City of Hanford

Downtown Pedestrian Safety & Traffic Circulation Project Update

December 4, 2023

Submitted to:

CITY OF HANFORD CALIFORNIA

Prepared by:

INTERWEST

A SAFEbuilt COMPANY

TABLE OF CONTENTS

LIST OF TABLES

LIST OF EXHIBITS

LIST OF EXHIBITS (Continued)

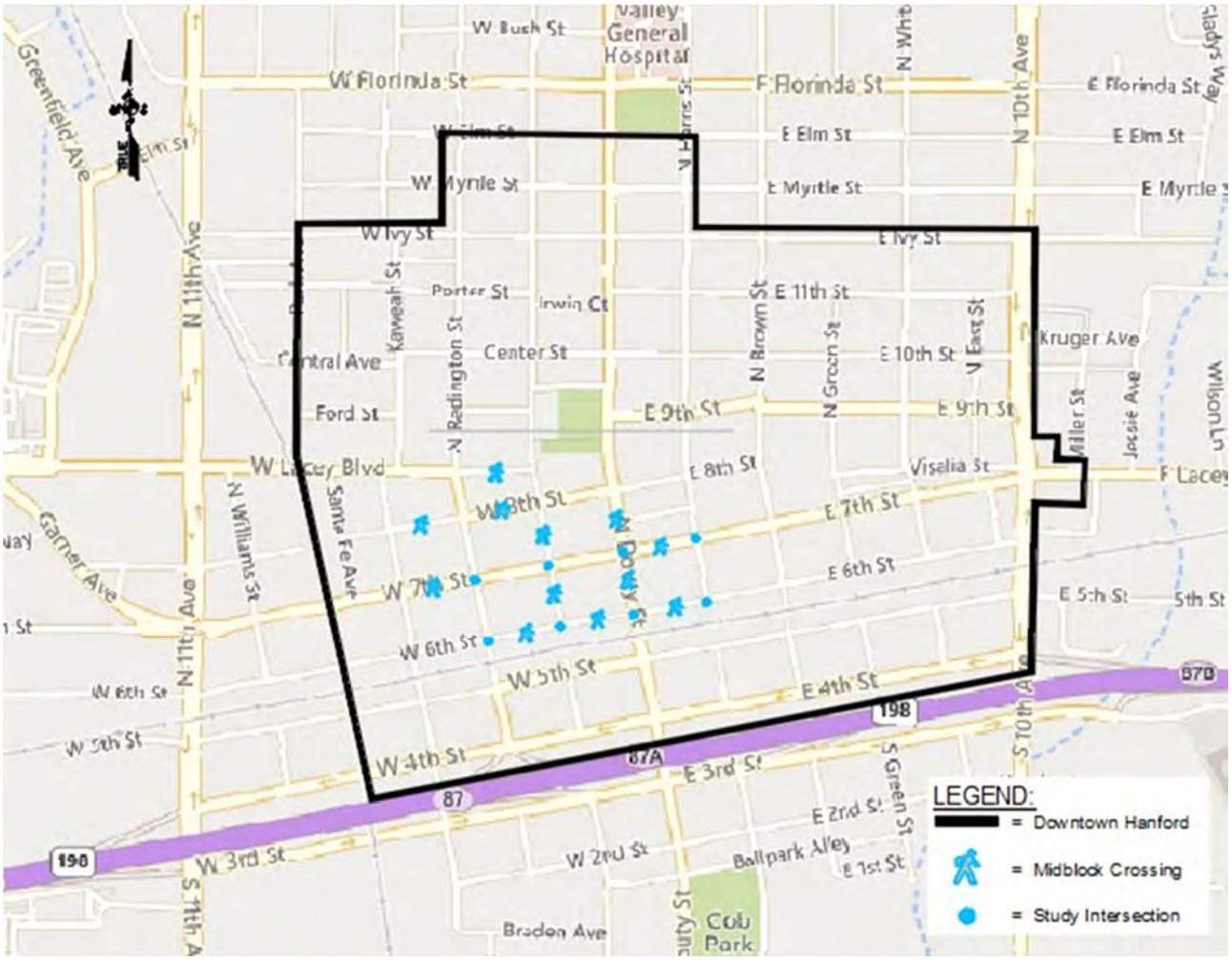
APPENDICES

SECTION 1.0
INTRODUCTION

In 2021, the *Downtown Pedestrian Safety and Traffic Circulation Project* report was prepared by Peters Engineering Group (2021 Peters Engineering study) to summarize the project analysis and findings. The project included "identifying intersections in the Central Parking and Business District that could potentially benefit from pedestrian safety and accessibility improvements." The analysis included "consideration of traffic calming (bulb-outs), evaluation of one-way streets downtown for traffic flow and parking/pedestrian safety, evaluation of conversion of Douty Street and Seventh Street to one lane with traffic calming, and design of intersection improvement for pedestrian safety/ADA compliance."

The study area is illustrated below, including the study intersections and midblock crosswalks.

Exhibit 1 - Study Area



The purpose of this study is to update the 2021 Peters Engineering study with current traffic data and expand the study with the addition of Saturday analyses. In particular, the study includes the following:

- A circulation analysis to evaluate the following proposed circulation modifications in the downtown area:
    - Conversion of Seventh Street and Sixth Street to a one-way couplet to potentially create additional on-street parking.
    - Conversion of Douty Street and Seventh Street to one lane in each direction, with angled parking.
- A traffic signal warrant analysis and all-way stop warrant analysis to determine if the four signalized intersections on 7th Street at Redington Street, Irwin Street, Douty Street and Harris Street currently warrant traffic signals or if they would operate satisfactorily as stop-controlled intersections.
- An analysis considering the construction of roundabouts on Douty Street at Sixth Street, Seventh Street and Eighth Street. Since public hearings following the 2021 Peters Engineering study made it clear that roundabouts at Sixth Street and Eighth Street are not popular with the public, only the intersection of Douty Street and Seventh Street was evaluated for a roundabout. The City requested that an Intersection Control Evaluation (ICE) be performed to determine the best traffic control for the intersection.
- Evaluation of twelve midblock crosswalks in the downtown area to assess the safety and effectiveness of the facilities.
- Consideration of the design of intersection improvements for pedestrian safety and ADA compliance.

SECTION 2.0
CIRCULATION ANALYSIS

The circulation analysis considers several options to improve traffic circulation and pedestrian safety in the downtown area. One option would convert 7th Street and 6th Street between Redington Street and Harris Street to a one-way couplet to provide room for additional on-street parking. Another option would reduce sections of Douty Street and of 7th Street to one lane of traffic in each direction to provide angled parking. The option to remove the existing traffic signals on 7th Street at Redington Street, Irwin Street, Douty Street and Harris Street, and replace them with All-Way Stop Controls (AWSC) was also considered. Since the one-way couplet options also include replacing the existing traffic signals with all-way stop control, this option was evaluated first. To assess the potential feasibility of each option, Level of Service (LOS) peak hour analyses were prepared for the following eight intersections (shown on Exhibit 1):

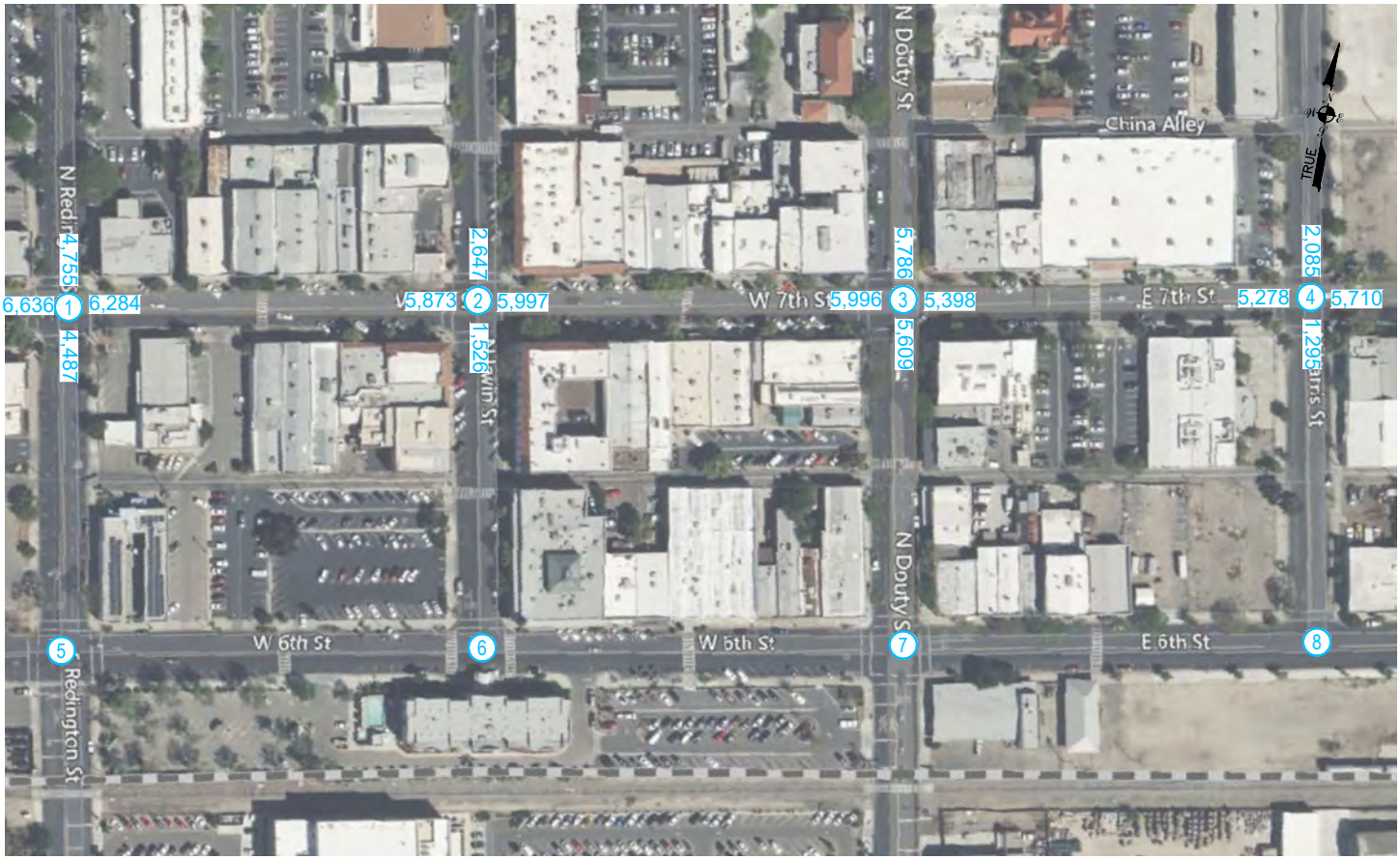
- 7th Street & Redington Street
- 7th Street & Irwin Street
- 7th Street & Douty Street
- 7th Street & Harris Street
- 6th Street & Redington Street
- 6th Street & Irwin Street
- 6th Street & Douty Street
- 6th Street & Harris Street

Peak hour intersection turning movement traffic count data was collected on Tuesday, August 29, 2023, Wednesday, August 30, 2023, Thursday, August 31, 2023 and Saturday, August 26, 2023. The traffic count data is illustrated on Exhibit 2 for weekdays and on Exhibit 3 for Saturdays, and is provided in Appendix A.

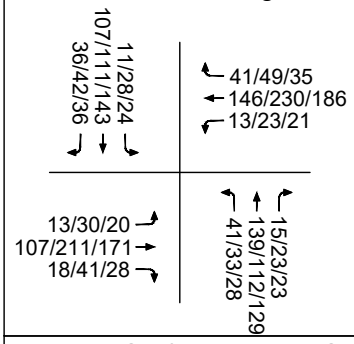
Each intersection was evaluated for the weekday peak hour, for both existing conditions and future 2040 conditions. To estimate 2040 conditions, a growth factor of 1.25, which was used in the 2021 Peters Engineering study, was applied to the existing traffic volumes. Although Saturday peak hour counts were collected, the Saturday counts were not evaluated since they were lower than the weekday counts and would not have provided worse-case results. The results of the analyses are shown in Tables 1 and 2. The LOS worksheets are provided in Appendix B.

Existing Lanes and Traffic Controls

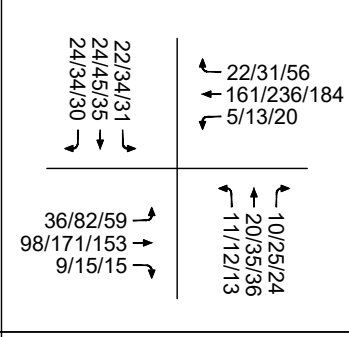
As shown in Table 1, all four intersections with 7th Street currently operate at LOS A and all four intersections with 6th Street currently operate at LOS B. As shown in Table 2, all four intersections with 7th Street are anticipated to operate at LOS A or B in 2040. All four



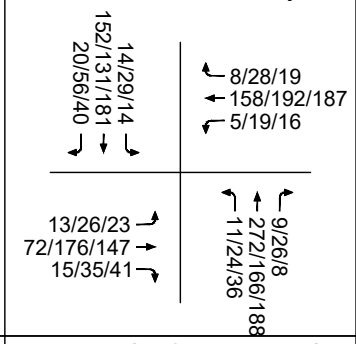
1. W. 7th St. & Redington St.



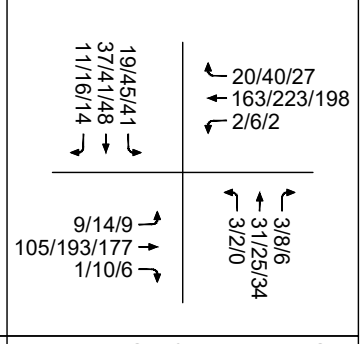
2. W. 7th St. & N. Irwin St.



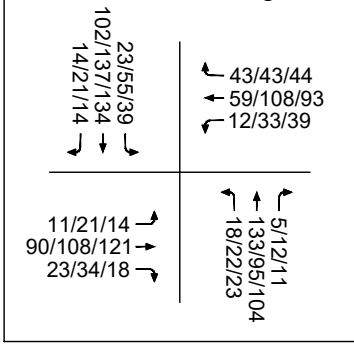
3. W. 7th St. & N. Douty St.



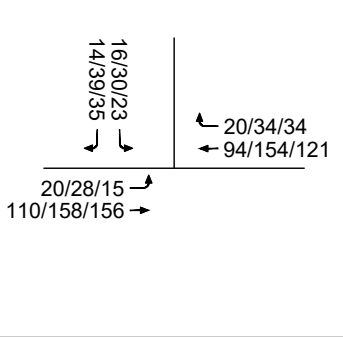
4. W. 7th St. & N. Harris St.



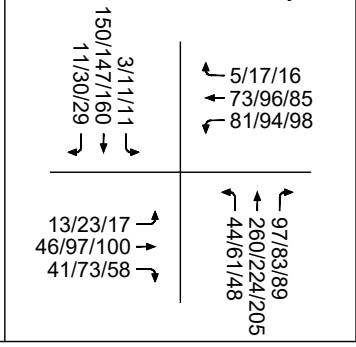
5. W. 6th St. & Redington St.



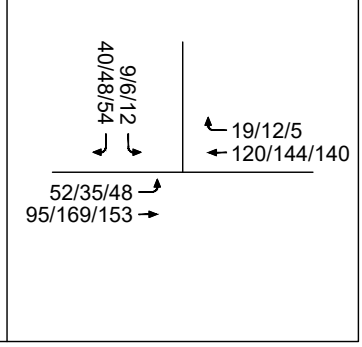
6. W. 6th St. & N. Irwin St.



7. W. 7th St. & N. Douty St.



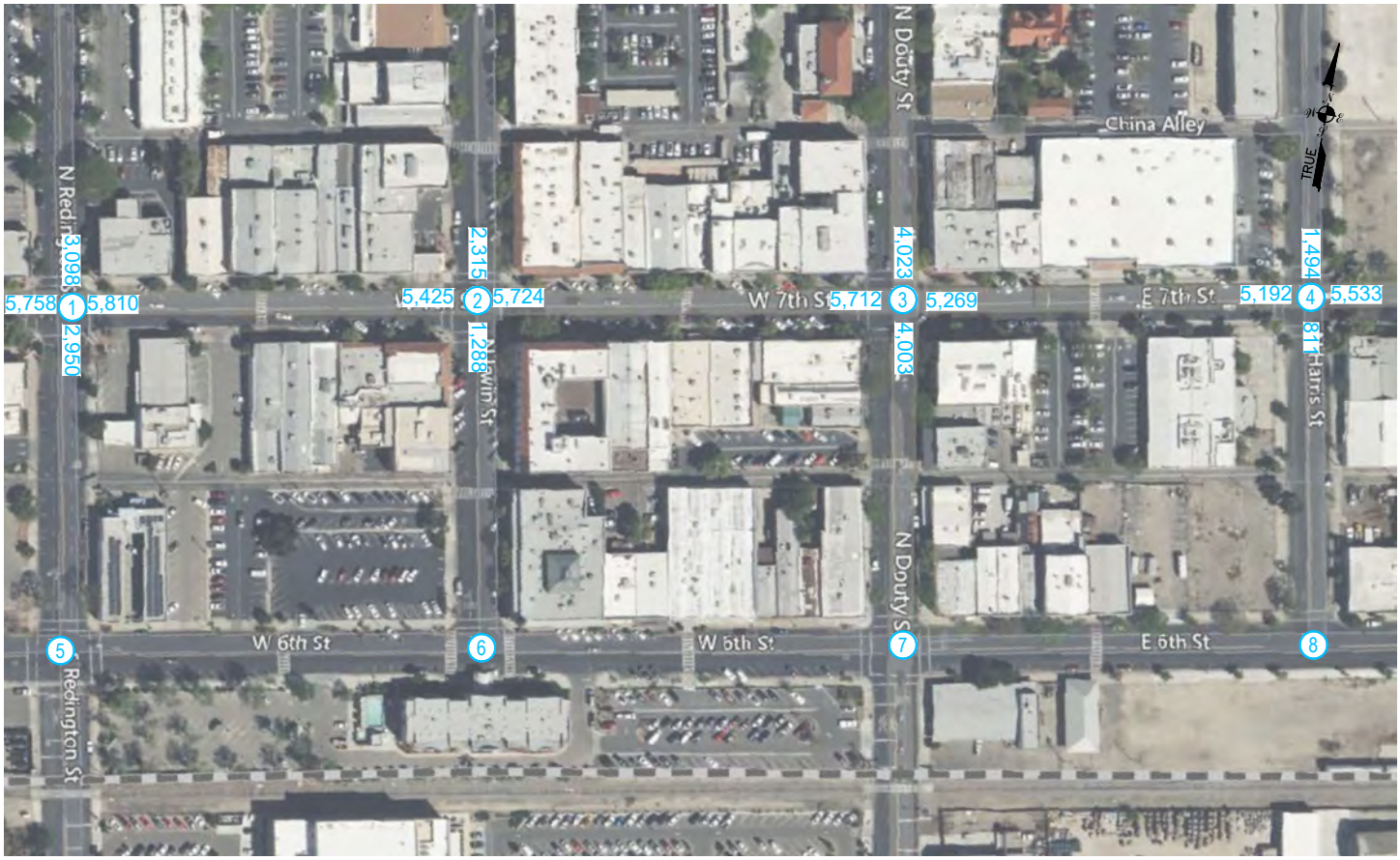
8. W. 6th St. & N. Harris St.



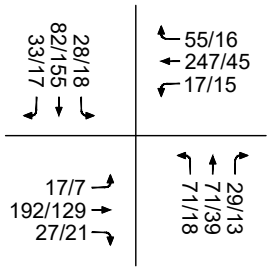
LEGEND:

13/30/20 → = AM/MD/PM Peak Hour Volumes, Weekday
6,636 = Daily Traffic Volume (Total both ways, in 24 hours)
AM = Morning peak hour
MD = Midday peak hour
PM = Afternoon/ Evening peak hour
(1) = Intersection numbers correspond to the numbers in the intersection boxes

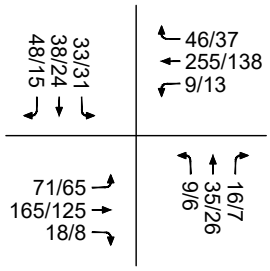
EXHIBIT 2
Existing Daily & Peak Hour
Traffic Volumes - Weekday



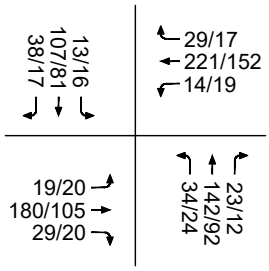
1. W. 7th St. & Redington St.



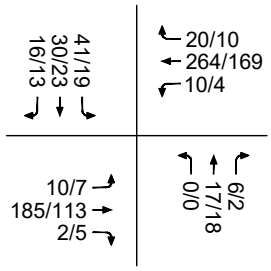
2. W. 7th St. & N. Irwin St.



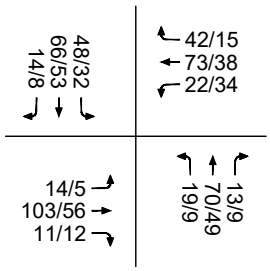
3. W. 7th St. & N. Douty St.



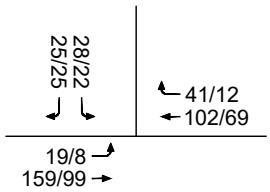
4. W. 7th St. & N. Harris St.



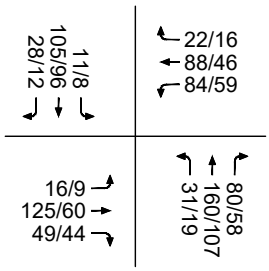
5. W. 6th St. & Redington St.



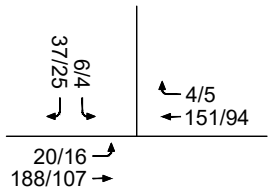
6. W. 6th St. & N. Irwin St.



7. W. 6th St. & N. Douty St.



8. W. 6th St. & N. Harris St.



LEGEND:

17/7 = MD/PM Peak Hour Volumes, Saturday
6,636 = Daily Traffic Volume (Total both ways, in 24 hours)
AM = Morning peak hour
MD = Midday peak hour
PM = Afternoon/ Evening peak hour
(1) = Intersection numbers correspond to the numbers in the intersection boxes

EXHIBIT 3
Existing Daily & Peak Hour
Traffic Volumes - Saturday

Table 1
Summary of Delay & Level of Service (LOS) for Study Options Peak Hour Analysis
Existing 2023 Conditions

Existing Lanes & Traffic Controls								
Street	Redington St		Irwin St		Douty St		Harris St	
	MD	PM	MD	PM	MD	PM	MD	PM
7th St	7.7 A	8.6 A	7.9 A	10.0 A	7.8 A	8.8 A	7.5 A	9.8 A
6th St	11.1 B	11.4 B	13.5 B	10.6 B	13.5 B	13.5 B	11.5 B	12.7 B

Existing Traffic Signals Removed (All-Way Stop Controlled)[2]								
Street	Redington St		Irwin St		Douty St		Harris St	
	MD	PM	MD	PM	MD	PM	MD	PM
7th St	13.2 B	12.1 B	10.7 B	10.8 B	13.0 B	10.6 B	10.5 B	9.8 A

One-Way, One Lane (Existing Traffic Signals Removed)								
Street	Redington St		Irwin St		Douty St		Harris St	
	MD	PM	MD	PM	MD	PM	MD	PM
7th St	50.4 F	22.0 C	25.6 D	21.2 C	35.4 E	13.5 B	25.2 D	22.4 C
6th St	52.3 F	129.8 F	16.2 C	15.3 C	54.5 F	76.3 F	14.8 B	17.7 C

One-Way, Two Lanes (Existing Traffic Signals Removed)								
Street	Redington St		Irwin St		Douty St		Harris St	
	MD	PM	MD	PM	MD	PM	MD	PM
7th St	18.9 C	15.3 C	13.4 B	12.2 B	14.4 B	11.0 B	12.5 B	11.4 B
6th St	15.6 C	15.0 B	13.5 B	11.9 B	17.6 C	19.0 C	12.6 B	14.1 B

[1]MD = Weekday Midday Peak Hour, PM = Weekday PM Peak Hour; 13.2 B = Delay, in seconds, and Level of Service (LOS)

[2]This scenario does not involve 6th Street, so it was not included.

Table 2

Summary of Delay & Level of Service (LOS) for Study Options Peak Hour Analysis

Future 2040 Conditions

Existing Lanes & Traffic Controls								
Street	Redington St		Irwin St		Douty St		Harris St	
	MD	PM	MD	PM	MD	PM	MD	PM
7th St	8.1 A	9.7 A	13.6 B	12.3 B	8.4 A	9.1 A	7.8 A	11.6 B
6th St	13.4 B	14.4 B	15.5 C	11.5 B	18.9 C	19.2 C	12.3 B	14.3 B
Existing Traffic Signals Removed (All-Way Stop Controlled)[2]								
Street	Redington St		Irwin St		Douty St		Harris St	
	MD	PM	MD	PM	MD	PM	MD	PM
7th St	19.8 C	15.8 C	13.6 B	13.9 B	18.3 C	12.4 B	12.5 B	11.6 B
One-Way, One Lane (Existing Traffic Signals Removed)								
Street	Redington St		Irwin St		Douty St		Harris St	
	MD	PM	MD	PM	MD	PM	MD	PM
7th St	117.7 F	52.7 F	78.5 F	64.4 F	80.7 F	22.3 C	72.2 F	63.5 F
6th St	138.7 F	131.2 F	21.3 C	20.7 C	120.7 F	158.6 F	18.5 C	26.5 D
One-Way, Two Lanes (Existing Traffic Signals Removed)								
Street	Redington St		Irwin St		Douty St		Harris St	
	MD	PM	MD	PM	MD	PM	MD	PM
7th St	40.3 E	24.6 C	19.1 C	16.3 C	21.6 C	13.2 B	16.2 C	14.0 B
6th St	25.3 D	23.2 C	15.7 C	13.8 B	31.2 D	36.6 E	14.3 B	17.2 C

[1]MD = Weekday Midday Peak Hour, PM = Weekday PM Peak Hour; 13.2 B = Delay, in seconds, and Level of Service (LOS)

[2]This scenario does not involve 6th Street, so it was not included.

intersections with 6th Street are anticipated to operate at LOS B or C in 2040. The intersections currently operate at acceptable levels of service and are expected to continue to do so through 2040.

Existing Traffic Signals Removed (All-Way Stop Controlled)

With this option, the existing four traffic signals at the intersections of 7th Street and Redington Street, 7th Street and Irwin Street, 7th Street at Douty Street and 7th Street at Harris Street, would be removed and replaced with all-way stop controls. As shown in Table 1, the intersections on 7th Street would operate at LOS A or B with existing traffic volumes. As shown in Table 2, in 2040, the intersections on 7th Street would be anticipated to operate at LOS B or C. Exercising this option would not significantly change traffic operations now or in 2040. It should be noted that this option would also depend on meeting traffic signal and all-way stop warrants, which are included in Section 3.

One-Way, One-Lane Couplet (7th and 6th Streets)

With this option, the existing four traffic signals at the intersections of 7th Street and Redington Street, 7th Street and Irwin Street, 7th Street at Douty Street and 7th Street at Harris Street, would be removed and replaced with all-way stop controls. 7th Street and 6th Street would be reduced to one lane, going eastbound on 7th Street and westbound on 6th Street. As shown in Table 1, with existing traffic volumes, the option to convert 7th Street and 6th Street between Redington Street and Harris Street to a one-lane couplet, would result in LOS F at 7th Street and Redington Street, at 6th Street and Redington St, and at 6th Street and Douty Street. 7th Street and Douty Street would operate at LOS E. Irwin Street at 7th Street and at 6th Street, as well as Harris Street at 7th Street and 6th Street would operate at LOS D or better.

As shown in Table 2, with 2040 conditions, this option would be expected to result in LOS F at all intersections with 7th Street. 6th Street and Redington Street and 6th Street and Douty Street would have LOS F, whereas 6th Street and Irwin Street, and 6th Street and Harris Street would operate at LOS D or better.

One-Way, Two-Lane Couplet (7th and 6th Streets)

Since the one-way, one-lane couplet operation would result in LOS F at most of the intersections, the analysis was repeated with two one-way lanes to determine if it would improve the level of service. As shown in Table 1, with existing traffic volumes, two one-way lanes would result in LOS C or better at all of the 7th Street and 6th Street intersections.

As shown in Table 2, with 2040 conditions, the two-lane one-way couplet is projected to result in an unacceptable LOS E at 7th Street and Redington Street with the other three intersections operating at LOS B or C. 6th Street and Douty Street is projected to operate at LOS E, whereas the other three intersections on 6th Street would operate at LOS D or better.

Should the City find LOS E acceptable in this case, a preliminary review indicates that both 7th Street and 6th Street between Redington Street and Harris Street are wide enough to accommodate two lanes of traffic and angled parking on both sides of the streets.

Although one-way couplets have their benefits, such as fewer traffic points of conflict and safer crossings for pedestrians, they also have their drawbacks. Additional signage is required to

discourage wrong-way driving and the one-way pattern, particularly for a short distance, is confusing for visitors from out of the area.

Although feasible, this option is not recommended due to the unacceptable LOS E and increased signage.

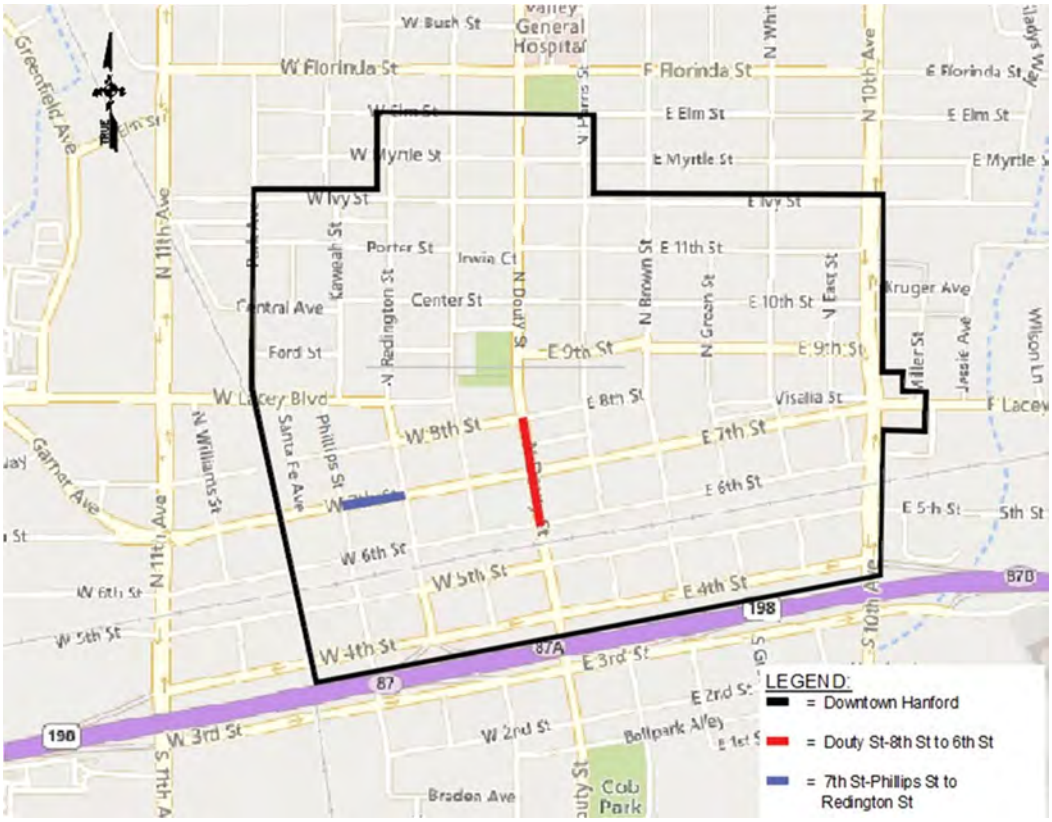
Road Diets for Douty Street and for 7th Street

Another option that was considered would be to reduce Douty Street and 7th Street from two lanes to one lane in each direction in order to provide angled parking. The road diet on Douty Street would be from 6th Street to 8th Street and the road diet on 7th Street would be one-block long, from Phillips Street to Redington Street (see Exhibit 4). Since this study is focused on 6th and 7th Streets between Redington Street and Harris Street, the analysis was limited to the following intersections:

- Douty Street & 7th Street
- Douty Street & 6th Street
- 7th Street & Redington Street

Based on engineering layouts, there is sufficient roadway width on both streets to accommodate angled parking on both sides of the streets with one lane of traffic in each direction.

Exhibit 4 - Proposed Road Diet Locations



Douty Street Road Diet

Douty Street is currently two lanes in each direction with parallel parking on both sides of the street between 8th Street and 3rd Street. The City of Hanford is planning to convert the segment between 8th Street and 6th Street to one lane in each direction with angled parking on both sides. The project is currently being designed.

A level of service (LOS) analysis was performed to determine the impact the road diet would have on the intersections of Douty Street & 7th Street and Douty Street & 6th Street. The results of the analysis are shown below in Table 3. For comparison purposes, the table also provides the intersection LOS for the other proposed options discussed in the previous section.

Table 3
Douty Street Road Diet
Summary of Delay & Level of Service for Study Options Peak Hour Analysis

Intersection of Douty Street & 7th Street								
Study Option	2023[1]				2040[1]			
	With Road Diet		Without Road Diet		With Road Diet		Without Road Diet	
	MD	PM	MD	PM	MD	PM	MD	PM
Existing Lanes & Traffic Controls	**8.2 A**	7.5 A	7.8 A	8.8 A	**9.3 A**	8.0 A	8.4 A	9.1 A
Existing Traffic Signals Removed (AWSC)[1]	12.2 B	9.3 A	13.0 B	10.6 B	**20.8 C**	11.0 B	18.3 C	12.4 B
One-Way, One-Lane Couplet[3]	***56.2 F***	11.6 B	35.4 E	13.5 B	**104.3 F**	16.2 C	80.7 F	22.3 C
One-Way, Two-Lane Couplet[3]	***24.1 C***	10.4 B	14.4 B	11.0 B	***30.3 D***	12.4 B	21.6 C	13.2 B

Intersection of Douty Street & 6th Street								
Study Option[2]	2023[1]				2040[1]			
	With Road Diet		Without Road Diet		With Road Diet		Without Road Diet	
	MD	PM	MD	PM	MD	PM	MD	PM
Existing Lanes & Traffic Controls	***17.1 C***	**14.7 B**	13.5 B	13.5 B	***46.1 E***	***33.8 D***	18.9 C	19.2 C
One-Way, One-Lane Couplet[3]	**68.2 F**	51.5 F	54.5 F	76.3 F	**158.8 F**	120.0 F	120.7 F	158.6 F
One-Way, Two-Lane Couplet[3]	***26.0 D***	**19.5 C**	17.6 C	19.0 C	***65.9 F***	**40.0 E**	31.2 D	36.6 E

[1]MD = Weekday Midday Peak Hour, PM = Weekday PM Peak Hour; 13.2 B = Delay, in seconds, and Level of Service (LOS), AWSC = All-Way Stop controlled, **Bolded** = Delay is worse with Road Diet, with ***Italics*** = LOS is also worse with Road Diet

[2] Since the intersection is already AWSC, it is the same as for Existing conditions, and the Existing Traffic Signals Removed (AWSC) option does not apply.

[3]Existing traffic signals removed and replaced with AWSC.

Table 3 indicates that for the intersection of Douty Street & 7th Street, for 2023, the Midday peak hour delay would be worse with the road diet for all options except AWSC, where the delay would be slightly better. For the two One-Way Couplet options, the LOS would also be worse during the Midday peak hour. For 2040, with the road diet, the Midday peak hour delay would be worse for all options, with the LOS also worse for the One-Way, Two Lanes option. For both 2023 and 2040, all delays would be better with the road diet, and for the AWSC option in 2023, the LOS would also improve.

For the intersection of Douty Street & 6th Street, Table 3 indicates that for both 2023 and 2040, the Midday peak hour delay and LOS would be worse with the road diet. For One-Way, One

Lane conditions, the LOS would not change, however, at LOS F, it couldn't get any worse. During the PM peak hour for 2023, the delay would be worse with the road diet for Existing and One-Way, Two-Lane Couplet conditions, however, the LOS would remain the same. For One-Way, One-Lane Couplet conditions, the delay would improve with the road diet, but remain at LOS F. During the PM peak hour for 2040, both the delay and LOS would be worse for both the Existing and One-Way, Two-Lane Couplet conditions. As with 2023, for One-Way, One-Lane Couplet conditions, the delay would improve with the road diet, but would remain at LOS F.

In summary, the Douty Street Road Diet should not be implemented with the One-Way, One-Lane Couplet option on 7th Street. For the Existing and the One-Way, Two-Lane Couplet options, however, the LOS would be acceptable in 2023 with the road diet. By 2040, though, the road diet would result in unacceptable LOS for both Midday and PM peak hours at the intersection of Douty Street and 6th Street. If the road diet is implemented and traffic increases as assumed, the Douty Street Road Diet would likely need to be reversed prior to 2040.

7th Street Road Diet

7th Street is currently two lanes eastbound and one lane westbound between Phillips Street and Redington Street, with angled parking on the north side for westbound traffic and parallel parking and landscaping on the south side for eastbound traffic. At Redington Street, the eastbound curb lane becomes a right turn lane. West of Phillips Street, 7th Street is two lanes in each direction, with parallel parking on both sides.

The road diet would drop the second eastbound lane at Phillips Street to provide one eastbound lane between Phillips Street and Remington Street. Angled parking would replace the existing parallel parking to provide additional parking spaces on the south side of 7th Street. There are currently seven parallel parking spaces on the south side, that could be replaced with 12 angled parking spaces, for a net gain of 5 parking spaces.

A level of service (LOS) analysis was performed to determine the impact the road diet would have on the intersection of 7th Street and Redington Street. The results of the analysis are shown in Table 4. For comparison purposes, the table also provides the intersection LOS for the other proposed options discussed in the previous section.

As can be seen in Table 4, the LOS would be the same with or without the road diet and the LOS would be at acceptable levels for both options, and for both 2023 and 2040. The delay would be slightly greater with the road diet during the Midday peak hour for both study options and during the PM peak hour with the AWSC conditions, however, the delay would be slightly less during the PM peak hour for existing conditions.

In summary, the analysis supports converting 7th Street to one lane in each direction for the one block between Phillips Street and Redington Street, to provide an additional five on-street parking spaces. Further study would be needed, however, to consider narrowing 7th Street to one lane in each direction west of Phillips Street.

Table 4

7th Street Road Diet

Summary of Delay & Level of Service for Study Options Peak Hour Analysis

Intersection of 7th Street & Redington Street								
Study Option[1]	2023[2]				2040[2]			
	With Road Diet		Without Road Diet		With Road Diet		Without Road Diet	
	MD	PM	MD	PM	MD	PM	MD	PM
Existing Lanes & Traffic Controls	**8.0 A**	7.7 A	7.7 A	8.6 A	**8.5 A**	8.2 A	8.1 A	9.7 A
Existing Traffic Signals Removed (AWSC)[2]	**14.4 B**	**12.3 B**	13.2 B	12.1 B	**24.2 C**	**16.6 C**	19.8 C	15.8 C

[1] The One-Way Couplet options are not applicable for the 7th St Road Diet and were not included

[2] MD = Weekday Midday Peak Hour, PM = Weekday PM Peak Hour; 13.2 B = Delay, in seconds, and Level of Service (LOS), AWSC = All-Way Stop Controlled, **Bolded** = Delay is worse with Road Diet, with ***Italics*** = LOS is also worse with Road Diet

SECTION 3.0

TRAFFIC SIGNALS vs ALL-WAY STOP CONTROLS ANALYSIS

This study also considers the feasibility of removing the existing traffic signals at the following intersections and replacing them with all-way stop controls:

- 7th Street & Redington Street
- 7th Street & Irwin Street
- 7th Street & Douty Street
- 7th Street & Harris Street

The feasibility study included four analyses. Traffic signal warrants from the California Manual on Uniform Traffic Control Devices (CA MUTCD) were used to determine if the intersections currently qualify for traffic signal control. The study also prepared CA MUTCD all-way stop warrants to determine if the intersections would qualify for an all-way stop control if the traffic signal was removed. A traffic collision analysis and a Level of Service (LOS) operational analysis were also performed.

Traffic signal warrants and all-way stop warrants are based on traffic volumes, traffic collisions and other intersection characteristics. Two-way 24-hour traffic count data was collected for each leg of each intersection on Tuesday, August 29, 2023 and Saturday, August 26, 2023. The traffic count data is illustrated on Exhibit 2 for weekday and Exhibit 3 for Saturday. The traffic count data is provided in Appendix A. Traffic collision data for the four intersections was collected for the most recently available five years of records, from August 1, 2018 – July 31, 2023, from the Statewide Integrated Traffic Records System (SWITRS). The traffic signal and all-way stop warrants, however, are based on 12 months of collision data. An collision analysis based on the five years of collision data was also prepared. The traffic collision records and a detailed list of collisions at each intersection are provided in Appendix C.

It should be noted that as of the preparation of this report, the intersection of 7th Street & Irwin Street was in the process of being converted to an all-way stop control. The signal heads have been removed and stop signs installed. The signal poles have yet to be removed. Since the traffic counts had already been collected, the warrant analyses were performed to confirm the removal.

Traffic Signal Warrant Analysis

The following warrants are applicable to this situation:

- Warrant 1, Eight Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 7, Crash Experience

Each intersection was analyzed for both weekdays and Saturdays. The analysis found that none of the four intersections currently meets any of the three CA MUTCD signal warrants, for weekdays or Saturdays, due to insufficient traffic volumes and too few traffic collisions that could be addressed with a traffic signal. The traffic signal warrant worksheets are provided in Appendix D.

All-Way Stop Control (AWSC) Warrant Analysis

To determine if it would be appropriate to replace the signals with AWSCs, the intersections were analyzed with the CA MUTCD AWSC warrant. Each intersection was analyzed for both weekdays and Saturdays. The analysis found that all four intersections meet warrants for an all-way stop control, for both weekdays and Saturdays. The all-way stop warrant sheets are provided in Appendix D.

Traffic Collision Analysis

As previously noted, the traffic signal warrant and the all-way stop warrant only consider the previous 12 months of traffic collision data. With five years of data, however, collision patterns are more likely to emerge. The traffic collision rate for each intersection was also calculated. The collision rate is based on the number of collisions and the number of vehicles passing through the intersection in one day and provides a useful basis for comparing the relative safety of intersections.

The results of the analysis are summarized in Table 5. They show that the intersection of 7th Street and Redington Street has the highest collision rate, followed by 7th Street and Douty Street, then 7th Street and Irwin Street, and 7th Street and Harris Street.

Table 5
Traffic Collision Summary (7th Street)

Intersection	Type of Collision					Total Collisions (5 years)	ADT (veh/day)	Collision Rate (C/MV)
	Broadside	Sideswipe	Rear End	Head-On	Other			
7th St & Redington St	19	5	2	0	0	26	11,081	1.29
7th St & Irwin St	3	3	2	0	1	9	8,022	0.61
7th St & Douty St	10	2	5	0	0	17	11,395	0.82
7th St & Harris St	2	0	1	2	0	5	7,184	0.38

NOTE:
ADT = Average Daily Traffic, in vehicles per day
C/MV = Collisions per million vehicles
Most Broadside collisions were due to red-light running.
No collisions involved pedestrians. 1 collision at 7th St & Redington St involved a bicycle.

The collision rates were also compared to the statewide average rates, published by Caltrans, most recently for 2021 data. If a collision rate is significantly greater than the statewide average for a similar intersection, it indicates that the intersection is less safe than typical

intersections and should be modified to reduce the number of collisions. The statewide average collision rate for signalized intersections in a suburban area is 0.55 collisions per million vehicles (C/MV). Comparing the collision rates for the study intersections, only one, 7th Street & Harris Street has a collision rate lower than the statewide average. The collision rate for 7th Street & Irwin Street is only slightly greater than the statewide average. The collision rate for 7th Street & Redington Street, however, is more than twice the statewide average. The collision rate for 7th Street & Douty Street is 1.5 times the statewide average.

Based on the collision rates, the intersections of 7th Street & Redington Street and 7th Street & Douty Street should be modified to improve their traffic safety. The collision data was further reviewed to determine if there were any patterns pointing to appropriate improvements. The analysis found that a majority of the traffic collisions (62%) at 7th Street and Redington Street were due to running red lights and a majority of those (50%) were in the westbound direction. At 7th Street and Douty Street, running red lights was also the greatest single cause of collisions, at 41%.

A field review indicated that the existing pedestal traffic signals have reduced visibility due to foliage behind them and the signal heads blending into the background. A similar situation exists at 7th Street and Douty Street, but the signal heads appear to stand out from the background better there. Replacing the existing backplates with enhanced backplates that have reflective yellow borders would make the signal heads more visible to motorists and would be relatively inexpensive and easy-to-install. A field review also noted that the signal heads for westbound Redington Street at 7th Street were partially/fully blocked by trees on the northeast and southeast corners. The trees on the corners of the intersections should be kept trimmed to ensure the traffic signal heads are fully visible from a point 150' from the back of the crosswalk, which would provide adequate stopping sight distance.

The relative safety of a traffic signal versus all-way stop control was also considered in this analysis. Section 4 of the report is an Intersection Control Evaluation (ICE) for the intersection of 7th Street and Douty Street, comparing different traffic control alternatives, including converting it to an all-way stop control from the existing traffic signal. The ICE analysis indicates that upgrading the intersection to an AWSC, with a 15.5 benefit cost ratio (BCR), would be safer than upgrading the traffic signal, which has a 7.9 BCR. When converting from an unwarranted signalized intersection to a warranted AWSC intersection, cities have found an approximate 24% improvement in traffic safety. The improvement is partly due to motorists knowing they will be required to stop and the resulting slower speeds. Also, when the traffic volumes on the intersection streets are similar, like these intersections, motorists are less likely to "run" the Stop signs. In this case, the Stop signs may also be more visible than the existing traffic signals, resulting in greater compliance. When an area is converted from traffic signals to AWSC, walkability in the area has also improved.

The collision/safety analysis indicates that converting the intersection to an AWSC would be safer than maintaining the existing signalized intersection.

Level of Service (LOS) Analysis

To assess the operation of the four signalized intersections and compare it with the proposed all-way stop traffic controls, an intersection level of service (LOS) analysis was performed for

the four intersections, for existing conditions and future 2040 traffic conditions, with the traffic signals. Another LOS analysis was performed with the signals replaced with all-way stops. The results of the analysis are summarized in Table 6 and indicate that all of the intersections currently operate at LOS A during both the midday and PM peak hours. If the intersections were to be converted to AWSC, they would all operate at LOS B with existing traffic volumes, except for the intersection of 7th Street and Harris Street, which would operate at LOS A during the PM peak hour. In 2040, the intersections are anticipated to operate at LOS A or LOS B with the existing lanes and traffic controls, but operate at LOS B or C with AWSC.

Table 6

Summary of Delay & Level of Service (LOS)[1]

Traffic Signals vs All-Way Stop Controls Analysis

Street	Redington St		Irwin St		Douty St		Harris St	
	MD	PM	MD	PM	MD	PM	MD	PM
Existing 2023 Conditions								
Existing Lanes & Traffic Controls								
7th St	7.7 A	8.6 A	7.9 A	10.0 A	7.8 A	8.8 A	7.5 A	9.8 A
Existing Traffic Signals Removed (All-Way Stop Controlled)[2]								
7th St	13.2 B	12.1 B	10.7 B	10.8 B	13.0 B	10.6 B	10.5 B	9.8 A
Future 2040 Conditions								
Existing Lanes & Traffic Controls								
7th St	8.1 A	9.7 A	13.6 B	12.3 B	8.4 A	9.1 A	7.8 A	11.6 B
Existing Traffic Signals Removed (All-Way Stop Controlled)[2]								
7th St	19.8 C	15.8 C	13.6 B	13.9 B	18.3 C	12.4 B	12.5 B	11.6 B

[1] Data is from Tables 1 and 2.

Conclusions

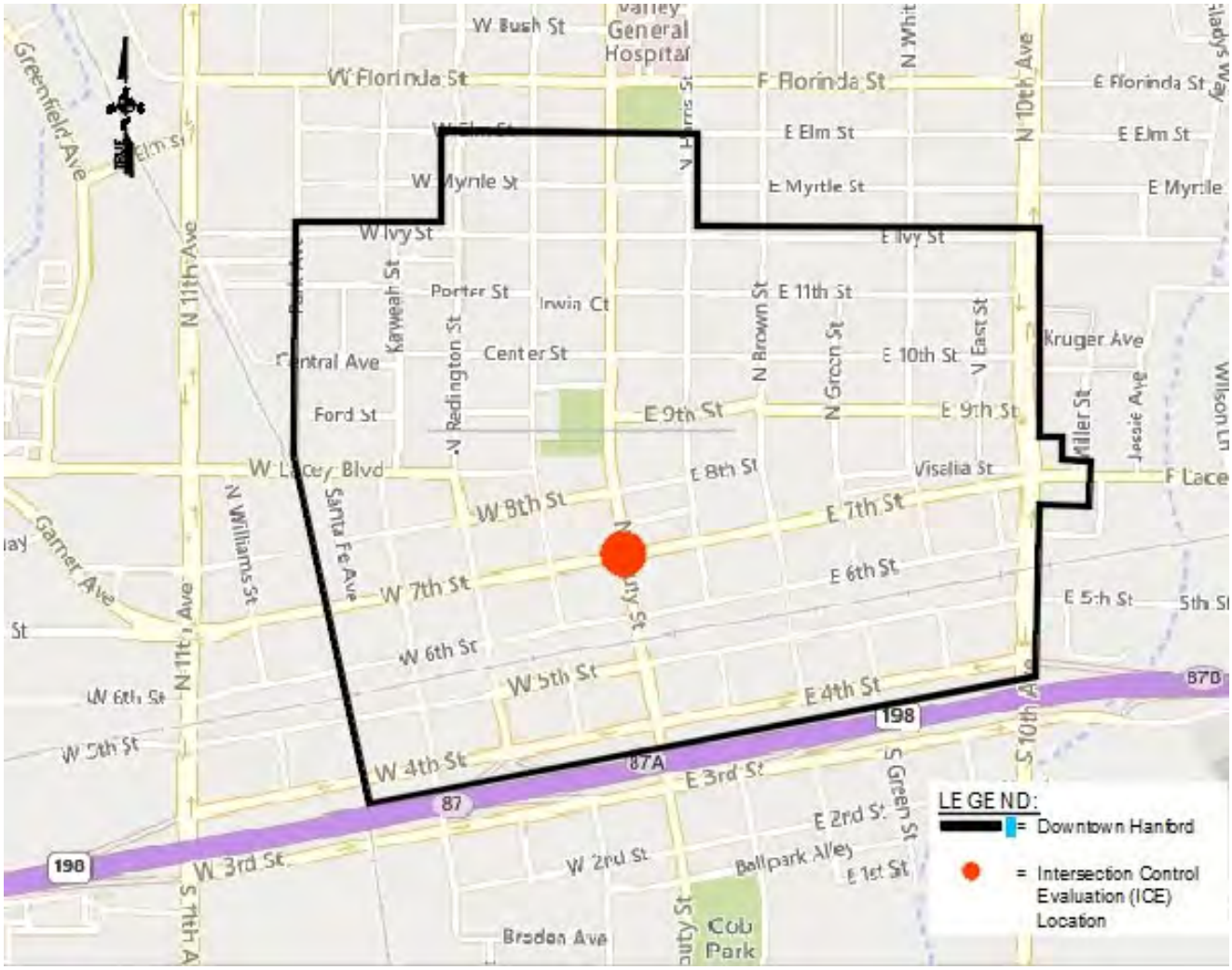
The analysis found that none of the four study intersections meet Caltrans warrants for the installation of traffic signals. It also found that all four intersections do meet Caltrans warrants for the installation of AWSC. The traffic collision analysis found that two of the intersections, 7th Street at Redington Street and at Douty Street have traffic collision rates that exceed the statewide average to an extent that measures should be taken to improve intersection safety. The intersection control evaluation (ICE) analysis in Section 4.0 found that AWSC can be safer than traffic signals. The LOS analysis found that the intersections would not operate as well if AWSC compared to the existing conditions, however, the LOS were still acceptable at LOS B and LOS C. The analysis indicates that the existing traffic signalized intersections should be converted to AWSC.

In the interim, the traffic signal head backplates at the intersections of 7th Street at Redington Street and at Douty Street should be modified or replaced to have the retroreflective yellow borders to make them more visible. Also, corner trees should also be trimmed to maintain adequate views of the traffic signal heads.

SECTION 4.0
INTERSECTION CONTROL EVALUATION

Several traffic control options were considered for the intersection of 7th Street and Douty Street (see Exhibit 5), including replacing the traffic signal with an all-way stop control or replacing the traffic signal with a roundabout. The City requested a more formal analysis, called an Intersection Control Evaluation (ICE), commonly used/required by Caltrans to evaluate various intersection traffic control options. The purpose of an ICE analysis is to assist in determining the most cost-effective method of intersection control, based on intersection LOS, safety and cost.

Exhibit 5 - ICE Location Map (7th Street & Douty Street)



As noted in the Circulation Analysis section, the City of Hanford is planning a road diet to convert the segment of Douty Street between 8th Street and 6th Street from two lanes to one lane in each direction. The project is currently being designed. The ICE analysis assumed the implementation of the Douty Street Road Diet in the LOS analyses for each traffic control alternative.

The ICE analysis is based on Caltrans *ICE Process Informational Guide*, and compares intersection level of service (LOS), traffic collision data, the costs of traffic collisions and the costs to construct, operate and maintain the intersection traffic control alternatives, to arrive at a safety benefit cost ratio (BCR) for each alternative. The ICE analysis considered the traffic control alternatives, listed below, at the intersection of 7th Street and Douty Street. The traffic control alternatives are illustrated on Exhibits 6 – 8.

- Existing Traffic Signal – Maintains the existing conditions
- Upgraded Traffic Signal – Upgrades the pedestal signals to new signal poles with mast arms and includes other related improvements
- All-Way Stop Control – Replaces the existing traffic signal with an all-way stop control
- Roundabout – Replaces the existing traffic signal with a one-lane roundabout

Exhibit 6 - Existing Traffic Signal Layout

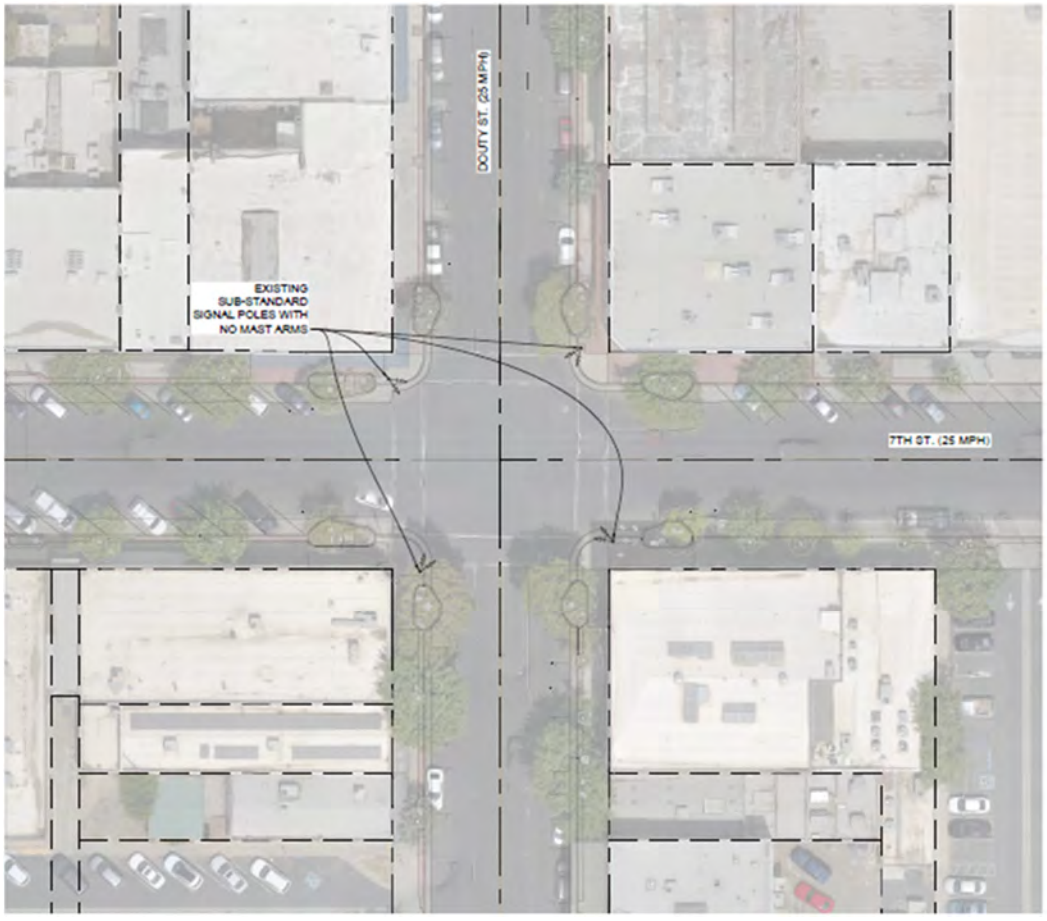


Exhibit 7 - Upgraded Traffic Signal Layout

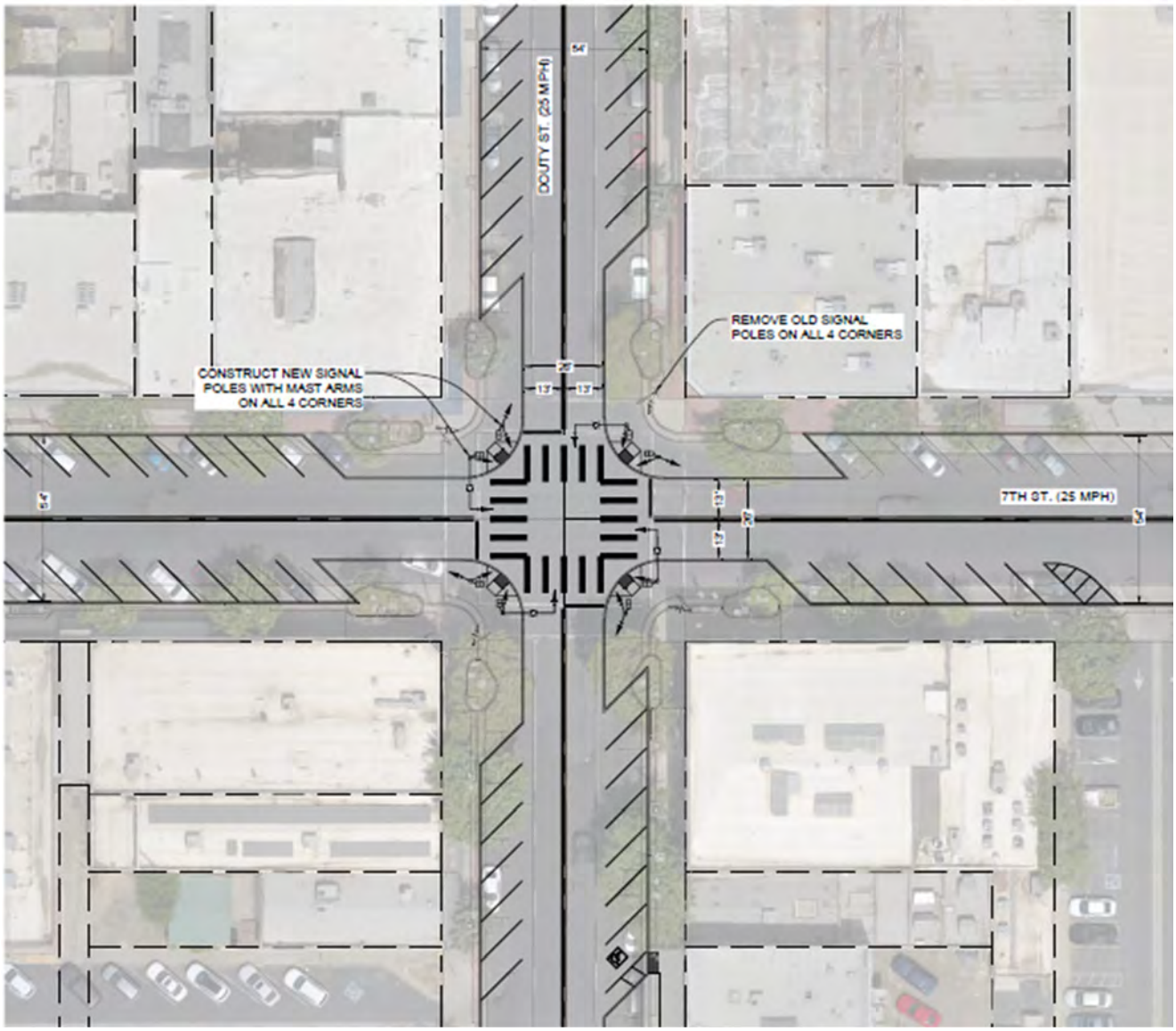


Exhibit 8 - All-Way Stop Controlled Intersection Layout

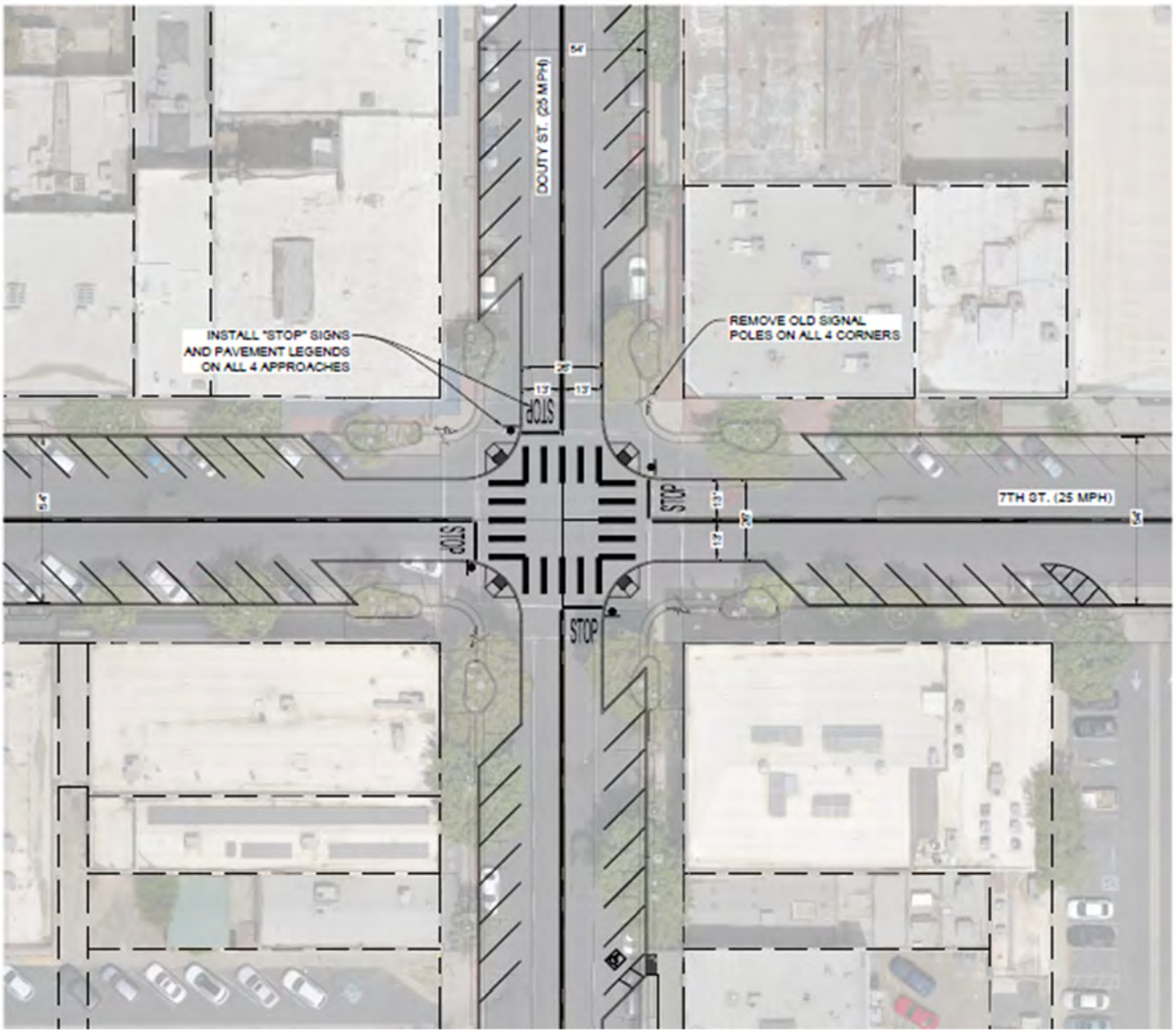
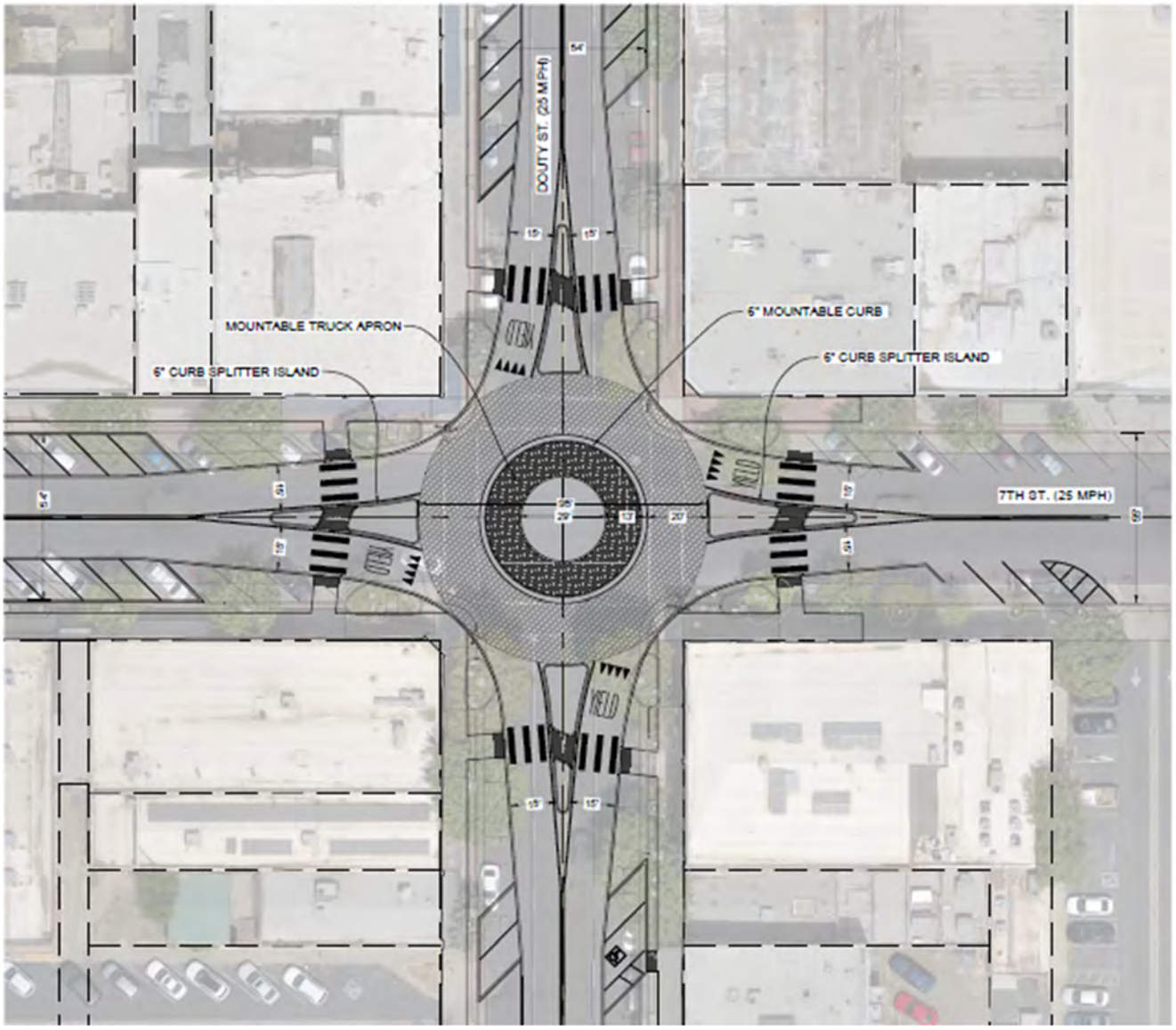


Exhibit 9 - Roundabout Intersection Layout



The Intersection Performance Measures that are included in the ICE analysis are summarized in Table 6 and discussed in the paragraphs below.

Delay/LOS Measure of Performance. As shown in Table 7, for both existing and all of the traffic control alternatives, the intersection would operate at acceptable LOS A or LOS B, based on existing traffic volumes. However, the smallest delay would occur with the Roundabout and the greatest delay would occur with the All-Way Stop Control (AWSC). Compared to the existing traffic signal, the roundabout would have the same LOS A, however, the delays would be much lower.

Table 7

Intersection Performace Measures[1]

Intersection: 7TH STREET & DOUTY STREET

Intersection Data			
Geometry:	4-Legged Intersection	**MD Entering Volume**	
Existing Control:	Traffic Signal	908	
Proposed Control #1:	Upgraded Traffic Signal	**PM Entering Volume**	
Proposed Control #2:	All-Way Stop Control	900	
Proposed Control #3:	Roundabout		
Major Roadway Data		**Minor Roadway Data**	
Street:	7th Street	**Street:**	Douty Street
Direction:	East/West	**Direction:**	North/South

Measures of Performance: Delay/Level of Service (LOS)		Existing	Upgraded Signal	All-Way Stop	Roundabout
Operations		**Existing**	**Upgraded Signal**	**All-Way Stop**	**Roundabout**
MD Peak Hour	**MD LOS**	A	A	B	A
	MD Average Delay (secs/veh)	7.8	8.2	12.1	5.8
PM Peak Hour	**PM LOS**	A	A	A	A
	PM Average Delay (secs/veh)	8.8	7.5	9.3	4.5

Measures of Performance: Operations & Maintenance	Existing	Upgraded Signal	All-Way Stop	Roundabout
Luminaires - Annual Electrical Consumption & Maintenance	$ 350	$ 850	$ 350	$ 1,300
Electrical Consumption - Traffic Signal Equipment	$ 850	$ 850	$ -	$ -
Signal Retiming & Maintenance	$ 6,150	$ 6,150	$ -	$ -
Total	$ 7,350	$ 7,850	$ 350	$ 1,300

Measures of Performance: Safety	Existing	Upgraded Signal	All-Way Stop	Roundabout
Base Collisions (5 year period)	17 total collisions: 5 Injury & 12 property damage only; no fatalities			
Crash Reduction Factor[2]		0.30	0.24	0.50
Expected Annual Benefit (Annual Collision Savings)[3]		$ 546,800	$ 690,900	$ 1,439,000
Benefit for Life of Project		$ 10,936,000	$ 13,818,000	$ 28,780,000

Measures of Performance: Capital Outlay		Upgraded Signal	All-Way Stop	Roundabout
Initial Construction Cost		$ 1,231,650	$ 886,650	$ 905,625
Right-of-Way Cost		$ -	$ -	$ -
Total Capital Cost		$ 1,231,650	$ 886,650	$ 905,625

Benefit/Cost Ratio Calculation			Upgraded Signal	All-Way Stop	Roundabout
Cost (Life)	Capital Cost		$ 1,231,650	$ 886,650	$ 905,625
	Operations & Maintenance (Life)		$ 157,000	$ 7,000	$ 26,000
	Total		**$ 1,388,650**	**$ 893,650**	**$ 931,625**
Benefit (Life)	Collision Cost Savings (Life)		$ 10,936,000	$ 13,818,000	$ 28,780,000
	Total		**$ 10,936,000**	**$ 13,818,000**	**$ 28,780,000**
Benefit/Cost Ratio[5]			**7.9**	**15.5**	**30.9**

[1] Based on a form developed by DKS that follows Caltrans' *ICE Process Informational Guide* . The expected life of the proposed alternatives is 20 years.

[2] Crash Reduction Factor (CRF), from FHWA. FHWA has a range of values for roundabouts, from 35-67. Since the proposed one-lane roundabout is safer than larger roundabouts, a CRF of 50 was used.

[3] Expected Annual Benefit (collision cost savings) is based on the equation in Caltrans Local Road Safety Manual, Appendix D.

[4] Benefit/Cost Ratio is the Collision Cost Savings (benefit) divided by the cost to install & maintain the proposed change, each over a 20-year life.

Operations & Maintenance Measure of Performance. This provides the estimated cost to operate and maintain each traffic control alternative over the life of the alternative (20 years for each alternative). These values were used in the BCR calculations. As shown in Table 7, the AWSC and roundabout would have the smallest annual cost, whereas the existing and upgraded traffic signals would have the greatest annual costs.

Safety Measure of Performance. The safety performance measure calculates the collision cost savings over the life of an alternative, based on the number of collisions that are expected to be prevented by the alternative traffic control. This annual benefit is determined using the following equation, which is from Caltrans' *Local Roadway Safety Manual*, v. 1.5, dated April 2020, which is the most recently available version:

Annual Benefit Equation

1) $$Benefit\ (Annual) = \sum_{s=0}^{3} \frac{CRF \times N \times CC_{ave}}{Y}$$

- CRF : Crash reduction factor in each countermeasure.
- S : Severity (0: PDO, 1: Minor Injury, 2: Injury, 3: Severe Injury/Fatal). See the below table.
- N : Number of Crashes, in severity levels, related to selected countermeasure.
- Y : Crash data time period (Year).
- CC_{ave} : Crash costs in severity levels.

Severity (S)	Crash Severity *	Location Type	Crash Cost ***
3	**Fatality and Severe Injury Combined (KA)	Signalized Intersection	$1,590,000
3		Non Signalized Intersection	$2,530,000
3		Roadway	$2,190,000
2	Evident Injury – Other Visible (B)		$142,300
1	Possible Injury–Complaint of Pain (C)		$80,900
0	Property Damage Only (O)		$13,300

* The letters in parenthesis (K, A, B, C and O) refer to the KABCO scale; it is commonly used by law enforcement agencies in their crash reporting efforts and is further documented in the HSM.

** Figures were calculated based on an average Fatality (K) / Severe Injury (A) ratio for each area type, a crash cost for a Fatality (K) of $7,219,800, and a crash cost of a Severe/Disabling Injury (A) of $389,000. These costs are used in the HSIP Analyzer.

*** Based on Table 7-1, Highway Safety Manual (HSM), First Edition, 2010. Adjusted to 2020 Dollars.

2) *Benefit (Life) = Benefit (annual) x Years of service life*

The Crash Reduction Factor (CRF) for each countermeasure is applied to each alternative. In this case, there was only one countermeasure for each alternative. The Federal Highway Administration (FHWA) provides the CRFs for different countermeasures, which are also provided in Caltrans' *Local Roadway Safety Manual*. CRFs are based on empirical data for

the percent reduction in number of traffic collisions due to converting from one type of intersection traffic control to another. The CRF for each alternative is as follows:

- Updated Signal: 15% (CRF No. S08 – convert to mast arm from pedestal-mounted)
- All-Way Stop Control: 24% (Remove unwarranted traffic signal)
- Roundabout: 50% (CRF No. S16 – convert intersection to roundabout from signal)

A CRF for removing an unwarranted traffic signal and replacing it with an AWSC is not included in Caltrans' *Local Roadway Safety Manual*, however, the FHWA's website lists several studies where the CRF is 24%. Several cities have also implemented programs to replace a group of traffic signals with AWSC. The most well-known, which also provided data, was done by the City of Philadelphia in 1978, removing 462 traffic signals and replacing most with AWSCs. The action resulted in an overall 24% reduction in traffic collisions. The streets in the Philadelphia study were all one-way streets, however, it is expected that the results would be similar for two-way streets and other studies support this assumption. Based on this data, a CRF of 24% was used.

For converting a signalized intersection to a roundabout, the CRF "varies", ranging from 35% to 67%. The CRF is based on all types of roundabouts, ranging from single-lane to multi-lane and from mini-roundabouts to large roundabouts. Single-lane roundabouts tend to be safer since there are fewer collision opportunities. An approximate mid-point of 50% was used in this case.

The resulting expected annual cost benefits are shown in Table 7. Each was multiplied by the 20-year life to arrive at the benefit over the life of each alternative. The Benefit for Life of Project value for an updated traffic signal would be $10,936,000, for an AWSC would be $13,818,000 and for a roundabout would be $28,780,000. Therefore, the updated traffic signal would have the lowest safety cost benefit and the roundabout would have the greatest safety cost benefit.

Capital Outlay Measures of Performance. The capital outlay for each alternative consists of the initial construction cost and the right-of-way costs. The capital costs are used in the BCR calculation. For all three alternatives, there would be no right-of-way costs, and the capital outlay would be the same as the initial construction cost. The initial construction costs were estimated for each alternative. The estimates can be found in Appendix F.

Benefit/Cost Ratio (BCR) Calculation. The BCR is the benefit over the life of the alternative's improvements divided by the total cost of the improvements over the life of the alternative. In this case, the expected life of all of the improvements is 20 years. The total costs are the sum of the initial capital costs with the annual operations & maintenance costs over 20 years. The benefits for the life of the improvements are the estimated annual collision savings applied over 20 years. As shown in Table 7, the BCRs for the alternatives are as follows:

- Upgraded Signal: 7.9
- All-Way Stop Control: 15.5
- One-Lane Roundabout: 30.9

The upgraded signal, which would convert the existing pedestal poles to signal poles with mast arms, would provide the smallest BCR, with the BCR for converting the existing traffic signal to an AWSC nearly twice as great. Replacing the existing traffic signal with a roundabout would provide the greatest BCR, nearly twice that of an AWSC and nearly four times that of an upgraded traffic signal.

Intersection Control Evaluation Summary. The Intersection Control Evaluation (Table 7) shows that a roundabout would result in the least delay and best LOS. The construction costs for a roundabout would be less than those for an upgraded traffic signal, but slightly greater than converting to an AWSC. The annual collision cost savings benefit for a roundabout is significantly greater than the other alternatives, resulting in the greatest BCR.

The Intersection Control Evaluation clearly shows that the best intersection traffic control alternative, based on both intersection operation (LOS) and savings due to a reduction in traffic collisions, would be to replace the existing traffic signal with a one-lane roundabout.

SECTION 5.0
MIDBLOCK CROSSWALK ANALYSIS

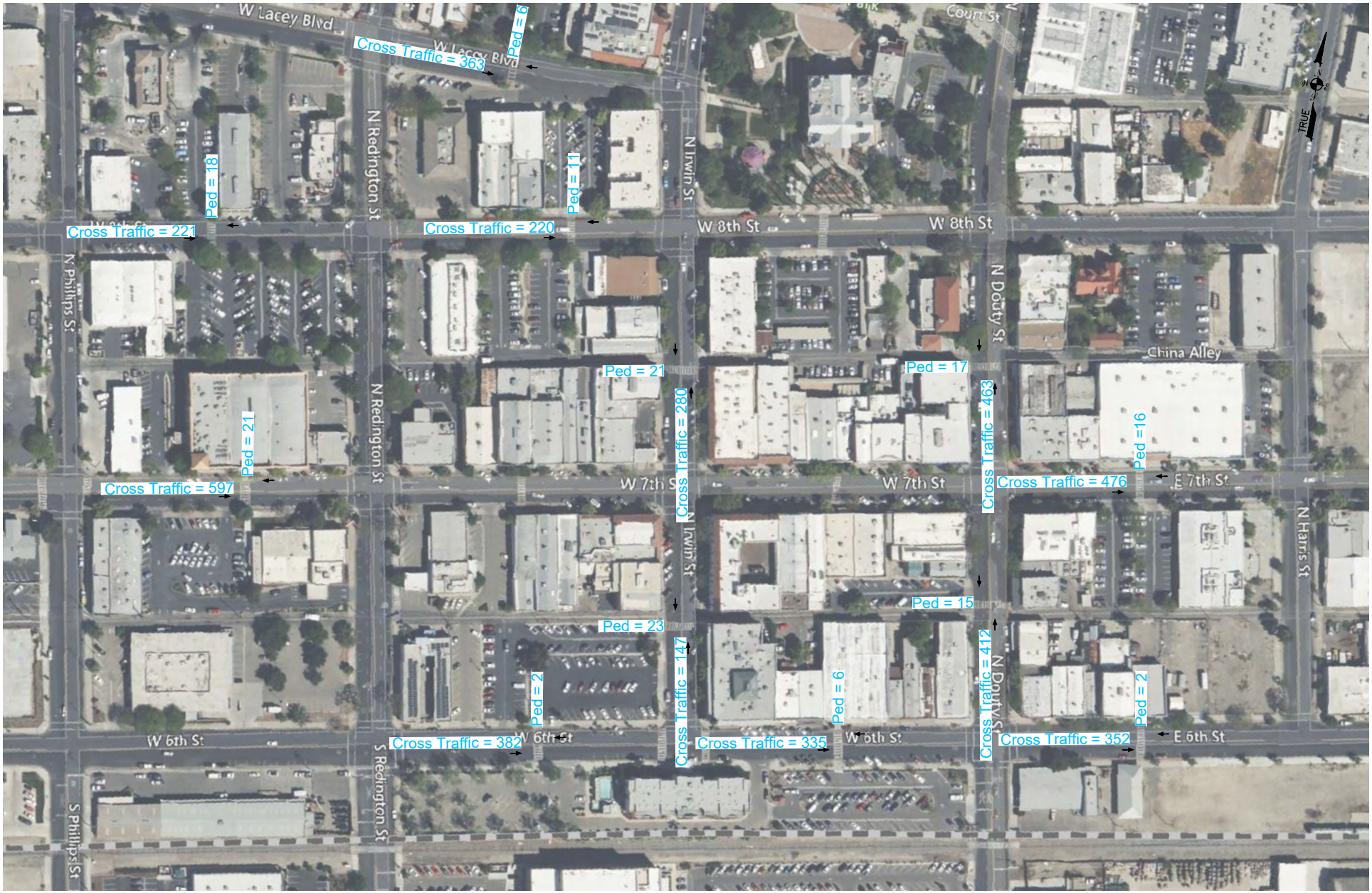
The project includes the evaluation of 12 midblock crosswalk locations for their safety and effectiveness, to determine if they should be removed or retained. The locations are as follows (see Exhibit 1):

- Lacey Blvd between Redington St & Irwin St
- 8th St between Phillips St & Redington St
- 8th St between Redington St & Irwin St
- Irwin St between 7th St & 8th St
- Douty St between 7th St & 8th St
- 7th St between Phillips St & Redington St
- 7th St between Douty St & Harris St
- Irwin St between 6th St & 7th St
- Douty St between 6th St & 7th St
- 6th St between Redington St & Irwin St
- 6th St between Irwin St & Douty St
- 6th St between Douty St & Harris St

Pedestrian, bicycle and motor vehicle traffic count data was collected for each crosswalk on Thursday, August 31, 2023 and on Saturday, August 26, 2023. The count data is illustrated on Exhibit 10, for weekdays, and on Exhibit 11, for Saturdays. The traffic count data is provided in Appendix A.

This process is unusual since existing crosswalks are being considered for removal rather than installation. The situation is also unusual since the midblock crosswalks were installed over 20 years ago and are an expected part of the downtown landscape. It is also anticipated that the revitalization of the downtown area will bring more patrons to the area and create a greater use of the crosswalks.

The pedestrian, bicycle and motor vehicle traffic count data was collected using video cameras. The videos were also reviewed to assess the behavior of pedestrians, bicyclists and motorists. In general, the motorists were respectful of pedestrians and bicyclists, usually yielding to them and stopping well in advance of the crosswalk. The primary purpose of a midblock crosswalk is to channelize pedestrians to cross at one location, thereby increasing their safety. In most cases, the midblock crosswalks serve that purpose, but at some locations, pedestrians crossed outside of the crosswalk. This primarily occurred at crosswalks adjacent to alleys and where access to the crosswalk from the sidewalk was obstructed by utilities. The low traffic volumes also allow pedestrians to take a more direct route from their vehicles to their destinations.



NOTE: Peak hour traffic volumes shown are for the AM, MD & PM weekday peak hour with the greatest pedestrian volume.

LEGEND:

Ped = Total number of pedestrians & bicyclists using the crosswalk, in both directions, in one hour
Cross Traffic = Total number of vehicles going across the cross walk, in both directions, in the same hour.

EXHIBIT 10
Existing Midblock Peak Hour
Traffic Volumes - Weekday

NOTE: Peak hour traffic volumes shown are for the MD & PM Saturday peak hour with the greatest pedestrian volume.

LEGEND:

Ped = Total number of pedestrians & bicyclists using the crosswalk, in both directions, in one hour

Cross Traffic = Total number of vehicles going across the cross walk, in both directions, in the same hour.

EXHIBIT 11
Existing Midblock Peak Hour
Traffic Volumes - Saturday

A review of the crosswalks showed that many are not ADA-compliant. If they are to remain, they will need to be improved to meet ADA requirements. In some cases, it would mean removing obstructions like utility poles and fire hydrants.

There are no standard warrants for the installation of midblock crosswalks or marked uncontrolled crosswalks at intersections, just a few basic guidelines. The criteria used in the 2021 Peters Engineering study was reviewed for reasonableness. Some of the criteria, such as the speed limit and nearest crosswalks, are commonly used for major highways with long distances between intersections, and are not applicable to a downtown area, where the blocks are approximately 400 feet long. On the other hand, most of the midblock crosswalks are less than 200 feet from another crosswalk controlled by a traffic signal or stop sign, which would be safer. The collision analysis only found two pedestrian collisions over the last five years for all 12 crosswalks, and one involved a pedestrian under the influence. The collision data indicates that there is not a safety issue to be considered.

The minimum pedestrian volume would typically be greater than the 10 pedestrians per hour previously used, more like 40 pedestrians per hour, since studies have shown that as the number of pedestrians in an uncontrolled crosswalk increases, the fewer collisions and near-misses. In this study area, though, the greatest pedestrian volume was 23 per hour. It appears that the midblock crosswalks were primarily installed for convenience and they generally serve that purpose. Due to the low volume and slow pace of vehicular traffic, the courtesy of the motorists, the small number of pedestrian collisions, there does not appear to be a need for more stringent criteria.

The following criteria were used to evaluate the midblock crosswalks:

- Pedestrian volume: Greater than 20/hour, however if greater than 10/hour, give further consideration
- Speed limit: 35 mph or less
- If above criteria are met, further evaluation is necessary:
    - Number of pedestrians
    - Effectiveness of crosswalk (visibility, channelization, etc.)
    - Available gaps in traffic
    - ADA compliance

The results of the midblock crosswalk analysis are summarized in Table 8. Any crosswalk with less than 10 pedestrians per hour, is recommended for removal. Almost every midblock crosswalk location has inadequate sight distance due to parked vehicles blocking the view of the pedestrians and motorists (see sight distance layouts in Appendix G). It is generally recommended that bulbouts be provided for crosswalks that are retained. These may initially consist of a painted bulbout, however, raised concrete bulbouts are preferred since they make the pedestrian more visible vertically. Four of the crosswalks that are recommended to be retained are not ADA-compliant. If these crosswalks are retained, they must be brought into compliance, not only for safety reasons, but also for liability reasons. Also, all crosswalks that are retained should have appropriate warning signs installed per the CA MUTCD.

Table 8
Midblock Crosswalk Warrant Summary

Street	Between	Peak Hour Volumes				Midblock Collisions (5 Years)[3]	Adequate Gaps in Traffic[4]	Adequate Sight Distance[5]	ADA-Compliant[6]	Recommendation
		Time of Week	Peak Hour[1]	Pedestrians & Bicyclists	Conflicting Vehicles[2]					
Lacey Blvd	Redington/Irwin	Saturday	MD	8	330	0	Yes	No	Yes	Remove crosswalk
Eighth St	Philips/Redington	Weekday	MD	18	221	0	Yes	No	Yes	Retain crosswalk, add bulbouts
Eighth St	Redington/Irwin	Weekday	PM	11	220	0	Yes	No	No	Retain crosswalk if upgrade ramps, remove obstructions, add bulbouts
Irwin St	7th/8th	Weekday	PM	21	280	0	Yes	No	No	Retain crosswalk, if add ramps, add bulbouts
Douty St	7th/8th	Weekday	MD	17	463	2 V	Yes	No	No	Retain crosswalk if add ramps, remove obstructions, add bulbouts
Seventh St	Philips/Redington	Weekday	MD	21	597	2 V	Yes	Yes & No	Yes	Retain crosswalk, add bulbout to south side
Seventh St	Douty/Harris	Saturday	PM	17	315	1 P (UI)	Yes	No	Yes	Retain crosswalk, add bulbouts
Irwin St	6th/7th	Weekday	PM	23	33	0	Yes	No	No	Retain crosswalk if add ramps, remove obstructions, add bulbouts
Douty St	6th/7th	Saturday	MD	23	336	1 P, 2 V	Yes	No	No	Retain crosswalk if add ramps, remove obstructions, add bulbouts
Sixth St	Redington/Irwin	Weekday	MD	2	382	0	Yes	No	Yes	Remove crosswalk
Sixth St	Irwin/Douty	Weekday	MD	6	335	0	Yes	No	Yes	Remove crosswalk
Sixth St	Douty/Harris	Weekday	MD	3	407	0	Yes	No	No	Remove crosswalk

[1] MD = Midday, PM = Afternoon/Evening

[2] Conflicting Vehicles = Vehicles crossing the crosswalk during the same peak hour

[3] V = Vehicle, P = Pedestrian, UI = Under the influence

[4] Adequate gaps in traffic for pedestrian to cross the street

[5] Adequate stopping sight distance

It is recommended that the following crosswalks be removed, due to having fewer than 10 pedestrians per hour during the peak hour:

- Lacey Blvd between Redington St & Irwin St
- 6th St between Redington St & Irwin St
- 6th St between Irwin St & Douty St
- 6th St between Douty St & Harris St

If crosswalks are removed, it must be done in accordance with state law (CVC 21950.5), which requires that notification to the public be given at least 30 days prior to the scheduled removal of an existing marked crosswalk. The notice of proposed removal shall inform the public how to provide input related to the scheduled removal and shall be posted at the crosswalk identified for removal.

It is recommended that the following crosswalks be retained and bulbouts be provided to improve sight distance:

- 8th St between Phillips St & Redington St
- 7th St between Phillips St & Redington St (south side only)
- 7th St between Douty St & Harris St

It is recommended that the following crosswalks be retained, but only if they are made ADA-compliant and bulbouts are provided for sight distance:

- 8th St between Redington St & Irwin St
- Irwin St between 7th St & 8th St
- Douty St between 7th St & 8th St
- Irwin St between 6th St & 7th St
- Douty St between 6th St & 7th St

The 2021 Peters Engineering study recommended that only two of the 12 midblock crosswalks be maintained:

- Lacey St between Redington St & Irwin St
- Sixth St between Redington St & Irwin St

At the time, the Downtown Committee reviewed the study's recommendation and accepted it, except for the recommendation to remove the following crosswalks:

- Irwin St between 6th St & 7th St
- Irwin St between 7th St & 8th St
- Douty St between 6th St & 7th St

Of the five midblock crosswalk locations the Downtown Committee wanted retained, this updated study is recommending that the two locations the previous study recommended retaining, on Lacey Street and on 6th Street, be removed, due to less than 10 pedestrians crossings in a peak hour. Regarding the three other locations that the Downtown Committee

wanted to be retained, this updated study recommends that they be retained only if they are made ADA-compliant and bulbouts are provided for sight distance. It is recommended that the Downtown Committee review the findings of this updated study and, based on the new data, reconsider its previous actions.

SECTION 6.0

INTERSECTION PEDESTRIAN IMPROVEMENTS

The 2021 Peters Engineering study included recommendations for intersection pedestrian improvements to promote pedestrian travel and improve safety. Curb extensions were recommended at 28 intersections and preliminary layouts were provided (see Appendix H).

We concur with the recommendations.

SECTION 7.0
SUMMARY AND RECOMMENDATIONS

The purpose of this study is to update the *Downtown Pedestrian Safety and Traffic Circulation Project* report prepared by Peters Engineering Group in 2021 (2021 Peters Engineering study). This update includes the collection of new traffic data and an expansion of the study to consider additional, appropriate analyses. The findings and recommendations are summarized below.

Circulation Analysis – Traffic Signal Removal. The circulation analysis reassessed the potential removal of the existing traffic signals at the intersections of 7th Street and Redington Street, Irwin Street, Douty Street and Harris Street, and their replacement with all-way stop controls. The LOS analysis showed that the change would not significantly impact traffic operations now or in 2040. The finding was similar to the 2021 Peters Engineering study.

Circulation Analysis – One-Way Couplet. The option of converting 6th Street and 7th Street to one-way, one-lane between Redington Street and Harris Street was also re-evaluated. This option would result in LOS F at several intersections for both 2023 and 2040 conditions and would not be recommended. Adding a second one-way lane was also considered to improve the LOS. While it would improve the LOS, a couple of intersections would operate at an unacceptable LOS E in 2040. With the two lanes, there would, however, be sufficient roadway width to provide additional on-street parking. Although there are benefits to one-way couplets, there are also disadvantages, such as additional signage to prevent wrong-way driving and motorist confusion. This option is not recommended due to the unacceptable LOS E and the additional signage and potential motorist confusion.

Circulation Analysis – Road Diets. Road diets were also considered for Douty Street and 7th Street, to provide additional on-street parking by reducing them from two lanes to one lane in each direction and replacing the parallel parking spaces with angled parking spaces. The limits of the road diet would be from 6th Street to 8th Street on Douty Street (three blocks), and from Phillips Street to Redington Street on 7th Street (one block). The analysis found that both streets are wide enough to accommodate the redesign. Based on the analysis, the Douty Street Road Diet should not be implemented with the One-Way, One-Lane Couplet option on 7th Street. For the other two options, the LOS would be acceptable in 2023 with the road diet. If the road diet is implemented, however, and traffic increases as assumed, the Douty Street Road Diet would likely need to be reversed prior to 2040 to maintain acceptable LOS. The analysis supports converting 7th Street to one lane in each direction for the one block between Phillips Street and Redington Street. Further study would be needed, however, to consider narrowing 7th Street to one lane in each direction west of Phillips Street.

Traffic Signals vs All-Way Stop Controls Analysis. A traffic signal warrant analysis of the intersections of 7th Street at Redington Street, at Irwin Street, at Douty Street and at Harris Street was performed to determine if the intersections would qualify for traffic signals today. The analysis found that none of the intersections would currently qualify for traffic signals. An all-way stop analysis was also performed for the same intersections to determine if it would be

the traffic signals with all-way stop controls. All of the intersections qualified for all-way stop controls. A traffic collision analysis was added to the other analyses included in the original study. It indicated that converting the intersection to an AWSC would be safer than maintaining the existing signalized intersection. The LOS analysis compared the operations of the existing traffic signals and the potential all-way stop controls. If the intersections were to be converted to all-way stop controls, they would operate at a similar level of service. The overall analysis concluded that all-way stop controls would be an appropriate replacement for the existing traffic signals.

Intersection Control Evaluation (ICE). Several traffic control options have been considered for the intersection of 7th Street and Douty Street, consisting of replacing the traffic signal with an upgraded traffic signal, an all-way stop control and a roundabout. The City is particularly interested in a roundabout. An intersection control evaluation (ICE) was performed to determine the best alternative. An ICE considers several factors, including LOS, cost of construction and maintenance and the relative safety of the alternatives, to develop a benefit/cost ratio. Although a roundabout would have shorter delays, the level of service for all alternates would be acceptable LOS A or LOS B. All three of the alternatives would be expected to result in a reduced number of traffic collisions when compared to the existing traffic signal. The construction, operations and maintenance costs were the least for an AWSC, however, roundabout costs were only slightly greater. The upgraded traffic signal total costs were about 40% greater. The benefit/cost ratio (BCR), which compared the capital, operation and maintenance costs with the benefit of the collision savings, was 7.9 for the upgraded signal, 15.5 for an AWSC and 30.9 for a roundabout. Based on the ICE analysis, a one-lane roundabout would be the best traffic control alternative for the intersection of 7th Street and Douty Street.

Midblock Crosswalk Analysis. The project includes the evaluation of 12 midblock crosswalk locations, to determine if they should be removed or retained, based on their safety and effectiveness. There are no standard warrants for midblock crosswalks. The midblock crosswalk warrant used in the 2021 Peters Engineering study was reviewed and somewhat modified. There were a number of factors to consider in this analysis, ranging from the relatively few pedestrians to limited sight distance to nearly half the crosswalks not being ADA compliant. As a result of the analysis, four crosswalks are recommended for removal due to having fewer than 10 pedestrians per hour during the peak hour, three crosswalks are recommended to be retained with bulbouts provided, and five crosswalks are recommended to be retained, but only if they are made ADA-compliant and bulbouts are provided for sight distance. The updated recommendations, however, do not concur with the recommendations made by the 2021 Peters Engineering study nor with the Downtown Committee's recommendations based on that study. In particular, the Downtown Committee agreed with the recommendation to maintain two intersections that this study is recommending to be removed, and the committee wished to maintain three intersections that this study recommends be retained only if brought into ADA compliance and sight distance is improved. The Downtown Committee should review this updated study and reconsider its previous findings and actions.

Intersection Pedestrian Improvements. The 2021 Peters Engineering study included recommendations for intersection pedestrian improvements to promote pedestrian travel and

improve safety. It included curb extensions at 28 intersections and preliminary layouts were provided (see Appendix H). We concur with their recommendations.

Recommendations. Based on the study findings, the following are recommended:

1. Remove the existing traffic signals at the intersections of 7th Street and Redington Street, 7th Street and Irwin Street and 7th Street and Harris Street, and replace them with all-way stop controls.
2. Do not convert 7th Street and 6th Street to a one-way couplet.
3. To gain additional on-street parking, convert Douty Street to one lane in each direction between 6th Street and 8th Street and convert the parallel parking to angled parking, however, it may need to be reversed prior to 2040.
4. To gain additional on-street parking, convert 7th Street to one lane in each direction for the one block between Phillips Street and Redington Street and convert the parallel parking to angled parking.
5. Remove the existing traffic signal at 7th Street and Douty Street and replace it with a one-lane roundabout.
6. Remove the following midblock crosswalks:
    a. Lacey Blvd between Redington St & Irwin St
    b. 6th St between Redington St & Irwin St
    c. 6th St between Irwin St & Douty St
    d. 6th St between Douty St & Harris St
7. Retain the following midblock crosswalks and provide bulbouts:
    a. 8th St between Phillips St & Redington St
    b. 7th St between Phillips St & Redington St (south side only)
    c. 7th St between Douty St & Harris St
8. Retain the following midblock crosswalks, but only if they are made ADA compliant and bulbouts are provided for sight distance:
    a. 8th St between Redington St & Irwin St
    b. Irwin St between 7th St & 8th St
    c. Douty St between 7th St & 8th St
    d. Irwin St between 6th St & 7th St
    e. Douty St between 6th St & 7th St
9. Recommendations in the 2021 Peters Engineering study for intersection pedestrian improvements to promote pedestrian travel and improve safety, including curb extensions at 28 intersections.