Hegan Lane Congestion Relief

Traffic Analysis Report

City of Chico

March 28, 2024

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1. Introduction

The City of Chico (City) has retained GHD to analyze and recommend transportation improvements for the Hegan Lane Congestion Relief Project. The Hegan Lane Congestion Relief Project (Project) aims to address long-standing congestion challenges in southwest Chico associated with vehicular travel between Hegan Lane and the East Park Avenue interchange at State Route (SR) 99.

Existing congestion in the Project area is associated with travel between commercial and industrial developments in southwest Chico, along Hegan Lane, and the East Park Avenue/SR 99 interchange. The congestion includes both passenger car commuter traffic and trucks of various sizes. Regional travel between unincorporated communities and the City and SR 99 add to congestion during peak periods. Continued growth in the Project area is anticipated to exacerbate congestion challenges. The City's General Plan has long included plans for a new roadway connection in the Project area to improve circulation in southwest Chico and accommodate anticipated future growth. This improvement, referred to as the Park Avenue Extension, was included in the 2030 Chico General Plan Circulation Element as a "Connection for Future Study". While the General Plan does not identify a specific alignment for the extension, it is indicated as a connection between Otterson Drive and the East Park Avenue/Midway intersection. In the early 2000s, a similar roadway was proposed that would have connected the north end of Otterson Drive to Meyers Street via a bridge over Comanche Creek. Ultimately, this project was voted down by the public during a special election held June 5, 2001 (Ballot Measure A) due to its potential fiscal and environmental impacts.

Purpose and Need

The purpose of the project is to improve vehicular operations, circulation, and accessibility for all modes of travel in the project area. The purpose of improving circulation in the study area includes reduction of vehicle delay, reduction of emissions, reduction in collision frequency and severity, and reduction of barriers to active transportation. In addition, the project should create an enhanced gateway in the City of Chico that improves orientation for residents and visitors, including people bicycling and walking, while minimizing environmental impacts.

This study is needed to identify and evaluate transportation improvements that achieve the project purpose. Although included in the current Circulation Element, constructing the Park Avenue Extension would be a costly project facing environmental challenges with mixed public support. In light of these concerns, and especially in consideration of recent investments along the Commanche Creek Greenway, the extension requires further study to reassess feasibility, necessity, and the potential for superior alternatives. Therefore, this study determines whether the existing and anticipated congestion and circulation challenges in the project area can be alleviated through alternative improvements to existing streets and intersections, and determine how much growth can be accommodated, without constructing a new roadway extension.

1.1 Project Approach

This Traffic Analysis Report analyzes a two phased approach to address future traffic demand along the roadways of Otterson Drive, Hegan Lane, Midway, and East Park Avenue. Phase I includes intersection operational and configuration improvements within the Project area without significant changes to existing circulation patterns via the construction of new roadway connections. Phase II includes the construction of a new roadway connection between the Project roadways.

This report provides a comprehensive assessment of potential future traffic conditions to identify and evaluate improvement alternatives for each Project phase. While both phases were studied concurrently, part of this assessment includes evaluating whether the intersection improvements in Phase I would adequately accommodate future traffic demand in the Project area, thereby delaying or eliminating the need for Phase II altogether. This report includes analyses typically completed for an Intersection Control Evaluation (ICE) and Traffic Operations Analysis Report (TOAR), and in support of an environmental document prepared pursuant to the California Environmental Quality Act (CEQA) or National Environmental Policy Act (NEPA), as applicable.

1.2 Project Phases & Alternatives

As described above, Phase I includes improvements to existing intersections within the Project area. Phase II includes the construction of a new roadway connection, consistent with the Park Avenue Extension included in the 2030 Chico General Plan Circulation Element. The following provides an overview of the Project phases and the improvement alternatives evaluated within each phase.

Phase I – Intersection Improvements

Phase I includes intersection control and configuration improvements within the Project area: East Park Avenue & Midway, Hegan Lane & Midway, Hegan Lane & Otterson Drive. The intersections have operational and queuing issues currently, which will only increase in the future. Additionally, the Hegan Lane Business Park District is currently primarily accessible via the intersection of Hegan Lane & Otterson Drive, creating traffic challenges for employees, visitors, freight, and other business-related traffic in the area.

Intersection improvements under Phase I include new or altered traffic signals, stop controls, and roundabouts as well as bicycle and pedestrian facilities at intersections. This report evaluates alternatives at each intersection to determine whether improvements would adequately address delay and congestion under existing and future conditions, consistent with ICE requirements. The intersections and their respective alternatives evaluated within this report include the following:

- **East Park Avenue & Midway (Existing Traffic Signal)**
  Alternative 1: Modified Signal Control
  Alternative 2: Roundabout Control *(Requires improvements to adjacent along East Park Avenue at Fair Street and Scott Avenue, described in subsequent sections of this report.)*
- **Hegan Lane & Midway (Existing Traffic Signal)**
  Alternative 1: Modified Signal Control
  Alternative 2: Roundabout Control
- **Hegan Lane & Otterson Drive (Existing Two-Way Stop Control)**
  Alternative 1a: All-Way Stop Control
  Alternative 1b: New Signal
  Alternative 2: Roundabout Control

Phase II – New Roadway Connections

Phase II includes a new roadway connection between Otterson Drive and Park Avenue. The potential need for a new roadway connection has been in the General Plan Circulation Element for many years known as the Park Avenue Extension. Potential alternatives for Phase II are evaluated in this report, balancing competing needs to improve connectivity while minimizing disturbances to environmental resources, recreation opportunities, private property, and existing traffic operations. Part of this assessment includes evaluating whether the intersection improvements in Phase I would delay or eliminate the need for Phase II altogether.

Four sub-alternatives with varying alignments were identified that create additional connections between Otterson Drive and Park Avenue, described in more detail in this report. The Phase II alternatives include:

- **Greenway Alternatives:** Three alignment alternatives from Otterson Drive to Park Avenue adjacent to the existing Comanche Creek Greenway.
- **Aztec Alternatives:** Two alignment alternatives extending east from the Otterson Drive & Aztec Drive intersection either directly to Park Avenue or via Midway to Park Avenue.
- **Hegan Alternatives:** Two alignment alternatives to create a parallel route to Otterson Drive with a new intersection at Hegan Lane east of the existing Otterson Drive & Hegan Lane intersection.
- **Meyers Street Connection:** One alignment to connect Otterson Drive to Park Avenue via Meyers Street.

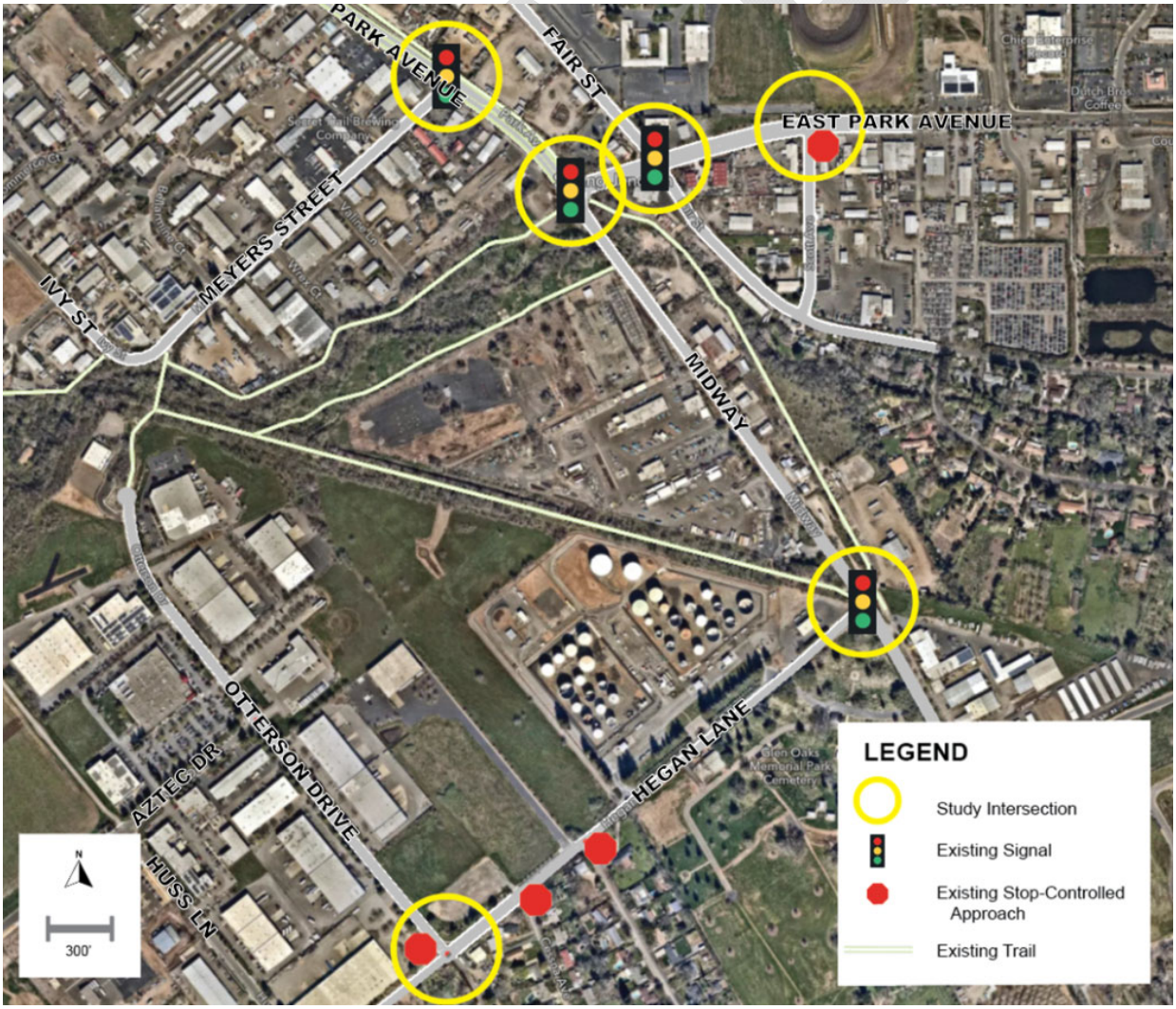
In addition to these alternatives, this report includes evaluation of widening Midway from its current three-lane configuration to two travel lanes in each direction. Improvements would also include turn lanes at intersections and bicycle and pedestrian facilities. The widened configuration would begin at Hegan Lane and extend at least to Park Avenue and may be extended further north based on analysis and roadway conform requirements. This alternative could be implemented instead of the Phase II alternatives described above, but may require revision to Phase I intersection improvements to accommodate that additional through lanes.

2. Existing Conditions

2.1 Study Area

The Project area is located in southwest Chico in the vicinity of the Hegan Lane Business Park. This study evaluates the transportation network serving vehicular travel between Otterson Drive and the East Park Avenue/SR 99 interchange. The study area includes the transportation network between Otterson Drive, Hegan Lane, Midway, East Park Avenue, and Meyers Street. The study area is depicted below and described on the following pages.

Figure 2-1 Study Area and Existing Conditions



Several large commercial and industrial uses are clustered within the Hegan Lane Business Park District along Otterson Drive and Hegan Lane, generating traffic as employees, visitors, and deliveries travel to and from area businesses. Most of these trips are between the Park Avenue interchange with SR 99 and the Otterson Drive area. Several undeveloped parcels offer growth opportunities for the City of Chico but may further exacerbate existing congestion and circulation challenges if they generate additional peak hour trips.

Roadways

Roadways that provide the primary vehicle circulation within the study area are Park Avenue, Midway, Hegan Lane, Otterson Drive, Aztec Drive, Meyers Street, Fair Street, and Scott Avenue. The following are brief descriptions of the study area roadways.

Park Avenue is a four-lane arterial that extends north and east from the Park Avenue/Midway intersection. North of the intersection, Park Avenue is separated by a center median. It provides connections to the center of Chico as well as to State Route (SR) 99 just east of the project area. Sidewalks are present along most of Park Avenue, though some gaps exist. Class II bicycle lanes are marked on Park Avenue east of Midway. A Class I bicycle facility is located on the east side of Park Avenue north of the Midway intersection.

Midway is a two-lane arterial with a two-way center left turn lane in the majority of the project area; at the Park Avenue/Midway intersection there is a second southbound lane in place of the center turn lane for approximately 800 feet, and there is a left turn pocket at the southbound approach to the Midway/Hegan Lane intersection. Sidewalk exists on the west side of Midway at Park Avenue, but the sidewalk ends approximately 500 feet north of Hegan Lane. The Chico-Durham Bike Path parallels Midway approximately 150 feet east of the street. Midway extends southeast from the Park Avenue/Midway intersection, providing connections to unincorporated Butte County, including the community of Durham to the south. South of the Hegan Lane intersection, SR 99 is accessible via Entler Avenue/Southgate Avenue and Oroville-Chico Highway/Neal Road.

Hegan Lane is a two-lane collector in the project area, with a two-way center left turn lane west of Skyway Avenue. It begins at Midway and extends southwest to Dayton Road, providing connections to the Otterson Drive area and the California State University (CSU) Chico Farm. Sidewalks are present on the north side of Hegan Lane near Otterson Drive and Huss Lane. No bicycle facilities exist on Hegan Lane.

Otterson Drive is a two-lane collector with parallel on-street parking on both sides. It begins at Hegan Lane and extends northwest, ending approximately 500 feet south of Meyers Street. There are continuous sidewalks on both sides of the street. No bicycle facilities exist on Otterson Drive.

Aztec Drive is a two-lane local street with parallel on-street parking on both sides. The street is only 750 feet long, extending from Otterson Drive to Huss Lane. There are continuous sidewalks on both sides of the street. No bicycle facilities exist on Aztec Drive.

Meyers Street is a two-lane local street with parallel on-street parking on both sides. There are continuous sidewalks on both sides of the street. Meyers Street is designated as a Class III Bicycle Route.

Fair Street is a two-lane local street with parallel on-street parking on both sides south of East Park Avenue. North of East Park Avenue, Fair Street is a four-lane arterial with a two-way center left turn lane.

Scott Avenue is a two-lane local street with parallel on-street parking on both sides. The street is only 800 feet long, extending from East Park Avenue to Fair Street.

Intersections

Six intersections were selected for evaluation in this study. The following are brief descriptions of the study intersections.

Park Avenue and Midway is a four-legged signalized intersection. The north and east legs are Park Avenue; the south leg is Midway. The fourth western leg of the intersection is a driveway which provides access to a small parking area for the Comanche Creek Greenway. Free right turn lanes exist for northbound Midway onto eastbound Park Avenue and for westbound East Park Avenue onto northbound Park Avenue. Crosswalks are marked on all legs except the western driveway leg. The Chico-Durham Bike Path parallels Midway and Park Avenue on the east side and crosses the east leg of this intersection.

East Park Avenue and Fair Street is a four-legged signalized intersection. East Park Avenue forms the east and west legs, and Fair Street forms the north and south legs. Crosswalks are marked on all four legs. This intersection is approximately 300 feet east of the East Park Avenue and Midway intersection.

Park Avenue and Meyers Street is a three-legged signalized intersection. Park Avenue forms the north and south legs of the intersection, and Meyers Street forms the third western leg. Park Avenue is separated by a center median at this location. Crosswalks are marked on the west and south legs. Access to the Chico-Durham Bike Path is provided at the east end of the crosswalk on the south leg.

Midway and Hegan Lane is a four-legged signalized intersection. Midway forms the north and south legs of the intersection; Hegan Lane is the western leg. The fourth eastern leg is a driveway into a private business; the driveway is offset slightly north of Hegan Lane. Crosswalks are marked on the north, west, and east legs of the intersection. Two trails connect to this intersection as well. The Chico-Durham Bike Path parallels Midway on the east side and crosses at a new marked crosswalk on the east leg of this intersection. A new trail on the northwest corner of the intersection was completed in December 2020 and extends along the old railroad right of way to connect to the Comanche Creek Greenway.

Hegan Lane and Otterson Drive is a three-legged intersection with side-street stop control. Hegan Lane forms the east and west legs of the intersection. Otterson Drive is the north leg, and is controlled by a stop sign. There is a driveway to a private business offset from Otterson Drive on the south side of the intersection. No crosswalks are marked at this intersection.

Park Avenue and Scott Avenue is a three-legged intersection with side-street stop control. East Park Avenue forms the east and west legs of the intersection while Scott Avenue is the south leg controlled by a stop sign. No crosswalks are marked at this intersection.

Trails

The **Chico-Durham Bike Path** parallels Park Avenue and Midway on the east side from East 20th Street to Jones Avenue. The paved path is 10-12 feet wide and is shared by people bicycling and walking.

The **Comanche Creek Greenway** includes paved and unpaved trails that connect the Park Avenue and Midway intersection to the end of Otterson Drive and Meyers Street. There are trails on the north and south sides of Comanche Creek through the greenway, a trail connecting the end of Otterson Drive to Meyers Street across the creek, and a recently completed trail that extends southeast to the intersection of Midway and Hegan Lane. Greenway trail access is provided at the Park Avenue/Midway intersection, approximately 380’ south of Park Avenue on Midway, at the Midway/Hegan Lane intersection, at the north end of Otterson Drive, and at the corner of Meyers Street and Ivy Street.

2.2 Known Environmental Constraints

A preliminary review of known environmental constraints was conducted to inform the preliminary evaluation of alternatives. This review included searches of relevant databases and other resources, including:

– National Wetlands Inventory
– California Natural Diversity Database
– GeoTracker

Local plans which document historic resources and other environmental receptors in the area were also reviewed. Known resources in the area include Glen Oaks Memorial Park at the southeast corner of Midway and Hegan Lane, which includes a mature oak tree near the intersection.

This preliminary review identified potential environmental impacts in the project area, including freshwater wetlands and riparian corridors along the Comanche Creek Greenway, some sensitive plant and animal species within 0.5 mile to 2 miles of the project area, and potential hazardous materials sites dispersed throughout the project area including Cleanup Program Sites and Permitted Underground Storage Tanks. The locations of these potential impacts are relatively evenly distributed throughout the project area, making them unlikely to result in any one alternative having significantly fewer impacts.

2.3 Traffic Analysis Methodology

Data Collection and Analysis Time Periods

Counts for this project were originally collected on January 9, 2020, before the onset of the COVID-19 pandemic. Additional counts were collected on October 28, 2021, to validate the counts previously collected at key intersections as well as collect new counts at the intersection of East Park Avenue & Scott Avenue which was added to the study area. The October 2021 counts were lower than the January 2020 counts, however, the heavy vehicle percentage was higher in the October 2021 counts than the January 2020 counts. It was determined that the higher counts from January 2020 would be used with the heavy vehicle percent from the October 2021 counts as that value seemed more in line with the existing traffic at the study intersections. The volumes were then balanced between intersections to ensure accuracy.

Existing AM and PM peak hour counts were collected on January 9, 2020, at the intersections of Park Avenue and Meyers Street, Midway and Park Avenue, Fair Street and East Park Avenue, Midway and Hegan Lane, and Hegan Lane and Otterson Drive. Because these counts predate the onset of the COVID-19 pandemic and related public health restrictions, they are assumed to reflect typical traffic conditions for the area. Additional traffic counts were collected on October 28, 2021, at the intersections of Midway and Park Avenue, Fair Street and East Park Avenue, and Scott Avenue and East Park Avenue. In both cases, data was collected following the 2018 Camp Fire and the influx of relocated individuals from Paradise to Chico.

The study intersections were analyzed during the weekday AM and PM peak hour periods. The AM peak hour is defined as the highest continuous hour of peak traffic flow counted between 7:00 am and 9:00 am and the PM peak hour is defined as the highest continuous hour of peak traffic flow counted between 2:00 pm and 6:00 pm under typical weekday conditions. Traffic volume counts are provided in Appendix A.

Level of Service Methodologies

The following section outlines the Level of Service (LOS) methodologies and analysis parameters used to quantify traffic operations at study locations.

LOS has been calculated for all intersection control types using the methods documented in the Transportation Research Board's Highway Capacity Manual, Sixth Edition, HCM 6 methodology. Traffic operations have been quantified through the determination of LOS.

LOS is a qualitative measure of traffic operating conditions, whereby a letter grade A through F is assigned to an intersection or roadway segment representing progressively worsening traffic conditions. For a signalized, roundabout (RNDBT), or All-Way Stop-Controlled (AWSC) intersection, an LOS determination is based on the calculated averaged delay for all approaches and movements. For a Two-Way Stop Controlled (TWSC) intersection, an LOS determination is based upon the calculated average delay for all movements of the worst-performing side street

approach. LOS definitions for different types of intersection controls are presented in Table 2.1. For unsignalized/signalized control, the LOS was determined using Synchro 10 software (Version 10.3.15.0) by Trafficware. For roundabout control, the LOS was determined using Sidra 9 software using sidra analysis methodology.

The City of Chico General Plan sets a minimum target LOS of D for all streets, or LOS E for arterials served by scheduled transit or with bicycle and pedestrian facilities. While the Park Avenue and Midway corridor is served by one transit route, it is a regional route with low frequency that does not support local trips. Similarly, while there are some bicycle and pedestrian facilities on East Park Avenue east of Midway, it is an incomplete network with multiple gaps. For these reasons, the LOS D target applies to all intersections in the project area.

Table 2.1: Level of Service (LOS) Criteria for Intersections

Level of Service	Type of Flow	Delay	Maneuverability	Stopped Delay per Vehicle (seconds per vehicle)	
				Signalized	Un-signalized
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.	>10.0 and ≤20.0	>10.0 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	>20.0 and ≤35.0	>15.0 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.	>35.0 and ≤55.0	>25.0 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.	>55.0 and ≤80.0	>35.0 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

Technical Analysis Parameters

The evaluation incorporated appropriate heavy vehicle adjustment factors, peak hour factors, environmental factors, and reported the resulting intersection delays and LOS as estimated using the HCM 6 analysis methodologies as appropriate. In addition to LOS the 95th percentile queues were also included in the analysis. 95th percentile queues are the queue length that is as long or longer than 95 percent of the queues that form on that lane during the peak hour.

Table 2.2 below presents the technical parameters that will be utilized for the evaluation of the study intersections for the analysis scenarios. All parameters not listed should be assumed as default values or calculated based on parameters listed.

Table 2.2: Technical Analysis Parameters for LOS

	Technical Parameter	Assumption
1	Intersection Peak Hour Factor (PHF)	Based on counts, intersection overall, 0.92 minimum was used for 2040 analysis at all intersections except for Midway and Hegan Lane in the AM peak hour, which uses 0.88.
2	Intersection Heavy Vehicle Percent (HV%)	Based on counts, intersection overall, minimum 2 percent
3	Signal Timings	Based on City timing plans

Existing Traffic Operations

Table 2.3 presents existing weekday AM and PM peak hour intersection traffic operations using existing traffic volumes and existing lane geometrics and controls. The intersections of Midway/Park Avenue & East Park Avenue and Otterson Drive & Hegan Lane both operate at an unacceptable LOS in the PM peak hour for existing conditions. Synchro reports for all scenarios are provided in Appendix A.

Table 2.3: Existing Conditions Traffic Operations

				AM Peak Hour			PM Peak Hour		
#	Intersection	Control Type[1,2]	Target LOS	Delay[4]	LOS	Warrant Met?[3]	Delay[4]	LOS	Warrant Met?[3]
1	Park Ave & Meyers St	Signal	D	8.9	A	-	10.8	B	-
2	**Midway/Park Ave & E Park Ave**	**Signal**	**D**	40.2	D	-	**72.4**	**E**	**-**
3	Fair St & E Park Ave	Signal	D	14.1	B	-	17.0	B	-
4	Midway & Hegan Ln	Signal	D	16.1	B	-	29.7	C	-
5	**Otterson Dr & Hegan Ln**	**TWSC**	**D**	16.7	C	-	**62.3**	**F**	**No**
6	E Park Ave & Scott Ave	TWSC	D	14.5	B	-	19.5	C	-

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. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions

Table 2.4 on the following page presents the existing 95th percentile queue lengths. There are several queues which exceed available storage.

Table 2.4: Existing Conditions 95th Percentile Queues

#	Intersection/Approach	Control Type	Existing 95th Percentile Queue[1] AM	Existing 95th Percentile Queue[1] PM	Storage
1	**Park Ave & Meyers St**				
	Eastbound Left/Right	Signal	87	208	-
	Northbound Left		89	100	100
	Northbound Thru		76	110	650
	Southbound Thru		78	100	-
	Southbound Thru/Right		95	113	-
2	**Midway/Park Ave & E Park Ave**				
	Eastbound Left/Thru/Right	Signal	12	28	-
	Westbound Left		**274**	**269**	160
	Westbound Left/Thru		**432**	**428**	295
	Westbound Right		121	65	295
	Northbound Left/Thru		407	899	-
	Northbound Right		**174**	**163**	120
	Southbound Left		193	215	650
	Southbound Left/Thru/Right		233	251	650
3	**Fair St & E Park Ave**				
	Eastbound Left	Signal	**86**	**128**	80
	Eastbound Thru		145	192	295
	Eastbound Thru/Right		151	199	295
	Westbound Left		79	70	180
	Westbound Thru		545	542	580
	Westbound Thru/Right		461	487	580
	Northbound Left/Thru/Right		56	139	-
	Southbound Left		119	106	-
	Southbound Thru/Right		151	106	-
4	**Midway & Hegan Ln**				
	Eastbound Left/Thru/Right	Signal	193	1532	-
	Westbound Left/Thru/Right		4	23	-
	Northbound Left		70	77	80
	Northbound Thru/Right		165	165	-
	Southbound Left		15	41	85
	Southbound Thru		201	301	-
	Southbound Right		**144**	**155**	50
5	**Otterson Dr & Hegan Ln**				
	Eastbound Left/Thru	TWSC	52	34	-
	Westbound Left		-	10	100
	Westbound Thru/Right		10	10	-
	Southbound Left		66	**133**	100
	Southbound Right		30	190	-
6	**E Park Ave & Scott Ave**				
	Eastbound Thru	TWSC	7	18	580
	Eastbound Thru/Right		8	9	580
	Westbound Left		**61**	48	50
	Westbound Thru		77	125	-
	Northbound Left/Right		64	68	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage

2.4 Collision Analysis and Safety Summary

The most recent five years of available collision data were reviewed to identify safety concerns in the project area. A total of 16 collisions were reported in the project area according to data from the Statewide Integrated Traffic Records System (SWITRS) from 2015 through 2019, including two that involved bicyclists, two that involved pedestrians, and one that involved a motorcyclist. While this is a relatively small number of overall collisions, analysis of the contributing factors and behaviors involved in crashes at intersections and along roadways informed development of improvement alternatives in the project area.

Of the 16 reported collisions, 7 occurred at intersections, 3 occurred near intersections, and 6 occurred along roadway segments. Five collisions occurred at the Park Avenue/Midway intersection—more than any other location.

No fatal collisions were reported in the project area. One collision, which involved a pedestrian, resulted in severe injury. Ten collisions resulted in other visible injuries, and five resulted in complaints of pain. Three of the collisions were reported as felony hit and run, including one pedestrian collision and one bicycle collision.

Collisions occurred throughout the day, with the largest number occurring midday between 11 AM and 2 PM. No collisions were reported during late-night hours between 10 PM and 7 AM.

Collision reports in California include a field to assign a Primary Collision Factor believed to be the main contributing behavior, as well as a California Vehicle Code violation, if applicable. The two most common factors reported in the study area were Unsafe Speed and Automobile Right of Way, which means a party failed to appropriately yield to a driver of an automobile.

The two most common collision types were broadside (five collisions) and rear end (four collisions).

Of the 16 reported collisions in the project area, half were attributed to either speed or improper yielding. More than half of reported collisions occurred at or near an intersection in the project area. Together, these two statistics suggest a need for improvements to the project area that better regulate driver speeds and reduce potential conflicts at intersections.

3. Traffic Volume Forecasts

Year 2040 forecasts were developed using the Butte County Association of Governments (BCAG) travel demand model (TransModeler Version 5.0 Build 7250). Citywide, the model generated an approximate annual traffic volume growth rate of 1%. In the study area, however, the model generated a relatively low level of traffic growth. Therefore, a 20% growth rate, consistent with the citywide average in the model, was applied to study intersections in order to generate Year 2040 forecasts. The travel demand model does include the Southgate extension project that may have been responsible for some of the reduced growth in the study area – however – this connection would not explain the model's lack of significant growth along Hegan Lane and Otterson Drive as these are "one way in and out" facilities. The model does not include the westerly Park Avenue extension. Therefore, scenarios that evaluated the extension required manual assignment of redistributed trips. 2025 Build Year volumes were developed using linear interpolation between existing counts and the 2040 forecasts.

3.1 No Build Traffic Operations

Build Year 2025 Conditions

Table 3.1 below presents LOS under 2025 conditions for the existing intersection layouts. The intersections of Midway/Park Avenue & East Park Avenue and Otterson Drive & Hegan Lane are projected to operate at an unacceptable LOS in the cumulative conditions.

Table 3.1: Year 2025 Conditions Traffic Operations – No Build Alternative

				AM Peak Hour			PM Peak Hour		
#	Intersection	Control Type[1,2]	Target LOS	Delay[4]	LOS	Warrant Met?[3]	Delay[4]	LOS	Warrant Met?[3]
1	Park Ave & Meyers St	Signal	D	9.1	A	-	11.5	B	-
2	**Midway/Park Ave & E Park Ave**	**Signal**	**D**	46.5	D	-	**86.7**	**F**	**-**
3	Fair St & E Park Ave	Signal	D	14.3	B	-	17.4	B	-
4	Midway & Hegan Ln	Signal	D	18.8	B	-	37.5	D	-
5	**Otterson Dr & Hegan Ln**	**TWSC**	**D**	17.7	C	-	**93.6**	**F**	**No**
6	E Park Ave & Scott Ave	TWSC	D	15.3	C	-	21.0	C	-

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. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions

Table 3.2 on the following page presents the 2025 queues for the study intersections under the No Build alternative. There are several queues that are projected to exceed storage, with the most notable queues being the westbound movement at Midway/Park Avenue & East Park Avenue and at East Park Avenue & Fair Street.

Table 3.2: Year 2025 Conditions 95th Percentile Queues – No Build Alternative

#	Intersection/Approach	Control Type	2025 95th Percentile Queue[1] AM	2025 95th Percentile Queue[1] PM	Storage
1	**Park Ave & Meyers St**				
	Eastbound Left/Right	Signal	82	192	-
	Northbound Left		98	113	100
	Northbound Thru		73	113	650
	Southbound Thru		84	97	-
	Southbound Thru/Right		107	104	-
2	**Midway/Park Ave & E Park Ave**				
	Eastbound Left/Thru/Right	Signal	13	29	-
	Westbound Left		**248**	**261**	160
	Westbound Left/Thru		**384**	**415**	295
	Westbound Right		113	124	295
	Northbound Left/Thru		428	1444	-
	Northbound Right		**173**	**151**	120
	Southbound Left		202	250	650
	Southbound Left/Thru/Right		264	301	650
3	**Fair St & E Park Ave**				
	Eastbound Left	Signal	**103**	**135**	80
	Eastbound Thru		160	212	295
	Eastbound Thru/Right		170	214	295
	Westbound Left		119	70	180
	Westbound Thru		**750**	497	580
	Westbound Thru/Right		**754**	418	580
	Northbound Left/Thru/Right		78	120	-
	Southbound Left		125	135	-
	Southbound Thru/Right		237	121	-
4	**Midway & Hegan Ln**				
	Eastbound Left/Thru/Right	Signal	203	1458	-
	Westbound Left/Thru/Right		7	24	-
	Northbound Left		**87**	69	80
	Northbound Thru/Right		181	157	-
	Southbound Left		11	35	85
	Southbound Thru		230	306	-
	Southbound Right		**146**	**155**	50
5	**Otterson Dr & Hegan Ln**				
	Eastbound Left/Thru	TWSC	56	37	-
	Westbound Left		-	6	100
	Westbound Thru/Right		4	3	-
	Southbound Left		62	**130**	100
	Southbound Right		30	142	-
6	**E Park Ave & Scott Ave**				
	Eastbound Thru	TWSC	6	9	580
	Eastbound Thru/Right		9	52	580
	Westbound Left		**83**	24	50
	Westbound Thru		527	14	-
	Northbound Left/Right		77	64	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage

Year 2040 Conditions

Table 3.3 below presents LOS under 2040 conditions for the existing intersection layouts. The intersections of Midway/Park Avenue & East Park Avenue, Midway & Hegan Lane, and Otterson Drive & Hegan Lane are projected to operate at an unacceptable LOS in the cumulative conditions, and the intersection of Otterson Drive & Hegan Lane meets the warrant for signal control, which means that it also meets the requirements for all-way stop control.

Table 3.3: Year 2040 Conditions Traffic Operations – No Build Alternative

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[4]	LOS	Warrant Met?[3]	Delay[4]	LOS	Warrant Met?[3]
1	Park Ave & Meyers St	Signal	D	9.7	A	-	14.6	B	-
2	**Midway/Park Ave & E Park Ave**	**Signal**	**D**	**55.3**	**E**	**-**	**99.4**	**F**	**-**
3	Fair St & E Park Ave	Signal	D	15.0	B	-	18.9	B	-
4	**Midway & Hegan Ln**	**Signal**	**D**	19.4	B	-	**75.1**	**E**	**-**
5	**Otterson Dr & Hegan Ln**	**TWSC**	**D**	21.4	C	-	**239.4**	**F**	**Yes**
6	E Park Ave & Scott Ave	TWSC	D	20.3	C	-	33.4	D	-

Notes:
1. TWSC = Tw o Way Stop Control
2. LOS = Delay based on w orst minor street approach for TWSC intersections, average of all approaches for Signal
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions

Table 3.4 on the following page presents the 2040 queues for the study intersections. There are several queues that are projected to exceed storage, with the most notable queues being the westbound movement at Midway/Park Avenue & East Park Avenue and at East Park Avenue & Fair Street.

Table 3.4: Year 2040 Conditions 95th Percentile Queues – No Build Alternative

#	Intersection/Approach	Control Type	2040 95th Percentile Queue[1] AM	2040 95th Percentile Queue[1] PM	Storage
	Park Ave & Meyers St				
1	Eastbound Left/Right	Signal	101	268	-
	Northbound Left		**102**	**105**	100
	Northbound Thru		79	119	650
	Southbound Thru		85	108	-
	Southbound Thru/Right		129	123	-
	Midway/Park Ave & E Park Ave				
2	Eastbound Left/Thru/Right	Signal	24	40	-
	Westbound Left		**238**	**238**	160
	Westbound Left/Thru		**345**	**339**	295
	Westbound Right		105	-	295
	Northbound Left/Thru		773	2806	-
	Northbound Right		**174**	**153**	120
	Southbound Left		256	319	650
	Southbound Left/Thru/Right		335	374	650
	Fair St & E Park Ave				
3	Eastbound Left	Signal	**126**	**147**	80
	Eastbound Thru		260	277	295
	Eastbound Thru/Right		261	277	295
	Westbound Left		69	108	180
	Westbound Thru		572	**592**	580
	Westbound Thru/Right		**708**	**690**	580
	Northbound Left/Thru/Right		184	181	-
	Southbound Left		409	157	-
	Southbound Thru/Right		568	196	-
	Midway & Hegan Ln				
4	Eastbound Left/Thru/Right	Signal	255	1259	-
	Westbound Left/Thru/Right		25	30	-
	Northbound Left		**111**	**176**	80
	Northbound Thru/Right		255	1259	-
	Southbound Left		22	38	85
	Southbound Thru		257	2032	-
	Southbound Right		**154**	**156**	50
5	**Otterson Dr & Hegan Ln**				
	Eastbound Left/Thru	TWSC	49	46	-
	Westbound Left		-	10	100
	Westbound Thru/Right		12	4	-
	Southbound Left		76	**147**	100
	Southbound Right		41	377	-
6	**E Park Ave & Scott Ave**				
	Eastbound Thru	TWSC	-	-	580
	Eastbound Thru/Right		8	8	580
	Westbound Left		**103**	**93**	50
	Westbound Thru		1939	1825	-
	Northbound Left/Right		446	598	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage

4. Phase I: Intersection Improvements

4.1 Improvement Alternatives

Phase I includes intersection operational and configuration improvements within the Project area without significant changes to existing circulation patterns via the construction of new roadway connections. Phase I intersection improvements were evaluated for East Park Avenue & Midway, Hegan Lane & Midway, Hegan Lane & Otterson Drive. The intersections have operational and queuing issues currently, which will only increase in the future. Additionally, the Hegan Lane Business Park District is currently only accessible via the intersection of Hegan Lane & Otterson Drive, creating challenges for employees, visitors, freight, and other business-related traffic in the area. With improvements at these intersections, the business park traffic issues could be reduced.

Intersection improvements under Phase I include new or altered traffic signals, stop controls, and roundabouts as well as bicycle and pedestrian facilities at intersections. This report evaluates alternatives at each intersection to determine whether improvements would adequately address delay and congestion under existing and future conditions, consistent with ICE requirements. The intersections and their respective alternatives evaluated within this report include the following (Note: Improvements at these intersections are not considered in combination with each other):

- **East Park Avenue & Midway (Existing Traffic Signal)**

  Alternative 1: Modified Signal Control

  Alternative 2: Roundabout Control *(Requires improvements to adjacent intersections along East Park Avenue at Fair Street and Scott Avenue, described below.)*

- **Hegan Lane & Midway (Existing Traffic Signal)**

  Alternative 1: Modified Signal Control

  Alternative 2: Roundabout Control

- **Hegan Lane & Otterson Drive (Existing Two-Way Stop Control)**

  Alternative 1a: All-Way Stop Control

  Alternative 1b: New Signal

  Alternative 2: Roundabout Control

East Park Avenue & Midway – Alternative 2 (Roundabout Control)

As noted above, Alternative 2 (Roundabout Control) for the East Park Avenue & Midway intersection would require improvements to adjacent intersections along East Park Avenue at Fair Street and Scott Avenue. Due to the close spacing between the East Park Avenue intersections at Midway and Fair Street, the proposed roundabout at Midway could be impacted by eastbound queues at the existing traffic signal at Fair Street. Proposed improvements at East Park Avenue & Fair Street include either roundabout control or access restriction. If access restriction is proposed for East Park Avenue & Fair Street, improvements at East Park Avenue & Scott Avenue would be necessary to address changes in circulation patterns caused by left-turn restrictions to/from Fair Street.

Alternative 2 (Roundabout Control) for the East Park Avenue & Midway intersection was evaluated within the following sub-alternatives for the East Park Avenue corridor at Fair Street and Scott Avenue:

Alternative 2a: Roundabout at Fair Street

East Park Avenue & Fair Street: Roundabout Control

East Park Avenue & Scott Avenue: No improvement

Alternative 2b: Partial Right-In Right-Out[1] (RIRO) Access at Fair Street

East Park Avenue & Fair Street: Partial RIRO Access with Signalized Eastbound Left Turn

East Park Avenue & Scott Avenue: New Signal Control with a new North Leg

Alternative 2c: Full RIRO Access at Fair Street

East Park Avenue & Fair Street: Full RIRO Access Only

East Park Avenue & Scott Avenue: Roundabout Control with a new North Leg

Alternative 2d: South Leg RIRO Only

East Park Avenue & Fair Street:

The Partial RIRO scenario involves converting the intersection of East Park Avenue & Fair Street to restrict left turns in and out of Fair Street to the north and south, only allowing one left in on the eastbound left movement. This intersection would be controlled by signal to allow for the left turn. The full right-in right-out scenario involves converting the intersection of East Park Avenue & Fair Street to restrict access to only right-outs on Fair Street and right-ins from East Park Avenue. With the turn restrictions in place, the full RIRO will have the signal removed and stop signs placed on Fair Street. The South Leg RIRO Only scenario involves converting East Park Avenue & Fair Street to restrict left turns to/from the south leg of Fair Street with channelized left turns to/from the north leg of Fair Street. The intersection would be controlled by a signal to allow for eastbound and southbound left turns. A center median would be added to channelize the allowed left turns and to separate the southbound left receiving lane from the unrestricted eastbound thru volumes.

Additional Considerations

The intersection of Park Avenue and Meyers Street was included in the study area because one alternative for the Phase II roadway extension would have connected via Meyers Street. That alternative was subsequently eliminated from consideration for Phase II. Because Park Avenue and Meyers Street operates acceptably under both Existing Conditions and 2040 No Build conditions, no intersection improvement alternatives were proposed or evaluated for Phase I.

All alternatives were designed to conform to City and State design standards wherever possible, as outlined in the Design Basis Memo in Appendix B. Exhibits showing preliminary design of all Phase I alternatives are provided in Appendix C.

Design Checks

Similar design checks were applied to all Phase I alternatives, regardless of the type of improvements. All intersections were analyzed for Approach Stopping Sight Distance and Truck Turns. For the truck turn checks, all intersections were evaluated for Cal Legal design vehicles, unless the specific path fell on the City's Surface Transportation Assistance Act (STAA) Route, which includes East Park Avenue, Midway between East Park Avenue and Hegan Lane, and west along Hegan Lane. Signalized intersections and All Way Stop Controlled intersections were also analyzed for corner sight distance.

Roundabouts were analyzed slightly differently than signals. The nuanced design elements of roundabouts require certain design checks to be modified, substituted, or added to analyze their performance. Every roundabout alternative was analyzed with the following: Fastest Path, Truck Turns, Bus Turns, Intersection Sight Distance, and Stopping Sight distance. For more information, see design check exhibits found in Appendix D.

Additional checks not included in Appendix D were Natural Path, Entry Angle, and View Angles. Intersections were designed to reduce merging or crossing at entry due to harsh entries and insufficient tangents entering the roundabouts. Additionally, entries were aligned at approximately 90 degrees wherever possible to maximize the viewing angle, reducing neck strain on people yielding at the roundabout. Entry Angles were held between 20 and 40

[1] Right-In Right-Out (RIRO) control at intersections restricts left turn movements to and/or from a roadway to another roadway.

degrees to promote yielding and not merging at entry. All values are consistent with National Cooperative Highway Research Program (NCHRP) Report 672 and other established roundabout design methodology around the country.

Non-Conforming Features

Analysis of the proposed intersections under the checks presented above yielded minimal non-conforming features. All roundabouts provided full access to the design vehicles using “Case I” Designs. This means that design vehicles would take up both lanes on entry, hold thru circulation, then merge back into a singular lane on exit. This design strategy is common on local road intersections as this strategy allows for the trucks to control the intersection better and allows for smaller intersection sizes.

The southbound entry at Fair Street has a known obstruction in the sight line for intersection sight distance. This object, identified as a gas station sign, would restrict the sight distance to a design speed of 24.2 mph, rather than the intended design speed of 25.2 mph. Additionally, the northbound approach at Fair Street has tall growth landscape that may potentially obstruct the sight line of an approaching westbound driver. It is advised to replant with low growth landscaping in this location to eliminate the conflict.

Both the northbound and southbound approaches of Midway and Park Avenue at East Park Avenue have tall growth landscape that may partially obstruct the sight of the yield line for approaching vehicles. If it is confirmed to be obstructed, it is advised to replant with low growth landscaping if possible.

At the intersection of Midway and Hegan Lane, the northbound intersection sight distance sight line is obstructed by the tree and shrubbery in the southwest quadrant. Additionally, to limit impacts with the signal alternative, the existing edge of pavement in the southwest quadrant is proposed to be maintained. Currently, this curb return does not accommodate STAA right turns.

Similar turn restrictions are seen at the All-Way Stop and Signal alternatives for the Hegan Lane & Otterson Drive intersection. The geometries of the northwest and northeast quadrants are proposed to remain. These existing curb returns do not provide adequate clearance for STAA vehicles.

While all non-conforming features are not mitigable, many are. Additionally, the slower speeds of the roundabouts and all way stops may reduce the chance of collisions. Analysis is based on maximum operating speed and not typical operating speeds. Thus, the impact of non-conforming features on roundabout intersections is less than at a signalized intersection.

4.2 Traffic Operations Analysis

Improvement alternatives for the study intersections include modified controls at the intersections that are projected to operate at an unacceptable LOS under future No Build conditions: Midway/Park Avenue & East Park Avenue, Midway & Hegan Lane, and Otterson Drive & Hegan Lane. Signal control improvements were analyzed for each study intersection, even those where a signal is not proposed. The following section describes the improvement assumptions for each alternative at these intersections. The improvements are presented based on the control type analyzed. As noted previously, improvements at these intersections are not considered in combination with each other.

4.2.1 Signalized/All-Way Stop Control Improvement Alternatives

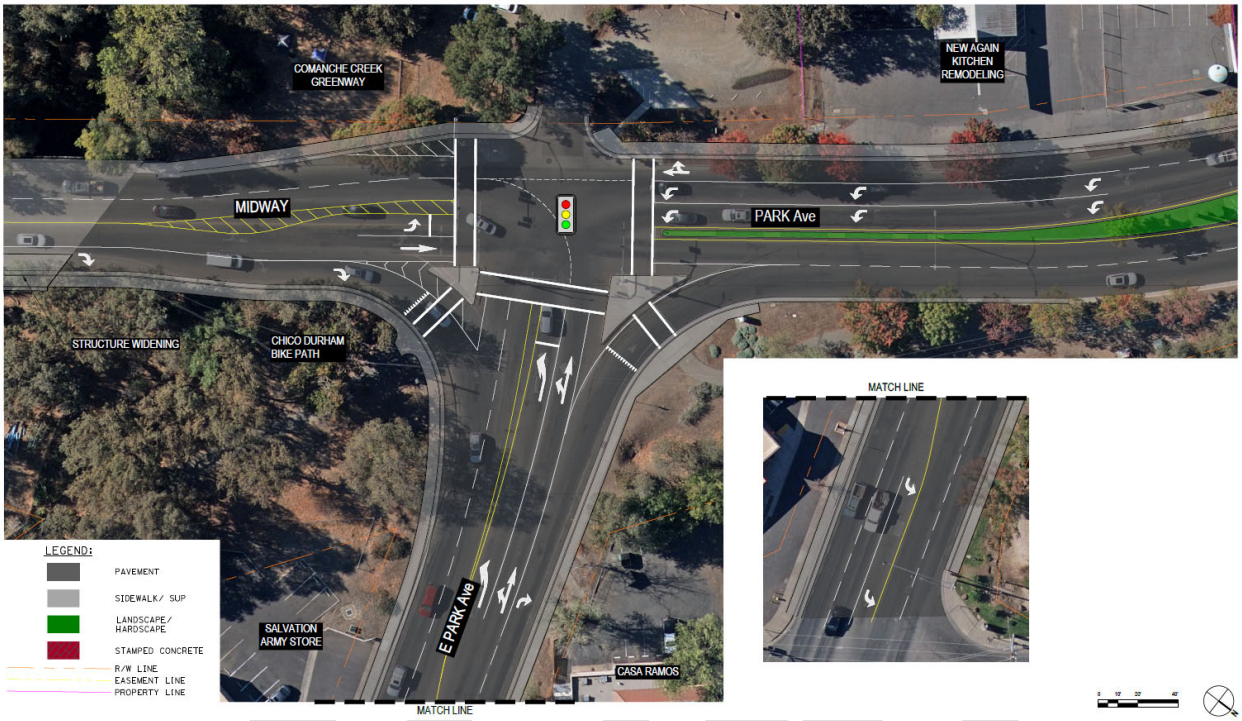
Traffic operations for Build Years 2025 and 2040 are presented in the following sections. LOS and queueing reports for signalized and stop-controlled alternatives are provided in Appendix E. Improvement assumptions for each study intersection are described below. Phase I alternative exhibits are provided in Appendix C, with images included below.

East Park Avenue & Midway: *Alternative 1:* Modified Signal Control

The Midway/Park Avenue & East Park Avenue intersection was modified to add a southbound left turn pocket and convert the southbound left/thru/right to a thru/right. A northbound left turn pocket was also added allowing for protected left turn phases and dedicated thru phases for the northbound and southbound movements. The

northbound right pocket was also extended back to the bridge south of the intersection. Unlike in previous designs, it was determined that an additional northbound right turn pocket was not needed.

Figure 4-1 East Park Avenue & Midway – Modified Signal Alternative



Hegan Lane & Midway: *Alternative 1:* Modified Signal Control

The Midway & Hegan Lane intersection was modified to channelize the southbound right turn pocket with a yield control. Additionally, an eastbound left turn pocket was added with another northbound receiving lane being needed that will taper down after the intersection.

Figure 4-2 Hegan Lane & Midway – Modified Signal Alternative

Hegan Lane & Otterson Drive: *Alternative 1a:* All-Way Stop Control & *Alternative 1b:* New Signal

The Otterson Drive & Hegan Lane intersection was analyzed as both a new signal and as an all-way stop controlled intersection. No changes in lane geometry are proposed.

Figure 4-3 Hegan Lane & Otterson Drive – All-Way Stop Control Alternative

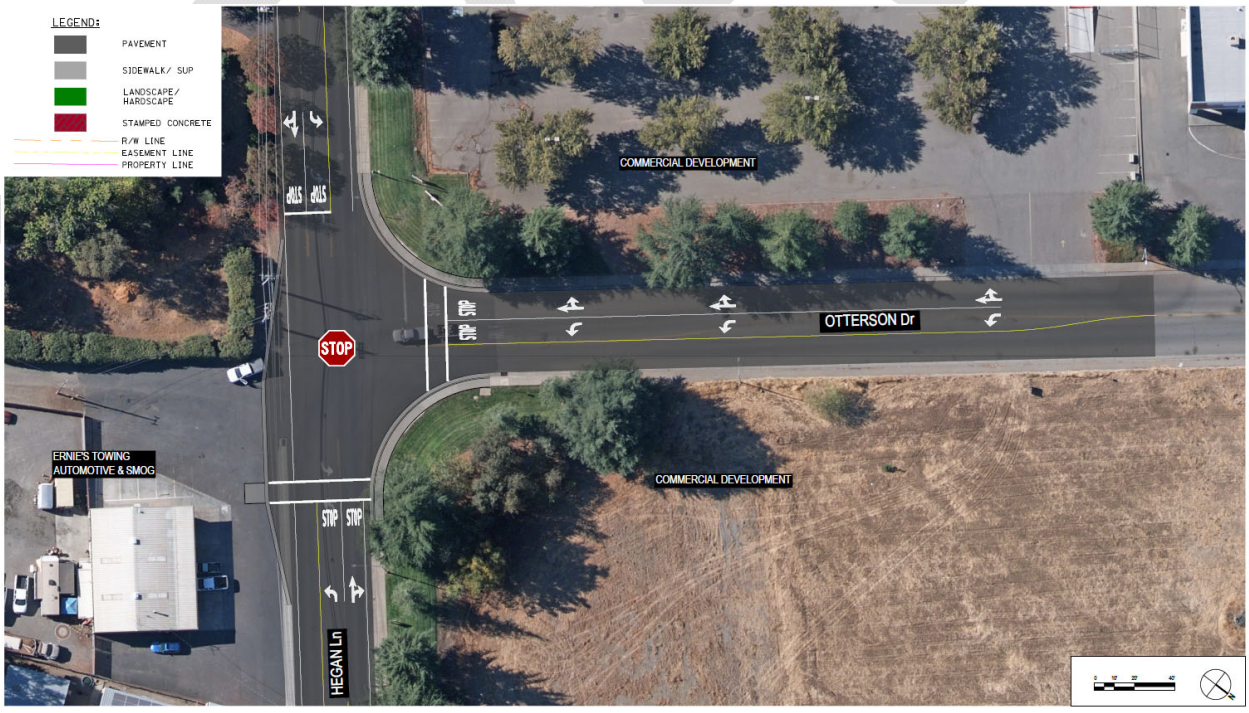


Figure 4-4 Hegan Lane & Otterson Drive – New Signal Alternative

Build Year 2025 Conditions

Table 4.1 presents the 2025 conditions for the improved intersection layouts. All intersections are projected to operate at an acceptable LOS in the cumulative improvement condition.

Table 4.1: Year 2025 Build Conditions Traffic Operations – Signal Improvements Alternative

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[4]	LOS	Warrant Met?[3]	Delay[4]	LOS	Warrant Met?[3]
2	Midway/Park Ave & E Park Ave	Signal	D	18.2	B	-	18.8	B	-
3	Fair St & E Park Ave	Signal	D	14.3	B	-	17.4	B	-
4	Midway & Hegan Ln	Signal	D	11.7	B	-	14.5	B	-
5a	Otterson Dr & Hegan Ln	AWSC	D	19.4	C	-	24.5	C	-
5b	Otterson Dr & Hegan Ln	Signal	D	7.8	A	-	12.1	B	-
6	E Park Ave & Scott Ave	Signal	D	7.4	A	-	4.8	A	-

Notes:
1. AWSC = All Way Stop Control; TWSC = Tw o Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on w orst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal,
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions

Table 4.2 on the following page presents the 2025 signalized improvements queues for the study intersections. While several queues exceed storage, this can be mitigated by providing more storage for the turn pockets.

Table 4.2: Year 2025 Build Conditions 95th Percentile Queues – Signal Improvements Alternative

#	Intersection/Approach	Control Type	2025 w/ Improvements 95th Percentile Queue[1]		Storage
			AM	PM	
	Midway/Park Ave & E Park Ave				
2	Eastbound Left/Thru/Right	Signal	12	30	-
	Westbound Left		**220**	**215**	160
	Westbound Left/Thru		217	213	295
	Westbound Right		156	203	295
	Northbound Thru		141	216	-
	Northbound Right		107	116	120
	Southbound Left		123	110	650
	Southbound Thru/Right		119	105	650
	Fair St & E Park Ave				
3	Eastbound Left	Signal	**88**	**119**	80
	Eastbound Thru		115	181	295
	Eastbound Thru/Right		126	180	295
	Westbound Left		14	9	180
	Westbound Thru		228	231	580
	Westbound Thru/Right		129	202	580
	Northbound Left/Thru/Right		52	84	-
	Southbound Left		104	118	-
	Southbound Thru/Right		83	77	-
	Midway & Hegan Ln				
4	Eastbound Left	Signal	**104**	**148**	100
	Eastbound Left/Thru/Right		132	471	-
	Westbound Left/Thru/Right		6	28	-
	Northbound Left		75	**99**	80
	Northbound Thru/Right		176	209	-
	Southbound Left		17	38	85
	Southbound Thru		255	409	-
	Southbound Right		**155**	**178**	50
	Otterson Dr & Hegan Ln				
5a	Eastbound Left/Thru	AWSC	77	122	-
	Westbound Left		-	11	100
	Westbound Thru/Right		128	122	-
	Southbound Left		51	97	100
	Southbound Right		27	64	-
	Otterson Dr & Hegan Ln				
5b	Eastbound Left	Signal	37	43	-
	Eastbound Thru		49	117	-
	Westbound Left		-	18	100
	Westbound Thru/Right		134	123	-
	Southbound Left		81	**125**	100
	Southbound Right		39	90	-
	E Park Ave & Scott Ave				
6	Eastbound Thru	Signal	142	118	580
	Eastbound Thru/Right		151	131	580
	Westbound Left		**71**	**58**	50
	Westbound Thru		155	110	-
	Northbound Left/Right		67	59	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage

Year 2040 Build Conditions

Table 4.3 presents the 2040 conditions for the improved intersection layouts. All intersections are projected to operate at an acceptable LOS in the cumulative improvement conditions. As documented in the 2040 no build scenario, the signal warrant weas met for the intersection of Otterson Drive & Hegan Lane, so it was analyzed as both an AWSC and a signal. However, the AWSC at Otterson Drive & Hegan Lane is projected to operate at LOS D, very close to becoming unacceptable. As traffic volumes continue to grow, it is likely that the intersection will begin to operate unacceptably at LOS E or F shortly after 2040 as an AWSC. Therefore, it may be more cost-effective to signalize the intersection which has a longer service life.

Table 4.3: Year 2040 Build Conditions Traffic Operations – Signal Improvements Alternative

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[4]	LOS	Warrant Met?[3]	Delay[4]	LOS	Warrant Met?[3]
2	Midway/Park Ave & E Park Ave	Signal	D	21.4	C	-	22.4	C	-
3	Fair St & E Park Ave	Signal	D	15.3	B	-	18.9	B	-
4	Midway & Hegan Ln	Signal	D	12.4	B	-	16.7	B	-
5a	Otterson Dr & Hegan Ln	AWSC	D	27.4	D	-	32.7	D	-
5b	Otterson Dr & Hegan Ln	Signal	D	8.7	A	-	12.9	B	-
6	E Park Ave & Scott Ave	Signal	D	7.6	A	-	4.7	A	-

Notes:
1. AWSC = All Way Stop Control; TWSC = Tw o Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on w orst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal,
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions

Table 4.4 on the following page presents the 2040 signalized improvements queues for the study intersections. While several queues exceed storage, this can be mitigated by providing more storage for the turn pockets.

Table 4.4: Year 2040 Build Conditions 95th Percentile Queues – Signal Improvements Alternative

#	Intersection/Approach	Control Type	2040 w/ Improvements 95th Percentile Queue[1]		Storage
			AM	PM	
	Midway/Park Ave & E Park Ave				
2	Eastbound Left/Thru/Right	Signal	24	30	-
	Westbound Left		**226**	**218**	160
	Westbound Left/Thru		248	225	295
	Westbound Right		156	203	295
	Northbound Thru		208	422	-
	Northbound Right		**192**	**134**	120
	Southbound Left		127	130	650
	Southbound Thru/Right		121	117	650
	Fair St & E Park Ave				
3	Eastbound Left	Signal	**102**	**137**	80
	Eastbound Thru		140	216	295
	Eastbound Thru/Right		152	217	295
	Westbound Left		35	16	180
	Westbound Thru		310	297	580
	Westbound Thru/Right		198	273	580
	Northbound Left/Thru/Right		64	107	-
	Southbound Left		142	127	-
	Southbound Thru/Right		115	91	-
	Midway & Hegan Ln				
4	Eastbound Left	Signal	**134**	**148**	100
	Eastbound Left/Thru/Right		196	1398	-
	Westbound Left/Thru/Right		17	38	-
	Northbound Left		**92**	**101**	80
	Northbound Thru/Right		194	260	-
	Southbound Left		42	59	85
	Southbound Thru		346	787	-
	Southbound Right		**166**	**178**	50
	Otterson Dr & Hegan Ln				
5a	Eastbound Left/Thru	AWSC	77	171	-
	Westbound Left		-	26	100
	Westbound Thru/Right		179	156	-
	Southbound Left		57	**129**	100
	Southbound Right		30	148	-
	Otterson Dr & Hegan Ln				
5b	Eastbound Left	Signal	38	52	-
	Eastbound Thru		57	123	-
	Westbound Left		-	23	100
	Westbound Thru/Right		150	135	-
	Southbound Left		85	**136**	100
	Southbound Right		46	149	-
	E Park Ave & Scott Ave				
6	Eastbound Thru	Signal	215	140	580
	Eastbound Thru/Right		231	158	580
	Westbound Left		**82**	**62**	50
	Westbound Thru		232	110	-
	Northbound Left/Right		69	70	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage

4.2.2 Roundabout Improvement Alternatives

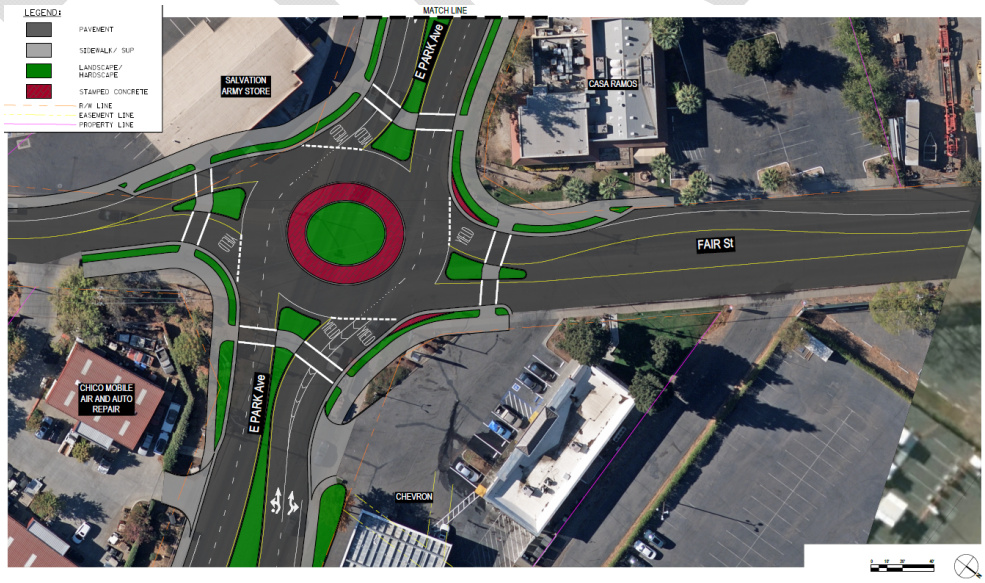
Traffic operations for Build Years 2025 and 2040 are presented in the following sections. LOS and queueing reports for roundabout alternatives are provided in Appendix F. Improvement assumptions for each study intersection are described below. Roundabout control improvements were analyzed for each study intersection, even those where a roundabout is not proposed. Phase I alternative exhibits are provided in Appendix C, with images included below.

East Park Avenue & Midway: *Alternative 2a:* Roundabout Control

As described in preceding sections of this report, improving the East Park Avenue & Midway intersection to roundabout control (Alternative 2) would require improvements along the East Park Avenue Corridor at the intersections East Park Avenue at Fair Street and Scott Avenue. Alternative 2a includes converting the East Park Avenue & Midway intersection to roundabout control, with no improvements to the East Park Avenue & Scott Avenue intersection. Traffic operations for additional alternatives (2b and 2c) for the East Park Avenue Corridor are presented in the following sections.

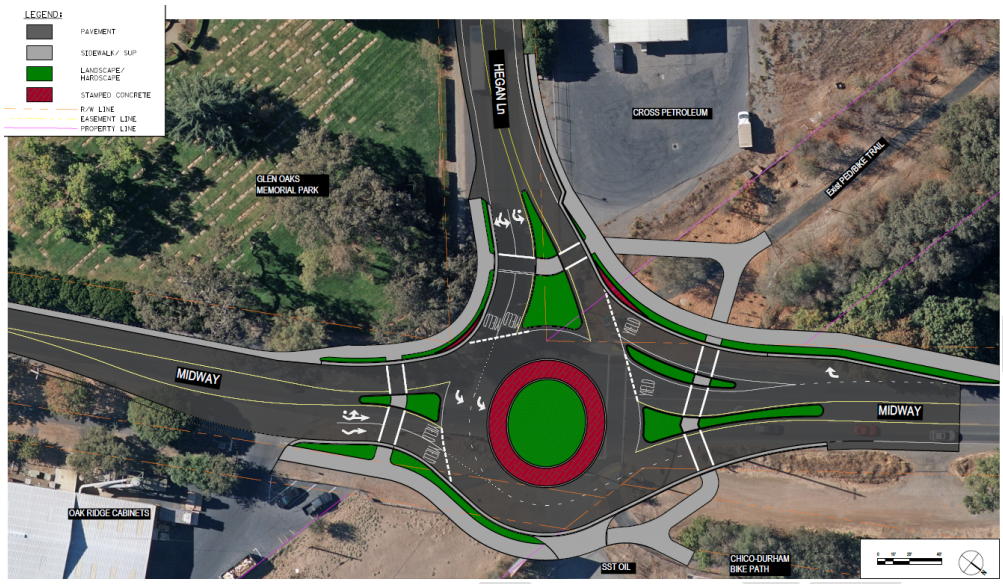
Figure 4-5 East Park Avenue & Midway – Roundabout Alternative

Figure 4-6 East Park Avenue & Fair Street – Roundabout Alternative



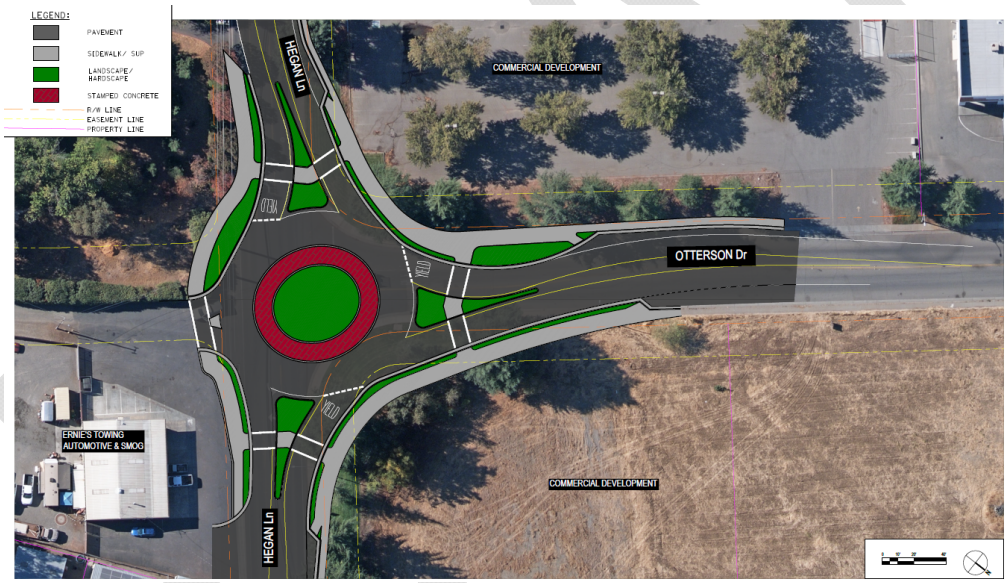
Hegan Lane & Midway: *Alternative 2:* Roundabout Control

Figure 4-7 Hegan Lane & Midway – Roundabout Alternative



Hegan Lane & Otterson Drive: *Alternative 2:* Roundabout Control

Figure 4-8 Hegan Lane & Otterson Drive – Roundabout Alternative



Build Year 2025 Conditions

Table 4.5 presents the 2025 conditions for the roundabout alternative. All intersections are projected to operate at an acceptable LOS in the cumulative roundabout conditions. Table 4.6 presents the 2025 Queues for the study intersections under the roundabout alternative. None of the queues exceed storage in 2025 conditions.

Year 2040 Build Conditions

Table 4.7 presents the 2040 conditions for the roundabout alternative. All intersections are projected to operate at an acceptable LOS in the cumulative roundabout conditions. Table 4.8 presents the 2040 Queues for the study intersections under the roundabout alternative. There are only two queues that exceed storage, both only exceeding the storage by an additional car length.

Table 4.5: Year 2025 Build Conditions Traffic Operations – Roundabout Alternative

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour		PM Peak Hour	
				Delay[3]	LOS	Delay[3]	LOS
2	Midway/Park Ave & E Park Ave	RNDBT	D	9.2	A	8.8	A
3	Fair St & E Park Ave	RNDBT	D	5.7	A	5.9	A
4	Midway & Hegan Ln	RNDBT	D	7.0	A	8.4	A
5	Otterson Dr & Hegan Ln	RNDBT	D	4.9	A	7.2	A
6	E Park Ave & Scott Ave	RNDBT	D	4.9	A	4.8	A

Notes:
1. RNDBT = Roundabout
2. LOS = Delay based on average of all approaches for Roundabout
3. Delay = Stopped Delay per Vehicle in seconds
4. **Bold** = Unacceptable Conditions

Table 4.6: Year 2025 Build Condition 95th Percentile Queues – Roundabout Alternative

#	Intersection/Approach	Control Type	2025 w/ Improvements 95th Percentile Queue[1]		Storage
			AM	PM	
2	**Midway/Park Ave & E Park Ave**				
	Eastbound Left/Thru/Right	RNDBT	2	2	100
	Westbound Left/Thru		125	94	300
	Westbound Right		44	57	300
	Northbound Left/Thru		51	64	-
	Northbound Right		97	164	200
	Southbound Left		79	73	-
	Southbound Thru/Right		76	53	-
3	**Fair St & E Park Ave**				
	Eastbound Left/Thru	RNDBT	57	82	-
	Eastbound Thru/Right		59	84	-
	Westbound Left/Thru		53	61	-
	Westbound Thru/Right		54	62	-
	Northbound Left/Thru/Right		4	13	-
	Southbound Left/Thru/Right		50	40	-
4	**Midway & Hegan Ln**				
	Eastbound Left	RNDBT	37	100	100
	Eastbound Left/Thru/Right		13	28	-
	Westbound Left/Thru/Right		1	3	-
	Northbound Left/Thru		135	80	-
	Northbound Thru/Right		19	15	50
	Southbound Left/Thru/Right		60	61	-
	Southbound Right		97	46	100
5	**Otterson Dr & Hegan Ln**				
	Eastbound Left/Thru/Right	RNDBT	28	69	-
	Westbound Left/Thru/Right		100	52	100
	Northbound Left/Thru/Right		0	1	-
	Southbound Left/Thru/Right		12	57	100
6	**E Park Ave & Scott Ave**				
	Eastbound Thru/Right	RNDBT	175	291	-
	Westbound Left/Thru		181	212	-
	Northbound Left/Right		23	31	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage

Table 4.7: Year 2040 Build Conditions Traffic Operations – Roundabout Alternative

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour		PM Peak Hour	
				Delay[3]	LOS	Delay[3]	LOS
2	Midway/Park Ave & E Park Ave	RNDBT	D	9.9	A	9.5	A
3	Fair St & E Park Ave	RNDBT	D	5.8	A	6.0	A
4	Midway & Hegan Ln	RNDBT	D	7.0	A	10.1	B
5	Otterson Dr & Hegan Ln	RNDBT	D	4.9	A	7.2	A
6	E Park Ave & Scott Ave	RNDBT	D	5.1	A	5.5	A

Notes:
1. RNDBT = Roundabout
2. LOS = Delay based on average of all approaches for Roundabout
3. Delay = Stopped Delay per Vehicle in seconds

Table 4.8: Year 2040 Build Condition 95th Percentile Queues – Roundabout Alternative

#	Intersection/Approach	Control Type	2040 w/ Improvements 95th Percentile Queue[1]		Storage
			AM	PM	
2	**Midway/Park Ave & E Park Ave**				
	Eastbound Left/Thru/Right	RNDBT	2	3	100
	Westbound Left/Thru		152	114	300
	Westbound Right		50	70	300
	Northbound Left/Thru		62	79	-
	Northbound Right		117	**231**	200
	Southbound Left		108	94	-
	Southbound Thru/Right		119	69	-
3	**Fair St & E Park Ave**				
	Eastbound Left/Thru	RNDBT	67	95	-
	Eastbound Thru/Right		70	99	-
	Westbound Left/Thru		61	71	-
	Westbound Thru/Right		62	74	-
	Northbound Left/Thru/Right		5	17	-
	Southbound Left/Thru/Right		60	50	-
4	**Midway & Hegan Ln**				
	Eastbound Left	RNDBT	40	**138**	100
	Eastbound Left/Thru/Right		13	43	-
	Westbound Left/Thru/Right		2	5	-
	Northbound Left/Thru		135	153	-
	Northbound Thru/Right		19	18	50
	Southbound Left/Thru/Right		63	71	-
	Southbound Right		97	54	100
5	**Otterson Dr & Hegan Ln**				
	Eastbound Left/Thru/Right	RNDBT	29	75	-
	Westbound Left/Thru/Right		100	52	100
	Northbound Left/Thru/Right		0	1	-
	Southbound Left/Thru/Right		13	60	100
6	**E Park Ave & Scott Ave**				
	Eastbound Thru/Right	RNDBT	230	485	-
	Westbound Left/Thru		245	287	-
	Northbound Left/Right		34	58	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage

4.2.3 East Park Avenue Corridor Access Restriction Alternatives

As described in preceding sections of this report, improving the East Park Avenue & Midway intersection to roundabout control (Alternative 2) would require improvements along the East Park Avenue Corridor at the intersections East Park Avenue at Fair Street and Scott Avenue. Alternative 2a includes converting the East Park Avenue & Fair Street intersection to a roundabout and is presented in Section 4.2.2 above.

Alternatives 2b and 2c include access restriction at East Park Avenue & Fair Street, resulting in additional vehicular trips utilizing the East Park Avenue & Scott Avenue intersection. Therefore, improvements at East Park Avenue & Scott Avenue are necessary to address changes in circulation patterns associated with access restriction alternatives at East Park Avenue & Fair Street. These improvements include:

Alternative 2b: Partial Right-In Right-Out (RIRO) at Fair Street

East Park Avenue & Fair Street: Partial (1/4) RIRO Access with Signalized Eastbound Left Turn

East Park Avenue & Scott Avenue: New Signal Control with a new North Leg

Alternative 2c: Full RIRO at Fair Street

East Park Avenue & Fair Street: Full RIRO Access Only

East Park Avenue & Scott Avenue: Roundabout Control with a new North Leg

Traffic operations for East Park Avenue & Midway Alternatives 2b and 2c are presented in the following sections. LOS and queueing reports for roundabout alternatives are provided in Appendix F. Phase I alternative exhibits are provided in Appendix C, with images included below.

Partial Right-In-Right-Out (RIRO) at Fair Street (Alternative 2b)

The partial right-in-right-out (RIRO) improvement at East Park Avenue & Fair Street includes traffic operations for the three study intersections on the East Park Avenue corridor. This alternative has the intersection of Midway/Park Avenue & East Park Avenue as a roundabout, the intersection of Fair Street & East Park Avenue as a 1/4 RIRO with the eastbound left-turn movement signalized, and the intersection of East Park Avenue & Scott Avenue signalized.

Figure 4-9 East Park Avenue & Fair Street – Partial RIRO Alternative

Build Year 2025 Conditions

Table 4.9 below presents the 2025 conditions for the partial RIRO alternative. All intersections are projected to operate at an acceptable LOS in the Partial RIRO conditions.

Table 4.9: Year 2040 Build Conditions Traffic Operations – Partial RIRO Alternative

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[4]	LOS	Warrant Met?[3]	Delay[4]	LOS	Warrant Met?[3]
2	Midway/Park Ave & E Park Ave	RNDBT	D	10.1	B	-	9.9	A	-
3	Fair St & E Park Ave	Signal	D	2.3	A	-	2.6	A	-
6	E Park Ave & Scott Ave	Signal	D	7.7	A	-	7.9	A	-

Notes:
1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions

Table 4.10 on the following page presents the 2025 Queues for the study intersections under the partial RIRO alternative. The eastbound left-turn pocket of Fair Street & East Park Avenue exceeds available storage by less than one car length.

Table 4.10: Year 2025 Build Condition 95th Percentile Queues – Partial RIRO Alternative

#	Intersection/Approach	Control Type	2025 Partial RIRO 95th Percentile Queue[1]		Storage
			AM	PM	
2	**Midway/Park Ave & E Park Ave**				
	Eastbound Left/Thru/Right	RNDBT	1	2	-
	Westbound Left		152	124	300
	Westbound Left/Thru		42	57	300
	Northbound Thru		53	69	-
	Northbound Right		99	189	200
	Southbound Left		93	88	650
	Southbound Thru/Right		99	66	650
3	**Fair St & E Park Ave**				
	Eastbound Left	Signal	66	**87**	80
	Eastbound Thru		55	51	295
	Eastbound Thru/Right		42	29	295
	Westbound Thru		67	68	580
	Westbound Thru/Right		65	52	580
	Northbound Left/Thru/Right		0	0	-
	Southbound Right		125	102	-
6	**E Park Ave & Scott Ave**				
	Eastbound Thru	Signal	151	149	
	Eastbound Thru/Right		168	155	580
	Westbound Left		73	67	100
	Westbound Thru		117	117	-
	Northbound Left/Thru/Right		87	93	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage

Year 2040 Build Conditions

Table 4.11 below presents the 2040 conditions for the Partial RIRO alternative. All intersections are projected to operate at an acceptable LOS in the Partial RIRO conditions.

Table 4.11: Year 2040 Build Conditions Traffic Operations – Partial RIRO Alternative

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[4]	LOS	Warrant Met?[3]	Delay[4]	LOS	Warrant Met?[3]
2	Midway/Park Ave & E Park Ave	RNDBT	D	13.4	B	-	12.7	B	-
3	Fair St & E Park Ave	Signal	D	2.4	A	-	2.7	A	-
6	E Park Ave & Scott Ave	Signal	D	7.8	A	-	8.9	A	-

Notes:
1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds

Table 4.12 on the following page presents the 2040 queues for the study intersections under the Partial RIRO alternative. There are two queues that exceed storage: the northbound right turn pocket of Midway & East Park Avenue and the eastbound left-turn pocket of Fair Street & East Park Avenue.

Table 4.12: Year 2040 Build Condition 95th Percentile Queues – Partial RIRO Alternative

#	Intersection/Approach	Control Type	2040 Partial RIRO 95th Percentile Queue[1]		Storage
			AM	PM	
2	**Midway/Park Ave & E Park Ave**				
	Eastbound Left/Thru/Right	RNDBT	3	3	-
	Westbound Left		252	188	300
	Westbound Left/Thru		53	74	300
	Northbound Thru		182	102	-
	Northbound Right		**205**	**345**	200
	Southbound Left		182	150	650
	Southbound Thru/Right		205	107	650
3	**Fair St & E Park Ave**				
	Eastbound Left	Signal	71	**102**	80
	Eastbound Thru		60	92	295
	Eastbound Thru/Right		42	40	295
	Westbound Thru		86	112	580
	Westbound Thru/Right		81	101	580
	Northbound Left/Thru/Right		0	0	-
	Southbound Right		149	130	-
6	**E Park Ave & Scott Ave**				
	Eastbound Left	Signal	57	63	580
	Eastbound Thru		236	230	
	Eastbound Thru/Right		217	232	580
	Westbound Left		85	69	100
	Westbound Thru		215	154	-
	Westbound Thru/Right		197	145	-
	Northbound Left/Thru/Right		102	125	-
	Southbound Left/Thru/Right		54	65	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage

FULL Right-In-Right-Out (RIRO) at Fair Street (Alternative 2c)

The full RIRO improvement at East Park Avenue & Fair Street includes traffic operations for the three study intersections on the East Park Avenue corridor. This alternative has the intersection of Midway/Park Avenue & East Park Avenue as a roundabout, the intersection of Fair Street & East Park Avenue as a full RIRO, and the intersection of East Park Avenue & Scott Avenue as a roundabout.

Figure 4-10 East Park Avenue & Fair Street – Full RIRO Alternative

Build Year 2025 Conditions

Table 4.13 below presents the 2025 conditions for the Full RIRO alternative. All intersections are projected to operate at an acceptable LOS in the Full RIRO conditions.

Table 4.13: Year 2025 Build Conditions Traffic Operations – Full RIRO Alternative

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[4]	LOS	Warrant Met?[3]	Delay[4]	LOS	Warrant Met?[3]
2	Midway/Park Ave & E Park Ave	RNDBT	D	10.1	B	-	9.9	A	-
3	Fair St & E Park Ave	TWSC	D	17.8	C	-	14.8	B	-
6	E Park Ave & Scott Ave	RNDBT	D	5.5	A	-	5.9	A	-

Notes:

1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions

Table 4.14 on the following page presents the 2025 Queues for the study intersections under the full RIRO alternative. No queues exceed available storage.

Table 4.14: Year 2025 Build Condition 95th Percentile Queues – Full RIRO Alternative

#	Intersection/Approach	Control Type	2025 Full RIRO 95th Percentile Queue[1]		Storage
			AM	PM	
	Midway/Park Ave & E Park Ave				
2	Eastbound Left/Thru/Right	RNDBT	1	2	-
	Westbound Left		152	124	300
	Westbound Left/Thru		42	57	300
	Northbound Thru		53	69	-
	Northbound Right		99	189	200
	Southbound Left		93	88	650
	Southbound Thru/Right		99	66	650
3	**Fair St & E Park Ave**				
	Westbound Thru	TWSC	3	0	556
	Westbound Thru/Right		0	0	556
	Southbound Right		106	94	-
6	**E Park Ave & Scott Ave**				
	Eastbound U/Left	RNDBT	10	17	200
	Eastbound Thru/Right		138	16	580
	Westbound Left		57	66	100
	Westbound Thru		58	68	-
	Northbound Left/Thru/Right		23	41	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage

Year 2040 Build Conditions

Table 4.15 below presents the 2040 conditions for the Full RIRO alternative. All intersections are projected to operate at an acceptable LOS in the Full RIRO conditions.

Table 4.15: Year 2040 Build Conditions Traffic Operations – Full RIRO Alternative

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[4]	LOS	Warrant Met?[3]	Delay[4]	LOS	Warrant Met?[3]
2	Midway/Park Ave & E Park Ave	RNDBT	D	13.4	B	-	12.7	B	-
3	Fair St & E Park Ave	TWSC	D	23.0	C	-	17.6	C	-
6	E Park Ave & Scott Ave	RNDBT	D	6.3	A	-	7.3	A	-

Notes:
1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions

Table 4.16 on the following page presents the 2040 Queues for the study intersections under the Full RIRO alternative. There is one queue that exceeds storage: the northbound right turn pocket of Midway & East Park Avenue.

Table 4.16: Year 2040 Build Condition 95th Percentile Queues – Full RIRO Alternative

#	Intersection/Approach	Control Type	2040 Full RIRO 95th Percentile Queue[1]		Storage
			AM	PM	
	Midway/Park Ave & E Park Ave				
2	Eastbound Left/Thru/Right	RNDBT	3	3	-
	Westbound Left		252	188	300
	Westbound Left/Thru		53	74	300
	Northbound Thru		71	102	-
	Northbound Right		146	**345**	200
	Southbound Left		182	150	650
	Southbound Thru/Right		205	107	650
3	**Fair St & E Park Ave**				
	Westbound Thru	TWSC	8	0	556
	Westbound Thru/Right		5	0	556
	Southbound Right		124	118	-
6	**E Park Ave & Scott Ave**				
	Eastbound U/Left	RNDBT	15	24	200
	Eastbound Thru/Right		190	364	580
	Westbound Left		75	88	100
	Westbound Thru/Right		76	91	-
	Northbound Left/Thru/Right		36	92	-
	Southbound Left/Thru/Right		12	14	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage

South Leg RIRO Only (Alternative 2d)

The South Leg RIRO Only improvement at East Park Avenue & Fair Street includes traffic operations for the intersections of East Park Avenue & Fair Street and East Park Avenue and Scott Avenue.

Figure 4-11 East Park Avenue & Fair Street – Partial South Leg RIRO Only Alternative

Build Year 2025 Conditions

Table 4.13 below presents the 2025 conditions for the South Leg RIRO Only alternative. All intersections are projected to operate at acceptable LOS conditions.

Table 4.17: Year 2025 Build Conditions Traffic Operations –South Leg RIRO Only

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[4, 6]	LOS	Warrant Met?[3]	Delay[4, 6]	LOS	Warrant Met?[3]
3	Fair St & E Park Ave	Signal	D	6.5	A	-	8.2	A	-
6	E Park Ave & Scott Ave	Signal	D	7.7	A	-	7.9	A	-

Notes:
1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions
6. Fair St & Park Ave were based on HCM 2000

Table 4.14 below presents the 2025 Queues for the study intersections under the South Leg RIRO Only alternative. There is one queue that exceeds storage: the westbound left pocket of East Park Avenue & Scott Avenue.

Table 4.18: Year 2025 Build Condition 95th Percentile Queues –South Leg RIRO Only Alternative

#	Intersection/Approach	Control Type	2025 Partial RIRO 95th Percentile Queue[1]		Storage
			AM	PM	
3	**Fair St & E Park Ave**				
	Eastbound Left	Signal	80	95	110
	Eastbound Thru/Right		0	15	295
	Westbound Thru		110	115	580
	Westbound Thru/Right		110	125	580
	Northbound Right		0	25	-
	Southbound Left		95	110	-
	Southbound Right		50	50	-
6	**E Park Ave & Scott Ave**				
	Eastbound Thru	Signal	145	155	580
	Eastbound Thru/Right		160	170	580
	Westbound Left		**70**	**60**	50
	Westbound Thru		140	105	-
	Northbound Left/Right		85	115	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage
3. Worst case scenario for movements with more than one of the same movements as shown in the Synchro Queuing and Blocking Reports.

Build Year 2040 Conditions

Table 4.13 below presents the 2040 conditions for the South Leg RIRO Only alternative. All intersections are projected to operate at acceptable LOS conditions.

Table 4.19: Year 2040 Build Conditions Traffic Operations –South Leg RIRO Only

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[4, 6]	LOS	Warrant Met?[3]	Delay[4, 6]	LOS	Warrant Met?[3]
3	Fair St & E Park Ave	Signal	D	7.4	A	-	8.3	A	-
6	E Park Ave & Scott Ave	Signal	D	7.8	A	-	8.9	A	-

Notes:
1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions
6. Fair St & Park Ave were based on HCM 2000

Table 4.14 below presents the 2040 Queues for the study intersections under the South Leg RIRO Only alternative. There are two queues that exceeds storage: the westbound left pocket of East Park Avenue & Scott Avenue and the eastbound left pocket of East Park Avenue & Fair Street.

Table 4.20: Year 2040 Build Condition 95th Percentile Queues –South Leg RIRO Only Alternative

#	Intersection/Approach	Control Type	2040 Partial RIRO 95th Percentile Queue[1]		Storage
			AM	PM	
3	**Fair St & E Park Ave**				
	Eastbound Left	Signal	80	**125**	110
	Eastbound Thru/Right		0	190	295
	Westbound Thru		120	130	580
	Westbound Thru/Right		115	135	580
	Northbound Right		0	45	-
	Southbound Left		135	110	-
	Southbound Right		75	55	-
6	**E Park Ave & Scott Ave**				
	Eastbound Thru	Signal	155	220	580
	Eastbound Thru/Right		210	230	580
	Westbound Left		**75**	**65**	50
	Westbound Thru		140	105	-
	Northbound Left/Right		95	115	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage
3. Worst case scenario for movements with more than one of the same movements as shown in the Synchro Queuing and Blocking Reports.

South Leg RIRO Only – Left Turn Phasing Alternative

The South Leg RIRO Only – Left Turn Phasing Alternative presents an alternative condition to the South Leg RIRO Only scenario. All parameters are unchanged as analyzed in the South Leg RIRO Only scenario except for the turn type phasing on the eastbound left turn movement. The eastbound left turn movement is changed from a protected left turn to a permitted + protected left turn movement.

Build Year 2025 Conditions

Table 4.13 below presents the 2025 conditions for the South Leg RIRO Only – Left Turn Phasing Alternative. All intersections are projected to operate at acceptable LOS conditions.

Table 4.21: Year 2025 Build Conditions Traffic Operations –South Leg RIRO Only – Left Turn Phasing Alternative

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[4, 6]	LOS	Warrant Met?[3]	Delay[4, 6]	LOS	Warrant Met?[3]
3	Fair St & E Park Ave	Signal	D	5.7	A	-	5.4	A	-
6	E Park Ave & Scott Ave	Signal	D	7.7	A	-	7.9	A	-

Notes:

1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions
6. Fair St & Park Ave were based on HCM 2000

Table 4.14 below presents the 2025 Queues for the study intersections under the South Leg RIRO Only – Left Turn Phasing Alternative. There is one queue that exceeds storage: the westbound left pocket of East Park Avenue & Scott Avenue.

Table 4.22: Year 2025 Build Condition 95th Percentile Queues –South Leg RIRO Only – Left Turn Phasing Alternative

#	Intersection/Approach	Control Type	2025 Partial RIRO		Storage
			AM	PM	
3	**Fair St & E Park Ave**				
	Eastbound Left	Signal	55	65	110
	Westbound Thru		90	90	580
	Westbound Thru/Right		85	95	580
	Northbound Right			15	-
	Southbound Left		100	95	-
	Southbound Right		55	50	-
6	**E Park Ave & Scott Ave**				
	Eastbound Thru		150	150	580
	Eastbound Thru/Right		155	170	580
	Westbound Left		**80**	**65**	50
	Westbound Thru		140	105	-
	Northbound Left/Right		85	105	-

Notes:

1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage
3. Worst case scenario for movements with more than one of the same movements as shown in the Synchro Queuing and Blocking Reports.

Build Year 2040 Conditions

Table 4.13 below presents the 2040 conditions for the South Leg RIRO Only – Left Turn Phasing Alternative. All intersections are projected to operate at acceptable LOS conditions.

Table 4.23: Year 2040 Build Conditions Traffic Operations –South Leg RIRO Only – Left Turn Phasing Alternative

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[4,6]	LOS	Warrant Met?[3]	Delay[4,6]	LOS	Warrant Met?[3]
3	Fair St & E Park Ave	Signal	D	6.1	A	-	6.0	A	-
6	E Park Ave & Scott Ave	Signal	D	7.8	A	-	8.9	A	-

Notes:
1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions
6. Fair St & Park Ave were based on HCM 2000

Table 4.14 below presents the 2040 Queues for the study intersections under the South Leg RIRO Only – Left Turn Phasing Alternative. There is one queue that exceeds storage: the westbound left pocket of East Park Avenue & Scott Avenue.

Table 4.24: Year 2040 Build Condition 95th Percentile Queues –South Leg RIRO Only – Left Turn Phasing Alternative

#	Intersection/Approach	Control Type	2040 Partial RIRO		Storage
			AM	PM	
3	**Fair St & E Park Ave**				
	Eastbound Left	Signal	55	65	110
	Westbound Thru		90	105	580
	Westbound Thru/Right		95	105	580
	Northbound Right		0	30	-
	Southbound Left		120	105	-
	Southbound Right		85	55	-
6	**E Park Ave & Scott Ave**				
	Eastbound Thru		190	210	580
	Eastbound Thru/Right		200	235	580
	Westbound Left		**80**	**70**	50
	Westbound Thru		190	140	-
	Northbound Left/Right		95	130	-

Notes:
1. Queue length (in feet) that has only 5% chance of being exceeded
2. **Bold** text indicates queues that exceed available storage
3. Worst case scenario for movements with more than one of the same movements as shown in the Synchro Queuing and Blocking Reports.

4.3 Life Cycle Benefit/Cost Analysis

The following sections present a brief summary of the parameters used to assess and monetize the life cycle benefits and costs for each of the proposed build alternatives.

Safety Benefit

Safety costs associated with collisions anticipated for each proposed intersection improvement were quantified using the Caltrans Intersection Control Evaluation Collision Cost Analysis spreadsheet.

To compute the existing collision rate, existing collision data over a five year period was utilized. The intersection ADT was converted to a Million Vehicle (MV) per year. The number of collisions were then divided by the total number of vehicles to obtain a collision rate (collision/MV). This determines the base cost of collisions for existing conditions.

Costs associated with collisions anticipated for each proposed intersection improvement were quantified using the Caltrans Intersection Control Evaluation Collision Cost Analysis spreadsheet.

Due to the low number of collisions in the project area, the monetized safety benefit is relatively low and does not currently reflect a safety-driven project. In the future as traffic volumes increase, additional collisions may occur that result in a greater safety benefit than currently documented.

The benefits of converting to a roundabout would reduce the number of conflict points for vehicles. Additionally, roundabouts reducing the entry speed of vehicles reducing the severity of any collision that do occur. Signal improvements will reduce congestion, which would in turn reduce potential collisions. Converting the intersection of East Park Avenue & Fair Street to a RIRO will also limit the number of conflict point. All intersection improvements will include improvements for bike and pedestrian crossings, improving safety for non-motorized traffic as well.

Vehicular Delay Reduction Benefit

To calculate the delay reduction benefit, the value of travel time was quantified for each proposed build alternative. Costs associated with vehicular delay were computed using the delay for the AM and PM peak hour periods of all the alternatives. In assessing the delay costs, the weighted average for costing the value of time for automobiles and trucks was used.

An average delay cost of $19.90/person/hour was used—a value escalated from the original value in the published data by Caltrans for Vehicle Operation Costs Parameters for 2016 (https://dot.ca.gov/programs/transportation-planning/economics-datamanagement /transportation-economics/vehicle-operation-cost-parameters). The rate was escalated by 12% from the 2016 values, based on 2% per year, and was weighted based on heavy vehicle percentages. The delay reduction benefit, therefore, includes the reduction in delay in dollar amounts compared to No Build conditions.

Fuel Benefit

To calculate the fuel cost for the alternatives, the vehicle operating costs were quantified. The fuel costs (vehicle operating costs) were computed using the delay for the AM and PM peak hour periods of all alternatives. An average fuel price for regular unleaded automobile fuel of $3.56 was used based on the last year’s average price at the pump adjusted to rates.

Environmental Benefit

To calculate the environmental cost, the greenhouse gas emissions costs were quantified for the project. The health cost of Carbon Monoxide (CO) in a rural/suburban California town is $84/ton. The health cost of Nitrogen Oxide is $15,568/ton. The health cost of Carbon Dioxide is $42.56. The methodology for using the environmental costs comes from the ICE guidelines. Emissions calculations are provided in Appendix G.

Construction Cost

Based on the concept-level preliminary project costs estimates, the total estimated project construction costs (including design, environmental, right of way, construction, and construction management costs) for each alternative are presented in the Life Cycle Cost Analysis tables presented in the Life Cycle Cost Analysis section. Preliminary cost estimates for Phase I alternatives are provided in Appendix H.

Other Costs

Operation and maintenance costs are other important components of the cost associated within the various alternatives. The operation and maintenance costs for a traffic signal include providing power service to the signal and street lighting ($750/year), signal retiming ($1,000/year), and signal maintenance for power outages/new detector loops/etc. ($1,500/year).

The roundabout alternatives would have lower operation and maintenance costs limited to power service for street lighting ($750/year). These values are typical industry averages.

Life Cycle Benefit/Cost Analysis

East Park Avenue Corridor

The East Park Avenue Corridor benefit/cost analysis was conducted for the following alternatives for improvements at East Park Avenue & Midway:

Alternative 1: Modified Signal Control at East Park Avenue & Midway

No additional improvements.

Alternative 2: Roundabout Control at East Park Avenue & Midway

Additional Improvements include:

Alternative 2a: Roundabout at Fair Street

East Park Avenue & Fair Street: Roundabout Control

East Park Avenue & Scott Avenue: No improvement

Alternative 2b: Partial Right-In Right-Out[2] (RIRO) Access at Fair Street

East Park Avenue & Fair Street: Partial RIRO Access with Signalized Eastbound Left Turn

East Park Avenue & Scott Avenue: New Signal Control with a new North Leg

Alternative 2c: Full RIRO Access at Fair Street

East Park Avenue & Fair Street: Full RIRO Access Only

East Park Avenue & Scott Avenue: Roundabout Control with a new North Leg

Alternative 2d: South Leg RIRO Only

East Park Avenue & Fair Street: South Leg RIRO Access Only

East Park Avenue & Scott Avenue: New Signal Control

Table 4.25 presents a summary of the life cycle benefit/cost ratio between the available alternatives for the intersections along the East Park Avenue Corridor from Midway to Scott Avenue. The Roundabout alternative has the highest benefit/cost ratio at 2.07, but operationally may not be feasible due to right of way concerns and queues that extend into adjacent intersections. Between the alternatives that incorporate Scott Avenue, the Full RIRO has a slightly higher benefit/cost ratio at 1.76.

Table 4.25: East Park Avenue Corridor Life Cycle Benefit/Cost Ratio

Life Cycle Benefit/Cost Ratio					
	Signal (Alt 1) Vs No Build	Roundabout (Alt 2a) Vs No Build	Partial RIRO (Alt 2b) Vs No Build	RIRO (Alt 2c) Vs No Build	South Leg RIRO Only (Alt 2d) Vs No Build
Safety Benefit	$ 3,863,000	$ 15,948,000	$ 12,869,000	$ 14,337,000	$ 12,423,000
Delay Reduction Benefit	$ 2,660,000	$ 3,780,000	$ 4,550,000	$ 4,470,000	$ 4,490,000
Fuel and GHG Benefit	$ 152,000	$ 405,000	$ (56,000)	$ 784,000	$ 417,000
Total Benefits	**$ 6,675,000**	**$ 20,133,000**	**$ 17,363,000**	**$ 19,591,000**	**$ 17,330,000**
Added Operations&Maintenance Costs	$ -	$ (47,000)	$ 21,000	$ (47,000)	$ 21,000
Construction Costs	$ 5,900,000	$ 9,770,000	$ 10,210,000	$ 11,190,000	$ 10,230,000
Total Costs	**$ 5,900,000**	**$ 9,723,000**	**$ 10,231,000**	**$ 11,143,000**	**$ 10,251,000**
Life Cycle Benefit/Cost Ratio	**1.13**	**2.07**	**1.70**	**1.76**	**1.69**

Hegan Lane & Midway

Table 4.26 presents a summary of the life cycle benefit/cost ratio between the available alternatives for the intersection of Midway & Hegan Lane. The Roundabout alternative (Alt 2) has a higher benefit/cost ratio than the Signal alternative (Alt 1).

[2] Right-In Right-Out (RIRO) control at intersections restricts left turn movements to and/or from a roadway to another roadway.

Table 4.26: Midway & Hegan Lane Life Cycle Benefit/Cost Ratio

Life Cycle Benefit/Cost Ratio		
	Signal (Alt 1) Vs No Build	Roundabout (Alt 2) Vs No Build
Safety Benefit	$ 500,000	$ 2,073,000
Delay Reduction Benefit	$ 910,000	$ 1,150,000
Fuel and GHG Benefit	$ 323,000	$ 361,000
Total Benefits	**$ 1,733,000**	**$ 3,584,000**
Added Operations&Maintenance Costs	$ -	$ (24,000)
Construction Costs	$ 4,180,000	$ 3,510,000
Total Costs	**$ 4,180,000**	**$ 3,486,000**
Life Cycle Benefit/Cost Ratio	**0.41**	**1.03**

Hegan Lane & Otterson Drive

Table 4.27 presents a summary of the life cycle benefit/cost ratio between the available alternatives for the intersection of Otterson Drive & Hegan Lane. The Signal alternative has the highest benefit/cost ratio.

The cost for conversion to all-way stop control includes resurfacing of the intersection and its approaches. It also includes reconstruction of sidewalk to ensure ADA compliance. Due to the high construction cost, the benefit/cost ratio does not warrant this alternative. However, if the intersection is converted to an all-way stop control (Alt 1a) and subsequently converted to a traffic signal (Alt 1b), the cost of the traffic signal construction will not be additive. In other words, the all-way stop control conversion could serve as an interim step to full conversion to signalized control, if a traffic signal is desired under future conditions. As there aren't any collisions to mitigate, the construction cost of the roundabout alternative (Alt 2) puts it below the signal alternative.

Table 4.27: Otterson Drive & Hegan Lane Life Cycle Benefit/Cost Ratio

Life Cycle Benefit/Cost Ratio			
	AWSC (Alt 1a) Vs No Build	Signal (Alt 1b) Vs No Build	Roundabout (Alt 2) Vs No Build
Safety Benefit	$ -	$ -	$ -
Delay Reduction Benefit	$ 70,000	$ 390,000	$ 490,000
Fuel and GHG Benefit	$ (20,000)	$ 85,000	$ (1,000)
Total Benefits	**$ 50,000**	**$ 475,000**	**$ 489,000**
Added Operations&Maintenance Costs	$ -	$ 47,000	$ 20,000
Construction Costs	$ 1,080,000	$ 2,030,000	$ 3,360,000
Total Costs	**$ 1,080,000**	**$ 2,077,000**	**$ 3,380,000**
Life Cycle Benefit/Cost Ratio	**0.05**	**0.23**	**0.14**

4.4 Summary of Phase I Analysis Results

Under 2040 conditions with existing traffic controls and geometries, the intersections of Midway/Park Avenue & East Park Avenue, Midway & Hegan Lane, and Otterson Drive & Hegan Lane all operate unacceptably, indicating a need for improvements.

For Midway/Park Avenue & East Park Avenue, alternatives were evaluated in conjunction with alternatives for the intersections of East Park Avenue & Fair Street and East Park Avenue & Scott Avenue due to the proximity of the intersections.

Table 4.28 presents a summary of evaluation results for the East Park Avenue corridor. The Signal alternative has the highest benefit/cost ratio but has substantial queues that exceed available storage, making the alternative less appealing. The Roundabout alternative performs well, but has significant right of way impacts at East Park Avenue and Fair St that were determined by the City to be unacceptable, leading to the development of the Partial and Full

RIRO alternatives. Between these, the two alternatives have similar benefit/cost ratios with the Partial RIRO alternative operating slightly better than the Full RIRO alternative.

Table 4.28: Summary for East Park Avenue Corridor Alternatives

		No Build	Signal (Alt 1)	Roundabout (Alt 2a)	Partial RIRO (Alt 2b)	RIRO (Alt 2c)	South Leg RIRO Only (Alt 2d)
2025	LOS	B to F	A to B	A	A to B	A to C	A
	Queue	Several queues exceed storage	Several queues exceed storage	No queues exceed storage	One queue exceeds storage	No queues exceed storage	One queue exceeds storage
2040	LOS	B to F	A to C	A	A to B	A to C	A
	Queue	Several queues exceed storage	Several queues exceed storage	One queue exceeds storage	Two queues exceed storage	One queue exceeds storage	One queue exceeds storage
Benefit/Cost Ratio		N/A	2.07	1.13	1.70	1.76	1.69

Table 4.29 presents a summary of evaluation results for the Midway and Hegan Lane intersection. The Signal alternative has the highest benefit/cost ratio but creates queueing conditions worse than the No Build alternative. The Roundabout has a lower benefit/cost ratio but provides substantially improved operations compared to the Signal alternative.

Table 4.29: Summary for Midway & Hegan Lane Alternatives

		No Build	Signal (Alt 1)	Roundabout (Alt 2)
2025	LOS	B to D	B	A
	Queue	One queue exceeds storage	Three queues exceed storage	No queues exceed storage
2040	LOS	B to E	B	A to B
	Queue	Two queues exceed storage	Three queues exceed storage	One queue exceeds storage
Benefit/Cost Ratio		N/A	1.03	0.41

Table 4.30 presents a summary of evaluation results for the Otterson Drive and Hegan Lane intersection. The Signal alternative has the highest benefit/cost ratio but has similar queueing conditions compared to the No Build scenario. The AWSC alternative has the second highest benefit/cost ratio, and improves queueing conditions in the 2025 scenario, but is likely to fail shortly after 2040 as traffic volumes continue to increase. While the Roundabout alternative offers the best operational improvement, the benefit/cost ratio is very low due to the high construction cost. An AWSC is therefore recommended as an interim improvement due to short-term operational benefits at relatively low cost, and the Signal alternative should be pursued as an ultimate improvement before 2040.

Table 4.30: Summary for Otterson Drive & Hegan Lane Alternatives

		No Build	AWSC (Alt 1a)	Signal (Alt 1b)	Roundabout (Alt 2)
2025	LOS	C to F	C	A to B	A
	Queue	One queue exceeds storage	No queues exceed storage	One queue exceeds storage	No queues exceed storage
2040	LOS	C to F	D	B	A
	Queue	One queue exceeds storage	One queue exceeds storage	One queue exceeds storage	No queues exceed storage
Benefit/Cost Ratio		N/A	0.14	0.23	0.05

4.5 Phase I Preferred Alternatives

Based on the preliminary design, operational analysis, and benefit/cost evaluation, the Phase I intersection improvement alternatives that most meet the objectives of the Project are:

- **East Park Avenue & Midway:**

  Alternative 2d: Roundabout Control with Right-In Right-Out (RIRO) on the South Leg of Fair Street, including:
  - East Park Avenue & Fair Street: South Leg RIRO Access with Signalized Eastbound and Southbound Left Turns
  - East Park Avenue & Scott Avenue: New Signal Control
- **Hegan Lane & Midway**

  Alternative 2: Roundabout Control
- **Hegan Lane & Otterson Drive**

  Alternative 1a: All-Way Stop Control (Interim for Year 2025)

  Alternative 1b: New Signal (Ultimate for Year 2040)

  Note: The all-way stop control conversion could serve as an interim step to full conversion to signalized control, if a traffic signal is desired under future Year 2040 conditions.

5. Phase II: New Roadway Connections

Phase II evaluates a new roadway connection between Otterson Drive and Park Avenue to improve circulation between the Hegan Lane Business Park District and SR 99. The need for a future roadway connection has been identified in the General Plan Circulation Element for many years as the Park Avenue Extension. This section describes the Phase II alternatives considered, screened, and evaluated to best serve future travel demands. Ultimately, findings from the Phase I traffic operations analysis indicated that intersection improvements alone are sufficient to accommodate vehicular traffic volumes anticipated through at least Year 2040. As such, this study finds that implementation of the preferred Phase I intersection improvements would delay or eliminate the need for Phase II altogether.

5.1 Improvement Alternatives

Roadway alignment alternatives that were considered for Phase II improvements are evaluated in this section, balancing competing needs to improve connectivity while minimizing disturbances to environmental resources, recreation opportunities, private property, and existing traffic operations. These alternatives include:

- **Greenway Alternatives:** Three alignment alternatives from Otterson Drive to Park Avenue adjacent to the existing Comanche Creek Greenway.
- **Aztec Alternatives:** Two alignment alternatives extending east from the Otterson Drive & Aztec Drive intersection either directly to Park Avenue or via Midway to Park Avenue.
- **Hegan Alternatives:** Two alignment alternatives to create a parallel route to Otterson Drive with a new intersection at Hegan Lane east of the existing Otterson Drive & Hegan Lane intersection.
- **Meyers Street Connection:** One alignment to connect Otterson Drive to Park Avenue via Meyers Street.

In addition to these alternatives, this report includes evaluation of widening Midway from its current three-lane configuration to two travel lanes in each direction. Improvements would also include turn lanes at intersections and bicycle and pedestrian facilities. The widened configuration would begin at Hegan Lane and extend at least to Park Avenue and may be extended further north based on analysis and roadway conform requirements. This alternative could be implemented in conjunction with the Phase II alternatives described above, but may conflict with Phase I intersection improvements.

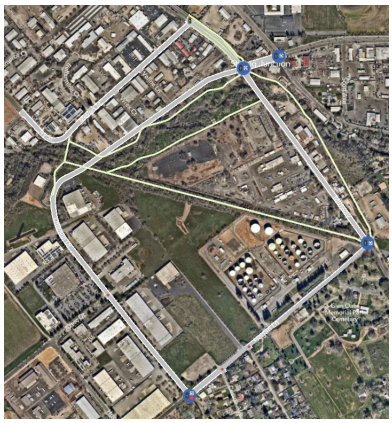
Greenway Alternatives Considered

The first set of alternative alignments that were considered would create a new connection parallel to the Comanche Creek Greenway from the north end of Otterson Drive to the vicinity of the Park Avenue/Midway intersection to maximize direct connectivity to SR 99. These alternatives are referred to as Greenway alternatives.

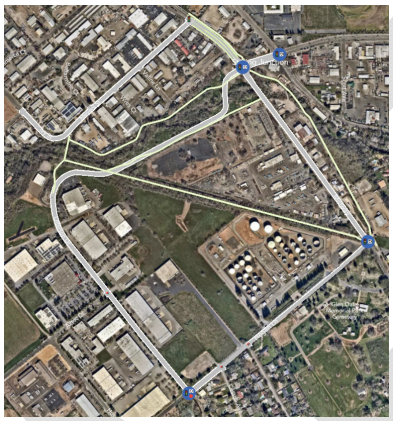
Two options were considered for the connection from Otterson Drive: one extending the existing end of the roadway, and one creating a new intersection and roadway south of the FAFCO, Inc. building. The option south of the FAFCO, Inc. building was eliminated because there is a high-voltage power line overhead, and there is insufficient width between existing buildings to provide the required 150 foot offset. All Greenway alternatives therefore connect to and extend the existing cul-de-sac at the north end of Otterson Drive.

Two options were also considered for the connection to Park Avenue and Midway: one option connects the new roadway to the existing Park Avenue/Midway intersection, and the other option would create a new intersection on Midway near the south edge of the Greenway. The new intersection with Midway was eliminated because it would be located less than 400 feet from the existing Park Avenue/Midway intersection, creating the potential for both safety and congestion impacts to the existing intersection. All Greenway alternatives therefore connect to the existing Park Avenue/Midway intersection.

Based on the preliminary research above, three options were considered for further evaluation of the alignment of the new roadway between Otterson Drive and Park Avenue. The first is on the north side of Comanche Creek. Because there is insufficient width within the Greenway on the north side of the creek, this option would be located outside of the Greenway property along multiple privately owned parcels. This alternative is referred to as Greenway North. The second option is on the south side of Comanche Creek and would replace the existing trail that parallels the south edge of the Greenway. This alternative is referred to as Greenway Middle. The third option would also be located south of the creek, but would be located on the edge of the parcel currently owned by PG&E rather than within the Greenway property. This alternative is referred to as Greenway South.



Greenway North



Greenway Middle

Greenway South

Aztec Alternatives

The second set of alternative alignments that were considered would create a new connection from Otterson Drive to Midway while avoiding and/or limiting impacts to the Comanche Creek Greenway. These are referred to as the Aztec alternatives. Both Aztec alternatives connect to the existing Otterson Drive/Aztec Drive intersection. They shift north in the open space east of the buildings along Otterson Drive and then pass through the PG&E property south of the power substation.

Different connections to Midway create two alternatives. The first creates a new intersection with Midway near the south edge of the PG&E substation, far enough from the existing intersections at Park Avenue/Midway and Hegan Lane/Midway to be acceptable. This alternative is referred to as Aztec (Midway Connection). The second would bend north and connect to the existing Park Avenue/Midway intersection, similar to the Greenway alternatives. This alternative is referred to as Aztec (Park Connection).

Aztec (Midway Connection)

Aztec (Park Connection)

Hegan Alternatives

The third set of alternative alignments that were considered would create a new connection from Otterson Drive to Hegan Lane, providing a secondary route for emergency access and re-distributing some traffic. These are referred to as the Hegan alternatives.

Both Hegan alternatives connect to Hegan Lane at the existing Keller Supply driveway near Skyway Avenue and generally follow the alignment of the driveway northwest, shifting to pass along the outside edge of the Keller Supply building.

Different connections to Otterson create two alternatives. The first connects to the north end of Otterson Drive, similar to the Greenway alternatives, creating a U-shaped street. This alternative is referred to as Hegan (Otterson Connection). The second connects to the existing intersection with Aztec Drive. This alternative is referred to as Hegan (Aztec Connection).

Hegan (Otterson Connection)

Hegan (Aztec Connection)

Meyers Street Alternative

The Meyers Street alternative that was considered would create a new connection between Otterson Drive and Park Avenue via Meyers Street. Otterson Drive would be extended north to connect to a new intersection with Meyers Street and Ivy Street. This alternative is referred to as the Meyers Street Connection. This alternative is the alignment that was proposed and denied by voters in the 2001 ballot Measure A.

Meyers Street Connection

Widen Midway Alternative

This alternative includes widening Midway from its current three-lane configuration to two travel lanes in each direction. Improvements would also include turn lanes at intersections and bicycle and pedestrian facilities. The widened configuration would begin at Hegan Lane and extend at least to Park Avenue and may be extended further north based on analysis and roadway conform requirements. This alternative could be implemented instead of the Phase II alternatives described above, but may require revision to Phase I intersection improvements to accommodate that additional through lanes.

5.2 Preliminary Evaluation

The preliminary evaluation includes the Phase II alternatives as well as the Widen Midway alternative. These alternatives can be compared because they all include new or existing roadway segments and have many of the same objectives and potential impacts. Because this is a preliminary evaluation, alternatives were scored using a high-level bubble system. A full circle or bubble means the alternative fully or mostly meets the criteria. A half circle means the alternative partially meets the criteria, but to a lesser degree than those alternatives which received a full circle. No circle means the alternative does not meet the criteria, compared to the other alternatives. The number of circles each alternative received overall is listed in the bottom row of the matrix for comparison purposes. This evaluation incorporates two types of criteria: project objectives and potential impacts to minimize.

Objectives

- Improve Connectivity between Highway 99 and Business Park
  - Alternatives that create a more direct connection between Park Avenue and the business park along Otterson Drive received a full circle
  - Alternatives that create a new connection that is less direct or increase capacity on an existing segment received a half circle
- Reduce Congestion
  - Alternatives that provide an alternate route between the business park and the East Park Avenue & Midway intersection, and are therefore likely to reduce congestion by re-distributing traffic, received a full circle
  - Alternatives that provide an alternate route but have other impacts that may increase delay, such as a new intersection, received a half circle
- Provide Alternate Route to/from Otterson Drive
  - Alternatives that provide an alternate/duplicitous route in and out of Otterson Drive for general traffic, deliveries, and emergency vehicle access received a full circle
- Consistency with General Plan
  - Alternatives that are consistent with the City's adopted General Plan received a full circle

Potential Impacts to Minimize

- Minimize Greenway Impacts
  - Alternatives that do not impact the Comanche Creek Greenway property received a full circle
  - Alternatives that impact the Comanche Creek Greenway received a half circle
- Minimize Right of Way Impacts
  - Alternatives that do not require right of way from a private property owner received a full circle
  - Alternatives that may require some right of way from a private property owner received a half circle
- Minimize Environmental Impacts (Other than the Comanche Creek Greenway)
  - Alternatives that minimize impacts to major known environmental resources other than the Comanche Creek Greenway, including mature trees, hazardous materials, and cultural resources, received a half circle
  - Alternatives that may have impacts to known environmental resources received no circle

– Minimize Cost
  - Alternatives that minimize costs by using shorter connections, reducing the need for additional right of way, or other factors received a full circle
  - Alternatives that have some potential for higher cost received a half-circle
– Minimize Community Impacts
  - Alternatives that minimize impacts to community including local businesses/private property, the cemetery, and the Comanche Creek Greenway received a full circle
  - Alternatives that may have some impact to community assets, though reduced impacts compared to other alternatives, received a half circle

Preliminary Evaluation Results

Results of this preliminary alternative evaluation are presented in Table 5.1.

Table 5.1: Preliminary Evaluation – Park Avenue Extension and Widen Midway Alternatives

		Park Avenue Extension Alternatives								
		Greenway North	Greenway Middle	Greenway South	Aztec (Midway Connection)	Aztec (Park Connection)	Hegan (Otterson Connection)	Hegan (Aztec Connection)	Meyers Street Connection	Widen Midway
Objectives	Improve Connectivity between Highway 99 and Industrial Park	●	●	●	◖	●			◖	
	Reduce Congestion	●	●	●	◖	●			◖	●
	Provide Alternate Route to/from Otterson Drive	●	●	●	●	●	●	●	●	
	Consistent with General Plan	●	●	●	●	●				●
Potential Impacts to Minimize	Minimize Greenway Impacts	◖		●	●	◖	●	●	◖	◖
	Minimize Right of Way Impacts		●	◖					◖	
	Minimize Environmental Impacts (Other than the Comanche Creek Greenway)		◖	◖	◖	◖			◖	◖
	Minimize Cost		◖		◖			◖	◖	
	Minimize Community Impacts			◖	●	◖	●	●		
Overall		4.5	6	6.5	6	5.5	3	3.5	4	3

Eliminated Alternatives

Alternatives that scored fewer than 5 circles in the preliminary evaluation were eliminated. While some of these eliminated alternatives meet project objectives, they have increased potential for negative impacts on the community.

Greenway North was eliminated due to relatively greater potential impacts compared to other alternatives. This alternative would require additional right of way from multiple property owners, which increases project costs and is anticipated to have negative community impacts. Due to the nature of the businesses on affected parcels, it is also anticipated that an alignment in this area would encounter significant environmental impacts.

Both Hegan (Otterson Connection) and Hegan (Aztec Connection) were eliminated because they do not support project objectives. While these alternatives have relatively lower potential impacts compared to other alternatives, they are not consistent with the General Plan and do not improve connectivity or reduce congestion. They provide an alternate access route to Otterson Drive, but all traffic would still be routed along Hegan Lane and Midway, resulting in no improvement compared to current conditions.

Meyers Street Connection was eliminated due to its limited support of project objectives and potential for impacts. While this alternative would provide an alternative route to access Otterson Drive and would have some benefit for connectivity and congestion reduction, it is not consistent with the General Plan. A similar proposal encountered significant community opposition in the past, ultimately resulting in a ballot measure to prohibit its implementation. Increased traffic along Meyers Street would require upgrading that street, potentially impacting adjacent property owners if additional right of way is needed. In addition, this connection would also require major updates to the Meyers Street/Park Avenue intersection which would require significant widening to accommodate additional traffic for turns in/out of the new connection and potentially further impact queuing and delays at the Park Avenue/Midway intersection. Overall, this could create similar environmental impacts to the Greenway North alternative, as noted above.

Widen Midway was eliminated due to relatively greater potential impacts compared to other alternatives, combined with insufficient support for project objectives. While this alternative is consistent with a recommendation in the 2030 General Plan, all Phase II alternatives are also consistent with a recommendation for a roadway extension in the 2030 General Plan. The General Plan identified a need to widen Midway based on a need to increase capacity; while increasing capacity and reducing congestion are also objectives of this project, there are several other objectives that the Widen Midway alternative does not achieve. Widening Midway may moderately reduce congestion in the project area, but it does not improve connectivity to Highway 99 or provide an alternate route to access Otterson Drive. Because it does not achieve the objectives of this project as well as other alternatives that are also consistent with the 2030 General Plan, the Widen Midway alternative was eliminated. This project does not preclude widening of Midway in the future.

5.3 Secondary Evaluation

Four alternatives scored above 5 circles in the preliminary evaluation: Greenway Middle, Greenway South, Aztec (Midway Connection), and Aztec (Park Connection). For each pair, the higher scoring alternative advanced to a secondary evaluation phase. Of the two Greenway alternatives, Greenway South advanced. Of the two Aztec alternatives, Aztec (Midway Connection) advanced.

Greenway South

Aztec (Midway Connection)

Following development of 10% design drawings for both alternatives, the Aztec (Midway Connection) alternative was eliminated based on anticipated impacts described below.

Eliminated Alternative: Aztec (Midway Connection)

Otterson Drive Connection: Impacts to UPS Customer Center parcel

To align the new roadway with the existing intersection of Aztec Drive and Otterson Drive, right of way would be required from the southeast side of the parcel where a UPS Customer Center is currently located. While this right of way would not impact existing buildings on the site, the roadway would occupy the open area used for truck access to loading bays on the southeast side of the building. This would likely prevent use of the existing loading bays, requiring the building to be reconfigured to accommodate loading from an alternate approach; these costs are likely to be significant and generate strong opposition to the project from the property owner.

S-Curve: Potential environmental and hazardous materials impacts

Beyond the UPS Customer Center parcel, the proposed roadway alignment makes an S-curve to the north. While this curve is in an open area free of existing structures, there are several parcels in the vicinity that may be hazardous materials generators. It is likely that hazardous materials may be present in soils in the area, creating environmental impacts and increasing project costs for disposal and mitigation efforts.

Midway Connection: Impacts to PG&E substation and traffic operations

The proposed alignment would require an easement or right of way acquisition through the existing PG&E substation parcel located west of Midway. In the preliminary design phase, the alignment was conceived to skirt the southern edge of the substation and follow a relatively straight path to connect with Midway at a new intersection. In development of more detailed design using a cross section that accounts for the City's minimum standards for vehicle, bicycle, and pedestrian connectivity, it was discovered that it is not possible to avoid impacting the substation without creating impacts to one or more existing buildings on the PG&E property. Both of these potential impacts are likely to incur significant costs and generate strong opposition to the project.

In addition, the creation of a new intersection on Midway between the existing intersections of Park Avenue and Hegan Lane is anticipated to negatively affect traffic operations in the area. Because improving operations and reducing congestion are key objectives of this project, these impacts are infeasible.

5.4 Phase II Future Alternative

Due to the described anticipated impacts that are unavoidable and likely to increase both project costs and opposition, the Aztec (Midway Connection) alternative was eliminated and will not proceed for further evaluation. The Greenway South alternative was determined to be the 2040 roadway connection alternative that meets most of the project objectives. A preliminary design and cost estimate for this alternative is provided in Appendix I.

While a new roadway connection from Otterson Drive to the Park Avenue/Midway intersection would be consistent with the Chico 2030 General Plan, findings from the Phase I traffic operations analysis indicate that intersection improvements alone are sufficient to accommodate vehicular traffic volumes anticipate through at least Year 2040.

A Phase II future alternative exhibit is provided in Appendix I, with an image included below.

Figure 5-1 Phase II Future Alternative (2040)

6. Vehicle Miles Traveled

Vehicle miles traveled (VMT) has replaced LOS as the criterion used to evaluate transportation impacts under the California Environmental Quality Act (CEQA). The California Code of Regulations (14 CCR §15064.3) states the following criteria for analyzing transportation impacts:

> *(2) Transportation Projects. Transportation projects that reduce, or have no impact on, vehicle miles traveled should be presumed to cause a less than significant transportation impact. For roadway capacity projects, agencies have discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements.*

Phase I of the Hegan Lane Congestion Relief Project consists of improvements to existing intersections, and is not anticipated to have a meaningful impact on VMT. The improvements would not create a shorter route between any destinations as the overall roadway network remains unchanged, and is therefore anticipated to have no aggregate impact on VMT.

Phase II of the project includes a potential future roadway connection that may have a small effect on VMT in the project area. Because the phase includes a new roadway connection, the distance from the north end of Otterson Drive to the intersection of Park Avenue and Midway would be reduced from approximately 1.25 miles to approximately 0.5 miles. Travel behavior beyond the immediate project vicinity is not anticipated to be affected. Because VMT would likely be reduced as a result of this project, the project is considered to have a less than significant impact on VMT.

7. Community Input

7.1 Stakeholder Meetings

Two stakeholder meetings were conducted in September 2021 to gather input on development of alternatives for Phase I and Phase II as well as discuss existing challenges in the project area. One meeting included representatives from businesses located in the Hegan Lane Business Park District, and the second included members of the Friends of Comanche Creek group as well as members of the Barber Neighborhood Association.

Both meetings were conducted via teleconference. The project team provided a brief overview of the project including existing conditions analyses and improvement alternatives being considered. All Phase I alternatives and the Greenway South Phase II alternative were discussed.

Feedback received at the business community meeting included concerns about access to the area for trucks and other large vehicles, as well as discussion on impacts to adjacent parcels. Input was largely focused on the Phase II extension, including opportunities to provide secondary access to some parcels via the new roadway.

Attendees at the neighborhood group meeting expressed strong opposition to a roadway extension, citing concerns about preservation of the Comanche Creek Greenway park and noting prior efforts to oppose a similar project that proposed a connection from the end of Otterson Drive to Meyers Street. Community members were open to learning more about Phase I intersection improvements, but felt Phase II was unnecessary and should not be pursued.

7.2 Social Pinpoint Site

Community input on the Phase I intersection alternatives and the Phase II Greenway South alternative was collected via an interactive mapping tool from November 29, 2021 through February 4, 2022. Respondents were invited to visit the website and provide automobile, truck, bicycle, or pedestrian comments by dropping a pin in the project area. Respondents could also respond and vote on comments left by previous participants. Feedback received is summarized below, and a map and table showing all comments are provided in Appendix J.

Park Ave. and Midway Intersection Improvements Comments

There were two map comments made at this intersection. The first respondent shared concern that the original plan for Otterson Bridge was not implemented, resulting in trucks needing to turn left to come down to Hegan Ln. to access the industrial park. The respondent shared concerns with semi-trucks towing trailers from the gas farm safely navigating roundabouts.

Another respondent made a bicycle comment, requesting either dedicated bike lanes on the section of the Midway between Hegan Ln. and East Park or constructing better access to the existing bike path from the north.

Park Ave. and Fair St. Intersection Improvements Comments

There was only one map comment made at this intersection. The respondent shared a concern that they were unclear what intersection improvement were proposed here (the comment received four up-votes).

Midway and Hegan Ln. Intersection Improvements Comments

There were three map comments related to this intersection. One respondent agreed that better traffic control is needed and also shared a concern of bottlenecking without an additional egress route for Otterson. One respondent supported the installation of roundabouts, given that stop lights cause traffic back-ups. Another respondent shared a concern with travelers inaccurately navigating roundabouts.

A respondent requested consideration of a dedicated bike lane given that better bicycle and pedestrian access on the segment of Midway between Hegan and Park is needed.

Hegan Ln. and Otterson Dr. Intersection Improvements Comments

There was only one map comment made at this intersection. The respondent supported the installation of a roundabout. The comment received eight up-votes and three down-votes.

Park Ave. and Scott Ave. Intersection Improvements Comments

There was one comment provided at this intersection. The respondent shared that in their experience, traffic concerns here were not due to traffic control issues. The respondent suggested adding an additional egress route for Otterson Dr. instead.

Roadway Extension (Phase II, if needed) Comments

The majority of the map comments (27) were related to the potential future roadway connection between Otterson Dr. and Park Ave. Overall, community sentiment trended towards dissatisfaction with the proposal.

Respondents worried about the cost of constructing a new road and cited safety and air pollution concerns for bicyclists and pedestrians using the existing paths through the park. A frequently cited concern related to the presence (and potential displacement) of unhoused individuals currently residing in the park. Three comments citing this concern received the most up and down votes of any comments (22 up votes/15 down votes, 17 up votes/13 down votes and 14 up votes/11 down votes). A few respondents spoke to the value of the existing neighborhood greenspace and bicycle/pedestrian path, citing local residents' investment in tree planting. One respondent voiced that Chico residents voted in a referendum to preserve the park.

A few respondents proposed alternative solutions, including widening Hegan and Midway instead or investing in improving public transit and installing more protected bikeways. Four respondents who agreed with providing an alternative access route submitted a "solution idea" comment inquiring about connecting Otterson Dr. to Meyers St. instead. Respondents cited this option as a previously proposed project.

Those who were in support of the Phase II extension spoke to the importance of secondary access for emergencies and reaching Otterson businesses, and the potential to relieve gridlock conditions and pollution from idling vehicles. One respondent envisioned the extension fostering developing of nearby businesses backyards into neighborhood cafes and gathering places. Another cited the added benefit of additional parking to access the area. The most popular supportive comment received 16 up votes and 11 down votes.

Misc. Comments

One respondent added a comment at Hegan Ln. and Skyway Avenue noting that the location is a truck route.

8. Conclusion

8.1 Preferred Alternatives

Based on the preliminary design, operational analysis, and benefit/cost evaluation, the Phase I alternatives that most meet the objectives of the Project are:

- **East Park Avenue & Midway:**

  Alternative 2d: Roundabout Control with Right-In Right-Out (RIRO) on the South Leg of Fair Street, including:
  - East Park Avenue & Fair Street: South Leg RIRO Access with Signalized Eastbound and Southbound Left Turns
  - East Park Avenue & Scott Avenue: New Signal Control
- **Hegan Lane & Midway**

  Alternative 2: Roundabout Control
- **Hegan Lane & Otterson Drive**

  Alternative 1a: All-Way Stop Control (Interim for Year 2025)

  Alternative 1b: New Signal (Ultimate for Year 2040)

Note: The all-way stop control conversion could serve as an interim step to full conversion to signalized control if a traffic signal is desired under future Year 2040 conditions.

For Phase II, the future alternative for a new roadway connection that met the most project objectives was determined to be the Greenway South alignment. While a new roadway connection from Otterson Drive to the Park Avenue/Midway intersection would be consistent with the Chico 2030 General Plan, findings from the Phase I traffic operations analysis indicate that intersection improvements alone are be sufficient to address the purpose and need for this project through at least Year 2040. Community support for Phase II was also low, with many residents expressing strong opposition to the project. Securing the required state and federal permits, and the necessary right of way, could also pose significant challenges to this project. In addition, planning efforts are currently underway to evaluate an additional freeway connection south of East Park Avenue at Southgate Avenue, which would further reduce the need for a new roadway connection under Phase II.

Therefore, this study finds that the Phase II new roadway connection is not needed at this time. For Phase I, the selected alternatives are recommended to proceed to the next phase of the project, which includes preparing intersection design concepts at a 30% detail level. For Phase II, no further design work will proceed at this time.

8.2 Additional Considerations

The recommendation of this report includes eliminating the need for a new roadway connection between Otterson Drive and Park Avenue (Phase II). Recognizing that there remain undeveloped parcels in the Hegan Lane Business Park along Otterson Drive, and that employee count could increase with further intensification of use, additional analysis was conducted to evaluate future traffic conditions with higher traffic volumes.

Specifically, traffic volume growth within the Hegan Lane Business Park was increased by 50 percent over twenty years to establish potential Year 2040 traffic conditions, compared to 20 percent utilized within this study. Intersection LOS results were calculated for the study intersections for the traffic signal and roundabout control alternatives:

- **East Park Avenue & Midway**
- **Hegan Lane & Midway**
- **Hegan Lane & Otterson Drive**

The results of this analysis demonstrate that the intersection improvements under Phase I would accommodate future Year 2040 traffic volumes assuming higher intensification of land use development along Otterson Drive. Table 8.1 presents the LOS results for the signal improvements for the sensitivity analysis.

Table 8.1: Year 2040 Signal Sensitivity Analysis

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour		PM Peak Hour	
				Delay[4]	LOS	Delay[4]	LOS
2	Midway/Park Ave & E Park Ave	Signal	D	24.4	C	24.5	C
3	Fair St & E Park Ave	Signal	D	15.7	B	19.6	B
4	Midway & Hegan Ln	Signal	D	13.0	B	20.7	C
5b	Otterson Dr & Hegan Ln	Signal	D	17.3	B	20.8	C
6	E Park Ave & Scott Ave	Signal	D	7.6	A	4.7	A

Notes:
1. AWSC = All Way Stop Control; TWSC = Tw o Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on w orst minor street approach for TWSC intersections, average of all approaches for
3. Warrant = Based on California MUTCD Warrant 3
4. Delay = Stopped Delay per Vehicle in seconds
5. **Bold** = Unacceptable Conditions

As presented in Table 8.1, all intersections operate at an acceptable LOS with the Otterson Drive growth.

Table 8.2 presents the LOS results for the roundabout improvements for the sensitivity analysis.

Table 8.2: Year 2040 Roundabout Sensitivity Analysis

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour		PM Peak Hour	
				Delay[3]	LOS	Delay[3]	LOS
2	Midway/Park Ave & E Park Ave	RNDBT	D	12.4	B	10.5	B
3	Fair St & E Park Ave	RNDBT	D	5.8	A	6.0	A
4	Midway & Hegan Ln	RNDBT	D	7.2	A	12.5	B
5	Otterson Dr & Hegan Ln	RNDBT	D	5.4	A	8.5	A
6	E Park Ave & Scott Ave	RNDBT	D	5.1	A	6.2	A

Notes:
1. RNDBT = Roundabout
2. LOS = Delay based on average of all approaches for Roundabout
3. Delay = Stopped Delay per Vehicle in seconds
4. **Bold** = Unacceptable Conditions


GHD