



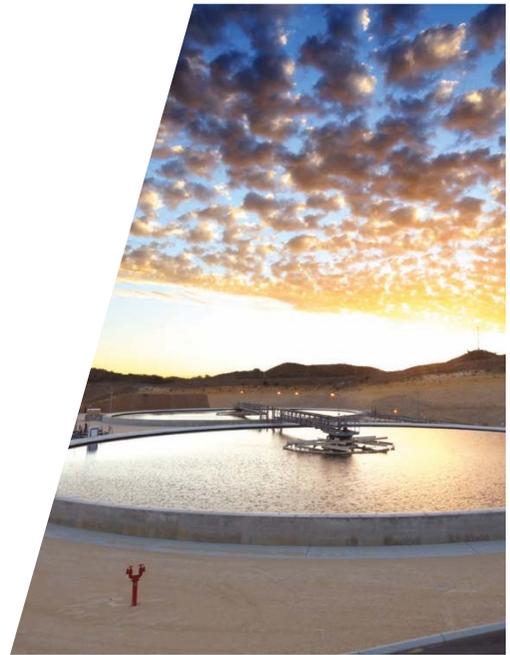
Dignity Mercy Medical Center Redding

North State Pavilion

Traffic Impact Analysis Report

Dignity Health

FINAL





Executive Summary

This report has been prepared to present the results of a Traffic Impact Analysis Report (TIAR) performed by GHD for the proposed development of the Dignity Mercy Medical Center Redding North State Pavilion in the City of Redding, California.

The proposed project is planned to be completed in two phases. For the purpose of this TIAR, the project will be analyzed in one phase. The term "project" for the construction phase, as used in this report, refers to the development as follows:

- Location - ±10.8 acres south of Cypress Avenue from Hartnell Avenue to the Sacramento River.
 - Up to 130 ksf Medical Office Space.
- Access to the project will be provided by the following proposed driveways:
 - One full access driveway to Henderson Road (South)
 - One full access driveway to Parkview Avenue (Open Space Access)
 - Two full access driveways to Henderson Road (North)
- The proposed project will modify the full access intersection of Henderson Road (North) and Hartnell Avenue to right-in-right-out only.

The proposed project will generate up to approximately 311 AM and 330 PM weekday peak hour trips.

The traffic analysis considered potential impacts (selected in coordination with City staff) along the following corridors:

- Parkview Avenue (South) corridor between Henderson Road (South) and Hartnell Avenue
- Henderson Road (North)
- Hartnell Avenue corridor between Churn Creek Road and Cypress Avenue
- Cypress Avenue corridor between Bechelli Lane and Hilltop Drive

Consistent with the January 2009 City of Redding TIA Guidelines, the following traffic scenarios were analyzed as part of this TIAR:

- *Existing* conditions
- *Existing Plus Project* conditions
- *Year 2040 No Project* conditions
- *Year 2040 Plus Project* conditions

The traffic analysis determined that all project impacts will be mitigated through either the payment of a city-wide traffic impact fees (TIF) for the construction of the recommended mitigation or implementation of the recommended mitigation.



Following is a summary of mitigations to improve intersections (with project induced significant impacts) to allow acceptable level of service:

Intersection 8 – Hartnell Avenue & Cobblestone Shopping Center (Main Driveway)

Under the *Year 2040 Plus Project* conditions, the proposed project creates a **significant** impact by increasing delay by more than five (5) seconds per vehicle and meeting the peak hour traffic signal warrant at an intersection operating at unacceptable LOS in the “no project” condition.

- **Year 2040 Plus Project Conditions**

- Option 1:
 - Restripe southbound left turn lane to a two-way left turn lane
 - Restripe eastbound left/thru/right to a left/thru lane and a right turn pocket, *or*
- Option 2:
 - Construct a traffic signal, *or*
- Option 3:
 - Restrict southbound left turn movement
 - Restrict the westbound left turn movement to a right-out only
 - Convert southbound left turn lane into acceptance pocket for the eastbound left turn movement

The mitigation is required due to the assumption that the Cobblestone Shopping Center will redevelop to full occupancy. Since the Shopping Center redevelopment is the core event that will trigger the mitigation, the driveway mitigation should be the responsibility of the future Shopping Center redevelopment, and not this project.

The project's Fair Share is 29%.

Intersection 10 – Hartnell Avenue & Cypress Avenue

Under the *Existing Plus Project* and *Year 2040 Plus Project* conditions, the proposed project creates a **significant** impact at this intersection due to the projected westbound left queue increase (from approximately 10 to 19 cars in the *Existing Plus Project* AM conditions, and from 18 to 29 cars in the *Year 2040 Plus Project* AM conditions). The available storage is for nine (9) cars.

- **Existing Plus Project Conditions**

- Construct a southbound left turn pocket
- Construct a southbound thru/right lane
- Convert intersection to an eight phase traffic signal

Note: An exhibit depicting this improvement is included in Appendix E.

- **Year 2040 Plus Project Conditions**



- Construct a southbound left turn pocket
- Construct a southbound thru/right lane
- Convert intersection to an eight phase traffic signal
- Construct dual left turn pockets for the westbound approach
- Expand southbound Hartnell Avenue to accommodate dual left turns from Cypress Avenue

Note: An exhibit depicting this improvement is included in Appendix E.

The *Existing Plus Project* impact will be mitigated by construction of the recommended improvement prior to occupancy of the project. The *Year 2040 Plus Project* impact will be mitigated by payment of the City-wide TIF.

The project's Fair-Share is 33%.

EXECUTIVE SUMMARY TABLE 1
DIGNITY MERCY MEDICAL CENTER REDDING NORTH STATE PAVILION TIAR
SUMMARY OF INTERSECTION OPERATIONS

SUMMARY OF INTERSECTION OPERATIONS	Hartnell Ave & Churn Creek Rd	Hartnell Ave & Northwoods Way	Hartnell Ave & Bechelli Ln	Hartnell Ave & Shotwick Trail	Hartnell Ave & Cobblestone Bus Park Dwy/VA Dwy	Hartnell Ave & Cobblestone Bus Park Dwy/RC Dwy	Hartnell Ave & Parkview Ave (South)	Hartnell Ave & Cobblestone Shopping Center (Main Dwy)	Hartnell Ave & Henderson Rd (North)
Intersection	1	2	3	4	5	6	7	8	9
Control Type	Signal	Signal	Signal	TWSC	Signal	TWSC	Signal	TWSC	TWSC
Target LOS	C	C	C	C	C	C	C	C	C
AM PEAK HOUR	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%	LOS Delay Q95%
Existing	D 37.9 -	C 29.8 -	C 26.3 -	B 13.7 Ok	B 14.0 -	C 19.3 Ok	A 5.3 -	C 16.8 Ok	B 12.6 Ok
Existing Plus Project	D 38.4 -	C 32.0 -	C 27.0 -	B 14.4 Ok	B 14.4 -	C 20.8 Ok	A 9.5 -	C 17.8 Ok	B 14.2 Ok
Delay Increase Due to Project	0.5	2.2	0.7	0.7	0.4	1.5	4.2	1.0	1.6
Significant Impact?	No	No	No	No	No	No	No	No	No
Year 2040 Base No Project	D 42.4 -	D 35.3 -	C 29.7 -	C 17.2 Ok	B 15.2 -	C 20.4 Ok	A 9.0 -	D 27.4 Ok	B 14.0 Ok
Year 2040 Base Plus Project	D 43.4 -	D 36.0 -	C 29.8 -	C 18.3 Ok	B 15.7 -	C 21.8 Ok	B 13.0 -	D 29.8 Ok	C 15.5 Ok
Delay Increase Due to Project	1.0	0.7	0.1	1.1	0.5	1.4	4.0	2.4	1.5
Significant Impact?	No	No	No	No	No	No	No	No	No
PM PEAK HOUR									
Existing	D 39.0 -	B 13.2 -	C 31.1 -	C 17.4 Ok	A 9.5 -	D 28.6 Ok	A 9.1 -	D 29.5 Ok	C 15.2 Ok
Existing Plus Project	D 39.7 -	B 13.4 -	C 31.5 -	C 19.2 Ok	A 9.6 -	D 33.7 Ok	B 14.5 -	E 37.4 Ok	B 14.8 Ok
Delay Increase Due to Project	0.7	0.2	0.4	1.8	0.1	5.1	5.4	7.9	-0.4*
Significant Impact?	No	No	No	No	No	No	No	No	No
Year 2040 Base No Project	D 47.8 -	B 15.4 -	C 34.1 -	C 21.3 Ok	A 10.0 -	E 37.8 Ok	B 10.7 -	F OVR Not Ok	C 19.3 Ok
Year 2040 Base Plus Project	D 48.5 -	B 15.6 -	C 34.6 -	C 23.5 Ok	B 10.0 -	E 46.0 Ok	B 20.0 -	F OVR Not Ok	C 18.3 Ok
Delay Increase Due to Project	0.7	0.2	0.5	2.2	0.0	8.2	9.3	>5	-1*
Significant Impact?	No	No	No	No	No	No	No	Yes	No
Fair Share	N/A	N/A	N/A	N/A	N/A	N/A	N/A	29%	N/A

Notes:

LOS - Level of Service

TWSC = Two Way Stop Control

* - Due to the left-out restriction in the Plus Project scenarios

EXECUTIVE SUMMARY TABLE 1
DIGNITY MERCY MEDICAL CENTER REDDING NORTH STATE PAVILION TIAR
CONTINUED
SUMMARY OF INTERSECTION OPERATIONS

SUMMARY OF INTERSECTION OPERATIONS Intersection	Hartnell Ave & Cypress Ave			Henderson Rd (South) & Parkview Ave (South)			Cypress Ave & Bechelli Ln			I-5 SB Ramps & Cypress Ave			I-5 NB Ramps & Cypress Ave			Cypress Ave & Hilltop Dr		
	10			11			12			13			14			15		
Control Type	Signal			TWSC			Signal			Signal			Signal			Signal		
Target LOS	D			C			D			D			D			D		
AM PEAK HOUR	LOS	Delay	Q95%	LOS	Delay	Q95%	LOS	Delay	Q95%	LOS	Delay	Q95%	LOS	Delay	Q95%	LOS	Delay	Q95%
Existing	C	27.8	-	A	8.8	Ok	C	26.0	-	C	24.5	-	B	18.2	-	C	25.9	-
Existing Plus Project	C	31.1	Not Ok	A	9.2	Ok	C	26.2	-	C	24.7	-	B	19.0	-	C	26.1	-
Delay Increase Due to Project	3.3			0.4			0.2			0.2			0.8			0.2		
Significant Impact?	Yes*			No			No			No			No			No		
Year 2040 Base No Project	C	32.4	Not Ok	A	8.8	Ok	C	28.1	-	C	25.1	-	C	22.7	-	C	28.5	-
Year 2040 Base Plus Project	D	35.1	Not Ok	A	9.1	Ok	C	28.2	-	C	25.3	-	C	25.0	-	C	28.6	-
Delay Increase Due to Project	2.7			0.3			0.1			0.2			2.3			0.1		
Significant Impact?	Yes*			No			No			No			No			No		
PM PEAK HOUR																		
Existing	C	27.0	-	A	8.8	Ok	C	34.7	-	D	36.7	-	C	26.0	-	D	44.1	-
Existing Plus Project	C	29.6	-	B	12.5	Ok	C	34.8	-	D	37.5	-	C	27.8	-	D	44.3	-
Delay Increase Due to Project	2.6			3.7			0.1			0.8			1.8			0.2		
Significant Impact?	No			No			No			No			No			No		
Year 2040 Base No Project	C	32.4	-	A	8.8	Ok	D	38.5	-	D	38.9	-	C	31.7	-	D	45.3	-
Year 2040 Base Plus Project	D	35.5	Not Ok	B	12.3	Ok	D	38.9	-	D	40.1	-	D	37.1	-	D	45.5	-
Delay Increase Due to Project	3.1			3.5			0.4			1.2			5.4			0.2		
Significant Impact?	Yes*			No			No			No			No			No		
Fair Share	33%			N/A			N/A			N/A			N/A			N/A		

Notes:

LOS - Level of Service

TWSC = Two Way Stop Control

** - Due to vehicle queue increases*

EXISTING PLUS PROJECT CONDITIONS MITIGATION

Intersection 10 - Hartnell Avenue & Cypress Avenue:

- Construct a southbound left turn pocket
- Construct a southbound thru/right lane
- Convert intersection to an eight phase traffic signal

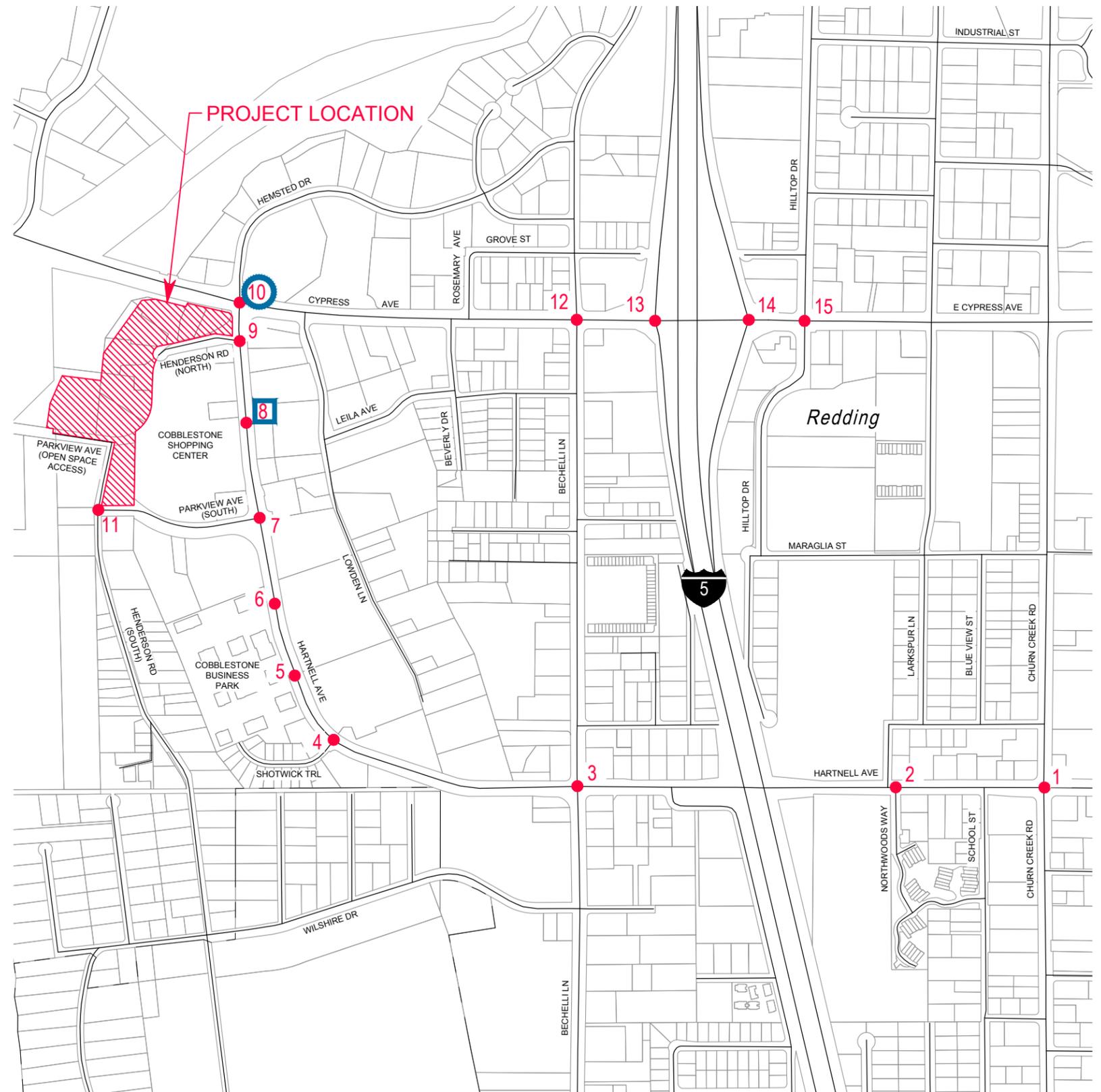
YEAR 2040 PLUS PROJECT CONDITIONS MITIGATION

Intersection 8 - Hartnell Avenue & Cobblestone Shopping Center Driveway (29%):

- Option 1:
 - Restripe southbound left turn lane to a two-way left turn lane
 - Restripe eastbound left/thru/right to a left/thru lane and right turn pocket
- Option 2:
 - Construct a traffic signal
- Option 3:
 - Restrict the southbound left turn movement
 - Restrict the westbound movement to right-out only
 - Convert southbound left turn lane into an acceptance pocket for the eastbound left turn movement

Intersection 10 - Hartnell Avenue & Cypress Avenue (33%):

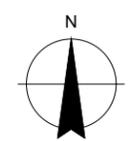
- Construct a southbound left turn pocket *
- Construct a southbound thru/right lane *
- Convert intersection to an eight phase traffic signal *
- Construct dual left turn pockets for the westbound approach
- Expand southbound Hartnell Avenue to accommodate dual left turn lanes from Cypress Avenue



LEGEND:

- EXISTING PLUS PROJECT MITIGATION
- CUMMULATIVE PLUS PROJECT MITIGATION

* - YEAR 2040 PLUS PROJECT MITIGATION IS THE SAME AS EXISTING PLUS PROJECT



Dignity Mercy Medical Center Redding
 NORTH STATE PAVILION TIAR

INTERSECTIONS REQUIRING IMPROVEMENTS

Project No. 111454024
 Report No. R1966RPT006
 Date October 2018

FIGURE ES 1



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1. Introduction

Dignity Health has retained GHD to complete a Transportation Impact Analysis Report (TIAR) for the proposed Dignity Mercy Medical Center Redding North State Pavilion in the City of Redding, California. The term "project" as used in this report refers to the proposed medical office complex.

Figure 1 presents the project vicinity map.

Consistent with the January 2009 City of Redding TIA Guidelines, the following traffic scenarios were analyzed as part of this TIAR:

- *Existing* conditions
- *Existing Plus Project* conditions
- *Year 2040 No Project* conditions
- *Year 2040 Plus Project* conditions

Existing conditions quantify the current traffic operations at the study locations.

The *Existing Plus Project* conditions present an analysis scenario in which traffic impacts of the proposed project are investigated in comparison to the *Existing* conditions scenario. Within this scenario, the project generated peak hour traffic volumes have been added to the *Existing* conditions volumes to obtain the *Existing Plus Project* volumes.

The January 2009 City of Redding TIA Guidelines defines the following as Cumulative Conditions:

Either:

Existing + Approved/Pending Project List, and

Existing + Approved/Pending Project List + Proposed Project

Or:

2030 Shasta County Travel Demand Model (SCTDM) without Proposed Project, and

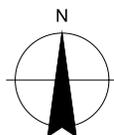
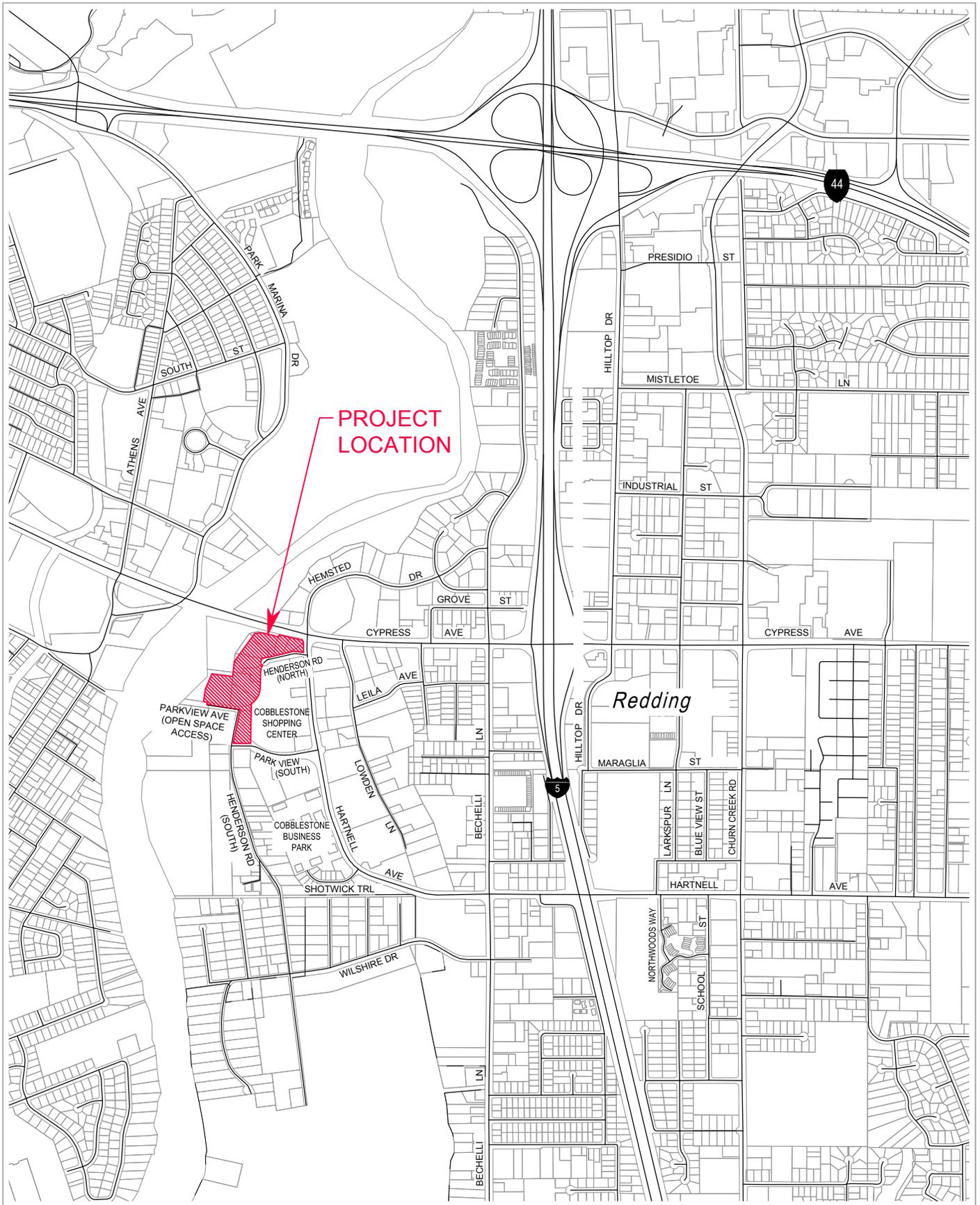
2030 SCTDM + Proposed Project

For the proposed project, City staff concurred that the Year 2040 forecasts from the SCTDM will be appropriate for Cumulative conditions.

Year 2040 No Project conditions refer to analysis scenarios that would exist following approximately twenty years of development in the City of Redding. The *Year 2040 No Project* conditions were forecasted using the SCTDM and the addition of approved/pending projects not included in the model.

Year 2040 Plus Project conditions is the analysis scenario in which traffic impacts associated with the project are investigated in comparison to the *Year 2040 No Project* conditions.

The above traffic scenarios are described in further detail and evaluated in subsequent sections of this report.



Dignity Mercy Medical Center Redding
NORTH STATE PAVILION TIAR

STUDY AREA MAP

Project No. 11145024
Report No. R1966RPT006
Date October 2018

FIGURE 1



2. Project Setting

The City of Redding is the largest city in Shasta County, California, covering approximately 60 square miles. The US Census Bureau reports that in 2017, the population in Redding was approximately 91,800.

2.1 Transportation System

Roadways that provide primary circulation in the vicinity of the project site are as follows:

Interstate 5 (I-5) is a major interstate freeway facility that traverses in the north-south direction through the State of California. In northern California, I-5 serves as the primary inter-regional auto and truck travel route that connects the northern counties with the Sacramento Valley. Within Shasta County, I-5 serves as a major commuter and truck route linking the Cities of Anderson, Redding, and Shasta Lake.

Hartnell Avenue is a two- to four-lane east-west arterial that runs between East Cypress Avenue and Airport Road.

Bechelli Lane is a two- to four-lane, north-south arterial that runs between south of South Bonnyview Road to its northern terminus, approximately one mile to the north of East Cypress Avenue.

Cypress Avenue is a four- to six-lane east-west arterial that runs between Pine Street and its eastern terminus, approximately 0.3 miles to the east of Victor Avenue.

Churn Creek Road is a two- to four-lane, north-south arterial that runs between Airport Road and College View Drive.

2.2 Study Intersections

The following list of critical study intersections were selected in coordination with the City of Redding staff for analysis within this study for weekday AM and PM peak hour conditions:

1. Hartnell Avenue & Churn Creek Road
2. Hartnell Avenue & Northwoods Way
3. Hartnell Avenue & Bechelli Lane
4. Hartnell Avenue & Shotwick Trail
5. Hartnell Avenue & Cobblestone Business Park Driveway/Veterans Affairs Driveway
6. Hartnell Avenue & Cobblestone Business Park Driveway/Retirement Community Driveway
7. Hartnell Avenue & Parkview Avenue (South)
8. Hartnell Avenue & Cobblestone Shopping Center (Main Driveway)
9. Hartnell Avenue & Henderson Road (North)

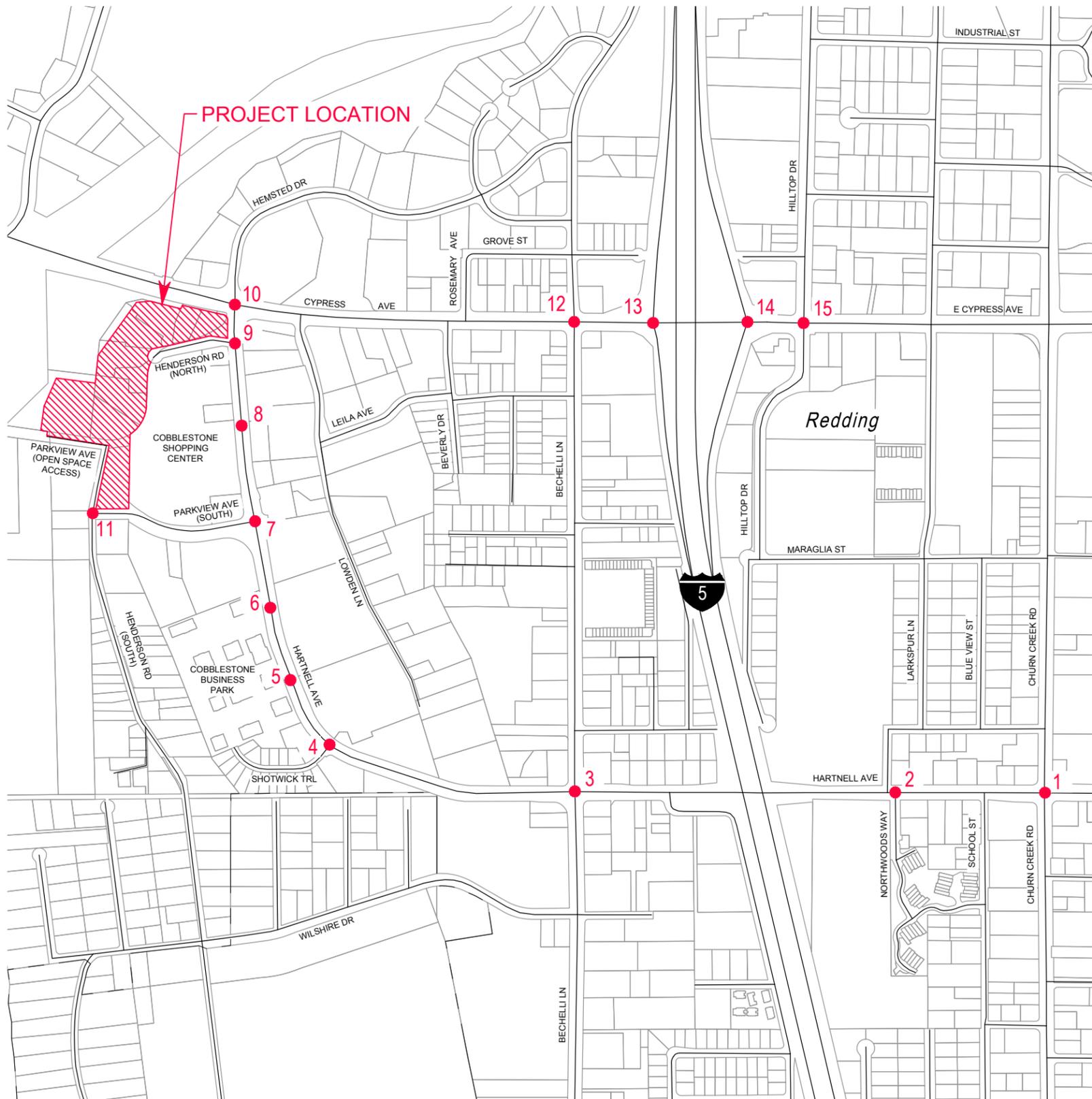
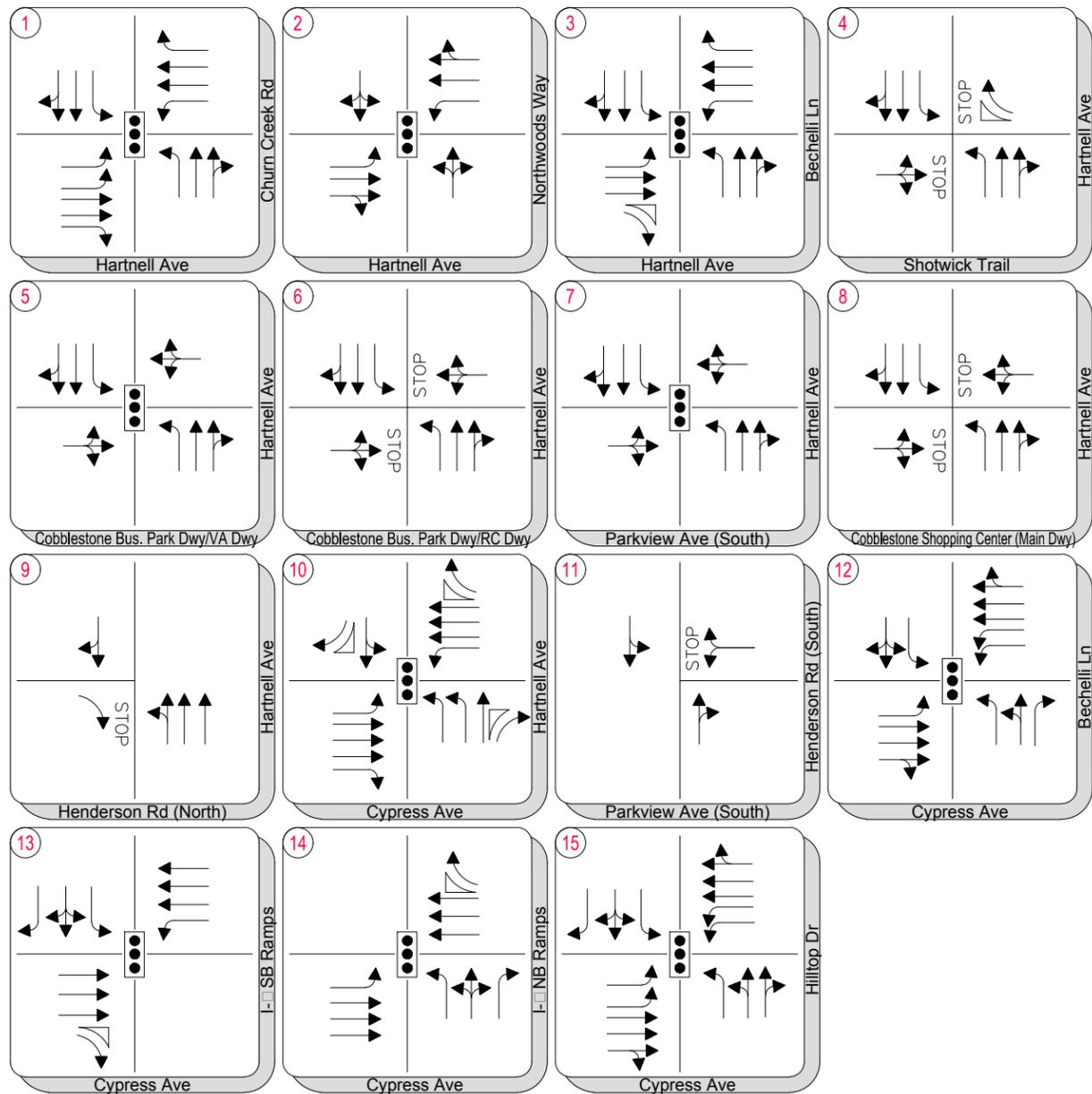


10. Hartnell Avenue & Cypress Avenue
11. Henderson Road (South) & Parkview Avenue (South)
12. Cypress Avenue & Bechelli Lane
13. I-5 Southbound (SB) Ramps & Cypress Avenue
14. I-5 Northbound (NB) Ramps & Cypress Avenue
15. Cypress Avenue & Hilltop Drive

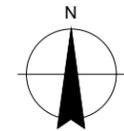
The AM peak hour is defined as one-hour of peak traffic flow counted between 7:00 am and 9:00 am. The PM peak hour is defined as one-hour of peak traffic flow counted between 4:00 pm and 6:00 pm.

AM and PM peak hour intersection turning movement traffic counts were originally collected at all study intersections by GHD in September, October, and November 2016. The study intersections were recounted in May 2018. The 2016 and 2018 counts were compared and for each study intersection the most conservative AM and PM peak hour intersection approach volumes were used for the analysis. Intersection approach volumes were balanced based to the highest count data along the East Cypress Avenue and Hartnell Avenue corridors. However, due to volume balancing along these study corridors, volumes used in the analysis may not exactly match raw count data included in Appendix A.

Figure 2 presents the *Existing* lane geometrics and intersection traffic control types. Figure 3 presents the *Existing* conditions traffic volumes for all study intersections.



LEGEND:
 VEHICLE LANE
 TRAFFIC SIGNAL

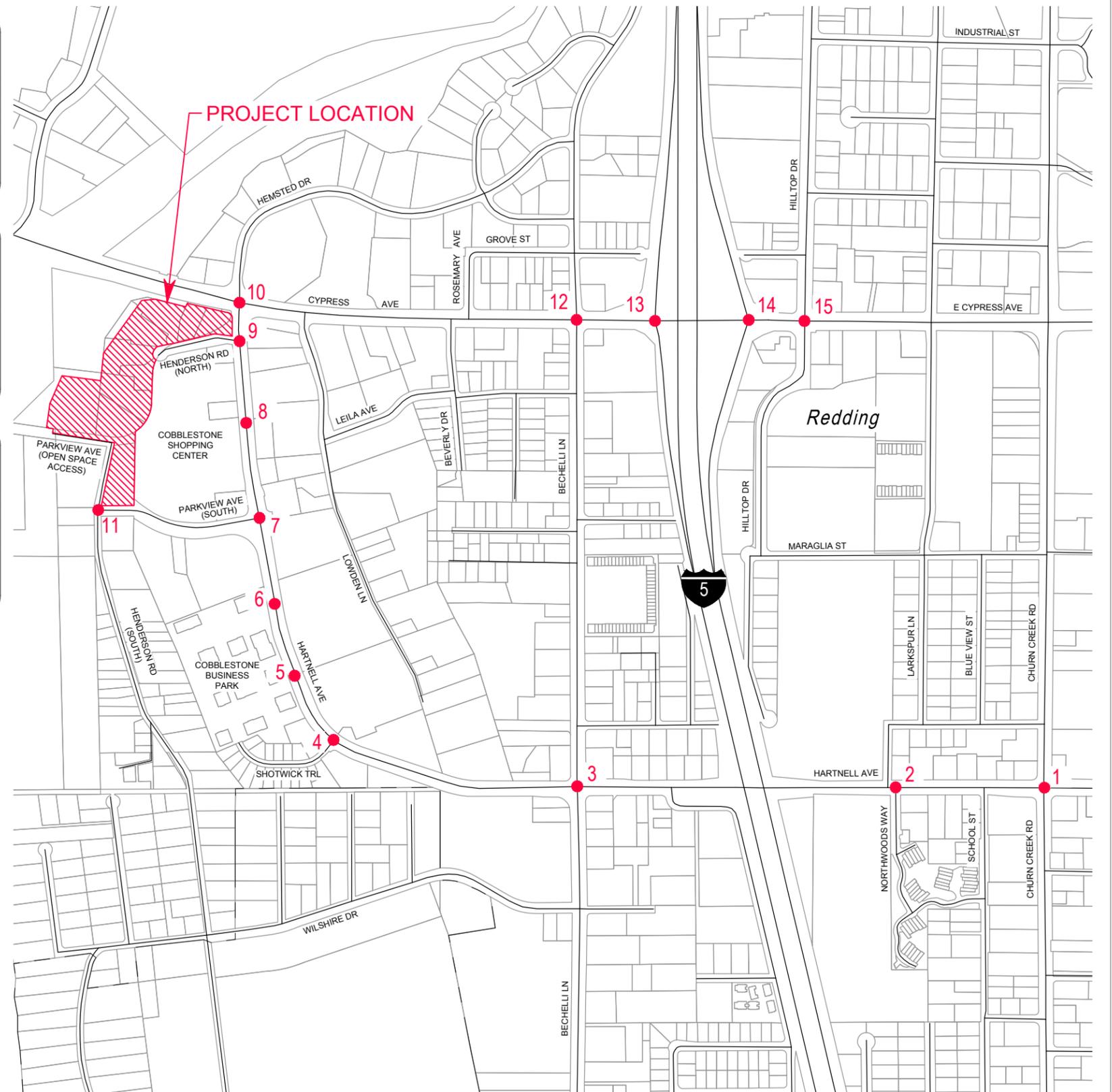
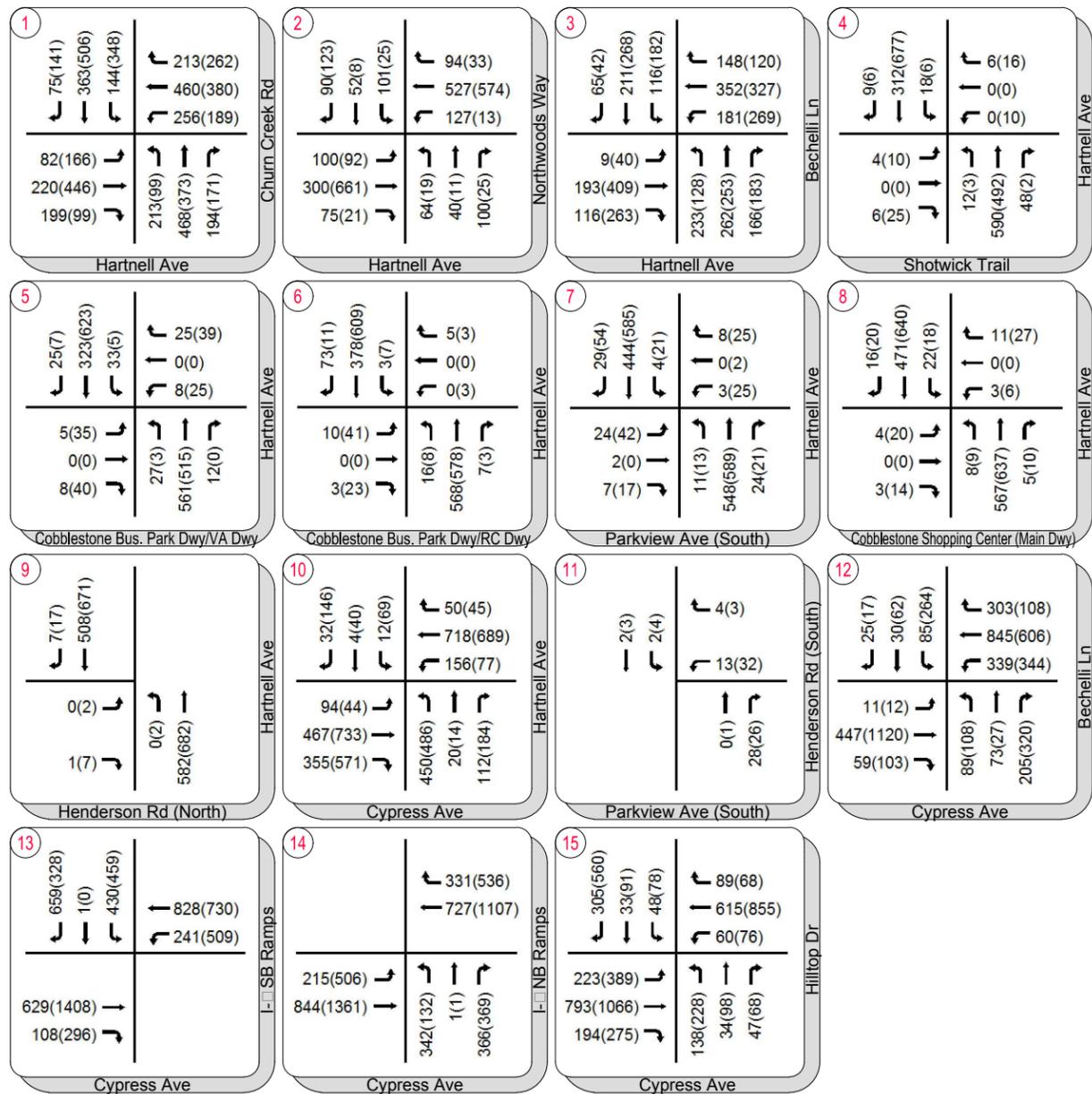


Dignity Mercy Medical Center Redding
 NORTH STATE PAVILION TIAR

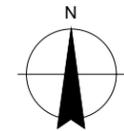
**EXISTING LANE GEOMETRICS
 AND CONTROL**

Project No. 111454024
 Report No. R1966RPT006
 Date October 2018

FIGURE 2



LEGEND:
 XXX - AM PEAK HOUR TRAFFIC VOLUMES
 (XX) - PM PEAK HOUR TRAFFIC VOLUMES



Dignity Mercy Medical Center Redding
 NORTH STATE PAVILION TIAR

**EXISTING PEAK HOUR
 TRAFFIC VOLUMES**

Project No. 111454024
 Report No. R1966RPT006
 Date October 2018

FIGURE 3



3. Level of Service Methodologies and Guidelines

3.1 General LOS Methodologies

Intersection level of service (LOS) was calculated for all control types using the methods documented in the Transportation Research Board publications *Highway Capacity Manual 2000 and 2010*. LOS determinations are presented on a letter grade scale from “A” to “F”, whereby LOS “A” represents “free-flow” conditions and LOS “F” represents over capacity conditions.

3.2 Intersection LOS Methodologies

Intersection LOS was calculated for all control types using the *Synchro 10* software by *Trafficware*. LOS calculations for signalized study intersections were performed using methods documented in HCM 2000. LOS calculations for unsignalized intersections were performed using HCM 2010. Table 4.1 presents the delay-based LOS criteria for different types of intersection control.



Table 4.1 – Level of Service Criteria for Intersections

Level of Service	Type of Flow	Delay	Maneuverability	Stopped Delay/Vehicle (sec)	
				Signalized/ Roundabouts	Unsignalized/ All-Way Stop
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	< 10.0	< 10.0
B	Stable Flow	Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles.	>10 and ≤ 20.0	>10 and ≤ 15.0
C	Stable Flow	Higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted.	>20 and ≤ 35.0	>15 and ≤ 25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	>35 and ≤ 55.0	>25 and ≤ 35.0
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	>55 and ≤ 80.0	>35 and ≤ 50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors.	Jammed conditions. Back-ups from other locations restrict or prevent movement. Volumes may vary widely, depending principally on the downstream back-up conditions.	> 80.0	> 50.0

References: 2000 Highway Capacity Manual



3.3 General Plan Information and Policies

The following section presents the LOS guidelines and policies used in this TIAR.

3.3.1 City of Redding LOS Guidelines

The City of Redding currently maintains its General Plan Transportation Element that is accessible via the following internet site: <http://www.cityofredding.org/home/showdocument?id=5513>. The City's Transportation Element contains the following information of particular interest to this study:

Policy T5A: Establish the following peak-hour LOS standards for transportation planning and project review. They reflect the special circumstances of various areas of the community:

1. Use LOS "C" – for most arterial streets and their intersections.
2. Use LOS "D" – for the Downtown area where vitality, activity, and pedestrian and transit use are primary goals.
3. Use LOS "D" – for streets within the State highway system and interchanges.
4. Use LOS "D" – for river-crossing street corridors whose capacity is affected by adjacent intersections.

3.3.2 Caltrans LOS Guidelines

The Caltrans published Guide for the Preparation of Traffic Impact Studies (dated December 2002) states the following:

"Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities, however, Caltrans acknowledges that this may not be always feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS."

3.3.3 LOS Thresholds

Consistent with the agencies' policies, this study will consider LOS "C" as the standard acceptable threshold for all intersections and LOS "D" as the standard acceptable threshold for all intersections in the jurisdiction of Caltrans. However, the following intersections are consider to operate at LOS "D" and are under jurisdiction of the City of Redding:

- Hartnell Avenue & Cypress Avenue
 - River-Crossing street corridor whose capacity is affected by adjacent intersection.
- Cypress Avenue & Bechelli Lane
 - Street within the State highway system and interchanges
- Cypress Avenue & Hilltop Drive
 - Street within the State highway system and interchanges



3.4 Significance Thresholds

In accordance with the January 2009 City of Redding TIA Guidelines, the following thresholds of significance are used to determine if the proposed project causes a significant impact and requires mitigation:

3.4.1 Signalized Intersections

The project causes an acceptable LOS to decline to an unacceptable LOS, or

The project increases the overall average delay by more than 5 seconds per vehicle at an intersection having an unacceptable LOS without project traffic.

3.4.2 Two-Way Stop Intersections

- The project causes the following to occur for the worst-case movement:
 - The LOS declines to an unacceptable LOS, and
 - The volume to capacity ratio exceeds 0.75, and
 - The 95th percentile queue exceeds 75 feet (3 vehicles), or
- The project causes the worst-case movement's acceptable LOS to decline to an unacceptable LOS and the peak hour volume signal warrant is met, or
- The project increases the average delay for the worst-case movement by more than 5 seconds per vehicle at an intersection that has an unacceptable LOS without the project and the intersection also meets the peak hour volume signal warrant

3.4.3 Queue Increase

- The project causes an unacceptable increase in vehicular queues at an intersection

3.4.4 Mitigations and Fee

In accordance with the January 2009 City of Redding TIA Guidelines, the following guidelines should be considered if the proposed project causes a significant impact and requires a payment into the Traffic Impact Fee programs.

6.1 Impacts in Existing plus Project Conditions - *It is the project's responsibility to install the project's recommended improvements at the time of development in order to mitigate impacts to a less-than-significant level. The project is 100% responsible for these improvements.*

6.2 Impacts in Cumulative Conditions -

- i. *If the project's fair share of a cumulative impact is 25 percent or more, then the recommended improvements shall be installed at the time of development, subject to a reimbursement agreement. If the recommended improvement is included in the current list of Traffic Impact Fee (TIF) projects, reimbursement will be in the form of either TIF credit or payment from the TIF.*



- ii. *If the project's fair share of a cumulative impact is less than 25 percent, then the project will be required to pay its fair share of the cost of the improvements to be constructed later by others, prior to the realization of the impact. If the recommended improvement is included in the current list of TIF projects, then payment of the project's. TIF fee will be considered mitigation for the impact.*

3.5 Technical Analysis Parameters

This TIAR provides a “preliminary operational level” evaluation of traffic operating conditions. Table 4.2 presents the technical analysis parameters used in this study.

Table 4.2 – Intersection Technical Analysis Parameters

1	Analysis Period - 15 Minutes
2	Peak Hour Factor (PHF)- from counts for Existing conditions, 0.92 or higher for Year 2040 conditions. PHF Greater than 0.92 due to Existing counts showing higher PHF.
3	% Trucks: weekday peak hour analysis - from counts, min. 2%
4	25 ft. assumed vehicle length for stacking and queues
5	Cycle Length - 80 sec min, 150 sec max (optimize signal timing)
6	Coordinated Cycle Length - obtained from City and Caltrans. Specifically, timings were obtained for the Cypress Ave interchange with Interstate 5. (optimize signal timing for Year 2040 conditions)
7	Total Lost Time Per Signal Phase - 4 seconds (24 sec max for 8-phase signal)
8	Pedestrian Speed - 3.5 ft/s and 10 mph for bicycles

Source: Figure 4.5 City of Redding TIA Guideline January 2009, modified as appropriate

3.6 Warrant Analysis

A supplemental traffic signal “warrant” analysis will be completed for unsignalized intersections determined to be operating at unacceptable LOS. The term “signal warrant” refers to the list of established criteria used by public agencies to quantitatively justify or ascertain the need for installation of a traffic signal at an unsignalized intersection. This study has employed the signal warrant criteria presented in the latest edition of the California (CA) Manual on Uniform Traffic Control Devices (MUTCD) for all unsignalized study intersection.

The CA MUTCD indicates that the installation of a traffic signal should be considered if one or more of the signal warrants are met. Specifically, this study utilizes the peak hour volume-based Warrant 3 as one representative type of traffic signal warrant analysis. It should be noted that the Peak Hour Volume Warrant was only applied when the intersection was found to be operating at unacceptable LOS. Therefore, there may be instances when the unsignalized intersection operates at acceptable LOS conditions but still meets the Peak Hour Volume Warrant.



4. Existing Conditions

The *Existing* conditions presents the analysis scenarios in which current operations at study locations are analyzed and establishes the baseline traffic conditions.

4.1 Existing Intersection Operations

Existing weekday AM and PM peak hour intersection traffic operations were quantified utilizing the existing traffic volumes and existing intersection lane geometrics and control. Table 5.1 presents the intersection operations for *Existing* conditions.

Table 5.1 – Existing Intersection Level of Service

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	Hartnell Ave & Churn Creek Rd	Signal	C	37.9	D	-	39.0	D	-
2	Hartnell Ave & Northwoods Way	Signal	C	29.8	C	-	13.2	B	-
3	Hartnell Ave & Bechelli Ln	Signal	C	26.3	C	-	31.1	C	-
4	Hartnell Ave & Shotwick Trail	TWSC	C	13.7	B	-	17.4	C	-
5	Hartnell Ave & Cobblestone Bus Park Dwy/VA Dwy	Signal	C	14.0	B	-	9.5	A	-
6	Hartnell Ave & Cobblestone Bus Park Dwy/RC Dwy	TWSC	C	19.3	C	-	28.6	D	No
7	Hartnell Ave & Parkview Ave (South)	Signal	C	5.3	A	-	9.1	A	-
8	Hartnell Ave & Cobblestone Shopping Center (Main Dwy)	TWSC	C	16.8	C	-	29.5	D	No
9	Hartnell Ave & Henderson Rd (North)	TWSC	C	12.6	B	-	15.2	C	-
10	Hartnell Ave & Cypress Ave	Signal	D	27.8	C	-	27.0	C	-
11	Henderson Rd (South) & Parkview Ave (South)	TWSC	C	8.8	A	-	8.8	A	-
12	Cypress Ave & Bechelli Ln	Signal	D	26.0	C	-	34.7	C	-
13	I-5 SB Ramps & Cypress Ave	Signal	D	24.5	C	-	36.7	D	-
14	I-5 NB Ramps & Cypress Ave	Signal	D	18.2	B	-	26.0	C	-
15	Cypress Ave & Hilltop Dr	Signal	D	25.9	C	-	44.1	D	-

Notes:

1. TWSC = Two Way Stop Control

2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for Signal

3. Warrant = Based on California MUTCD Warrant 3

4. Bold font denotes unacceptable LOS

As presented in Table 5.1, all study intersections, except the intersections listed below, are currently found to operate at or above the threshold LOS:

- Intersection 1 - Hartnell Avenue & Churn Creek Road
- Intersection 6 - Hartnell Avenue & Cobblestone Business Park Driveway/Retirement Community Driveway
- Intersection 8 - Hartnell Avenue & Cobblestone Shopping Center (Main Driveway)



4.2 Existing Queues

Tables 5.2 and 5.3 present the *Existing* queues for critical intersections on the Hartnell Avenue and Cypress Avenue corridors.

Table 5.2 – Existing 95th Percentile Queue Length

Int. #	Intersection/Approach	Control Type	Existing 95 th Percentile Queue (ft)		Available Storage
			AM Peak Hour	PM Peak Hour	
1	Hartnell Avenue & Churn Creek Road				
	Eastbound Left	Signal	68	112	100
	Eastbound Thru		129	240	-
	Eastbound Right		65	52	75
	Westbound Left		328	239	175
	Westbound Thru		207	180	-
	Westbound Right		78	61	145
	Northbound Left		401	146	115
	Northbound Thru		435	287	-
	Southbound Left		204	532	110
	Southbound Thru		238	325	-
2	Hartnell Avenue & Northwoods Way				
	Eastbound Left	Signal	118	83	75
	Eastbound Thru		157	171	-
	Westbound Left		142	22	90
	Westbound Thru		272	171	-
	Northbound Thru		211	46	-
	Southbound Thru		212	66	-
5	Hartnell Avenue & Cobblestone Business Park Driveway/VA Driveway				
	Northbound Left	Signal	43	8	60
	Northbound Thru		206	104	-
	Southbound Left		50	11	70
	Southbound Thru		121	129	-
7	Hartnell Avenue & Parkview Avenue				
	Eastbound Thru	Signal	26	0	-
	Westbound Thru		0	30	-
10	Hartnell Avenue & Cypress Avenue				
	Westbound Left	Signal	232	113	225

Note: **Bold** text indicates queues that exceed available storage



Table 5.3 – Existing 95th Percentile Queue Length

Int. #	Intersection/Approach	Control Type	Existing 95 th Percentile Queue (ft)		Available Storage
			AM Peak Hour	PM Peak Hour	
12	Bechelli Lane & Cypress Avenue				
	Eastbound Left	Signal	30	116	95
	Eastbound Thru		200	856	-
	Eastbound Thru/Right		109	533	-
	Westbound Left		190	181	300
	Westbound Thru		164	169	-
	Westbound Thru/Right		214	203	-
	Northbound Left/Thru		187	273	-
	Northbound Right		90	339	-
	Southbound Left		98	237	-
	Southbound Left/Thru/Right		95	212	-
13	I-5 SB Ramps & Cypress Avenue				
	Eastbound Thru	Signal	293	457	-
	Eastbound Right		48	177	30
	Westbound Left		276	350	215
	Westbound Thru		220	539	-
	Southbound Left		267	657	-
	Southbound Left/Thru/Right		367	672	-
	Southbound Right		305	526	375
14	I-5 NB Ramps & Cypress Avenue				
	Eastbound Left	Signal	281	345	230
	Eastbound Thru		229	545	-
	Westbound Thru		257	288	-
	Westbound Right		108	171	30
	Northbound Left		264	255	535
	Northbound Left/Thru/Right		340	336	-
	Northbound Right		291	287	635
15	Hilltop Drive & Cypress Avenue				
	Eastbound Left	Signal	151	253	220
	Eastbound Thru		201	279	-
	Eastbound Thru/Right		223	268	-
	Westbound Left		117	269	95
	Westbound Thru		218	997	-
	Westbound Thru/Right		242	946	-
	Northbound Left		104	241	-
	Northbound Left/Thru		120	226	-
	Northbound Thru/Right		54	154	-
	Southbound Left		78	166	130
	Southbound Left/Thru/Right		240	318	-
	Southbound Right		139	329	-

Note: **Red** text indicates queues that exceed available storage

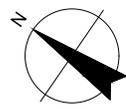
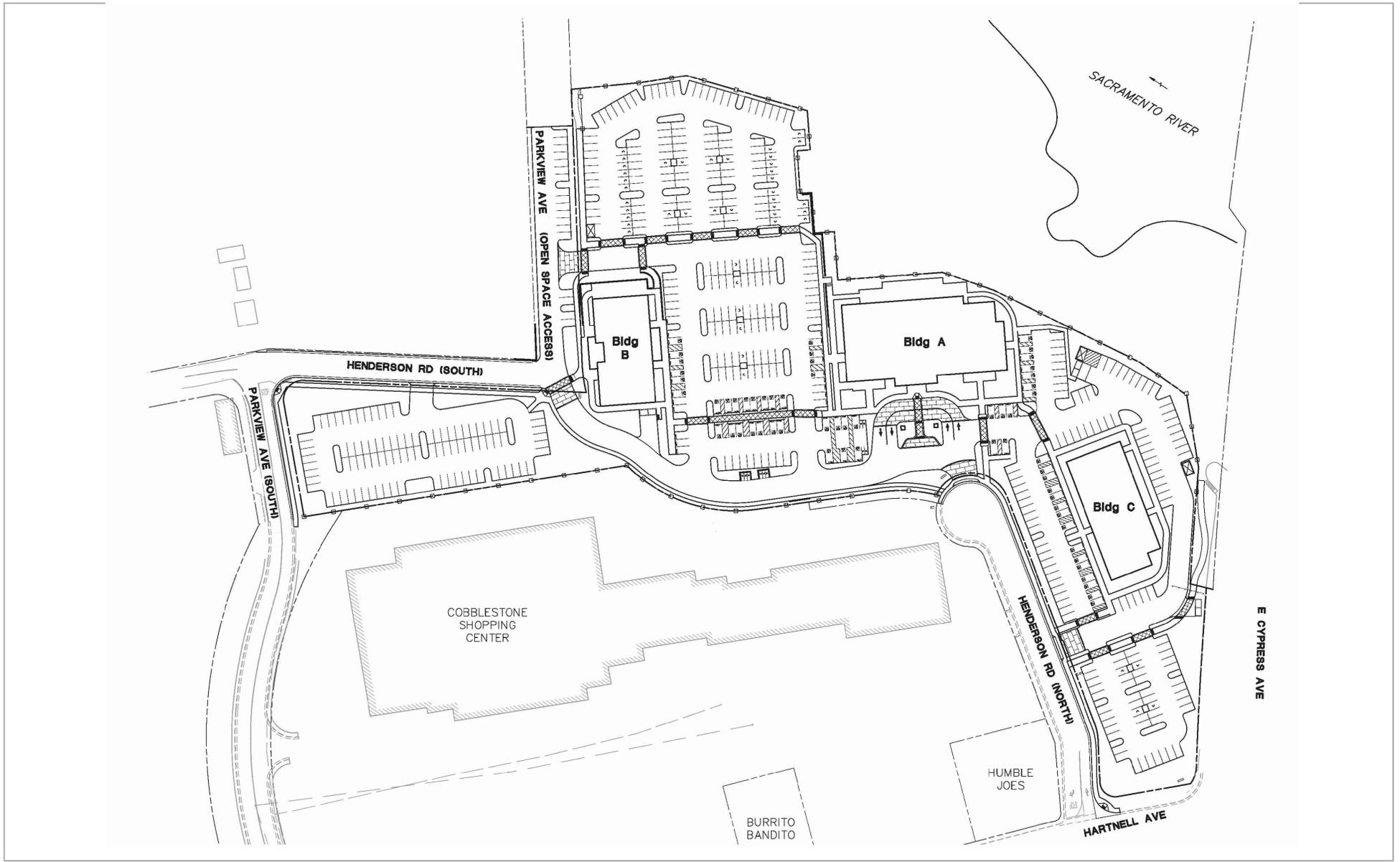


5. Project Description

The proposed project will be completed in one phase for the purposes of traffic analysis. The term "project", as used in this report, refers to the development as follows:

- Location - ±10.8 acres south of Cypress Avenue from Hartnell Avenue to the Sacramento River.
 - Up to 130 ksf Medical Office Space.
- Access to the project will be provided at the following proposed driveways:
 - One full access driveway to Henderson Road (South)
 - One full access driveway to Parkview Avenue (Open Space Access)
 - Two full access driveways along Henderson Road (North)
- The proposed project will modify the intersection of Henderson Road (North) and Hartnell Avenue to right-in-right-out only by constructing a narrow raised concrete median on Hartnell to restrict left turns out.

Figure 4 presents the project site plan and the project access locations.



Dignity Mercy Medical Center Redding
NORTH STATE PAVILION TIAR

PROJECT SITE PLAN

Project No. 11145024
Report No. R1966RPT006
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FIGURE 4



5.1 Project Trip Generation

Trip generation was developed using the Institute of Transportation Engineers (ITE) *Trip Generation Manual 9th Edition*.

In order to calculate trip generation for the proposed project during the PM peak hour, PM peak hour counts were performed at four (4) northern California medical complexes with similar uses to the proposed project. When compared, the four northern California medical complexes were shown to generate less traffic compared to the published averaged rates and equations in the ITE Trip Generation Manual 4th Edition.

The proposed project will use ITE average rates for AM peak hour and the average rate derived from the four northern California medical complexes for the PM peak hour (Omni-Means Memorandum, Project Trip Rates, November 22, 2016), as presented in Appendix D. Table 6.1 presents the trip generation rates for AM and PM peak hours for the proposed project.

Table 6.1 – Project Trip Generation

Land Use Category (ITE Code)	Unit ¹	Daily Trip Rate/Unit ²	AM Peak Hour Trip Rate/Unit			PM Peak Hour Trip Rate/Unit		
			Total	In %	Out %	Total	In %	Out %
Medical-Dental Office Building (720)	ksf	36.13	2.39	79%	21%	2.54	24%	76%
Project Name	Quantity (Units)	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
Dignity Health Medical Center Redding	130	4,697	Total	In	Out	Total	In	Out
			311	245	66	330	79	251
Net New Project Trips		4,697	311	245	66	330	79	251

Notes:

1. 1 ksf = 1,000 square feet

2. Trip rates based on ITE Trip Generation Manual 9th edition average rates for Daily and AM Peak Hour conditions. Trip rates for PM Peak Hour were generated using driveway counts

As presented in Table 6.1, the proposed project is projected to generate up to approximately 311 AM and 330 PM peak hour trips.

5.2 Project Access Driveways

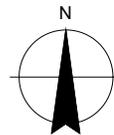
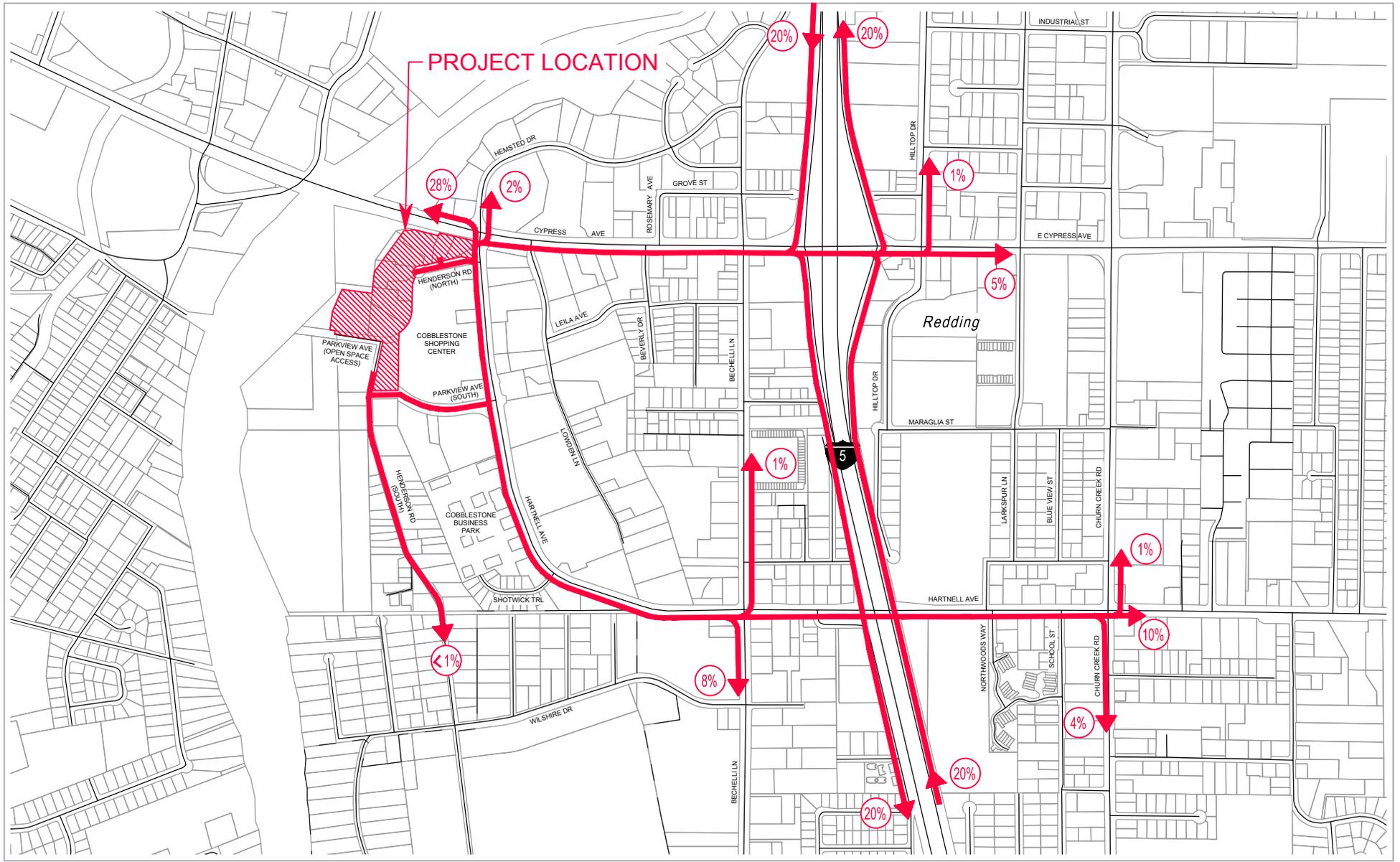
Access to the project will be provided by the following proposed driveways:

- One full-access driveway to Henderson Road (South)
- One full access driveway to Parkview Avenue (Open Space Access)
- Two full access driveways to Henderson Road (North)

5.2.1 Project Trip Distribution

GHD used the Shasta County Regional Traffic Model to determine an approximate distribution of trips that can be expected from the project.

Figure 5 presents the trip distribution based on the current roadway circulation system for the project.



Dignity Mercy Medical Center Redding
NORTH STATE PAVILION TIAR

TRIP DISTRIBUTION

Project No. 11145024
Report No. R1966RPT006
Date October 2018

FIGURE 5



6. Alternative Transportation Modes

The following section outlines the alternative transportation methods present for the existing conditions.

6.1 Pedestrian Facilities

The following section outlines the existing and proposed pedestrian facilities within the project vicinity.

6.1.1 Henderson Road

Henderson Road (North), from Hartnell Avenue to the proposed project frontage (see Figure 4), does not contain any sidewalks on the easterly or westerly sides of the roadway. Henderson Road (South) from the existing open space access to the intersection of Henderson Road & Parkview Avenue, does not contain any sidewalks on the northerly or southerly sides of the roadway. No marked crosswalks are present within the North or South segments of Henderson Road.

6.1.2 Parkview Avenue

Parkview Avenue, along the existing open space access, does not contain any sidewalks on the easterly or westerly sides of the roadway. Park Avenue (South), from Henderson Road (South) to Hartnell Avenue, contains sidewalks on the northerly and southerly sides of the roadway, terminating approximately 165 ft east of Henderson Road (South).

Currently, pedestrian activity is very light on the stated roadways. With the development of the proposed project, pedestrian traffic is expected to increase slightly due to the proximity of the project to surrounding residential and the transit connections on Hartnell Avenue.

6.1.3 Off-Site Improvements

The project will add sidewalks along the following roadway segments:

- On Henderson Road (North) along the project frontage
- On Parkview Avenue (South) along the project frontage
- On Henderson Road (South) along the project frontage
- On Parkview Avenue (Open Space Access) along the project frontage

6.1.4 On-Site Improvements

Pedestrian sidewalks, crosswalks, and accessible paths of travel should be provided within the project area as follows:

- Within the developed core to allow easy access to each building and crosswalk
- Where feasible, configure sidewalks to channel pedestrians to crosswalks



- Between public streets and the developed core
- Between the Existing Cypress Avenue Stairs and Henderson Road (North)

6.2 Bicycle Facilities

Within the City of Redding, the goals for bicycle and trail facilities are contained in the City of Redding *Active Transportation Plan 2018*. The City of Redding *Active Plan 2018* may be viewed at <https://www.dropbox.com/s/mqf1lbu1tdak5bu/2018%20City%20of%20Redding%20ATP.pdf?dl=0>. As related to the proposed projects' study area, the plans identify the following existing and future bicycle facilities:

- Existing Bikeway Network:
 - Class II Buffered Bike Lanes:
 - Hartnell Avenue from Parkview Avenue to Cypress Avenue
 - Class II Bike Lanes:
 - Hartnell Avenue from Parkview Avenue to Northwoods Way
 - Cypress Avenue from Churn Creek Road to Victor Avenue
 - Cypress Avenue from Athens Avenue to Hartnell Avenue
 - Bechelli Lane from Third Street to Cypress Avenue
 - Churn Creek Road from South Bonnyview Road to Hartnell Avenue
 - Class II Bike Routes:
 - Hartnell Avenue from Northwoods Way to Churn Creek Road
 - Cypress Avenue from Hartnell Avenue to Churn Creek Road
 - Bechelli Lane from Cypress Avenue to northern dead end
 - Churn Creek Road from Hartnell Avenue to Cypress Avenue
- Planned Bikeway Network:
 - Class II Buffered Bike Lanes:
 - Hartnell Avenue from Cypress Avenue to Shasta View Drive
 - Bechelli Lane from South Bonnyview Road to Cypress Avenue
 - Churn Creek Road from South Bonnyview Road to Dana Drive
 - Class II Bike Lanes:
 - Cypress Avenue from Athens Avenue to Churn Creek Road
 - Class III Bike Routes:
 - Bechelli Lane from Cypress Avenue to northern dead end



- Build-Out Bikeway Network
 - Class II Buffered Bike Lanes:
 - Hartnell Avenue from Cypress Avenue to Shasta View Drive
 - Bechelli Lane from South Bonnyview Road to Cypress Avenue
 - Churn Creek Road from South Bonnyview Road to Dana Drive
 - Class II Bike Lanes:
 - Cypress Avenue from Athens Avenue to Churn Creek Road
 - Class II Bikes Routes:
 - Bechelli Lane from Cypress Avenue to northern dead end
 - Hemstead Drive from Cypress Avenue to Bechelli Lane

The California Streets and Highways Code defines the various classes of bicycle facilities as follows:

(a) Bike paths or shared use paths, also referred to as "Class I bikeways," which provide a completely separated right-of-way designated for the exclusive use of bicycles and with cross-flows by motorists minimized.

(b) Bike lanes, also referred to as "Class II bikeways," which provide a restricted right-of-way designated for the exclusive or semi-exclusive use of bicycles with through travel by motor vehicles or pedestrians prohibited, but with vehicle parking and cross-flows by pedestrians and motorists permitted.

(c) Bike routes, also referred to as "Class III bikeways," which provide a right-of-way on street or off-street, designated by signs or permanent markings and shared with pedestrians and motorists.

(d) Cycle tracks or separated bikeways, also referred to as "Class IV bikeways," which promote active transportation and provide a right-of-way designated exclusively for bicycle travel adjacent to a roadway and which are separated from vehicular traffic. Types of separation include, but are not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

Under existing conditions, the study roadways have very light bicycle use. With the development of the proposed project, the bicycle traffic is projected to remain very light.

6.2.1 Off-Site Improvements

No off-site improvements to existing bicycle facilities will be constructed by the proposed project.



6.2.2 On-Site Improvements

The implementation of the City's development standards will satisfy the transportation needs of bicyclists.

6.3 Transit Services

Existing transit service is provided primarily by the Redding Area Bus Authority (RABA). RABA provides fixed route services, express route services and demand response services to the general public within the urbanized area of the Shasta County. RABA operates 14 fixed routes and 4 commuter routes within the Cities of Redding, Shasta Lake, and Anderson with the route maps available at:

<http://redding.maps.arcgis.com/apps/webappviewer/index.html?id=8de7d35d437043598aad894ddb7ecb7b>.

Route 5 is a north-south direction service on Hartnell Avenue to/from the Downtown Transit Center. Route 5, which originates and terminates at the Downtown Transit Center, provides bus stops at the Sequoia Middle School, Village Plaza Shopping Center, Parsons Junior High School, and Alta Mesa Elementary School. The nearest Route 5 bus stop is on Hartnell Avenue at Parkview Avenue.

6.3.1 Off-Site Improvements

No off-site improvements to existing transit facilities will be constructed by the proposed project.

6.3.2 On-Site Improvements

Accessible paths of travel will be provided between the project's buildings and public right of way.



7. Existing Plus Project Conditions

The *Existing Plus Project* condition is the analysis scenario in which traffic impacts associated with the proposed project are investigated in comparison to the *Existing* condition scenario.

7.1 Existing Plus Project Intersection Operations

Existing Plus Project AM and PM peak hour intersection traffic operations were quantified by superimposing traffic generated by the proposed project onto *Existing* conditions.

Figure 6 presents the *Existing Plus Project* traffic volumes.

Table 8.1 presents a summary of the *Existing Plus Project* study intersection LOS conditions.

Table 8.1 – Existing Plus Project Intersection Level of Service

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	Hartnell Ave & Churn Creek Rd	Signal	C	38.4	D	-	39.7	D	-
2	Hartnell Ave & Northwoods Way	Signal	C	32.0	C	-	13.4	B	-
3	Hartnell Ave & Bechelli Ln	Signal	C	27.0	C	-	31.5	C	-
4	Hartnell Ave & Shotwick Trail	TWSC	C	14.4	B	-	19.2	C	-
5	Hartnell Ave & Cobblestone Bus Park Dwy/VA Dwy	Signal	C	14.4	B	-	9.6	A	-
6	Hartnell Ave & Cobblestone Bus Park Dwy/RC Dwy	TWSC	C	20.8	C	-	33.7	D	No
7	Hartnell Ave & Parkview Ave (South)	Signal	C	9.5	A	-	14.5	B	-
8	Hartnell Ave & Cobblestone Shopping Center (Main Dwy)	TWSC	C	17.8	C	-	37.4	E	No
9	Hartnell Ave & Henderson Rd (North)	TWSC	C	14.2	B	-	14.8	B	-
10	Hartnell Ave & Cypress Ave	Signal	D	31.1	C	-	29.6	C	-
11	Henderson Rd (South) & Parkview Ave (South)	TWSC	C	9.2	A	-	12.5	B	-
12	Cypress Ave & Bechelli Ln	Signal	D	26.2	C	-	34.8	C	-
13	I-5 SB Ramps & Cypress Ave	Signal	D	24.7	C	-	37.5	D	-
14	I-5 NB Ramps & Cypress Ave	Signal	D	19.0	B	-	27.8	C	-
15	Cypress Ave & Hilltop Dr	Signal	D	26.1	C	-	44.3	D	-

Notes:

1. TWSC = Two Way Stop Control

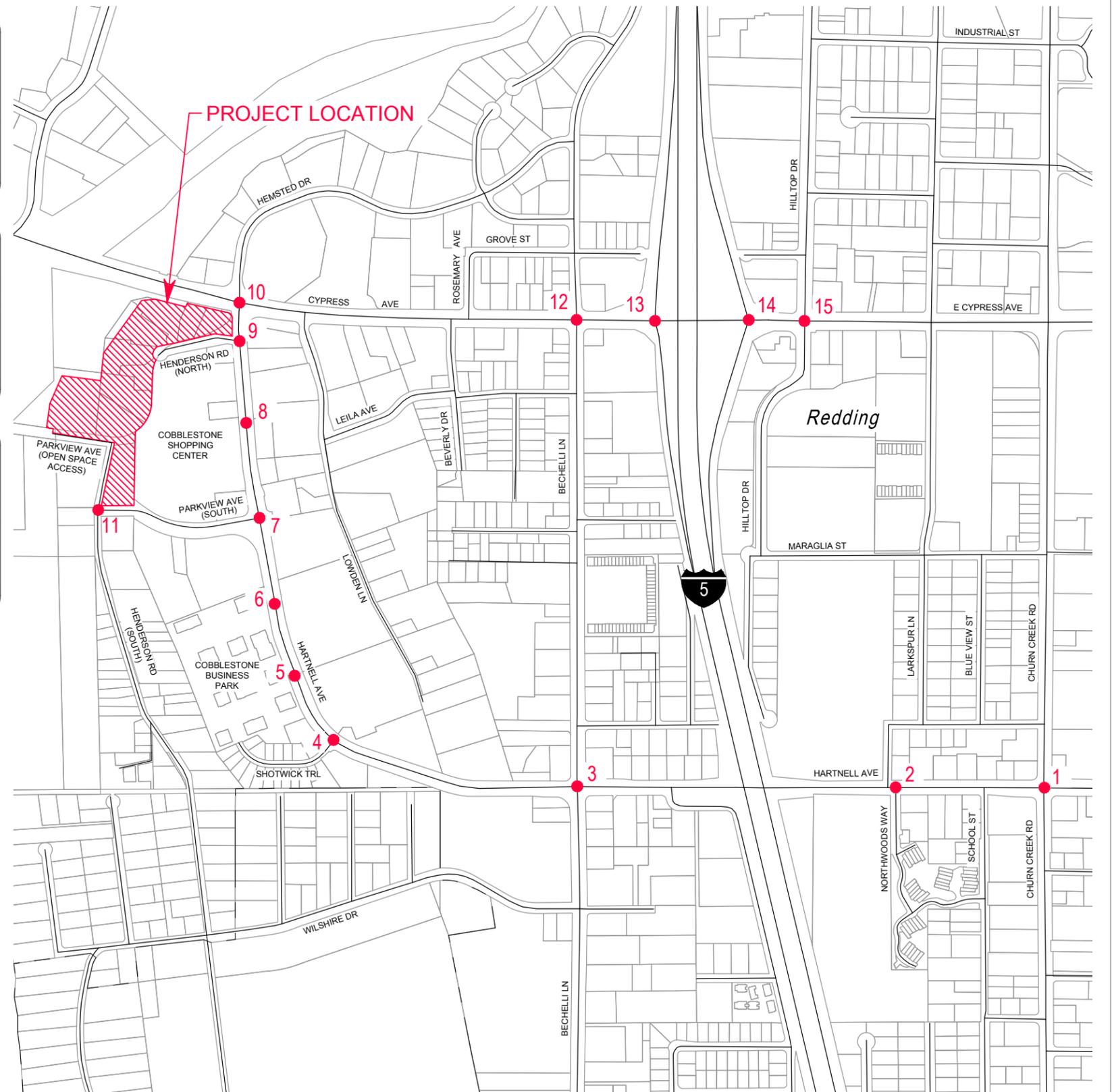
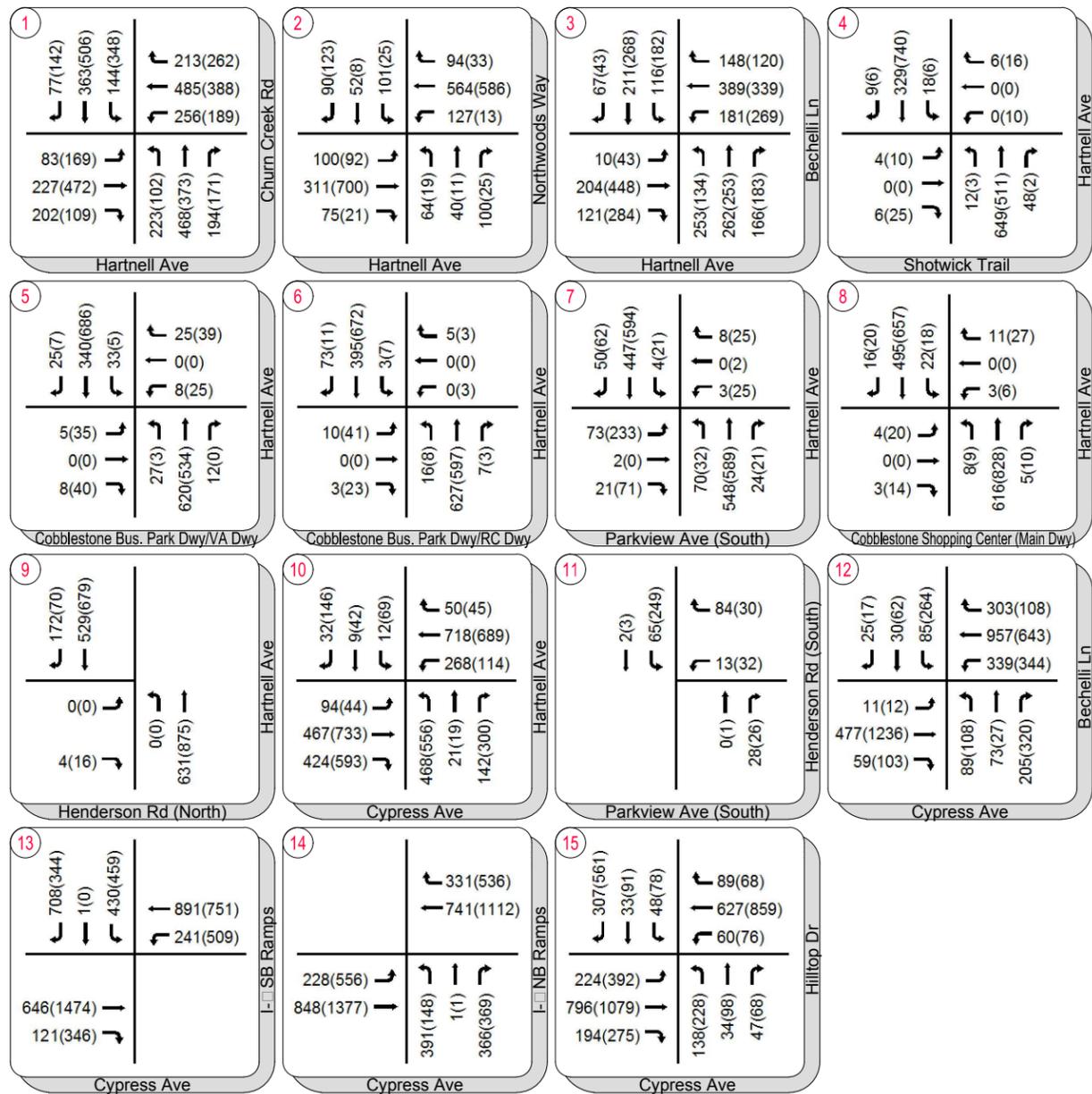
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for Signal

3. Warrant = Based on California MUTCD Warrant 3

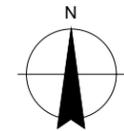
4. **Bold** font denotes unacceptable LOS

As presented in Table 8.1, all study intersections, except the intersection listed below, are currently found to operate at or above the threshold LOS:

- Intersection 1 - Hartnell Avenue & Churn Creek Road
- Intersection 6 - Hartnell Avenue & Cobblestone Business Park Driveway/Retirement Community Driveway
- Intersection 8 - Hartnell Avenue & Cobblestone Shopping Center (Main Driveway)



LEGEND:
 XXX - AM PEAK HOUR TRAFFIC VOLUMES
 (XX) - PM PEAK HOUR TRAFFIC VOLUMES



Dignity Mercy Medical Center Redding
 NORTH STATE PAVILION TIAR
EXISTING PLUS PROJECT PEAK HOUR TRAFFIC VOLUMES

Project No. 111454024
 Report No. R1966RPT006
 Date October 2018

FIGURE 6



7.2 Existing Plus Project Queues

Tables 8.2 and 8.3 present a comparison between the *Existing* and the *Existing Plus Project* queues for critical intersections on the Hartnell Avenue and Cypress Avenue corridors.

Table 8.2 – Existing Plus Project 95th Percentile Queue Length

Int. #	Intersection/Approach	Control Type	Existing 95th Percentile Queue (ft)		Existing Plus Project 95th Percentile Queue (ft)		Available Storage
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
1	Hartnell Avenue & Churn Creek Road						
	Eastbound Left	Signal	68	112	69	113	100
	Eastbound Thru		129	240	133	255	-
	Eastbound Right		65	52	65	61	75
	Westbound Left		328	239	328	239	175
	Westbound Thru		207	180	218	183	-
	Westbound Right		78	61	86	61	145
	Northbound Left		401	146	424	148	115
	Northbound Thru		435	287	435	287	-
	Southbound Left		204	532	204	532	110
	Southbound Thru		238	325	240	325	-
2	Hartnell Avenue & Northwoods Way						
	Eastbound Left	Signal	118	83	118	84	75
	Eastbound Thru		157	171	163	186	-
	Westbound Left		142	22	142	22	90
	Westbound Thru		272	171	292	178	-
	Northbound Thru		211	46	213	46	-
	Southbound Thru		212	66	214	66	-
5	Hartnell Avenue & Cobblestone Business Park Driveway/VA Driveway						
	Northbound Left	Signal	43	8	43	8	60
	Northbound Thru		206	104	234	108	-
	Southbound Left		50	11	50	11	70
	Southbound Thru		121	129	129	144	-
7	Hartnell Avenue & Parkview Avenue						
	Eastbound Thru	Signal	26	0	66	154	-
	Westbound Thru		0	30	0	31	-
10	Hartnell Avenue & Cypress Avenue						
	Westbound Left	Signal	232	113	463	158	225

Note: **Bold** text indicates queues that exceed available storage



Table 8.3 – Existing Plus Project 95th Percentile Queue Length

Int. #	Intersection/Approach	Control Type	Existing 95th Percentile Queue (ft)		Existing Plus Project 95th Percentile Queue (ft)		Available Storage
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
12	Bechelli Lane & Cypress Avenue						
	Eastbound Left	Signal	30	116	41	116	95
	Eastbound Thru		200	856	203	1124	-
	Eastbound Thru/Right		109	533	128	1159	-
	Westbound Left		190	181	190	181	300
	Westbound Thru		164	169	188	172	-
	Westbound Thru/Right		214	203	235	204	-
	Northbound Thru/Left		187	273	190	273	-
	Northbound Right		90	339	94	339	-
	Southbound Left		98	237	98	256	-
	Southbound Left/Thru/Right		95	246	119	236	-
13	I-5 SB Ramps & Cypress Avenue						
	Eastbound Thru	Signal	293	457	293	457	-
	Eastbound Right		48	177	58	177	30
	Westbound Left		276	350	288	351	215
	Westbound Thru		220	539	251	539	-
	Southbound Left		267	657	267	832	-
	Southbound Left/Thru/Right		367	672	381	828	-
	Southbound Right		305	526	329	632	375
14	I-5 NB Ramps & Cypress Avenue						
	Eastbound Left	Signal	281	345	284	353	230
	Eastbound Thru		229	545	234	558	-
	Westbound Thru		257	288	271	292	-
	Westbound Right		108	171	124	171	30
	Northbound Left		264	255	278	257	535
	Northbound Left/Thru/Right		340	336	357	340	-
	Northbound Right		291	287	291	291	635
15	Hilltop Drive & Cypress Avenue						
	Eastbound Left	Signal	151	253	152	253	220
	Eastbound Thru		201	279	201	281	-
	Eastbound Thru/Right		223	268	224	268	-
	Westbound Left		117	269	117	269	95
	Westbound Thru		218	997	227	1178	-
	Westbound Thru/Right		242	946	242	1025	-
	Northbound Left		104	241	114	270	-
	Northbound Thru/Left		120	226	120	230	-
	Northbound Thru/Right		54	154	54	154	-
	Southbound Left		78	166	100	174	130
	Southbound Left/Thru/Right		240	318	270	319	-
	Southbound Right		139	329	172	352	-

Note: **Bold** text indicates queues that exceed available storage



8. Cumulative (Year 2040) Conditions

The long-term future year traffic forecasts for this study have been developed using the Shasta County Regional Travel Demand model.

Year 2040 No Project conditions refer to a cumulative "No Project" condition where the proposed development remains undeveloped through Year 2040, and Year 2040 model land uses are assumed. Additionally, the following projects have been added to the model growth assumptions:

- River Crossing Specific Plan (Costco)
- Churn Creek Marketplace
- Rancheria Development
- K2 Mixed Use Downtown Redevelopment
- K2/McConnell Mixed Use Downtown Development
- Downtown Courthouse
- Lowden Office Complex
- Re-occupancy of vacant grocery store in Cobblestone Shopping Center

Figure 7 presents the *Year 2040 No Project* intersection traffic volumes.



9. Year 2040 No Project Conditions

The *Year 2040 No Project* condition is the analysis scenario in which future operations at study locations, assuming no project development, are analyzed.

9.1 Year 2040 No Project Intersection Operations

Table 10.1 presents a summary of the *Year 2040 No Project* study intersection LOS conditions.

Table 10.1 – Year 2040 No Project Intersection Level of Service

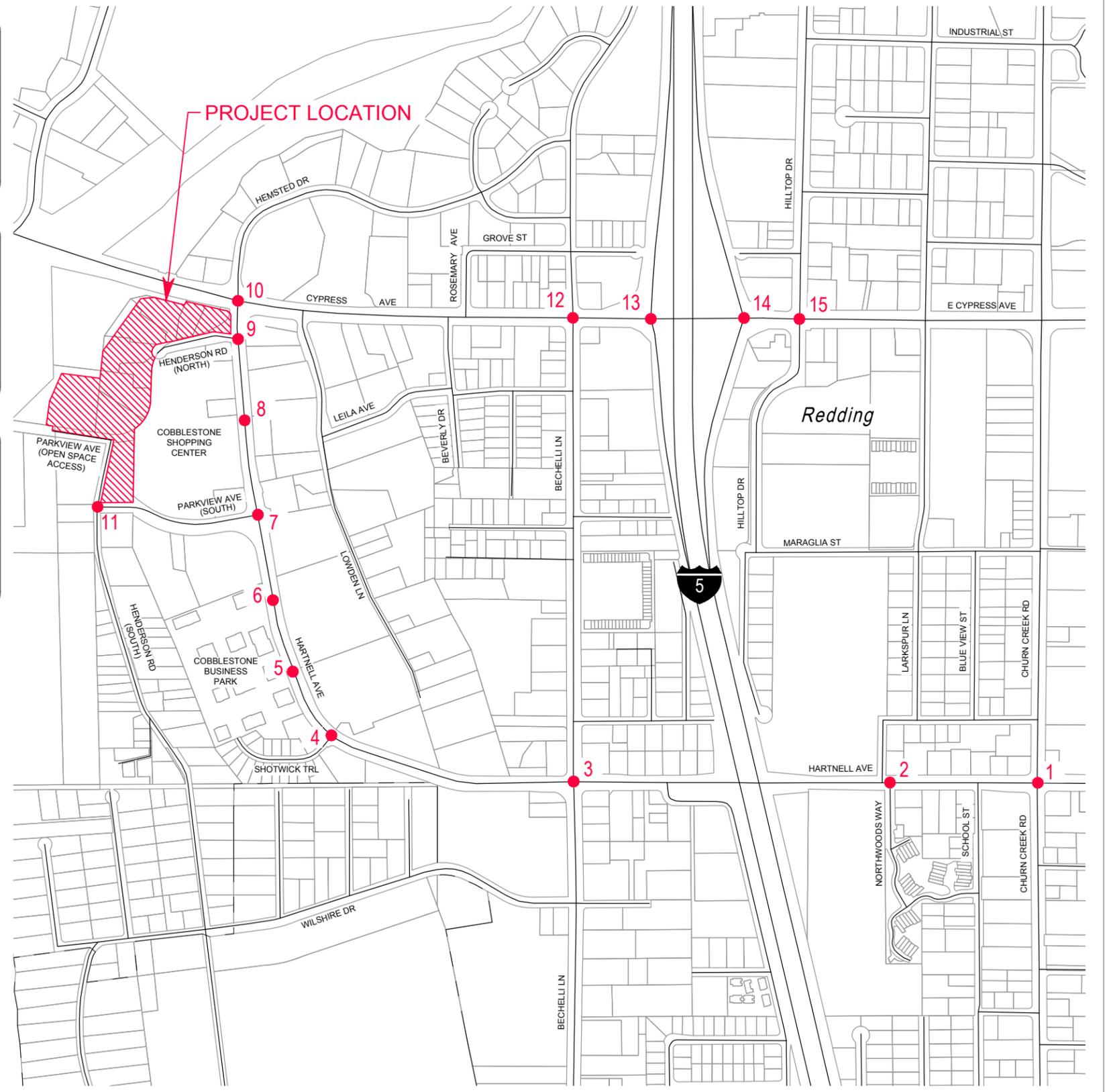
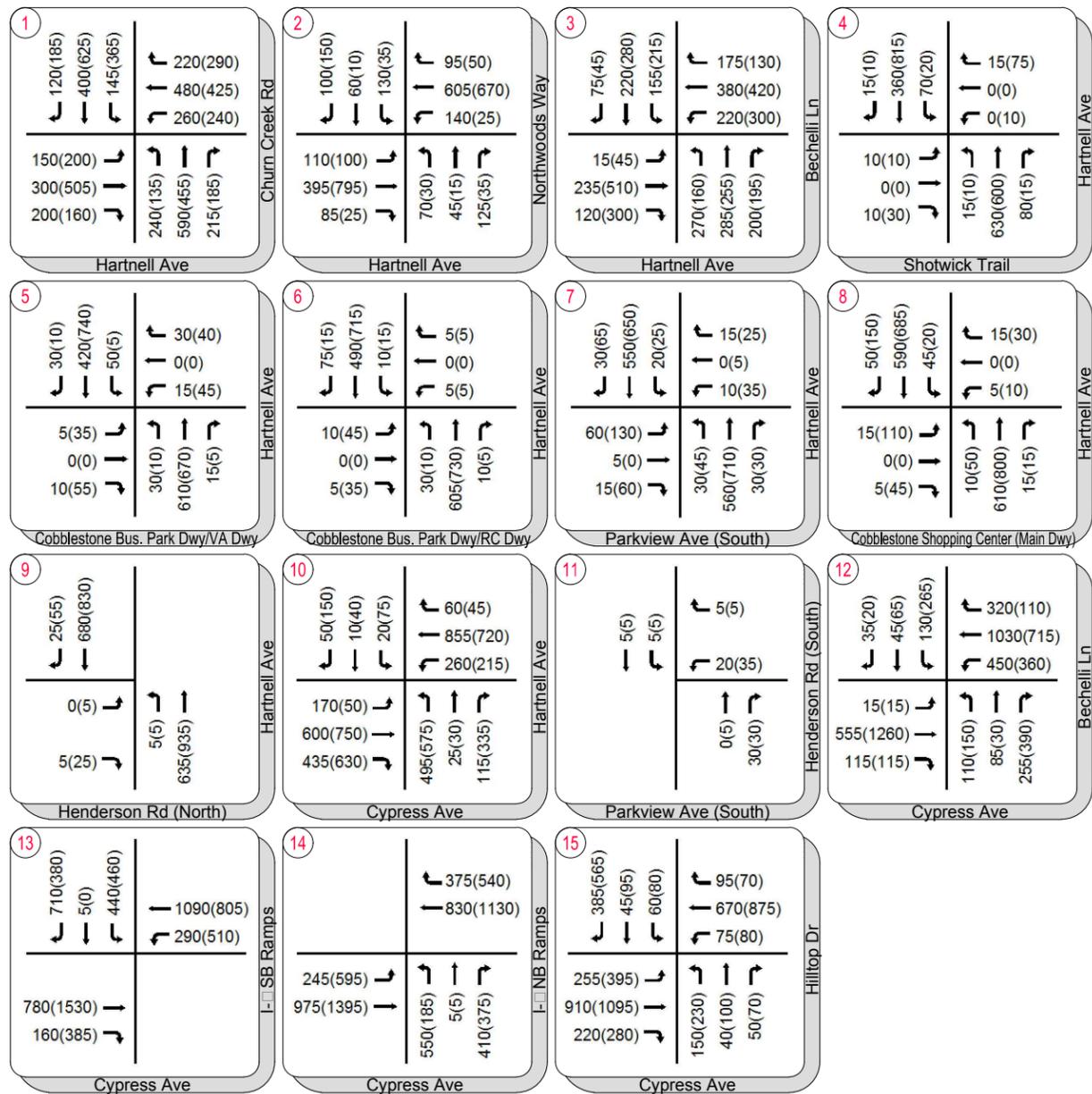
#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	Hartnell Ave & Churn Creek Rd	Signal	C	42.4	D	-	47.8	D	-
2	Hartnell Ave & Northwoods Way	Signal	C	35.3	D	-	15.4	B	-
3	Hartnell Ave & Bechelli Ln	Signal	C	29.7	C	-	34.1	C	-
4	Hartnell Ave & Shotwick Trail	TWSC	C	17.2	C	-	21.3	C	-
5	Hartnell Ave & Cobblestone Bus Park Dwy/VA Dwy	Signal	C	15.2	B	-	10.0	A	-
6	Hartnell Ave & Cobblestone Bus Park Dwy/RC Dwy	TWSC	C	20.4	C	-	37.8	E	No
7	Hartnell Ave & Parkview Ave (South)	Signal	C	9.0	A	-	10.7	B	-
8	Hartnell Ave & Cobblestone Shopping Center (Main Dwy)	TWSC	C	27.4	D	No	OVR	F	Yes
9	Hartnell Ave & Henderson Rd (North)	TWSC	C	14.0	B	-	19.3	C	-
10	Hartnell Ave & Cypress Ave	Signal	D	32.4	C	-	32.6	C	-
11	Henderson Rd (South) & Parkview Ave (South)	TWSC	C	8.8	A	-	8.8	A	-
12	Cypress Ave & Bechelli Ln	Signal	D	28.1	C	-	38.5	D	-
13	I-5 SB Ramps & Cypress Ave	Signal	D	25.1	C	-	38.9	D	-
14	I-5 NB Ramps & Cypress Ave	Signal	D	22.7	C	-	31.7	C	-
15	Cypress Ave & Hilltop Dr	Signal	D	28.5	C	-	45.3	D	-

Notes:

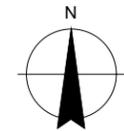
1. TWSC = Two Way Stop Control
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for Signal
3. Warrant = Based on California MUTCD Warrant 3
4. **Bold** font denotes unacceptable LOS

As presented in Table 10.1, all study intersections, except the intersections listed below, are projected to operate at or above the threshold LOS:

- Intersection 1 - Hartnell Avenue & Churn Creek Road
- Intersection 2 - Hartnell Avenue & Northwoods Way
- Intersection 6 - Hartnell Avenue & Cobblestone Business Park/Retirement Community Driveway
- Intersection 8 - Hartnell Avenue & Cobblestone Shopping Center Driveway



LEGEND:
 XXX - AM PEAK HOUR TRAFFIC VOLUMES
 (XX) - PM PEAK HOUR TRAFFIC VOLUMES



Dignity Mercy Medical Center Redding
 NORTH STATE PAVILION TIAR

YEAR 2040 PEAK HOUR
 TRAFFIC VOLUMES

Project No. 111454024
 Report No. R1966RPT006
 Date October 2018

FIGURE 7



9.2 Year 2040 No Project Queues

Tables 10.2 and 10.3 present the Year 2040 No Project queues for critical intersections on the Hartnell Avenue and Cypress Avenue corridors.

Table 10.2 – Year 2040 No Project 95th Percentile Queue Length

Int. #	Intersection/Approach	Control Type	Year 2040 No Project 95 th Percentile Queue (ft)		Available Storage
			AM Peak Hour	PM Peak Hour	
1	Hartnell Avenue & Churn Creek Road				
	Eastbound Left	Signal	107	135	100
	Eastbound Thru		170	288	-
	Eastbound Right		102	120	75
	Westbound Left		328	301	175
	Westbound Thru		221	205	-
	Westbound Right		86	76	145
	Northbound Left		449	208	115
	Northbound Thru		576	392	-
	Southbound Left		204	601	110
	Southbound Thru		277	453	-
2	Hartnell Avenue & Northwoods Way				
	Eastbound Left	Signal	127	93	75
	Eastbound Thru		206	240	-
	Westbound Left		157	36	90
	Westbound Thru		345	229	-
	Northbound Thru		272	64	-
	Southbound Thru		265	82	-
5	Hartnell Avenue & Cobblestone Business Park Driveway/VA Driveway				
	Northbound Left	Signal	46	17	60
	Northbound Thru		234	145	-
	Southbound Left		63	11	70
	Southbound Thru		158	166	-
7	Hartnell Avenue & Parkview Avenue				
	Eastbound Thru	Signal	54	68	-
	Westbound Thru		0	41	-
10	Hartnell Avenue & Cypress Avenue				
	Westbound Left	Signal	451	253	225

Note: **Bold** text indicates queues that exceed available storage



Table 10.3 – Year 2040 No Project 95th Percentile Queue Length

Int. #	Intersection/Approach	Control Type	Year 2040 No Project 95 th Percentile Queue (ft)		Available Storage
			AM Peak Hour	PM Peak Hour	
12	Bechelli Lane & Cypress Avenue				
	Eastbound Left	Signal	74	127	95
	Eastbound Thru		220	673	-
	Eastbound Thru/Right		184	693	-
	Westbound Left		220	187	300
	Westbound Thru		256	199	-
	Westbound Thru/Right		319	233	-
	Northbound Thru/Left		220	370	-
	Northbound Right		124	449	-
	Southbound Left		126	317	-
	Southbound Left/Thru/Right		161	323	-
13	I-5 SB Ramps & Cypress Avenue				
	Eastbound Thru	Signal	306	467	-
	Eastbound Right		103	178	30
	Westbound Left		290	347	215
	Westbound Thru		251	533	-
	Southbound Left		320	773	-
	Southbound Left/Thru/Right		446	781	-
	Southbound Right		375	582	375
14	I-5 NB Ramps & Cypress Avenue				
	Eastbound Left	Signal	300	367	230
	Eastbound Thru		283	530	-
	Westbound Thru		287	302	-
	Westbound Right		145	176	30
	Northbound Left		439	290	535
	Northbound Left/Thru/Right		519	367	-
	Northbound Right		436	317	635
15	Hilltop Drive & Cypress Avenue				
	Eastbound Left	Signal	168	242	175
	Eastbound Thru		243	290	-
	Eastbound Thru/Right		268	282	-
	Westbound Left		148	256	95
	Westbound Thru		277	588	-
	Westbound Thru/Right		285	513	-
	Northbound Left		129	267	-
	Northbound Thru/Left		130	240	-
	Northbound Thru/Right		67	144	-
	Southbound Left		154	177	130
	Southbound Left/Thru/Right		351	355	-
	Southbound Right		256	418	-

Note: **Bold** text indicates queues that exceed available storage



10. Year 2040 Plus Project Conditions

Year 2040 Plus Project conditions were simulated by superimposing traffic generated by full build-out of the proposed project onto Year 2040 No Project traffic volumes.

Figure 8 presents the Year 2040 Plus Project traffic volumes.

10.1 Year 2040 Plus Project Intersection Operations

Table 11.1 presents a summary of the Year 2040 Plus Project study intersection LOS conditions.

Table 11.1 – Year 2040 Plus Project Intersection Level of Service

#	Intersection	Control Type ^{1,2}	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay	LOS	Warrant Met? ³	Delay	LOS	Warrant Met? ³
1	Hartnell Ave & Churn Creek Rd	Signal	C	43.4	D	-	48.5	D	-
2	Hartnell Ave & Northwoods Way	Signal	C	36.0	D	-	15.6	B	-
3	Hartnell Ave & Bechelli Ln	Signal	C	29.8	C	-	34.6	C	-
4	Hartnell Ave & Shotwick Trail	TWSC	C	18.3	C	-	23.5	C	-
5	Hartnell Ave & Cobblestone Bus Park Dwy/VA Dwy	Signal	C	15.7	B	-	10.0	B	-
6	Hartnell Ave & Cobblestone Bus Park Dwy/RC Dwy	TWSC	C	21.8	C	-	46.0	E	No
7	Hartnell Ave & Parkview Ave (South)	Signal	C	13.0	B	-	20.0	B	-
8	Hartnell Ave & Cobblestone Shopping Center (Main Dwy)	TWSC	C	29.8	D	No	OVR	F	Yes
9	Hartnell Ave & Henderson Rd (North)	TWSC	C	15.5	C	-	18.3	C	-
10	Hartnell Ave & Cypress Ave	Signal	D	35.1	D	-	35.6	D	-
11	Henderson Rd (South) & Parkview Ave (South)	TWSC	C	9.1	A	-	12.3	B	-
12	Cypress Ave & Bechelli Ln	Signal	D	28.2	C	-	38.9	D	-
13	I-5 SB Ramps & Cypress Ave	Signal	D	25.3	C	-	40.1	D	-
14	I-5 NB Ramps & Cypress Ave	Signal	D	25.0	C	-	37.1	D	-
15	Cypress Ave & Hilltop Dr	Signal	D	28.6	C	-	45.5	D	-

Notes:

1. TWSC = Two Way Stop Control

2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for Signal

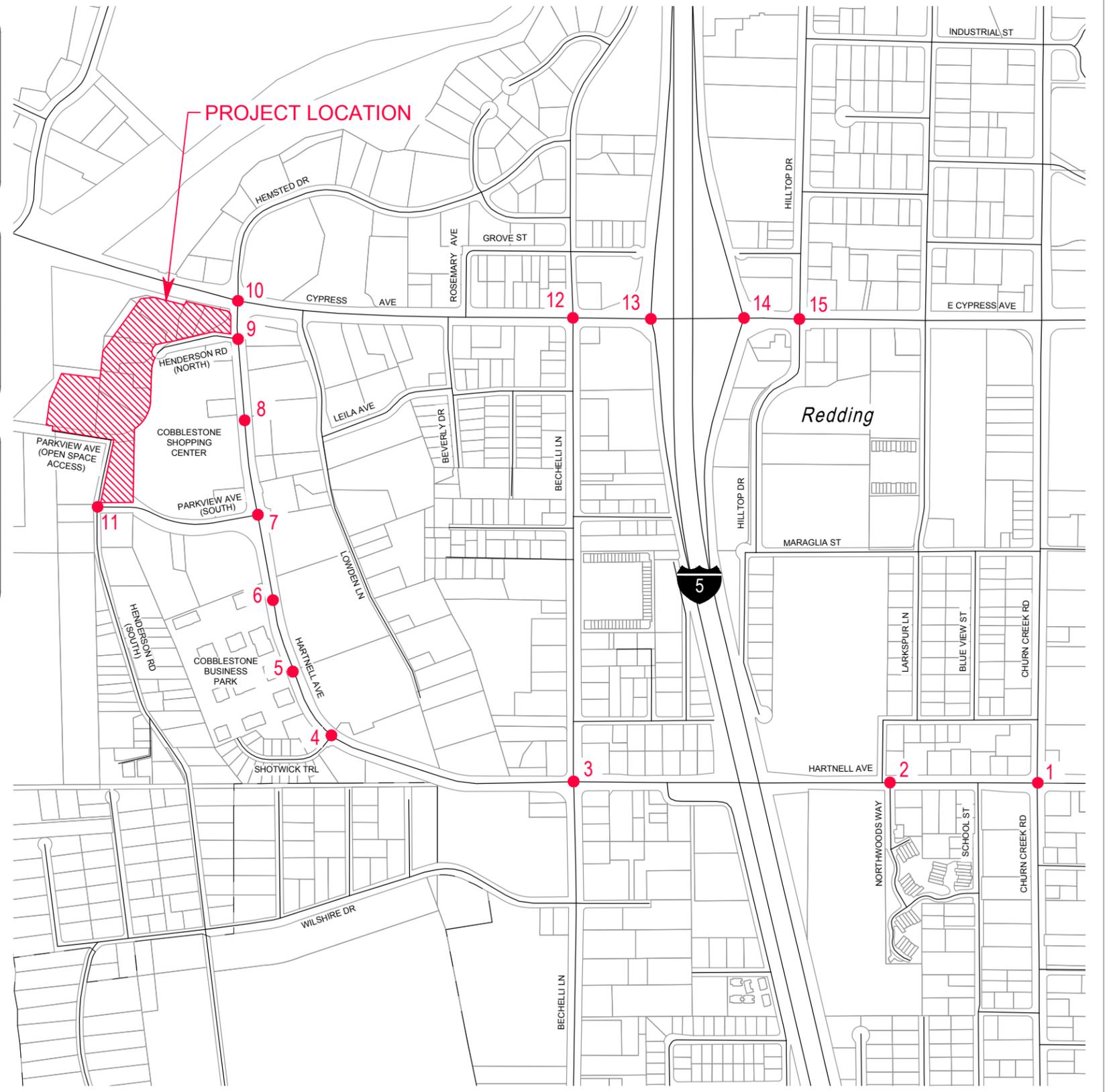
3. Warrant = Based on California MUTCD Warrant 3

4. **Bold** font denotes unacceptable LOS

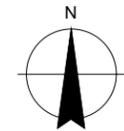
5. OVR = Intersection delay exceeds 300 seconds.

As presented in Table 11.1, all study intersections, except the intersections listed below, are projected to operate at or above the threshold LOS:

- Intersection 1 - Hartnell Avenue & Churn Creek Road
- Intersection 2 - Hartnell Avenue & Northwoods Way
- Intersection 6 - Hartnell Avenue & Cobblestone Business Park Driveway/Retirement Community Driveway
- Intersection 8 - Hartnell Avenue & Cobblestone Shopping Center (Main Driveway)



LEGEND:
 XXX - AM PEAK HOUR TRAFFIC VOLUMES
 (XX) - PM PEAK HOUR TRAFFIC VOLUMES



Dignity Mercy Medical Center Redding
 NORTH STATE PAVILION TIAR
YEAR 2040 PLUS PROJECT PEAK HOUR TRAFFIC VOLUMES

Project No. 111454024
 Report No. R1966RPT006
 Date October 2018

FIGURE 8



10.2 Year 2040 Plus Project Queues

Tables 11.2 and 11.3 present a comparison of the *Year 2040 No Project* and *Year 2040 Plus Project* queues for critical intersections on the Hartnell Avenue and Cypress Avenue corridors.

Table 11.2 – Year 2040 Plus Project 95th Percentile Queue Length

Int. #	Intersection/Approach	Control Type	Year 2040 No Project 95th Percentile Queue (ft)		Year 2040 Plus Project 95th Percentile Queue (ft)		Available Storage
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
1	Hartnell Avenue & Churn Creek Road						
	Eastbound Left	Signal	107	135	107	136	100
	Eastbound Thru		150	288	173	304	-
	Eastbound Right		102	120	107	132	75
	Westbound Left		328	301	328	301	175
	Westbound Thru		221	205	234	209	-
	Westbound Right		86	76	92	81	145
	Northbound Left		449	208	472	213	115
	Northbound Thru		576	392	576	392	-
	Southbound Left		204	601	204	601	110
	Southbound Thru		277	453	279	453	-
2	Hartnell Avenue & Northwoods Way						
	Eastbound Left	Signal	127	93	127	94	75
	Eastbound Thru		206	240	212	256	-
	Westbound Left		157	36	157	36	90
	Westbound Thru		345	229	376	236	-
	Northbound Thru		272	64	272	64	-
	Southbound Thru		265	82	265	82	-
5	Hartnell Avenue & Cobblestone Business Park Driveway/VA Driveway						
	Northbound Left	Signal	46	17	46	17	60
	Northbound Thru		234	145	262	151	-
	Southbound Left		63	11	64	11	70
	Southbound Thru		158	166	165	185	-
7	Hartnell Avenue & Parkview Avenue						
	Eastbound Thru	Signal	54	68	103	334	-
	Westbound Thru		0	41	0	42	-
10	Hartnell Avenue & Cypress Avenue						
	Westbound Left	Signal	451	253	718	297	225

Note: **Bold** text indicates queues that exceed available storage



Table 11.3 – Year 2040 Plus Project 95th Percentile Queue Length

Int. #	Intersection/Approach	Control Type	Year 2040 No Project 95th Percentile Queue (ft)		Year 2040 Plus Project 95th Percentile Queue (ft)		Available Storage
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
12	Bechelli Lane & Cypress Avenue						
	Eastbound Left	Signal	74	127	74	127	95
	Eastbound Thru		220	673	245	745	-
	Eastbound Thru/Right		184	693	196	772	-
	Westbound Left		220	187	221	187	300
	Westbound Thru		256	199	265	202	-
	Westbound Thru/Right		319	233	319	236	-
	Northbound Thru/Left		220	370	220	439	-
	Northbound Right		124	449	124	463	-
	Southbound Left		126	317	131	317	-
	Southbound Left/Thru/Right		161	323	161	323	-
13	I-5 SB Ramps & Cypress Avenue						
	Eastbound Thru	Signal	306	467	306	467	-
	Eastbound Right		103	178	222	178	30
	Westbound Left		290	347	316	361	215
	Westbound Thru		251	533	293	533	-
	Southbound Left		320	773	358	773	-
	Southbound Left/Thru/Right		446	781	494	781	-
	Southbound Right		375	582	402	582	375
14	I-5 NB Ramps & Cypress Avenue						
	Eastbound Left	Signal	300	367	300	367	230
	Eastbound Thru		283	530	283	530	-
	Westbound Thru		287	302	287	307	-
	Westbound Right		145	176	145	176	30
	Northbound Left		439	290	552	290	535
	Northbound Left/Thru/Right		519	367	651	367	-
	Northbound Right		436	317	565	317	635
15	Hilltop Drive & Cypress Avenue						
	Eastbound Left	Signal	168	242	172	242	220
	Eastbound Thru		243	290	252	291	-
	Eastbound Thru/Right		268	282	271	285	-
	Westbound Left		148	256	165	262	95
	Westbound Thru		277	588	294	860	-
	Westbound Thru/Right		285	513	285	790	-
	Northbound Left		129	267	129	269	-
	Northbound Thru/Left		130	240	130	249	-
	Northbound Thru/Right		67	144	67	166	-
	Southbound Left		154	177	154	177	130
	Southbound Left/Thru/Right		351	355	351	360	-
	Southbound Right		256	418	256	418	-

Note: **Bold** text indicates queues that exceed available storage



11. Project Impacts, Mitigation Measures, and Recommended Improvements

This section presents recommended project-related mitigation measures at the study intersections, developed based on the findings from the analyses presented in the prior sections of this report. The mitigations are provided for both *Existing* conditions and *Year 2040* conditions separately, so it may be possible that the same mitigations at one location are applicable for both conditions.

11.1 Impact Significance Criteria

In accordance with the January 2009 City of Redding TIA Guidelines, the following thresholds of significance are used to determine if the proposed project causes a significant impact and requires mitigation:

Signalized Intersections

- The project causes an acceptable LOS to decline to an unacceptable LOS, or
- The project increases the overall average delay by more than 5 seconds per vehicle at an intersection having an unacceptable LOS without project traffic

Two-Way Stop Intersections

- The project causes the following to occur for the worst-case movement:
 - The LOS declines to an unacceptable LOS, and
 - The volume to capacity ratio exceeds 0.75, and
 - The 95th percentile queue exceeds 75 feet (3 vehicles), or
- The project causes the worst-case movement's acceptable LOS to decline to an unacceptable LOS and the peak hour volume signal warrant is met, or
- The project increases the average delay for the worst-case movement by more than 5 seconds per vehicle at an intersection that has an unacceptable LOS without the project and the intersection also meets the peak hour volume signal warrant

Vehicle Queues

- The project causes an unacceptable increase in vehicular queues at an intersection



11.2 Existing Plus Project Impacts

Table 12.1 presents the intersections projected to display unacceptable queuing and are significantly impacted by the proposed project under the *Existing Plus Project* conditions.

Table 12.1 – Existing Plus Project Significant Impacts

AM Peak Hour												
#	Intersection	Control Type	Target LOS	Existing LOS	Existing Plus Project LOS	Existing Delay (D1)	Existing Plus Project Delay (D2)	Delay Increase (D2-D1)	Signal Warrant Met?	V/C	95% Queue (veh)	Significant Impact?
1	Hartnell Ave & Churn Creek Rd	Signal	C	D	D	37.9	38.4	0.5	-	0.71	-	No
10	Hartnell Ave & Cypress Ave	Signal	D	C	C	27.8	31.1	3.3	-	0.58	19	Yes

PM Peak Hour												
#	Intersection	Control Type	Target LOS	Existing LOS	Existing Plus Project LOS	Existing Delay (D1)	Existing Plus Project Delay (D2)	Delay Increase (D2-D1)	Signal Warrant Met?	V/C	95% Queue (veh)	Significant Impact?
1	Hartnell Ave & Churn Creek Rd	Signal	C	D	D	39	39.7	0.7	-	0.73	-	No
6	Hartnell Ave & Cobblestone Bus Park Dwy/RC Dwy	TWSC	C	D	D	28.6	33.7	5.1	No	0.38	2	No
8	Hartnell Ave & Cobblestone Shopping Center (Main Dwy)	TWSC	C	D	E	29.5	37.4	7.9	No	0.27	1	No

Notes:

1. TWSC = Two Way Stop Control

2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for Signal

Mitigations are proposed (in the following section) to provide acceptable operations at the intersection of Hartnell Avenue & Cypress Avenue, where a project significant impact is identified.

11.3 Existing Plus Project Mitigations

11.3.1 Intersection 10 - Hartnell Avenue & Cypress Avenue

Under the *Existing Plus Project* conditions, the proposed project creates a significant impact at this intersection due to the projected westbound left queue increase (from approximately 10 to 19 cars) for the AM peak hour. The available storage is for nine (9) cars. The following improvements are proposed to mitigate the project impact to less than significant.

- Construct a southbound left turn pocket
- Construct a southbound thru/right lane
- Convert the intersection to an eight phase traffic signal

Note: An exhibit depicting this improvement is included in Appendix E.



11.4 Year 2040 Plus Project Impacts

Table 12.2 presents the intersections projected to operate at unacceptable levels of service and are significantly impacted by the proposed project under the *Year 2040 Plus Project* conditions.

Table 12.2 – Year 2040 Plus Project Significant Impacts

AM Peak Hour												
#	Intersection	Control Type ¹	Target LOS	Year 2040		Year 2040 Plus Project		Delay Increase (D2-D1)	Signal Warrant Met?	V/C	95% Queue (veh)	Significant Impact?
				LOS ²	LOS ²	Delay (D1)	Delay (D2)					
1	Hartnell Ave & Churn Creek Rd	Signal	C	D	D	42.4	43.4	1	-	0.79	-	No
2	Hartnell Ave & Northwoods Way	Signal	C	D	D	35.3	36	0.7	-	0.74	-	No
8	Hartnell Ave & Cobblestone Shopping Center (Main Dwy)	TWSC	C	D	D	27.4	29.8	2.4	No	0.13	1	No
10	Hartnell Ave & Cypress Ave	Signal	D	C	D	32.4	35.1	2.7	-	0.67	29	Yes

PM Peak Hour												
#	Intersection	Control Type ¹	Target LOS	Year 2040		Year 2040 Plus Project		Delay Increase (D2-D1)	Signal Warrant Met?	V/C	95% Queue (veh)	Significant Impact?
				LOS ²	LOS ²	Delay (D1)	Delay (D2)					
1	Hartnell Ave & Churn Creek Rd	Signal	C	D	D	47.8	48.5	0.7	-	0.82	-	No
6	Hartnell Ave & Cobblestone Bus Park Dwy/RC Dwy	TWSC	C	E	E	37.8	46	8.2	No	0.51	3	No
8	Hartnell Ave & Cobblestone Shopping Center (Main Dwy)	TWSC	C	F	F	OVR	OVR	>5	Yes	1.85	13	Yes
10	Hartnell Ave & Cypress Ave	Signal	D	C	D	32.6	35.6	3	-	0.76	12	Yes

Notes:

1. TWSC = Two Way Stop Control
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for Signal
3. OVR = Intersection delay exceeds 300 seconds.
4. Addition of project traffic results in significant queue spillback. Specifically for Intersection 10 the spillback is for the westbound left.

Mitigations are proposed (in the following section) to provide acceptable operations at the following intersections where a project significant impact is identified:

- Intersection 8 - Hartnell Avenue & Cobblestone Shopping Center (Main Driveway)
- Intersection 10 - Hartnell Avenue & Cypress Avenue

11.5 Year 2040 Plus Project Mitigations

11.5.1 Intersection 8 - Hartnell Avenue & Cobblestone Shopping Center Driveway

Under the *Year 2040 Plus Project* conditions, the proposed project creates a significant impact by increasing delay by more than five (5) seconds per vehicle and meeting the peak hour traffic signal warrant at an intersection operating at unacceptable LOS in the “no project” condition.

The following improvements are proposed to mitigate the project impact to less than significant:

- Option 1:
 - Restripe southbound left turn lane to a two-way left turn lane
 - Restripe eastbound left/thru/right to a left/thru lane and right turn pocket, or
- Option 2:
 - Construct a traffic signal, or



- Option 3:
 - Restrict the southbound left turn movement
 - Restrict the westbound movement to a right-out only
 - Convert southbound left turn lane into an acceptance pocket for the eastbound left turn movement

The mitigation is required due to the assumption that the Cobblestone Shopping Center will redevelop to full occupancy. Since the Shopping Center redevelopment is the core event that will trigger the mitigation, the driveway mitigation should be the responsibility of the future Shopping Center redevelopment, and not this project.

11.5.2 Intersection 10 - Hartnell Avenue & Cypress Avenue

Under the *Year 2040 Plus Project* conditions, the proposed project creates a significant impact at this intersection due to the projected westbound left queue increase for the weekday AM and PM peak hours. The available storage is for nine (9) cars. The following improvements are proposed to mitigate the project impact to less than significant:

- Construct a southbound left turn pocket
- Construct a southbound thru/right lane
- Convert the intersection to an eight phase traffic signal
- Construct dual left turn pockets for westbound approach
- Expand southbound Hartnell Avenue to accommodate dual left turns from Cypress Avenue



12. Fair-Share of Improvement Cost Calculations

Fair-share calculations have been identified for all intersections, which are projected to operate at unacceptable LOS under no project conditions, and experience an increase in delay with the addition of project traffic. Below is a listing of each of the study intersections warranting improvements, the corresponding improvements that the proposed project would be required to pay a Fair-Share of improvement cost towards, and the proposed project's equitable share of these improvements. The proposed project's equitable share is calculated using the method for calculating equitable mitigation measures outlined in the *Caltrans Guide for the Preparation of Traffic Impact Studies* (State of California, DOT, December 2002), which is shown below:

$$P = T / (T_B - T_E) \text{ where,}$$

P = The equitable share for the project's traffic impact.

T = The vehicle trips generated by the project during the peak hour of adjacent roadway facility in vehicles per hour (vph).

T_B = The forecasted traffic volume on an impacted roadway facility at the time of general plan build-out (e.g. 20 year model or the furthest model date feasible), vph.

T_E = The traffic volume existing on the impacted roadway facility plus other approved projects that will generate traffic that has yet to be constructed/opened, vph.

Note that the percent Fair-Share calculated using the above formula is reported to the nearest whole number and the calculations are based on the highest fair share percentage from all peak hour scenarios where a significant impact occurs.

12.1 Year 2040 Plus Project Fair-Share

Table 13.1 presents a summary of the fair share calculation performed for the intersection of Hartnell Avenue and Cobblestone Shopping Center Driveway for the *Year 2040 Plus Project* conditions.

Table 13.1 – Summary of Fair-Share Calculations for Year 2040 Plus Project Conditions

#	Intersection Name	T	T _b	T _e	P
8	Hartnell Avenue & Cobblestone Shopping Center Driveway	206	2121	1401	29%
10	Hartnell Avenue & Cypress Avenue	252	3867	3098	33%



12.2 Development Impact Fee Program

The following development impact fee program includes transportation facility improvements that may be applicable to this project:

12.2.1 Citywide Transportation Impact Fee Program

Minor Projects: Various Roadway, Bike and Pedestrian capacity enhancement projects. \$6,000,000. Minor capacity related roadway widening, bike and pedestrian facilities, and grant match.

All of Which is Respectfully Submitted,

GHD

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about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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