1 : Travel WB		Changing Lanes				At Fault	DRIVER (INCLUDING HIT AN	Male		49years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
←	Party 2 : Travel WB		Proceeding Straight					DRIVER (INCLUDING HIT AN	Female		65years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
	PASSENGER (INCLUDES NON-OPERATOR				Male		19years old	NO INJURY			PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
5790740	8/29/2012	1100	*3RD ST*	*HETHERTON*	0		Injury (Complaint of Pain)	V.C Violation	22350		Unsafe Speed	Rear-End	Dry	Clear
←	Party 1 : Travel WB		Changing Lanes				At Fault	DRIVER (INCLUDING HIT AN	Female		77years old	PASSENGER CAR/STATION WAGON	IMPAIRMENT UNKNOWN	
←	Party 2 : Travel WB		Stopped					DRIVER (INCLUDING HIT AN	Female		37years old	PASSENGER CAR/STATION WAGON	IMPAIRMENT UNKNOWN	
	DRIVER				Female		37years old	COMPLAINT OF PAIN			DRIVER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
←	Party 3 : Travel WB		Stopped					DRIVER (INCLUDING HIT AN	Female		26years old	PASSENGER CAR/STATION WAGON	IMPAIRMENT UNKNOWN	
	PASSENGER (INCLUDES NON-OPERATOR				Female		23years old	COMPLAINT OF PAIN			PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
	DRIVER				Female		26years old	COMPLAINT OF PAIN			DRIVER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
5640983	5/26/2012	1028	*3RD ST*	*HETHERTON ST*	0		Injury (Complaint of Pain)	V.C Violation	22350		Unsafe Speed	Rear-End	Dry	Clear
←	Party 1 : Travel WB		Proceeding Straight				At Fault	DRIVER (INCLUDING HIT AN	Female		22years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party 2 : Travel WB		Stopped					DRIVER (INCLUDING HIT AN	Female		59years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
	DRIVER				Female		59years old	COMPLAINT OF PAIN			DRIVER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
←	Party 3 : Travel WB		Stopped					DRIVER (INCLUDING HIT AN	Female		69years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
5466742	1/6/2012	1230	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	V.C Violation	21703		Following Too Closely	Rear-End	Dry	Clear
←	Party 1 : Travel WB		Proceeding Straight				At Fault	DRIVER (INCLUDING HIT AN	Male		20years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party 2 : Travel WB		Slowing/Stopping					DRIVER (INCLUDING HIT AN	Male		55years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
	PASSENGER (INCLUDES NON-OPERATOR				Male		55years old	NO INJURY			DRIVER	UNKNOWN	NOT EJECTED	

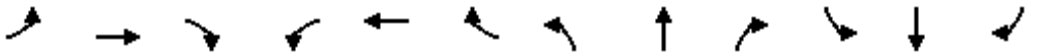
Id#	Date	Time	Primary Road	Secondary Road	DS	Dr.	Collision Severity	Primary Collision Factor		Violation Category	Collision Type	Surface	Weather
5382912	11/10/2011	1554	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	V.C Violation	22350	Unsafe Speed	Rear-End	Dry	Clear
←	Party	1 : Travel	WB	Proceeding Straight			At Fault	DRIVER (INCLUDING HIT AN	Male	23years old	PICKUP OR PANEL TRUCK	HNBD-HAD NOT BEEN DRINKING	
		PASSENGER (INCLUDES NON-OPERATOR		Male	21years old	NO INJURY		PASSENGER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
		PASSENGER (INCLUDES NON-OPERATOR		Male	23years old	NO INJURY		DRIVER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
←	Party	2 : Travel	WB	Stopped				DRIVER (INCLUDING HIT AN	Male	47years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
		PASSENGER (INCLUDES NON-OPERATOR		Male	47years old	NO INJURY		DRIVER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
←	Party	3 : Travel	WB	Stopped				DRIVER (INCLUDING HIT AN	Female	56years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
		PASSENGER (INCLUDES NON-OPERATOR		Female	56years old	NO INJURY		DRIVER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
5184483	6/1/2011	1445	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	V.C Violation	22107	Unknown	Sideswipe	Dry	Clear
←	Party	1 : Travel	WB	Changing Lanes			At Fault	DRIVER (INCLUDING HIT AN	Male	52years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party	2 : Travel	WB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Female	23years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
7200700	2/19/2016	2129	*HETHERTON AV*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	22450	Traffic Signals and Signs	Broadside	Dry	Clear
←	Party	1 : Travel	WB	Proceeding Straight			At Fault	DRIVER (INCLUDING HIT AN	Female	24years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
↓	Party	2 : Travel	SB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Female	24years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
7145683	12/10/2015	0	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	V.C Violation	21453	A Traffic Signals and Signs	Broadside	Wet	Clear
←	Party	1 : Travel	WB	Proceeding Straight			At Fault	DRIVER (INCLUDING HIT AN	Female	43years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
↓	Party	2 : Travel	SB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Male	42years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
6697022	10/24/2014	645	*HETHERTON ST*	*3RD ST*	0		Injury (Complaint of Pain)	V.C Violation	21453	A Traffic Signals and Signs	Broadside	Dry	Clear
←	Party	1 : Travel	WB	Proceeding Straight			At Fault	DRIVER (INCLUDING HIT AN	Female	23years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
		DRIVER		Female	23years old	COMPLAINT OF PAIN		DRIVER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
↓	Party	2 : Travel	SB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Female	56years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
5982218	2/4/2013	1418	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	21453	A Traffic Signals and Signs	Broadside	Dry	Clear
←	Party	1 : Travel	WB	Proceeding Straight			At Fault	DRIVER (INCLUDING HIT AN	Male	62years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
↓	Party	2 : Travel	SB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Female	50years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
5821147	9/11/2012	2249	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	V.C Violation	21453	A Traffic Signals and Signs	Broadside	Dry	Clear
←	Party	1 : Travel	WB	Proceeding Straight			At Fault	DRIVER (INCLUDING HIT AN	Male	28years old	PASSENGER CAR/STATION WAGON	HBD-HAD BEEN DRINKING,IMPAIRM	
↓	Party	2 : Travel	SB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Male	39years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
6056766	4/14/2013	1205	*TAMALPAIS AV*	*HEATHERTON AV*	72	W	PDO (Property Damage Only)	V.C Violation	22107	Improper Turning	Hit Object	Dry	Clear
←	Party	1 : Travel	WB	Ran off Road			At Fault	DRIVER (INCLUDING HIT AN	Female	56years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
6263522	10/24/2013	1259	*3RD ST*	*HETHERTON ST*	45	E	PDO (Property Damage Only)	V.C Violation	22107	Improper Turning	Broadside	Dry	Clear
↵	Party	1 : Travel	SB	Making Right Turn			At Fault	DRIVER (INCLUDING HIT AN	Female	27years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party	2 : Travel	WB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Female	64years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
6754313	12/19/2014	1330	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	22100	A Improper Turning	Sideswipe	Wet	Cloudy
↵	Party	1 : Travel	SB	Making Right Turn			At Fault	DRIVER (INCLUDING HIT AN	Male	24years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
↓	Party	2 : Travel	SB	Stopped				DRIVER (INCLUDING HIT AN	Male	22years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
		PASSENGER (INCLUDES NON-OPERATOR		Male	24years old	NO INJURY		PASSENGER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
5410625	11/28/2011	2131	*HETHERTON AV*	*3RD ST*	0		Injury (Complaint of Pain)	V.C Violation	21950	A Pedestrain Right-of-Way	Vehicle/Pedestri	Dry	Clear
↳	Party	1 : Travel	SB	Making Left Turn			At Fault	DRIVER (INCLUDING HIT AN	Male	58years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
		PASSENGER (INCLUDES NON-OPERATOR		Male	58years old	NO INJURY		PASSENGER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
→	Party	2 : Travel	EB	Not Stated				PEDESTRIAN	Male	34years old	PEDESTRIAN	HNBD-HAD NOT BEEN DRINKING	
		PEDESTRIAN		Male	34years old	COMPLAINT OF PAIN		POSITION UNKNOWN		NONE IN VEHICLE		UNKNOWN	
7130070	11/10/2015	1747	*HETHERTON ST*	*3RD ST*	0		Injury (Other Visible)	V.C Violation		Not Stated	Vehicle/Pedestri	Dry	Clear
↳	Party	1 : Travel	SB	Making Left Turn			At Fault	DRIVER (INCLUDING HIT AN	Female	66years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party	2 : Travel	WB	Not Stated				PEDESTRIAN	Female	61years old	PEDESTRIAN	HNBD-HAD NOT BEEN DRINKING	
		PEDESTRIAN		Female	61years old	OTHER VISIBLE INJ		POSITION UNKNOWN				NOT EJECTED	

Id#	Date	Time	Primary Road	Secondary Road	DS	Dr.	Collision Severity	Primary Collision Factor		Violation Category	Collision Type	Surface	Weather
6635789	9/19/2014	1300	*HETHERTON ST*	*3RD ST*	30	S	PDO (Property Damage Only)	V.C Violation	21658	A Unsafe Lane Change	Sideswipe	Dry	Clear
Party 1 : Travel SB	Making Left Turn		At Fault	DRIVER (INCLUDING HIT AN	Male	27years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
Party 2 : Travel SB	Making Left Turn			DRIVER (INCLUDING HIT AN	Male	39years old	OTHER BUS				HNBD-HAD NOT BEEN DRINKING		
6176109	8/12/2013	1119	*HETHERTON ST*	*3RD ST*	15	S	PDO (Property Damage Only)	V.C Violation	21658	A Unsafe Lane Change	Sideswipe	Dry	Clear
Party 1 : Travel SB	Making Left Turn		At Fault	DRIVER (INCLUDING HIT AN	Female	64years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
Party 2 : Travel SB	Making Left Turn			DRIVER (INCLUDING HIT AN	Female	52years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
5330772	10/6/2011	1155	*HETHERTON*	*3RD ST*	50	S	PDO (Property Damage Only)	V.C Violation	22350	Unsafe Speed	Rear-End	Dry	Clear
Party 1 : Travel SB	Making Left Turn		At Fault	DRIVER (INCLUDING HIT AN	Male	53years old	NOT STATED (ALSO NOT CHP)				HNBD-HAD NOT BEEN DRINKING		
Party 2 : Travel SB	Making Left Turn			DRIVER (INCLUDING HIT AN	Female	44years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
7184136	1/30/2016	845	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	21453	A Traffic Signals and Signs	Broadside	Dry	Clear
Party 1 : Travel SB	Proceeding Straight		At Fault	DRIVER (INCLUDING HIT AN	Male	36years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
Party 2 : Travel WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Male	63years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
7152795	12/31/2015	1315	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	21453	A Traffic Signals and Signs	Sideswipe	Dry	Clear
Party 1 : Travel SB	Proceeding Straight		At Fault	DRIVER (INCLUDING HIT AN			NOT STATED (ALSO NOT CHP)				IMPAIRMENT UNKNOWN		
Party 2 : Travel WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female	55years old	NOT STATED (ALSO NOT CHP)				HNBD-HAD NOT BEEN DRINKING		
PASSENGER (INCLUDES NON-OPERATOR	Female	80years old	NO INJURY	PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED							
7097100	10/8/2015	2205	*HETHERTON ST*	*3RD ST*	21	N	Injury (Complaint of Pain)	V.C Violation	21453	A Traffic Signals and Signs	Broadside	Dry	Clear
Party 1 : Travel SB	Proceeding Straight		At Fault	DRIVER (INCLUDING HIT AN	Male	38years old	PICKUP OR PANEL TRUCK				HNBD-HAD NOT BEEN DRINKING		
Party 2 : Travel WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Male	24years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
PASSENGER (INCLUDES NON-OPERATOR	Male	10years old	COMPLAINT OF PAIN	PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED							
6973514	6/14/2015	20	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	V.C Violation		Not Stated	Broadside	Dry	Clear
Party 1 : Travel SB	Proceeding Straight		At Fault	DRIVER (INCLUDING HIT AN	Male	29years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
Party 2 : Travel WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Male	64years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
6647794	9/27/2014	1135	*HETHERTON*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	21453	A Traffic Signals and Signs	Broadside	Dry	Clear
Party 1 : Travel SB	Proceeding Straight		At Fault	DRIVER (INCLUDING HIT AN	Female	39years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
Party 2 : Travel WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female	44years old	PASSENGER CAR/STATION WAGON				NOT STATED		
6543489	7/1/2014	1943	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	21453	A Traffic Signals and Signs	Sideswipe	Dry	Clear
Party 1 : Travel SB	Proceeding Straight		At Fault	DRIVER (INCLUDING HIT AN	Male	30years old	NOT STATED (ALSO NOT CHP)				HNBD-HAD NOT BEEN DRINKING		
Party 2 : Travel WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Male	65years old	NOT STATED (ALSO NOT CHP)				HNBD-HAD NOT BEEN DRINKING		
6375783	2/10/2014	1802	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	21453	A Traffic Signals and Signs	Broadside	Dry	Clear
Party 1 : Travel SB	Proceeding Straight		At Fault	DRIVER (INCLUDING HIT AN	Female	62years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
Party 2 : Travel WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female	22years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
6375439	2/1/2014	1405	*HETHERTON ST*	*3RD ST*	0		Injury (Complaint of Pain)	V.C Violation	21453	A Traffic Signals and Signs	Broadside	Dry	Clear
Party 1 : Travel SB	Proceeding Straight		At Fault	DRIVER (INCLUDING HIT AN	Male	31years old	MOTORCYCLE/SCOOTER				HNBD-HAD NOT BEEN DRINKING		
Party 2 : Travel WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female	40years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
PASSENGER (INCLUDES NON-OPERATOR	Female	4years old	NO INJURY	PASSENGER	CHILD RESTRAINT IN VEHICLE	NOT EJECTED							
Party 3 : Travel WB	Making Left Turn			DRIVER (INCLUDING HIT AN	Female	59years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
PASSENGER (INCLUDES NON-OPERATOR	Female	24years old	COMPLAINT OF PAIN	PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED							
5875879	12/11/2012	1136	*HETHERTON*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	21453	A Traffic Signals and Signs	Broadside	Dry	Clear
Party 1 : Travel SB	Proceeding Straight		At Fault	DRIVER (INCLUDING HIT AN	Female	21years old	PASSENGER CAR/STATION WAGON				HNBD-HAD NOT BEEN DRINKING		
PASSENGER (INCLUDES NON-OPERATOR	Female	20years old	NO INJURY	PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED							
Party 2 : Travel WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Male	60years old	PICKUP OR PANEL TRUCK				HNBD-HAD NOT BEEN DRINKING		

Id#	Date	Time	Primary Road	Secondary Road	DS	Dr.	Collision Severity	Primary Collision Factor			Violation Category	Collision Type	Surface	Weather
5875032	9/8/2012	923	*3RD ST*	*HETHERTON*	0		Injury (Complaint of Pain)	V.C Violation	21453	A	Traffic Signals and Signs	Broadside	Dry	Clear
↓	Party	1 : Travel	SB	Proceeding Straight			At Fault	DRIVER (INCLUDING HIT AN	Female		81years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
		PASSENGER (INCLUDES NON-OPERATOR		Female		59years old	COMPLAINT OF PAIN		PASSENGER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
		PASSENGER (INCLUDES NON-OPERATOR		Female		84years old	COMPLAINT OF PAIN		PASSENGER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
←	Party	2 : Travel	WB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Male		30years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
		PASSENGER (INCLUDES NON-OPERATOR		Female		2years old	NO INJURY		STATION WAGON REAR		CHILD RESTRAINT IN VEHICLE,	NOT EJECTED		
		PASSENGER (INCLUDES NON-OPERATOR		Male		5years old	COMPLAINT OF PAIN		PASSENGER		CHILD RESTRAINT IN VEHICLE	NOT EJECTED		
		DRIVER		Male		30years old	COMPLAINT OF PAIN		DRIVER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
		PASSENGER (INCLUDES NON-OPERATOR		Male		25years old	NO INJURY		PASSENGER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
5637116	5/14/2012	1917	*3RD ST*	*HEATHERTON ST*	0		Injury (Complaint of Pain)	V.C Violation	21453	A	Traffic Signals and Signs	Broadside	Dry	Clear
↓	Party	1 : Travel	SB	Proceeding Straight			At Fault	DRIVER (INCLUDING HIT AN	Female		40years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party	2 : Travel	WB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Female		32years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
		PASSENGER (INCLUDES NON-OPERATOR		Female		4years old	NO INJURY		PASSENGER		CHILD RESTRAINT IN VEHICLE	NOT EJECTED		
		PASSENGER (INCLUDES NON-OPERATOR		Male		26years old	COMPLAINT OF PAIN		PASSENGER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
		PASSENGER (INCLUDES NON-OPERATOR		Female		5years old	COMPLAINT OF PAIN		PASSENGER		CHILD RESTRAINT IN VEHICLE	NOT EJECTED		
5076642	1/19/2011	1232	*3RD ST*	*HETHERTON ST*	0		Injury (Complaint of Pain)	V.C Violation	21453	A	Traffic Signals and Signs	Broadside	Dry	Clear
↓	Party	1 : Travel	SB	Ran off Road			At Fault	DRIVER (INCLUDING HIT AN	Male		48years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
←	Party	2 : Travel	WB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Female		39years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
		PASSENGER (INCLUDES NON-OPERATOR		Female		31years old	COMPLAINT OF PAIN		PASSENGER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
		PASSENGER (INCLUDES NON-OPERATOR		Male		1years old	NO INJURY		PASSENGER		CHILD RESTRAINT IN VEHICLE	NOT EJECTED		
		PASSENGER (INCLUDES NON-OPERATOR		Male		1years old	NO INJURY		PASSENGER		CHILD RESTRAINT IN VEHICLE	NOT EJECTED		
8001200	3/24/2016	1219	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	21658	A	Unsafe Lane Change	Rear-End	Dry	Clear
↓	Party	1 : Travel	SB	Changing Lanes			At Fault	DRIVER (INCLUDING HIT AN	Female		42years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
↓	Party	2 : Travel	SB	Changing Lanes				DRIVER (INCLUDING HIT AN	Female		35years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
6802143	1/22/2015	1555	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	23152	A	Driving or Bicycling Under Influence of Alcohol or	Rear-End	Dry	Clear
↓	Party	1 : Travel	SB	Proceeding Straight			At Fault	DRIVER (INCLUDING HIT AN	Female		26years old	PASSENGER CAR/STATION WAGON	HBD-HAD BEEN DRINKING,UNDER IN	
↓	Party	2 : Travel	SB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Male		20years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
6461323	4/29/2014	1238	*HETHERTON ST*	*3RD ST*	35	N	PDO (Property Damage Only)	V.C Violation	21658	A	Unsafe Lane Change	Sideswipe	Dry	Clear
↓	Party	1 : Travel	SB	Proceeding Straight			At Fault	DRIVER (INCLUDING HIT AN	Male		70years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
↓	Party	2 : Travel	SB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Male		21years old	PICKUP OR PANEL TRUCK	HNBD-HAD NOT BEEN DRINKING	
		PASSENGER (INCLUDES NON-OPERATOR		Male		34years old	NO INJURY		PASSENGER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		
5935851	11/26/2012	1529	*HETHERTON ST*	*3RD ST*	0		Injury (Complaint of Pain)	V.C Violation	21950	A	Pedestrain Right-of-Way	Vehicle/Pedestri	Dry	Clear
↰	Party	1 : Travel	NB	Making Left Turn			At Fault	DRIVER (INCLUDING HIT AN	Female		39years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
↱	Party	2 : Travel	WB	Making Left Turn				PEDESTRIAN	Male		44years old	PEDESTRIAN	HNBD-HAD NOT BEEN DRINKING	
		PEDESTRIAN		Male		44years old	COMPLAINT OF PAIN		POSITION UNKNOWN				UNKNOWN	
8090295	7/9/2016	1504	*3RD ST*	*IRWIN ST/TAMALPAIS AV*	0		PDO (Property Damage Only)	V.C Violation	22107		Improper Turning	Sideswipe	Dry	Clear
←	Party	1 : Travel	WB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Male		59years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party	2 : Travel	WB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Male		31years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
8056200	5/24/2016	2123	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	V.C Violation	21453	A	Traffic Signals and Signs	Broadside	Dry	Clear
←	Party	1 : Travel	WB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Male		25years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
↓	Party	2 : Travel	SB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Male		59years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
8043142	4/30/2016	1539	*3RD ST*	*HETHERTON ST*	0		Injury (Other Visible)	V.C Violation	22101	D	Improper Turning	Broadside	Dry	Clear
←	Party	1 : Travel	WB	Proceeding Straight				DRIVER (INCLUDING HIT AN	Female		75years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
↱	Party	2 : Travel	WB	Making Left Turn				DRIVER (INCLUDING HIT AN	Male		57years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
		DRIVER		Male		57years old	OTHER VISIBLE INJ		DRIVER		LAP/SHOULDER HARNEDD USED	NOT EJECTED		

Id#	Date	Time	Primary Road	Secondary Road	DS	Dr.	Collision Severity	Primary Collision Factor		Violation Category	Collision Type	Surface	Weather
6824784	2/6/2015	1514	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	22450	Traffic Signals and Signs	Broadside	Wet	Raining
←	Party	1 : Travel	WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female		51years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
↓	Party	2 : Travel	SB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female		60years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
6354549	12/18/2013	1930	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	Unknow		Unknown	Sideswipe	Dry	Clear
←	Party	1 : Travel	WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female		71years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
←	Party	2 : Travel	WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Male		49years old	PICKUP OR PANEL TRUCK	HNBD-HAD NOT BEEN DRINKING	
6153813	7/21/2013	935	*HETHERTON ST*	*3RD ST*	0		Injury (Complaint of Pain)	V.C Violation	21453 A	Traffic Signals and Signs	Broadside	Dry	Clear
←	Party	1 : Travel	WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female		53years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
	DRIVER				Female		53years old	COMPLAINT OF PAIN		DRIVER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
↓	Party	2 : Travel	SB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female		37years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
	DRIVER				Female		37years old	COMPLAINT OF PAIN		DRIVER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
6263581	10/22/2013	1230	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	Unknow		Unknown	Sideswipe	Dry	Clear
↳	Party	1 : Travel	SB	Making Left Turn			DRIVER (INCLUDING HIT AN	Female		50years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
↓	Party	2 : Travel	SB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Male		46years old	PASSENGER CAR WITH TRAILER	HNBD-HAD NOT BEEN DRINKING	
8180048	11/26/2016	1336	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	21453 A	Traffic Signals and Signs	Broadside	Wet	Raining
↓	Party	1 : Travel	SB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female		41years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
↑	Party	2 : Travel	WB	Making Right Turn			DRIVER (INCLUDING HIT AN	Female		77years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
6757111	12/12/2014	1514	*HETHERTON ST*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	22107	Improper Turning	Sideswipe	Wet	Cloudy
↓	Party	1 : Travel	SB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female		53years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
↳	Party	2 : Travel	SB	Making Left Turn			DRIVER (INCLUDING HIT AN	Male		22years old	PICKUP OR PANEL TRUCK	HNBD-HAD NOT BEEN DRINKING	
6697252	11/2/2014	2051	*3RD ST*	*HETHERTON ST*	0		PDO (Property Damage Only)	Unknow		Unknown	Broadside	Dry	Clear
↓	Party	1 : Travel	SB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female		61years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
←	Party	2 : Travel	WB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Female		31years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
6525734	6/2/2014	1700	*HETHERTON ST*	*3RD ST*	20	S	PDO (Property Damage Only)	V.C Violation	22350	Unsafe Speed	Rear-End	Dry	Clear
	Party	1 : Travel	-B	Making Left Turn		At Fault	DRIVER (INCLUDING HIT AN	Female		49years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
↓	Party	2 : Travel	SB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Male		71years old	PASSENGER CAR/STATION WAGON	HNBD-HAD NOT BEEN DRINKING	
5378779	10/19/2011	1910	*HETHERTON AV*	*3RD ST*	0		PDO (Property Damage Only)	V.C Violation	21453 A	Traffic Signals and Signs	Rear-End	Dry	Clear
↓	Party	1 : Travel	SB	Proceeding Straight			DRIVER (INCLUDING HIT AN	Male		85years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	
	PASSENGER (INCLUDES NON-OPERATOR				Male		78years old	NO INJURY		PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
	PASSENGER (INCLUDES NON-OPERATOR				Female		80years old	NO INJURY		PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
	PASSENGER (INCLUDES NON-OPERATOR				Female		55years old	NO INJURY		PASSENGER	LAP/SHOULDER HARNEDD USED	NOT EJECTED	
↳	Party	2 : Travel	SB	Making Left Turn			DRIVER (INCLUDING HIT AN	Male		27years old	NOT STATED (ALSO NOT CHP)	HNBD-HAD NOT BEEN DRINKING	

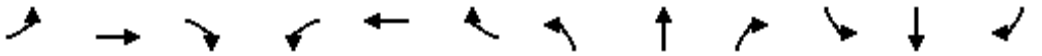
Appendix C: Synchro Analysis Worksheets



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	440	1330	0	0	0	0	0	669	419
Future Volume (vph)	0	0	0	440	1330	0	0	0	0	0	669	419
Ideal Flow (vphpl)	1800	1800	1800	1700	1700	1800	1800	1800	1800	1800	1700	1800
Lane Width	12	12	12	14	12	12	12	12	12	12	11	11
Total Lost time (s)				4.2	4.2						2.2	2.2
Lane Util. Factor				*0.74	*0.74						0.91	1.00
Frpb, ped/bikes				1.00	1.00						1.00	0.91
Flpb, ped/bikes				0.99	1.00						1.00	1.00
Frt				1.00	1.00						1.00	0.85
Flt Protected				0.95	1.00						1.00	1.00
Satd. Flow (prot)				1209	3629						4314	1298
Flt Permitted				0.95	1.00						1.00	1.00
Satd. Flow (perm)				1209	3629						4314	1298
Peak-hour factor, PHF	0.90	0.90	0.90	0.89	0.89	0.89	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	494	1494	0	0	0	0	0	704	441
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	20
Lane Group Flow (vph)	0	0	0	494	1494	0	0	0	0	0	704	421
Confl. Peds. (#/hr)	19		16	16		19	69		1	1		69
Confl. Bikes (#/hr)						4						6
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	2%	2%	2%	4%	4%	4%
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						8	
Permitted Phases				6								8
Actuated Green, G (s)				39.2	39.2						26.4	26.4
Effective Green, g (s)				40.2	40.2						28.4	28.4
Actuated g/C Ratio				0.54	0.54						0.38	0.38
Clearance Time (s)				5.2	5.2						4.2	4.2
Vehicle Extension (s)				3.0	3.0						3.0	3.0
Lane Grp Cap (vph)				648	1945						1633	491
v/s Ratio Prot											0.16	
v/s Ratio Perm				0.41	0.41							c0.32
v/c Ratio				0.76	0.77						0.43	0.86
Uniform Delay, d1				13.7	13.7						17.3	21.4
Progression Factor				0.91	0.91						1.43	1.46
Incremental Delay, d2				5.7	2.0						0.2	12.1
Delay (s)				18.1	14.5						24.9	43.4
Level of Service				B	B						C	D
Approach Delay (s)		0.0			15.4			0.0			32.0	
Approach LOS		A			B			A			C	

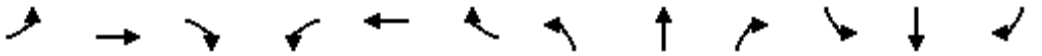
Intersection Summary			
HCM 2000 Control Delay	21.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	6.4
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	402	1393	0	0	0	0	0	670	434
Future Volume (vph)	0	0	0	402	1393	0	0	0	0	0	670	434
Ideal Flow (vphpl)	1800	1800	1800	1600	1700	1800	1800	1800	1800	1800	1700	1800
Lane Width	12	12	12	14	12	12	12	12	12	12	11	11
Total Lost time (s)				4.2	4.2						2.2	2.2
Lane Util. Factor				*0.75	*0.75						0.91	1.00
Frpb, ped/bikes				1.00	1.00						1.00	0.90
Flpb, ped/bikes				0.96	1.00						1.00	1.00
Frt				1.00	1.00						1.00	0.85
Flt Protected				0.95	1.00						1.00	1.00
Satd. Flow (prot)				1147	3741						4398	1312
Flt Permitted				0.95	1.00						1.00	1.00
Satd. Flow (perm)				1147	3741						4398	1312
Peak-hour factor, PHF	0.90	0.90	0.90	0.97	0.97	0.97	0.90	0.90	0.90	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	414	1436	0	0	0	0	0	720	467
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	19
Lane Group Flow (vph)	0	0	0	373	1477	0	0	0	0	0	720	448
Confl. Peds. (#/hr)	48		41	41		48	74					74
Confl. Bikes (#/hr)						5						1
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						8	
Permitted Phases				6								8
Actuated Green, G (s)				43.8	43.8						26.8	26.8
Effective Green, g (s)				44.8	44.8						28.8	28.8
Actuated g/C Ratio				0.56	0.56						0.36	0.36
Clearance Time (s)				5.2	5.2						4.2	4.2
Vehicle Extension (s)				3.0	3.0						3.0	3.0
Lane Grp Cap (vph)				642	2094						1583	472
v/s Ratio Prot											0.16	
v/s Ratio Perm				0.33	0.39							c0.34
v/c Ratio				0.58	0.71						0.45	0.95
Uniform Delay, d1				11.5	12.8						19.6	24.9
Progression Factor				0.92	0.94						0.53	0.59
Incremental Delay, d2				2.3	1.2						0.2	26.0
Delay (s)				12.8	13.2						10.6	40.6
Level of Service				B	B						B	D
Approach Delay (s)		0.0			13.1			0.0			22.4	
Approach LOS		A			B			A			C	

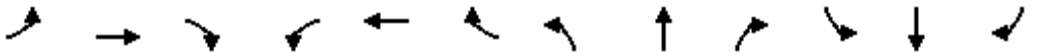
Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	6.4
Intersection Capacity Utilization	105.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	440	1330	0	0	0	0	0	669	419
Future Volume (vph)	0	0	0	440	1330	0	0	0	0	0	669	419
Ideal Flow (vphpl)	1800	1800	1800	1700	1700	1800	1800	1800	1800	1800	1700	1800
Lane Width	12	12	12	14	12	12	12	12	12	12	11	11
Total Lost time (s)					4.2						2.2	2.2
Lane Util. Factor					0.91						0.91	1.00
Frpb, ped/bikes					1.00						1.00	0.91
Flpb, ped/bikes					1.00						1.00	1.00
Frt					1.00						1.00	0.85
Flt Protected					0.99						1.00	1.00
Satd. Flow (prot)					4393						4314	1297
Flt Permitted					0.99						1.00	1.00
Satd. Flow (perm)					4393						4314	1297
Peak-hour factor, PHF	0.90	0.90	0.90	0.89	0.89	0.89	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	494	1494	0	0	0	0	0	704	441
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	66
Lane Group Flow (vph)	0	0	0	0	1988	0	0	0	0	0	704	375
Confl. Peds. (#/hr)	19		16	16		19	69		1	1		69
Confl. Bikes (#/hr)						4						6
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	2%	2%	2%	4%	4%	4%
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						8	
Permitted Phases				6								8
Actuated Green, G (s)					37.4						22.7	22.7
Effective Green, g (s)					38.4						24.7	24.7
Actuated g/C Ratio					0.51						0.33	0.33
Clearance Time (s)					5.2						4.2	4.2
Vehicle Extension (s)					3.0						3.0	3.0
Lane Grp Cap (vph)					2249						1420	427
v/s Ratio Prot											0.16	
v/s Ratio Perm					0.45							c0.29
v/c Ratio					0.88						0.50	0.88
Uniform Delay, d1					16.3						20.2	23.7
Progression Factor					0.96						1.21	1.35
Incremental Delay, d2					3.8						0.2	16.1
Delay (s)					19.4						24.6	48.0
Level of Service					B						C	D
Approach Delay (s)		0.0			19.4			0.0			33.6	
Approach LOS		A			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.4
Intersection Capacity Utilization	118.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

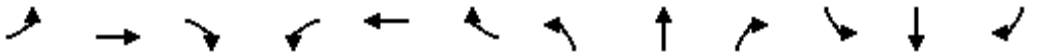


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	402	1393	0	0	0	0	0	670	434
Future Volume (vph)	0	0	0	402	1393	0	0	0	0	0	670	434
Ideal Flow (vphpl)	1800	1800	1800	1600	1700	1800	1800	1800	1800	1800	1700	1800
Lane Width	12	12	12	14	12	12	12	12	12	12	11	11
Total Lost time (s)					4.2						2.2	2.2
Lane Util. Factor					0.91						0.91	1.00
Frpb, ped/bikes					1.00						1.00	0.90
Flpb, ped/bikes					0.99						1.00	1.00
Frt					1.00						1.00	0.85
Flt Protected					0.99						1.00	1.00
Satd. Flow (prot)					4462						4398	1312
Flt Permitted					0.99						1.00	1.00
Satd. Flow (perm)					4462						4398	1312
Peak-hour factor, PHF	0.90	0.90	0.90	0.97	0.97	0.97	0.90	0.90	0.90	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	414	1436	0	0	0	0	0	720	467
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	62
Lane Group Flow (vph)	0	0	0	0	1850	0	0	0	0	0	720	405
Confl. Peds. (#/hr)	48		41	41		48	74					74
Confl. Bikes (#/hr)						5						1
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						8	
Permitted Phases				6								8
Actuated Green, G (s)					40.8						24.5	24.5
Effective Green, g (s)					41.8						26.5	26.5
Actuated g/C Ratio					0.52						0.33	0.33
Clearance Time (s)					5.2						4.2	4.2
Vehicle Extension (s)					3.0						3.0	3.0
Lane Grp Cap (vph)					2331						1456	434
v/s Ratio Prot											0.16	
v/s Ratio Perm					0.41							c0.31
v/c Ratio					0.79						0.49	0.93
Uniform Delay, d1					15.6						21.4	25.9
Progression Factor					0.99						0.56	0.48
Incremental Delay, d2					1.7						0.2	24.4
Delay (s)					17.2						12.2	37.0
Level of Service					B						B	D
Approach Delay (s)		0.0			17.2			0.0			21.9	
Approach LOS		A			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.4
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

502: Hetherton & 3rd

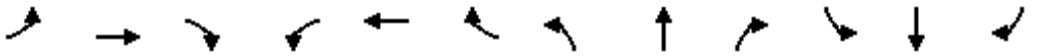
AM Peak



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	440	1330	0	0	0	0	0	669	419
Future Volume (vph)	0	0	0	440	1330	0	0	0	0	0	669	419
Ideal Flow (vphpl)	1800	1800	1800	1700	1700	1800	1800	1800	1800	1800	1700	1800
Lane Width	12	12	12	14	12	12	12	12	12	12	11	11
Total Lost time (s)				3.0	4.2						2.2	2.0
Lane Util. Factor				*0.74	0.95						0.91	0.88
Frpb, ped/bikes				1.00	1.00						1.00	1.00
Flpb, ped/bikes				1.00	1.00						1.00	1.00
Frt				1.00	1.00						1.00	0.85
Flt Protected				0.95	1.00						1.00	1.00
Satd. Flow (prot)				2451	3106						4314	2503
Flt Permitted				0.95	1.00						1.00	1.00
Satd. Flow (perm)				2451	3106						4314	2503
Peak-hour factor, PHF	0.90	0.90	0.90	0.89	0.89	0.89	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	494	1494	0	0	0	0	0	704	441
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	494	1494	0	0	0	0	0	704	441
Confl. Peds. (#/hr)	19		16	16		19	69		1	1		69
Confl. Bikes (#/hr)						4						6
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	2%	2%	2%	4%	4%	4%
Turn Type				Prot	NA						NA	custom
Protected Phases				3	6						8	3
Permitted Phases												
Actuated Green, G (s)				14.0	42.8						19.8	14.0
Effective Green, g (s)				15.0	43.8						21.8	16.0
Actuated g/C Ratio				0.17	0.49						0.24	0.18
Clearance Time (s)				4.0	5.2						4.2	4.0
Vehicle Extension (s)				3.0	3.0						3.0	3.0
Lane Grp Cap (vph)				408	1511						1044	444
v/s Ratio Prot				c0.20	c0.48						c0.16	0.18
v/s Ratio Perm												
v/c Ratio				1.21	0.99						0.67	0.99
Uniform Delay, d1				37.5	22.9						30.9	36.9
Progression Factor				1.00	1.00						1.00	1.00
Incremental Delay, d2				115.6	20.6						1.7	40.7
Delay (s)				153.1	43.5						32.6	77.7
Level of Service				F	D						C	E
Approach Delay (s)		0.0			70.7			0.0			50.0	
Approach LOS		A			E			A			D	

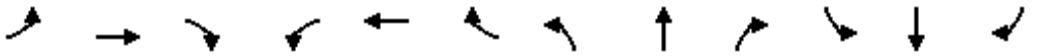
Intersection Summary			
HCM 2000 Control Delay	63.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.4
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	402	1393	0	0	0	0	0	670	434
Future Volume (vph)	0	0	0	402	1393	0	0	0	0	0	670	434
Ideal Flow (vphpl)	1800	1800	1800	1600	1700	1800	1800	1800	1800	1800	1700	1800
Lane Width	12	12	12	14	12	12	12	12	12	12	11	11
Total Lost time (s)				3.0	4.2						2.2	2.0
Lane Util. Factor				*0.75	0.95						0.91	0.88
Frpb, ped/bikes				1.00	1.00						1.00	1.00
Flpb, ped/bikes				1.00	1.00						1.00	1.00
Frt				1.00	1.00						1.00	0.85
Flt Protected				0.95	1.00						1.00	1.00
Satd. Flow (prot)				2384	3167						4398	2552
Flt Permitted				0.95	1.00						1.00	1.00
Satd. Flow (perm)				2384	3167						4398	2552
Peak-hour factor, PHF	0.90	0.90	0.90	0.97	0.97	0.97	0.90	0.90	0.90	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	414	1436	0	0	0	0	0	720	467
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	414	1436	0	0	0	0	0	720	467
Confl. Peds. (#/hr)	48		41	41		48	74					74
Confl. Bikes (#/hr)						5						1
Turn Type				Prot	NA						NA	custom
Protected Phases				3	6						8	3
Permitted Phases												
Actuated Green, G (s)				14.0	42.4						20.2	14.0
Effective Green, g (s)				15.0	43.4						22.2	16.0
Actuated g/C Ratio				0.17	0.48						0.25	0.18
Clearance Time (s)				4.0	5.2						4.2	4.0
Vehicle Extension (s)				3.0	3.0						3.0	3.0
Lane Grp Cap (vph)				397	1527						1084	453
v/s Ratio Prot				0.17	c0.45						c0.16	c0.18
v/s Ratio Perm												
v/c Ratio				1.04	0.94						0.66	1.03
Uniform Delay, d1				37.5	22.1						30.5	37.0
Progression Factor				1.00	1.00						1.00	1.00
Incremental Delay, d2				56.8	12.6						1.5	50.4
Delay (s)				94.3	34.7						32.1	87.4
Level of Service				F	C						C	F
Approach Delay (s)		0.0			48.0			0.0			53.9	
Approach LOS		A			D			A			D	

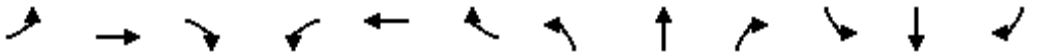
Intersection Summary			
HCM 2000 Control Delay	50.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.4
Intersection Capacity Utilization	93.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	440	1330	0	0	0	0	0	669	419
Future Volume (vph)	0	0	0	440	1330	0	0	0	0	0	669	419
Ideal Flow (vphpl)	1800	1800	1800	1700	1700	1800	1800	1800	1800	1800	1700	1800
Lane Width	12	12	12	14	12	12	12	12	12	12	11	11
Total Lost time (s)					4.2						2.2	2.2
Lane Util. Factor					0.91						0.86	0.86
Frpb, ped/bikes					1.00						1.00	0.91
Flpb, ped/bikes					1.00						1.00	1.00
Frt					1.00						1.00	0.85
Flt Protected					0.99						1.00	1.00
Satd. Flow (prot)					4393						4077	1115
Flt Permitted					0.99						1.00	1.00
Satd. Flow (perm)					4393						4077	1115
Peak-hour factor, PHF	0.90	0.90	0.90	0.89	0.89	0.89	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	494	1494	0	0	0	0	0	704	441
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	121
Lane Group Flow (vph)	0	0	0	0	1988	0	0	0	0	0	704	320
Confl. Peds. (#/hr)	19		16	16		19	69		1	1		69
Confl. Bikes (#/hr)						4						6
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	2%	2%	2%	4%	4%	4%
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						8	
Permitted Phases				6								8
Actuated Green, G (s)					33.4						21.7	21.7
Effective Green, g (s)					34.4						23.7	23.7
Actuated g/C Ratio					0.46						0.32	0.32
Clearance Time (s)					5.2						4.2	4.2
Vehicle Extension (s)					3.0						3.0	3.0
Lane Grp Cap (vph)					2014						1288	352
v/s Ratio Prot											0.17	
v/s Ratio Perm					0.45							c0.29
v/c Ratio					0.99						0.55	0.91
Uniform Delay, d1					20.1						21.2	24.6
Progression Factor					0.92						1.21	1.65
Incremental Delay, d2					13.7						0.4	23.4
Delay (s)					32.1						26.0	64.1
Level of Service					C						C	E
Approach Delay (s)		0.0			32.1			0.0			40.7	
Approach LOS		A			C			A			D	

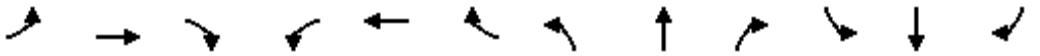
Intersection Summary			
HCM 2000 Control Delay	35.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.4
Intersection Capacity Utilization	108.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	402	1393	0	0	0	0	0	670	434
Future Volume (vph)	0	0	0	402	1393	0	0	0	0	0	670	434
Ideal Flow (vphpl)	1800	1800	1800	1600	1700	1800	1800	1800	1800	1800	1700	1800
Lane Width	12	12	12	14	12	12	12	12	12	12	11	11
Total Lost time (s)					4.2						2.2	2.2
Lane Util. Factor					0.91						0.86	0.86
Frpb, ped/bikes					1.00						0.98	0.90
Flpb, ped/bikes					0.99						1.00	1.00
Frt					1.00						0.97	0.85
Flt Protected					0.99						1.00	1.00
Satd. Flow (prot)					4462						3941	1128
Flt Permitted					0.99						1.00	1.00
Satd. Flow (perm)					4462						3941	1128
Peak-hour factor, PHF	0.90	0.90	0.90	0.97	0.97	0.97	0.90	0.90	0.90	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	414	1436	0	0	0	0	0	720	467
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	56	114
Lane Group Flow (vph)	0	0	0	0	1850	0	0	0	0	0	860	157
Confl. Peds. (#/hr)	48		41	41		48	74					74
Confl. Bikes (#/hr)						5						1
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						8	
Permitted Phases				6								8
Actuated Green, G (s)					38.9						21.2	21.2
Effective Green, g (s)					39.9						23.2	23.2
Actuated g/C Ratio					0.50						0.29	0.29
Clearance Time (s)					5.2						4.2	4.2
Vehicle Extension (s)					3.0						3.0	3.0
Lane Grp Cap (vph)					2225						1142	327
v/s Ratio Prot											c0.22	
v/s Ratio Perm					0.41							0.14
v/c Ratio					0.83						0.75	0.48
Uniform Delay, d1					17.2						25.8	23.4
Progression Factor					0.98						0.57	0.32
Incremental Delay, d2					2.3						2.5	1.0
Delay (s)					19.2						17.1	8.4
Level of Service					B						B	A
Approach Delay (s)		0.0			19.2			0.0			15.1	
Approach LOS		A			B			A			B	

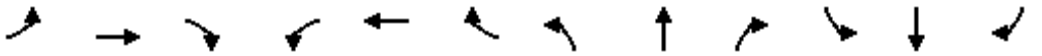
Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.4
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	440	1330	0	0	0	0	0	669	419
Future Volume (vph)	0	0	0	440	1330	0	0	0	0	0	669	419
Ideal Flow (vphpl)	1800	1800	1800	1700	1700	1800	1800	1800	1800	1800	1700	1800
Lane Width	12	12	12	14	12	12	12	12	12	12	11	11
Total Lost time (s)				4.2	4.2						2.2	2.2
Lane Util. Factor				*0.74	*0.74						0.91	1.00
Frpb, ped/bikes				1.00	1.00						1.00	0.91
Flpb, ped/bikes				0.99	1.00						1.00	1.00
Frt				1.00	1.00						1.00	0.85
Flt Protected				0.95	1.00						1.00	1.00
Satd. Flow (prot)				1209	3629						4314	1297
Flt Permitted				0.95	1.00						1.00	1.00
Satd. Flow (perm)				1209	3629						4314	1297
Peak-hour factor, PHF	0.90	0.90	0.90	0.89	0.89	0.89	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	494	1494	0	0	0	0	0	704	441
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	123
Lane Group Flow (vph)	0	0	0	494	1494	0	0	0	0	0	704	318
Confl. Peds. (#/hr)	19		16	16		19	69		1	1		69
Confl. Bikes (#/hr)						4						6
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	2%	2%	2%	4%	4%	4%
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						8	
Permitted Phases				6								8
Actuated Green, G (s)				34.0	34.0						20.8	20.8
Effective Green, g (s)				35.0	35.0						22.8	22.8
Actuated g/C Ratio				0.47	0.47						0.30	0.30
Clearance Time (s)				5.2	5.2						4.2	4.2
Vehicle Extension (s)				3.0	3.0						3.0	3.0
Lane Grp Cap (vph)				564	1693						1311	394
v/s Ratio Prot											0.16	
v/s Ratio Perm				0.41	0.41							c0.25
v/c Ratio				0.88	0.88						0.54	0.81
Uniform Delay, d1				18.0	18.1						21.7	24.1
Progression Factor				0.88	0.89						1.18	1.58
Incremental Delay, d2				12.4	4.9						0.4	10.0
Delay (s)				28.2	21.1						26.1	48.1
Level of Service				C	C						C	D
Approach Delay (s)		0.0			22.9			0.0			34.5	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.4
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	402	1393	0	0	0	0	0	670	434
Future Volume (vph)	0	0	0	402	1393	0	0	0	0	0	670	434
Ideal Flow (vphpl)	1800	1800	1800	1600	1700	1800	1800	1800	1800	1800	1700	1800
Lane Width	12	12	12	14	12	12	12	12	12	12	11	11
Total Lost time (s)				4.2	4.2						2.2	2.2
Lane Util. Factor				*0.75	*0.75						0.91	1.00
Frpb, ped/bikes				1.00	1.00						1.00	0.90
Flpb, ped/bikes				0.96	1.00						1.00	1.00
Frt				1.00	1.00						1.00	0.85
Flt Protected				0.95	1.00						1.00	1.00
Satd. Flow (prot)				1147	3741						4398	1311
Flt Permitted				0.95	1.00						1.00	1.00
Satd. Flow (perm)				1147	3741						4398	1311
Peak-hour factor, PHF	0.90	0.90	0.90	0.97	0.97	0.97	0.90	0.90	0.90	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	414	1436	0	0	0	0	0	720	467
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	113
Lane Group Flow (vph)	0	0	0	373	1477	0	0	0	0	0	720	354
Confl. Peds. (#/hr)	48		41	41		48	74					74
Confl. Bikes (#/hr)						5						1
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						8	
Permitted Phases				6								8
Actuated Green, G (s)				38.8	38.8						21.4	21.4
Effective Green, g (s)				39.8	39.8						23.4	23.4
Actuated g/C Ratio				0.50	0.50						0.29	0.29
Clearance Time (s)				5.2	5.2						4.2	4.2
Vehicle Extension (s)				3.0	3.0						3.0	3.0
Lane Grp Cap (vph)				570	1861						1286	383
v/s Ratio Prot											0.16	
v/s Ratio Perm				0.33	0.39							c0.27
v/c Ratio				0.65	0.79						0.56	0.92
Uniform Delay, d1				15.0	16.7						23.9	27.4
Progression Factor				0.93	0.97						0.58	0.41
Incremental Delay, d2				3.5	2.2						0.5	24.9
Delay (s)				17.5	18.4						14.4	36.1
Level of Service				B	B						B	D
Approach Delay (s)		0.0			18.2			0.0			22.9	
Approach LOS		A			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.4
Intersection Capacity Utilization	105.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	494	1494	704	441
v/c Ratio	0.76	0.77	0.43	0.86
Control Delay	20.4	15.3	25.3	45.2
Queue Delay	5.4	48.6	0.1	10.2
Total Delay	25.9	63.9	25.4	55.4
Queue Length 50th (ft)	190	200	118	212
Queue Length 95th (ft)	#477	286	154	#347
Internal Link Dist (ft)		299	272	
Turn Bay Length (ft)	70			225
Base Capacity (vph)	648	1946	1714	535
Starvation Cap Reductn	69	215	0	25
Spillback Cap Reductn	103	756	217	74
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.91	1.26	0.47	0.96

Intersection Summary

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

Lane Group	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	373	1477	720	467
v/c Ratio	0.58	0.71	0.45	0.95
Control Delay	13.5	13.5	11.3	45.0
Queue Delay	1.0	49.6	0.0	2.9
Total Delay	14.5	63.1	11.4	47.9
Queue Length 50th (ft)	114	169	38	229
Queue Length 95th (ft)	m176	244	68	#401
Internal Link Dist (ft)		299	272	
Turn Bay Length (ft)	70			225
Base Capacity (vph)	642	2095	1583	491
Starvation Cap Reductn	99	344	0	0
Spillback Cap Reductn	95	1084	68	9
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.69	1.46	0.48	0.97

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	WBT	SBT	SBR
Lane Group Flow (vph)	1988	704	441
v/c Ratio	0.88	0.50	0.89
Control Delay	20.4	25.3	45.1
Queue Delay	47.0	0.1	46.3
Total Delay	67.4	25.4	91.4
Queue Length 50th (ft)	353	116	195
Queue Length 95th (ft)	#400	153	#336
Internal Link Dist (ft)	299	272	
Turn Bay Length (ft)			225
Base Capacity (vph)	2248	1484	510
Starvation Cap Reductn	286	0	3
Spillback Cap Reductn	796	164	105
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.37	0.53	1.09

Intersection Summary

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

Lane Group	WBT	SBT	SBR
Lane Group Flow (vph)	1850	720	467
v/c Ratio	0.79	0.49	0.94
Control Delay	17.6	13.0	39.0
Queue Delay	48.5	0.0	8.5
Total Delay	66.1	13.1	47.5
Queue Length 50th (ft)	248	43	45
Queue Length 95th (ft)	298	68	#373
Internal Link Dist (ft)	299	272	
Turn Bay Length (ft)			225
Base Capacity (vph)	2331	1473	501
Starvation Cap Reductn	392	0	4
Spillback Cap Reductn	1100	46	27
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.50	0.50	0.99

Intersection Summary

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

Lane Group	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	494	1494	704	441
v/c Ratio	1.21	0.99	0.67	0.99
Control Delay	150.4	45.1	34.3	79.9
Queue Delay	0.0	39.3	0.0	0.0
Total Delay	150.4	84.4	34.3	79.9
Queue Length 50th (ft)	~233	~450	130	143
Queue Length 95th (ft)	#356	#607	169	#251
Internal Link Dist (ft)		299	272	
Turn Bay Length (ft)	70			225
Base Capacity (vph)	408	1513	1140	444
Starvation Cap Reductn	0	283	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.21	1.21	0.62	0.99

Intersection Summary

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

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

Lane Group	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	414	1436	720	467
v/c Ratio	1.04	0.94	0.66	1.03
Control Delay	95.2	36.5	33.6	88.6
Queue Delay	0.0	44.7	0.0	0.0
Total Delay	95.2	81.1	33.6	88.6
Queue Length 50th (ft)	~171	397	133	~163
Queue Length 95th (ft)	#290	#573	173	#269
Internal Link Dist (ft)		299	272	
Turn Bay Length (ft)	70			225
Base Capacity (vph)	397	1526	1163	453
Starvation Cap Reductn	0	314	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.04	1.18	0.62	1.03

Intersection Summary

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

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

Lane Group	WBT	SBT	SBR
Lane Group Flow (vph)	1988	704	441
v/c Ratio	0.99	0.55	0.93
Control Delay	33.9	27.0	49.9
Queue Delay	40.7	0.2	48.4
Total Delay	74.6	27.2	98.3
Queue Length 50th (ft)	~372	128	204
Queue Length 95th (ft)	#457	166	#374
Internal Link Dist (ft)	299	272	
Turn Bay Length (ft)			225
Base Capacity (vph)	2015	1348	487
Starvation Cap Reductn	128	0	9
Spillback Cap Reductn	636	125	103
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.44	0.58	1.15

Intersection Summary

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

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

Lane Group	WBT	SBT	SBR
Lane Group Flow (vph)	1850	916	271
v/c Ratio	0.83	0.76	0.62
Control Delay	19.6	17.5	8.9
Queue Delay	48.3	0.2	1.0
Total Delay	67.9	17.7	9.9
Queue Length 50th (ft)	275	65	0
Queue Length 95th (ft)	319	78	32
Internal Link Dist (ft)	299	272	
Turn Bay Length (ft)			225
Base Capacity (vph)	2225	1227	447
Starvation Cap Reductn	319	0	11
Spillback Cap Reductn	1007	27	48
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.52	0.76	0.68

Intersection Summary

Lane Group	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	494	1494	704	441
v/c Ratio	0.88	0.88	0.54	0.85
Control Delay	31.8	22.6	26.7	37.3
Queue Delay	39.5	47.5	0.1	25.2
Total Delay	71.3	70.1	26.8	62.5
Queue Length 50th (ft)	283	295	119	174
Queue Length 95th (ft)	#539	#412	156	#290
Internal Link Dist (ft)		299	272	
Turn Bay Length (ft)	70			225
Base Capacity (vph)	563	1693	1426	547
Starvation Cap Reductn	16	53	0	9
Spillback Cap Reductn	103	583	143	115
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.07	1.35	0.55	1.02

Intersection Summary

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

Lane Group	WBL	WBT	SBT	SBR
Lane Group Flow (vph)	373	1477	720	467
v/c Ratio	0.65	0.79	0.56	0.94
Control Delay	18.4	18.8	15.5	36.6
Queue Delay	1.8	49.3	0.0	21.5
Total Delay	20.3	68.1	15.6	58.1
Queue Length 50th (ft)	133	240	47	10
Queue Length 95th (ft)	m218	302	94	#353
Internal Link Dist (ft)		299	272	
Turn Bay Length (ft)	70			225
Base Capacity (vph)	570	1861	1308	502
Starvation Cap Reductn	52	203	0	10
Spillback Cap Reductn	86	885	36	50
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.77	1.51	0.57	1.03

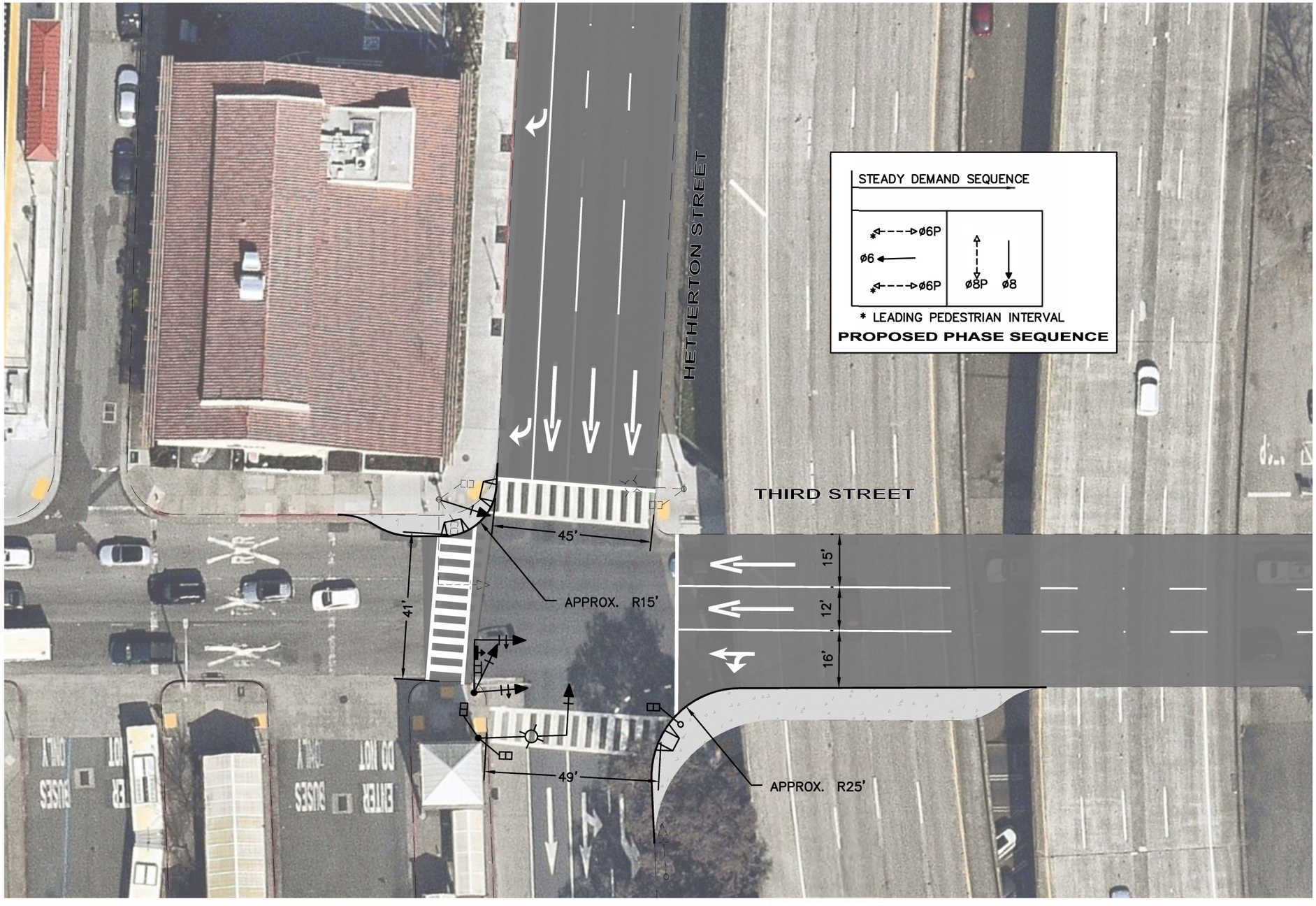
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Appendix D: Intersection Concept Drawings

THIRD STREET AT HETHERTON STREET RECOMMENDED CONCEPT: GEOMETRIC MODIFICATIONS AND LEADING PEDESTRIAN INTERVAL - DRAFT

SAN RAFAEL
THE CITY WITH A MISSION



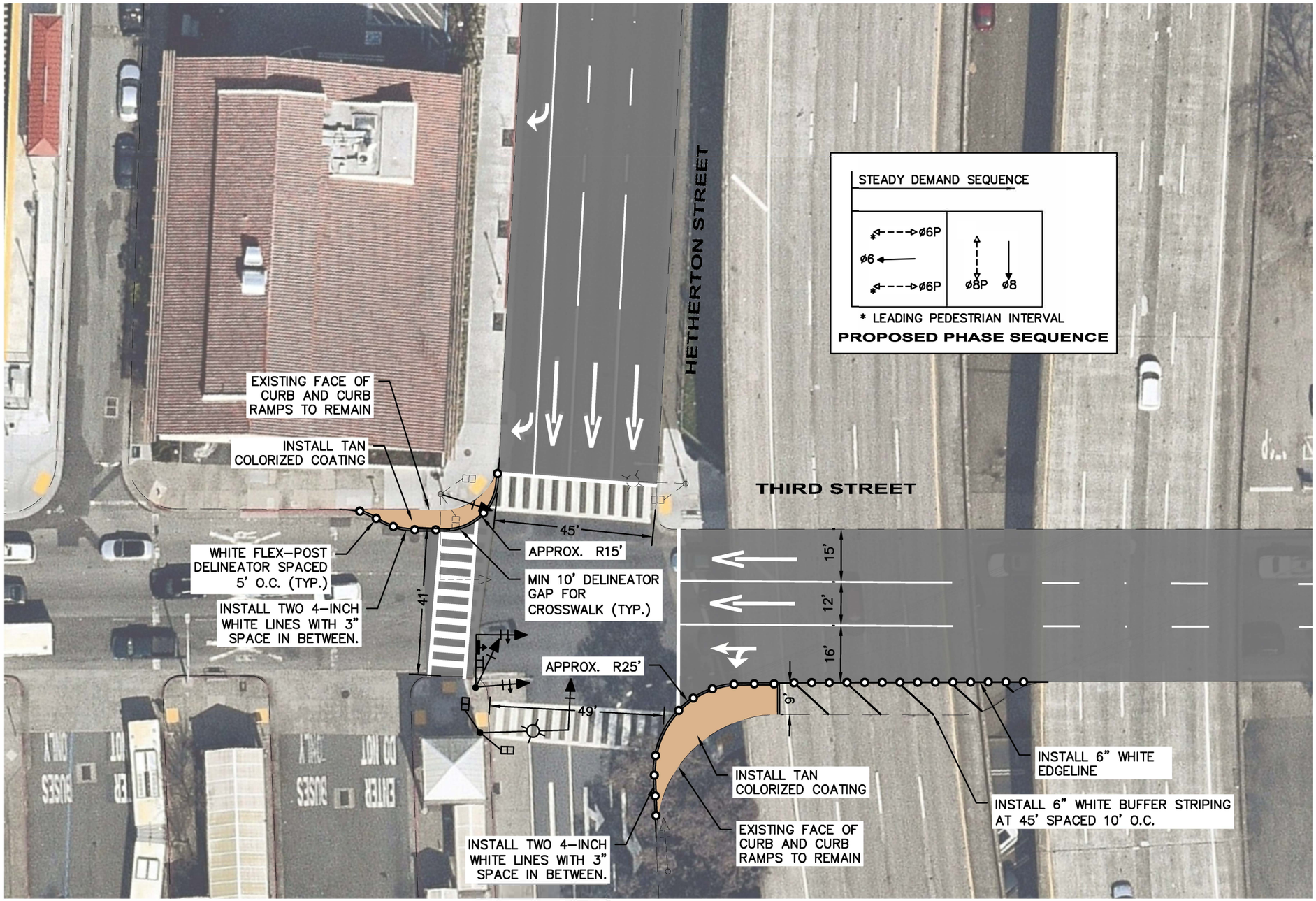
NO SCALE

Kimley»Horn

9-20-2017

THIRD STREET AT HETHERTON STREET
RECOMMENDED CONCEPT: INTERIM STRIPING MODIFICATIONS AND LEADING PEDESTRIAN INTERVAL - DRAFT

SAN RAFAEL
THE CITY WITH A MISSION



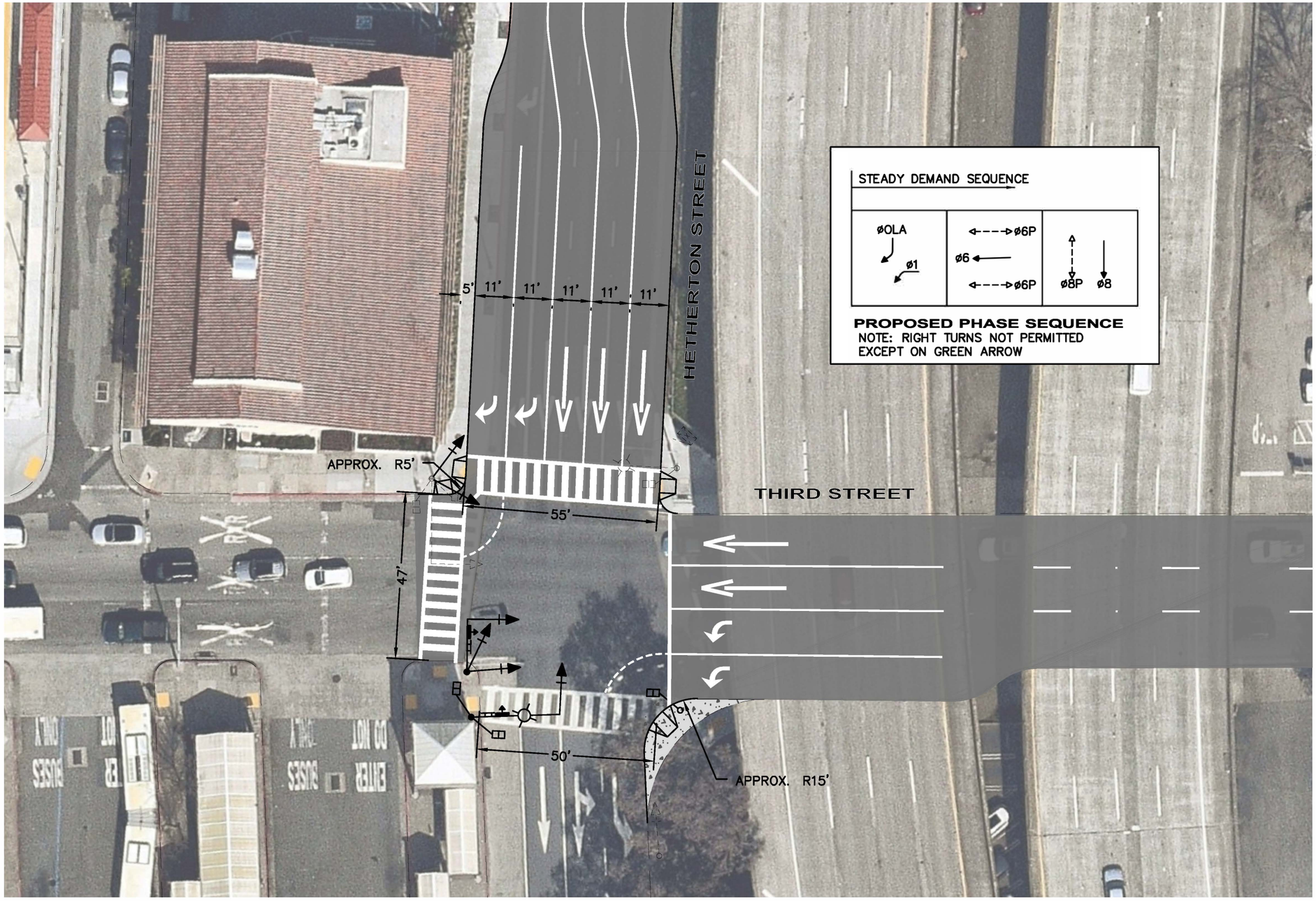
NO SCALE

Kimley»Horn

6-7-2018

THIRD STREET AT HETHERTON STREET
ELIMINATED CONCEPT #1: SEPARATED PEDESTRIAN PHASES - DRAFT

SAN RAFAEL
THE CITY WITH A MISSION



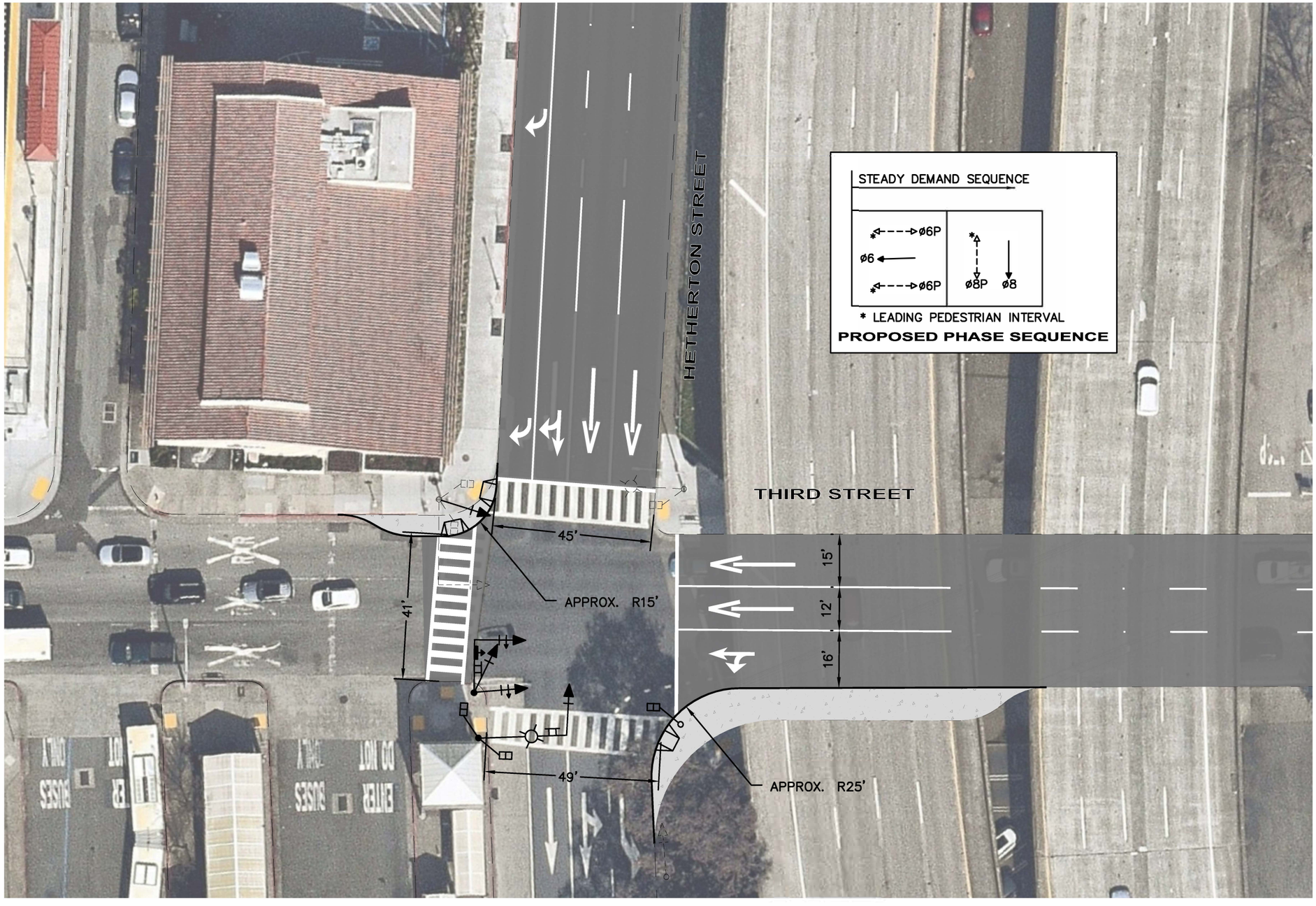
NO SCALE

Kimley»Horn

8-14-2017

THIRD STREET AT HETHERTON STREET
ELIMINATED CONCEPT #2: GEOMETRIC MODIFICATIONS AND LEADING PEDESTRIAN INTERVAL - DRAFT

SAN RAFAEL
THE CITY WITH A MISSION



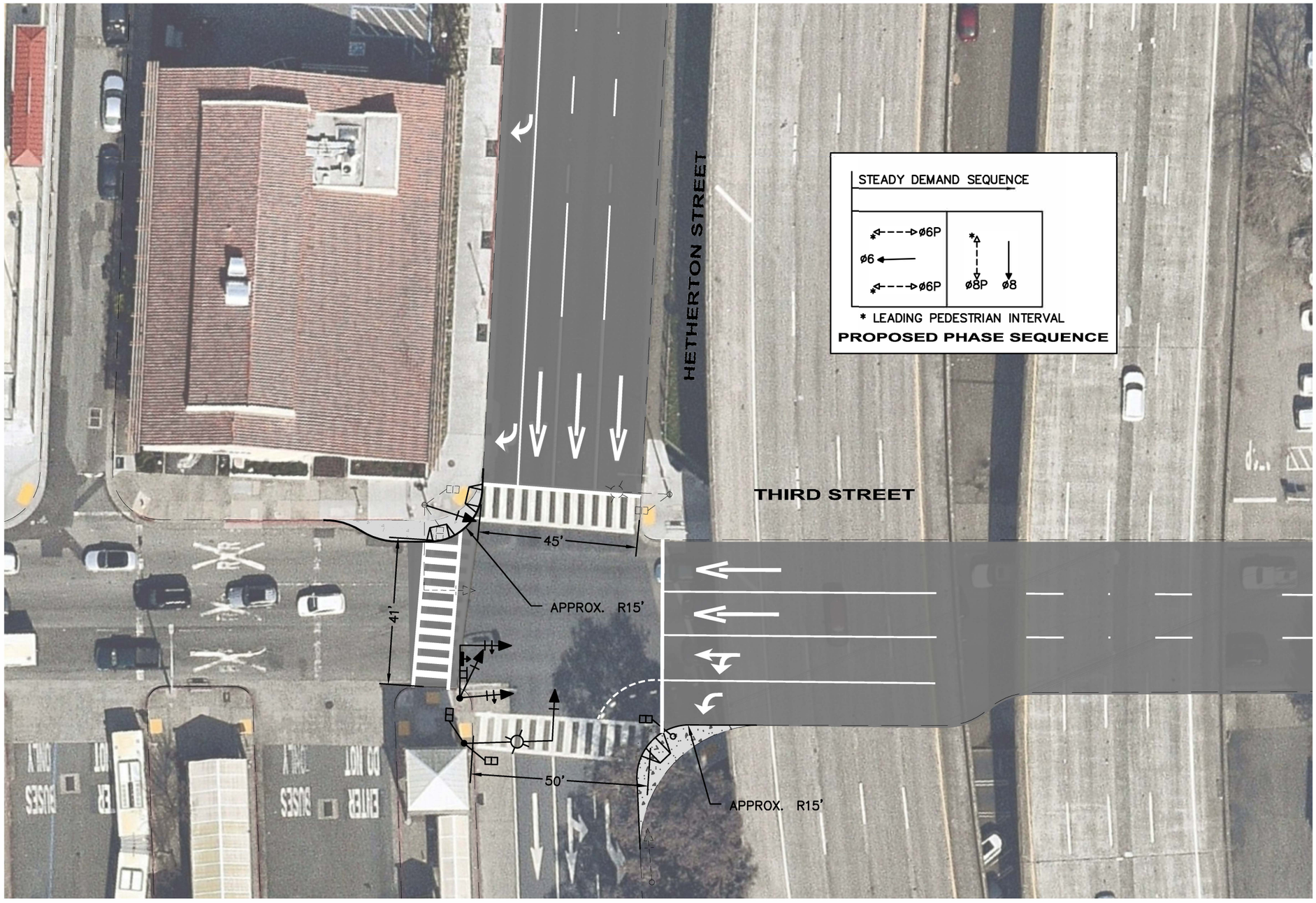
NO SCALE

Kimley»Horn

9-20-2017

THIRD STREET AT HETHERTON STREET
ELIMINATED CONCEPT #3: NEW SIGNAGE AND TURN RADIUS MODIFICATION AND LEADING PEDESTRIAN INTERVAL- DRAFT

SAN RAFAEL
THE CITY WITH A MISSION



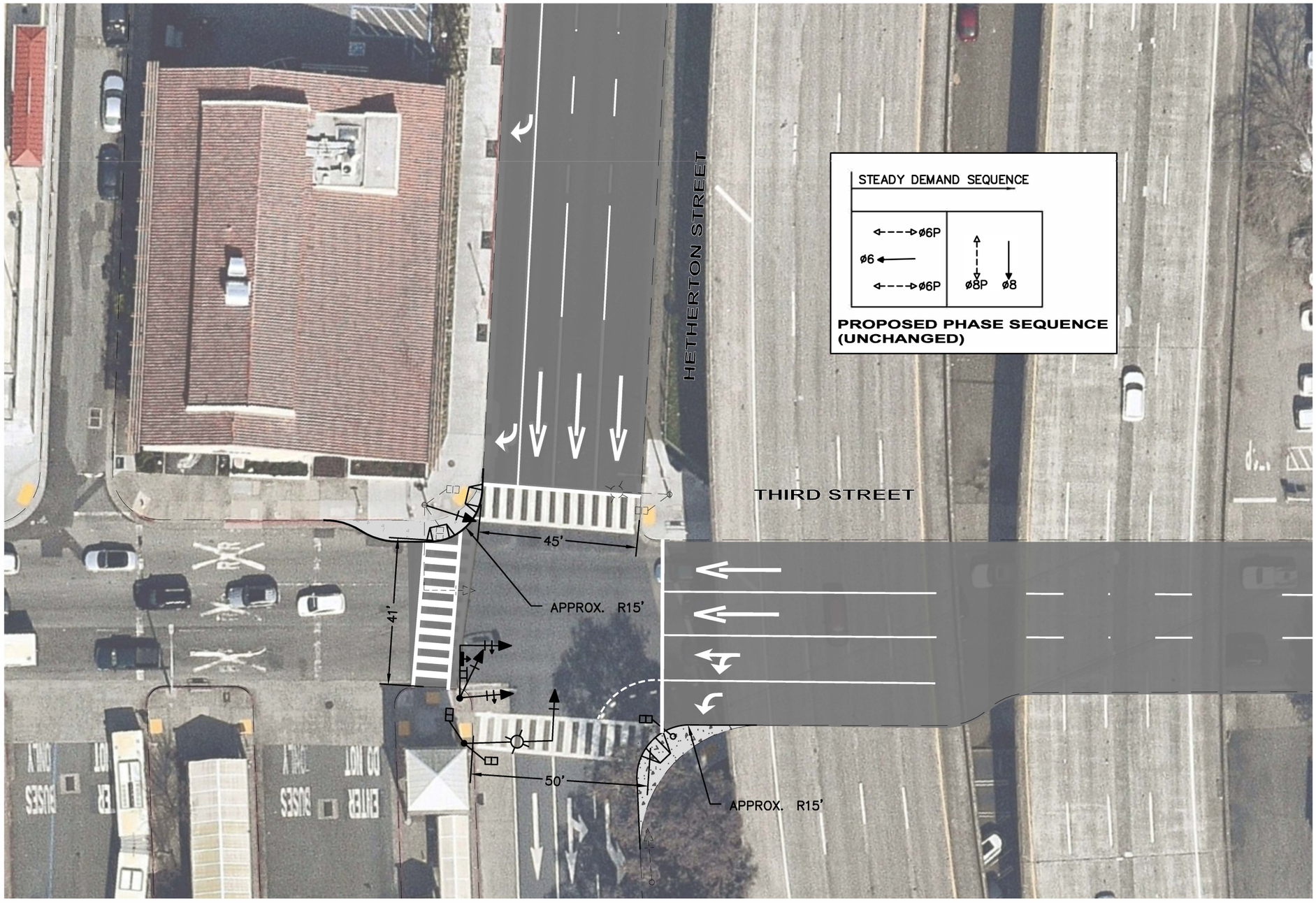
NO SCALE

Kimley»Horn

8-14-2017

THIRD STREET AT HETHERTON STREET
ELIMINATED CONCEPT #4: NEW SIGNAGE AND TURN RADIUS MODIFICATION - DRAFT

SAN RAFAEL
THE CITY WITH A MISSION



NO SCALE

Kimley»Horn

8-14-2017

Appendix E: Intersection Concept Cost Estimates

Third Street at Hetherton Street
Improvement Options - Cost Estimates

Recommended Concept - Summary					
ITEM NO.	ITEM	EST QTY	UNIT	UNIT PRICE, $	ITEM TOTAL, $
1	Mobilization	1	LS	$14,328	$14,328
2	Traffic Control	1	LS	$21,491	$21,491
3	SWPPP/Drainage	1	LS	$7,164	$7,164
4	Design	1	LS	$28,655	$28,655
5	Construction Admin	1	LS	$21,491	$21,491
6	Traffic Signal Modification	1	LS	$60,400	$60,400
7	Civil Improvements	1	LS	$76,570	$76,570
8	Signing and Striping	1	LS	$6,305	$6,305
				Subtotal	$236,404
				Contingency (20%)	$47,281
				Total	**$283,700**

Recommended Concept - Interim Version					
ITEM NO.	ITEM	EST QTY	UNIT	UNIT PRICE, $	ITEM TOTAL, $
1	Mobilization	1	LS	$6,173	$6,173
2	Traffic Control	1	LS	$9,260	$9,260
3	SWPPP/Drainage	1	LS	$0	$0
4	Design	1	LS	$12,346	$12,346
5	Construction Admin	1	LS	$9,260	$9,260
6	Traffic Signal Modification	1	LS	$50,800	$50,800
7	Civil Improvements	1	LS	$0	$0
8	Signing and Striping	1	LS	$10,930	$10,930
				Subtotal	$98,768
				Contingency (20%)	$19,754
				Total	**$118,500**

Eliminated Concept #1 Summary					
ITEM NO.	ITEM	EST QTY	UNIT	UNIT PRICE, $	ITEM TOTAL, $
1	Mobilization	1	LS	$19,218	$19,218
2	Traffic Control	1	LS	$28,826	$28,826
3	SWPPP/Drainage	1	LS	$9,609	$9,609
4	Design	1	LS	$38,435	$38,435
5	Construction Admin	1	LS	$28,826	$28,826
6	Traffic Signal Modification	1	LS	$69,500	$69,500
7	Civil Improvements	1	LS	$116,670	$116,670
8	Signing and Striping	1	LS	$6,005	$6,005
				Subtotal	$317,089
				Contingency (20%)	$63,418
				Total	**$380,500**

Eliminated Concept #2 Summary					
ITEM NO.	ITEM	EST QTY	UNIT	UNIT PRICE, $	ITEM TOTAL, $
1	Mobilization	1	LS	$14,328	$14,328
2	Traffic Control	1	LS	$21,491	$21,491
3	SWPPP/Drainage	1	LS	$7,164	$7,164
4	Design	1	LS	$28,655	$28,655
5	Construction Admin	1	LS	$21,491	$21,491
6	Traffic Signal Modification	1	LS	$61,100	$61,100
7	Civil Improvements	1	LS	$76,570	$76,570
8	Signing and Striping	1	LS	$1,785	$1,785
				Subtotal	$232,584
				Contingency (20%)	$46,517
				Total	**$279,100**

Eliminated Concept #3 Summary					
ITEM NO.	ITEM	EST QTY	UNIT	UNIT PRICE, $	ITEM TOTAL, $
1	Mobilization	1	LS	$10,378	$10,378
2	Traffic Control	1	LS	$15,566	$15,566
3	SWPPP/Drainage	1	LS	$5,189	$5,189
4	Design	1	LS	$20,755	$20,755
5	Construction Admin	1	LS	$15,566	$15,566
6	Traffic Signal Modification	1	LS	$60,400	$60,400
7	Civil Improvements	1	LS	$41,980	$41,980
8	Signing and Striping	1	LS	$1,395	$1,395
				Subtotal	$171,229
				Contingency (20%)	$34,246
				Total	**$205,500**

Eliminated Concept #4 Summary					
ITEM NO.	ITEM	EST QTY	UNIT	UNIT PRICE, $	ITEM TOTAL, $
1	Mobilization	1	LS	$10,378	$10,378
2	Traffic Control	1	LS	$15,566	$15,566
3	SWPPP/Drainage	1	LS	$5,189	$5,189
4	Design	1	LS	$20,755	$20,755
5	Construction Admin	1	LS	$15,566	$15,566
6	Traffic Signal Modification	1	LS	$60,400	$60,400
7	Civil Improvements	1	LS	$41,980	$41,980
8	Signing and Striping	1	LS	$1,395	$1,395
				Subtotal	$171,229
				Contingency (20%)	$34,246
				Total	**$205,500**