DEPARTMENT OF TRANSPORTATION
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September 20, 2016

Kamesh Vedula, P.E., T.E.
OMNI-MEANS
943 Reserve Drive
Roseville, California 95678
(916) 782-8688

Re: Interstate 8 (I-8) and Lake Jennings Park Road Intersection Control Evaluation Report.

Dear Mr. Vedula:

Thank you for your submittal of the Intersection Control Evaluation (ICE) report dated September 15, 2016 for the Lake Jennings Marketplace Development Project located at I-8 and Lake Jennings Park Road. District 11 concurs with the conclusion of the ICE report.

If you have any other questions or need additional information, please contact me at (619) 688-6640 or by email at tan.doan@dot.ca.gov.

Sincerely,

TAN DOAN, P.E.
Branch Chief, Traffic Engineering and Analysis, Caltrans District 11

cc: South Coast Development, LLC
Stuart Engineering
Victor Diaz/Enrique Ramirez/Traffic Engineering and Analysis files

I-8 & Lake Jennings Park Road
Intersection Improvement Project

INTERSECTION CONTROL EVALUATION

Caltrans District 11

11-SD-008-PM 021.585

September 2016

Prepared for:

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INTERSECTION CONTROL EVALUATION

I-8 & Lake Jennings Park Road Intersection Improvement Project

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September 2016

Prepared By: Date: September, 2016

KAMESH VEDULA, PE, TE, TRANSPORTATION ENGINEER

916-782-8688

OMNI-MEANS

943 RESERVE DRIVE,

ROSEVILLE, CA- 95678

R2167RPT004.docx

This Traffic Operations Report in Support of the Intersection Control Evaluation process for the intersection on Interstate 8 and Lake Jennings Park Rd. has been prepared under the direction of the following registered engineer. The registered civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

September 15, 2016

REGISTERED CIVIL ENGINEER

DATE

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1. Executive Summary

Omni-Means and Stuart Engineering generated this report in support of the Caltrans Intersection Control Evaluation (ICE) Process for South Coast Development to evaluate two alternatives at the intersection of Lake Jennings Park Road/Interstate 8 eastbound Off-Ramp (I-8) and Olde Highway 80. The two alternatives that were evaluated as a part of this analysis are provided below:

a) Signal Alternative
b) Roundabout Alternative.

The No Build Alternative utilized the existing lane geometrics. The study intersection is currently operating at a LOS of A during the AM Peak Hour and LOS of C during the PM Peak Hour. This intersection will result in a LOS of F during the PM Peak Hour with the addition of a proposed commercial development on the southeast side of this intersection.

Executive Summary Table 1 provides a summary of the life cycle costs for the Roundabout vs. Signal Alternative.

EXECUTIVE SUMMARY TABLE 1
LIFE CYCLE COSTS SUMMARY FOR THE ROUNDABOUT AND SIGNAL ALTERNATIVE

Life Cycle Costs (20 year design)	Roundabout	Signal
Collision and Mobility Costs (Roundabout VS Signal)		
Delay Costs	$545,346	$2,066,935
Fuel and GHG Costs	$1,289,776	$1,382,799
Project Costs including design, construction and maintenance (Roundabout VS Signal)		
Operations and Maintenance Costs	$30,578	$54,361
Project Costs (including soft costs)	$2,400,000	$1,550,000
Total Life Cycle Costs (Opening Year $) - Net Present Value	$4,265,700	$5,054,095

Executive Summary Table 2 summarizes the performance for the Roundabout and Signal Alternatives.

EXECUTIVE SUMMARY TABLE 2
PERFORMANCE SUMMARY FOR THE ROUNDABOUT AND SIGNAL ALTERNATIVE

Alternatives Performance Comparison

Performance Measure	Signal	Roundabout	Measurement
Cumulative Condition			
Delay - All approaches LOS "D" or better LOS A will be rated at 5 and E will be rated at 1.	**12**	**17** ✓	Quantitative
95th Percentile Queue - Adequate queue storage	✓	✓	Quantitative
Future Investment Needs			
Service Life - will the alternative function acceptably beyond the design year	**LOS D**	**LOS B** ✓	Quantitative
Costs			
Operations & Maintenance - Annualized	**$4,000/yr**	**$2250/yr** ✓	$ costs per year
Delay Costs - Annualized	**$162,000**	**$85,000** ✓	Delay (hrs/yr) * $17.35/hr / with discount rate of 4% over 20 years
Green House Gas Emissions - Annualized	**$53,000**	**$52,000** ✓	$Fuel +$CO + $NOx / with discount rate of 4% over 20 years
Construction Costs - Annualized	**$114,000/yr** ✓	**$177,000/yr**	$Total Construction / with discount rate of 4% over 20 years
Truck Accommodations			
Serves design vehicle for all movements	**100%** ✓	**100%** ✓	Quantitative
Safety			
Predictive Measures - Greatest crash reduction potential for expected fatal and injury crashes		**80% reduction in severe crashes** ✓	Quantitative
Vehicle Conflicts - The number of potential conflict points that may occur at the intersection based on layout geometry	**22**	**9** ✓	Quantitative
Pedestrian Safety - Exposure to traffic in terms of number of lanes, conflict points, and crossing times	**435**	**238** ✓	Qualitative
Bicycle Safety - Exposure to traffic in terms of number of lanes, conflict points, and speed differential	**240**	**87** ✓	Qualitative
Nonconforming Features			
Nonconforming Features. Based on the geometry of the design. They are features that do not follow current standards stated in Highway Design Manual (HDM) and the National Cooperative Highway Research Program (NCHRP). Only the features that may result in **fatalities** are considered.	**1**	**0** ✓	Quantitative
Local Access			
Maintains local access and circulation	**90%**	**100%** ✓	Qualitative
Total Performance Measures Met	**3**	**14**	

Based on the performance summary, the Roundabout alternative best met the set criteria.

2. Introduction

This report has been prepared to present the results of conceptual alternatives analysis performed by Omni-Means for South Coast Development support of the Caltrans Intersection Control Evaluation (ICE). The term “project”, as used in this report, refers to potential improvements that can be constructed at the Lake Jennings Park Road/Interstate 8 eastbound Off-Ramp and Olde Highway 80. The project is located in the unincorporated Lakeside Community on the south side of San Diego.

Future developments such as the Lake Jennings Market Place, the Lakeside Tractor Supply project, and an 18 unit residential project on Lake Jennings Park Road will produce an unacceptable level of service at this studied intersection. As a result, mitigations are necessary for an acceptable operating intersection.

2.1 Need & Purpose

Relieve Traffic Congestion: The study intersection has become increasingly less able to function operationally as traffic has increased since it was originally constructed. Keeping the current conditions, the addition of the proposed Lake Jennings Marketplace will further worsen the operation of this intersection by generating an additional 10,992 daily trips, resulting in a level of service F. Mitigation is required in order to generate an acceptable level of service.

Enhance Pedestrian and Bicycle Access through the Intersection: The design of the existing intersection does not reflect current considerations regarding the accommodation of pedestrian and bicycle modes of transportation. This is reflected in its limited facilities for bicyclists, pedestrians, and other modes of transportation. Other needs related to multi-modal relationships and social considerations have been identified, including the need to continue public transit use near this intersection and the needs expressed by residents and businesses regarding safe and efficient ingress and egress to properties adjacent to the project area.

3. Existing Conditions

3.1 Existing Roadway Geometric Features

Roadways that provide the primary vehicle circulation for the study intersection include Interstate 8 eastbound Off-Ramp, Ridge Hill Road, Lake Jennings Park Road, and Olde Highway 80. The following is a brief description of the roadways for the study intersection:

Interstate 8 Freeway (I-8) runs east/west connecting the eastern and western communities in San Diego County from Pacific Ocean to Cleveland National Forest. I-8 continues to extend eastward into the State of Arizona. Near the study intersection, I-8 has two travel lanes in each direction. The existing interchange configuration at I-8 and Lake Jennings Park Road is Type L-9.

Olde Highway 80 runs east/west running parallel to Interstate 8 from Lake Jennings Park Road to Dunbar Lane. The ultimate classification of this roadway is 4.1B major road with intermittent left turn lanes from Lake Jennings Park Road to Marina Springs and 4.2B boulevard with intermittent turn lanes from Pepper Drive to Lake Jennings Park Road per the County of San Diego General Plan. The existing condition of this road is a 2 lane road with a two way left turn lane. The posted speed limit is 50 mph.

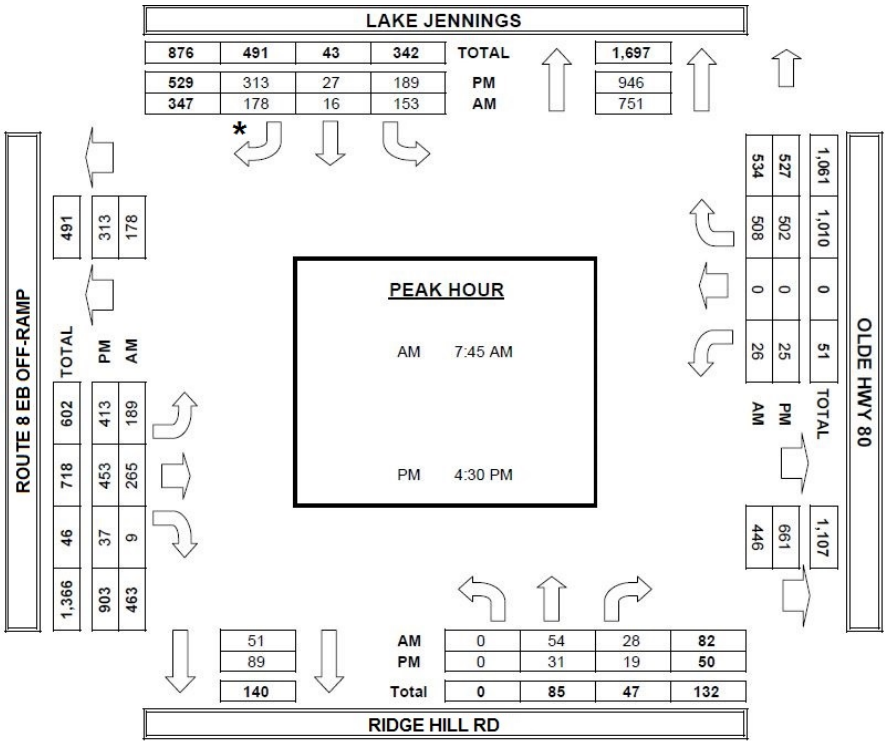
Lake Jennings Park Road runs north/south connecting Ridge Hill Road and Olde Highway 80 to Pino Drive where it becomes Mapleview Street. Lake Jennings Park Road varies from 2-4 lanes and the ultimate classification of this road from Mapleview Street to Olde Highway 80 is 4.1B major road with intermittent two way left turn lanes. The pavement width of the roadway varies along the roadway with certain areas having two travel lanes in one direction, stripped median, and/or bike lane. The posted speed limit is 40 mph at the studied intersection. The existing interchange configuration at I-8 and Lake Jennings Park Road is Type L-9.

Ridge Hill Road runs predominantly east/west and is classified as a two lane residential collector per the County of San Diego General Plan with one lane in each direction.

3.2 Existing Traffic Data

Existing AM and PM peak hour intersection traffic counts were collected by the KOA Corporation in January 2014 for a 2-hour AM (7:00-9:00 am) period and a 2-hour PM (4:00-6:00 pm) period. The AM and PM peak hours were observed to be 7:45-8:45 AM, and 4:30-5:30 PM, respectively. Figure 1 shows the Existing 2014 peak hour traffic volumes at the study intersection.

Figure 1 - Existing Traffic Volumes



***** The southbound right turn movement represents vehicles heading on the eastbound On-Ramp

3.3 Existing Land Uses

On the southwest quadrant of the intersection, there exists vacant land that separates the I-8 eastbound On-Ramp and Ridge Hill Road.

The southeast quadrant of the intersection, contains a vacated site that will be used for the proposed Lake Jennings Marketplace Development.

The northwest quadrant of the intersection is vacant land that separates the I-8 eastbound On-Ramp from the I-8 eastbound Off-Ramp.

The northeast quadrant of the intersection contains commercial used developments such as: a gas station, retail shops, restaurant, liquor store, and Burger King.

3.4 Collision History

Accident data for the study intersections was obtained from the Statewide Integrated Traffic Records System for a five year period, dated from January 1, 2009 to December 31, 2014.

There was an injury accident at the study location. A breakdown of the accidents at the intersection by type is shown below in Table 1.

TABLE 1
ACCIDENTS BY TYPE OF COLLISION

Collision Type	Percentage	Numbers
A-Head-On	0.0%	0
B-Sideswipe	0.0%	0
C-Rear End	0.0%	0
D-Broadside	100%	1
E-Hit Object	0.0%	0
F-Overturn	0.0%	0
G-Auto-Pedestrian	0.0%	0
H-Other	0.0%	0
Not Stated	0.0%	0
	100%	**1**

3.5 Transportation Planning Document

3.5.1 Interstate 8 Transportation Concept Report

3.5.1.1 Route Concept and Corridor Vision

The Interstate Conceptual Report (ICR) provides the long-range planning concept for the corridor through the next 25 years. Interstate 8 in the project vicinity is classified as an urban area with rolling terrain. Interstate 8 in the project vicinity provides the main connection to San Diego.

The ICR illustrates that there is a long term concept plan (2025-2035) to add 2 general purpose lanes from Greenfield Drive to Tavern Road, which passes through Lake Jennings Park Road.

The long term concept plan (2025-2035) also states that there will be an additional eastbound auxiliary lane between Greenfield Drive and Lake Jennings Park Road Interchange.

3.5.1.2 Design Vehicle

Interstate 8 is a National Network for STAA trucks. However, Lake Jennings Road does not permit STAA trucks. Per the direction of San Diego County and Caltrans, the largest vehicle traversing the intersection will be CA Legal. Therefore the design vehicle used for truck turns are California Legal 50 from the Caltrans Highway Design Manual, 6th Edition (update December 2015).

3.5.2 San Diego Regional Plan 2015

3.5.2.1 Route Concept and Corridor Vision

The San Diego Regional Plan 2015 outlines major goals and policy framework for which will guide decisions on future growth, development, and conservation of resources through the year 2050 in a manner consistent with the goals and quality of life desired by the County's residents.

3.6 Multi-Modal Transportation

3.6.1 Public Transportation

The San Diego County Metropolitan Transit System provides Bus Route 864 along Olde Highway, Pecan Park Lane and Lake Jennings Park Road that services the Lakeside Community.

3.6.2 Bicycle Facilities

Class II bike lanes are currently available in both directions along Olde Highway 80 and are the only available bicycle facilities at this studied intersection.

3.6.3 Pedestrian Facilities

Continuous pedestrian facilities currently do not exist within the study area. There is a need to provide accessible and clearly delineated pedestrian paths to provide safe access to the commercial, transit, and recreational destinations at the study intersection.

3.6.4 Equestrian Accommodations

Continuous equestrian delineated paths currently do not exist within the study area. There is a potential need to provide accessible and clearly delineated paths for safe access to the commercial and recreational destinations at the study intersection.

4. Design Year Volumes

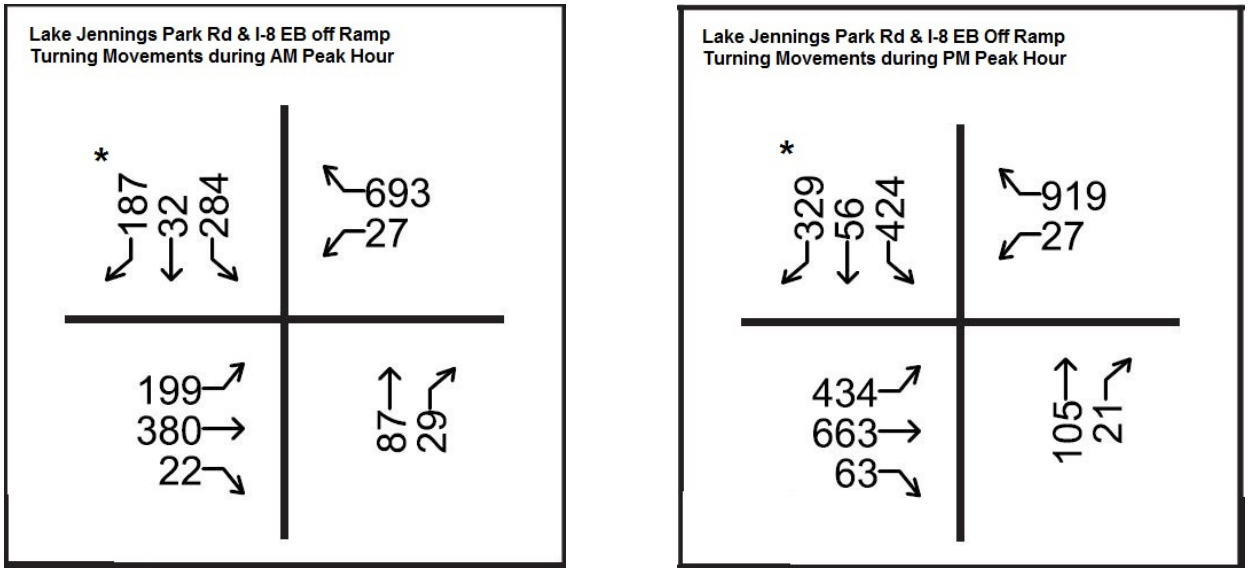
4.1 General Plan Buildout

The Lake Jennings Marketplace traffic impact study July 29, 2015 (hereafter referred to as July 2015 TIS) contains the details of the existing traffic data and the traffic forecasts methodology.

As noted in the July 29 TIS, the cumulative conditions were developed by assuming that every parcel builds out to the General Plan designation as modeled by SANDAG for the year 2035 and that all General Plan Amendments within the study area are approved and implemented. Three proposed developments have been identified and were included in the analysis. The developments include the Lakeside Tractor Supply Project directly across the street from the proposed commercial shopping center, an 18 unit residential project on Lake Jennings Park Road just to the north of I-8, and Lake Jennings Market Place, which will be located on the southeast side of the studied intersection.

The Buildout forecasts within the July 2015 TIS were developed using the SANDAG Series 12 traffic forecast model, which was used to derive General Plan Buildout baseline volumes. Mobility element classifications that reflect buildout of roadways was also used in this analysis. Figure 2 presents the cumulative turning movements, while Tables 2 and 3 present the roadway segment LOS for existing and cumulative and the general plan build conditions, respectively.

Figure 2 – Cumulative Condition Turning Movements



***** The southbound right turn movement represents vehicles heading on the eastbound on-ramp.

TABLE 2 LOS OF ROADWAY SEGMENTS IN THE EXISTING AND CUMULATIVE CONDITIONS

Roadway Segment	Existing Lanes Configuration	LOS E Cap.	Existing		Cumulative	
			ADT	LOS	ADT	LOS
Olde Highway 80						
This segment begins at the Lake Jennings and I-8 intersection and extends 200ft eastward on Olde Highway 80.	2CCITL	19,000	14350	E	23428	F
Lake Jennings Park Rd						
This segment begins at the I-8 WB off Ramp and extends to the Lake Jennings and I-8 intersection.	2CCNM	16,200	17130	F	22931	F
This segment begins at the intersection of Lake Jennings Park Road and I-8 and extends to 200 ft south of this intersection.	2CCNM	16,200	1670	A	3018	B

Abbreviations: 2CCITL is a 2 lane Community Collector with an Intermittent Turn Lane

2CCNM is a 2 lane Community Collector with no Median

TABLE 3 LOS OF ROADWAY SEGMENTS IN THE GENERAL PLAN BUILDOUT CONDITIONS

Roadway Segment	Mobility Element Lanes/ Configuration	LOS E Cap.	General Plan Buildout	
			ADT	LOS
Olde Highway 80				
This segment begins at the Lake Jennings and I-8 intersection and extends 200ft eastward on Olde Highway 80.	4MRITL	34,000	26990	C
Lake Jennings Park Rd				
This segment begins at the I-8 WB off Ramp and extends to the Lake Jennings and I-8 intersection.	4MRITL	34,200	28293	F
This segment begins at the intersection of Lake Jennings Park Road and I-8 and extends to 200 ft south of this intersection.	4MRITL	34,200	3352	A

Abbreviations: 4MRITL is a 4 lane Major Road with an Intermeittent Turn Lane

5. Design Alternatives

Two project alternatives were selected for this study based. Since the focus of the study is to alleviate congestion at the study intersection, the analysis includes intersection traffic operations for No Build, Signal Alternative, and Roundabout Alternative. The alternatives are summarized below.

5.1 No Build Alternative

Within this alternative, the existing lane geometrics and control were utilized. This alternative is projected to provide unacceptable LOS in the cumulative condition during the PM Peak Hour with a LOS F and an average delay of 72.2 seconds. Since this alternative is projected to provide unacceptable LOS in current conditions, the alternative was not included in the ICE alternatives comparison.

5.2 Signal Alternative

The Signal Alternative developed by Stuart Engineering proposes to construct a traffic signal at the study intersection of Interstate 8 and Lake Jennings Road.

Signal Alternative includes the following features:

- Construct a traffic signal at I-8 and Lake Jennings Park Road
- Widen I-8 eastbound Off-Ramp for 320 ft to have a third lane to accommodate a left turn lane, a left through lane and a through right lane

- Improve the roadway on the Southbound leg by providing 4 lanes plus bike lanes
- Provide ADA and pedestrian access between the commercials development and on the east side of the intersection
- Restripe the westbound leg to allow for two right turns lane and a 98 ft pocket lane on the approach side and two lanes on the receiving lane
- Provide a class II bike lane along Olde Highway 80
- Restripe/widen the northbound approach leg to have a through 60 ft through pocket and a shared through right lane and reduce the receiving lane to 14 ft
- Given the site conditions, a potential conflict may occur between existing overhead power lines and the proposed traffic signal poles at the southwest and southeast curb returns

An exhibit showing the Signal Alternative layout is provided in the Appendix B.

5.2.1 Signal Performance Checks

The following design criteria were used to analyze the geometrics and safety performance of the proposed Signal Alternative:

- The "CA Legal" design vehicle from the Caltrans Highway Design Manual, 6th Edition (update September 2014) shall be accommodated on all movements from Interstate 8 and Lake Jennings Park Road

5.3 Roundabout Alternative

The Roundabout Alternative proposes to construct a modern roundabout with single lane approaches on all legs with the exception of a partial right turn lane bypass in the westbound direction to the northbound movement and two lanes on the eastbound approach at the study intersection. The roundabout would be located slightly northwest of the existing intersection. A partial right turn bypass lane is generally defined as a channelized right-turn lane that is separated by a median and does not share the same entrance to the roundabout. The roundabout would allow uninterrupted flow of traffic and reduced queuing and delay at all approaches of the intersection.

The Roundabout Alternative includes the following improvements:

- Construct a modern at the intersection of I-8 EB Off-Ramp/Lake Jennings Park Road, and Olde Highway 80
- Shared use paths are provided along the southeast side, along the northeast side, and along the northwest side of the study intersection
- Crosswalks are located on the east leg and north leg of the studied intersection and are both 10 ft wide
- Construct a 165 ft right turn yield controlled partial bypass lane
- Widening the southbound leg and providing a 59 ft left turn pocket on into E Sierra Alta Way

Due to the complexity in the design, several performance checks would need to be conducted to verify the Roundabout's feasibility. These performance checks meet current Caltrans TOPD 13-02 and HDM 405.10 which mandates conformance with the National Cooperative Highway Research Program (NCHRP) Report 672 entitled "Roundabouts An Informational Guide, 2nd edition". Performance measures listed in the NCHRP Report 672 are described in the following section.

An exhibit showing the Roundabout Alternative is provided in the Appendix C.

5.3.1 Roundabout Performance Checks

The following design criteria were used to analyze the geometrics and safety performance of the proposed Roundabout Alternative:

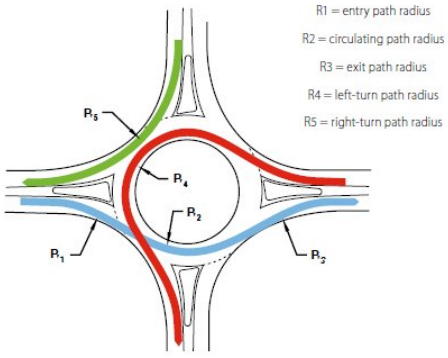
- Criteria and methodologies to be consistent with Caltrans DIB 80-01, Caltrans Highway Design Manual, and Report 672 of the National Cooperative Highway Research Program (NCHRP) titled *Roundabouts: An Informational Guide (Second Edition).* This document supersedes the original roundabout guide published by the FHWA in 2000.
- The “CA Legal” design vehicle from the Caltrans Highway Design Manual, 6th Edition (update September 2014) shall be accommodated on all movements at the study intersection. This vehicle shall be accommodated such that the tractor portion of the vehicle does not need to mount any truck aprons.
- Fast path entry speeds on single lane roundabout approaches should be 25 mph or less. Fast path entry speeds on multi-lane approaches should be 30 mph or less.

5.3.2 Fastest Path and Vehicle Speed Checks

The “Fastest Path” represents the path that the most aggressive drivers could take through the roundabout and assumes no other traffic to be within the intersection. NCHRP Report 672 indicates that the recommended maximum vehicle entry speeds along the fastest path should be less than 25 mph at urban single-lane roundabouts and less than 30 mph at urban multi-lane roundabouts. NCHRP Report 672 also indicates that the differential speed between consecutive or conflicting projected fast path speeds should be less than 15 mph.

Fast path speeds are determined for five locations per approach. These include entry speeds (referred to as V1); through movement circulating speeds (V2); exiting speeds (V3); left turn movement circulating speeds (V4); and right turn speeds (V5). A diagram of the described locations are shown in Figure 3.

Figure 3 - Fast Path Critical Speed Locations



Fast-path table is shown in Table 4. The Roundabout Alternative achieves the target safety performance criteria for fast-path and vehicle speed through the intersection as seen in Appendix C.

TABLE 4 FAST PATH SPEEDS

Movement	Northbound Lake Jenning Park Rd (N#)	Southbound Lake Jenning Park Rd (S#)	Eastbound I-8 Off Ramp (E#)	Westbound Street Name (W#)
Entering (V1)	24.3	20.5	26.8	21.9
Circulating (V2)	14.9	14.2	18.9	N/A
Exiting (V3)	29.3	29.0	31.6	N/A
Left Turn (V4)	N/A	17.1	13.8	14.2
Right Turn (V5)	17.7	N/A	20.6	20.4

6. Alternative Design Consideration Features

Several geometric design features need to be considered for both roundabout and signal design. Below are the descriptions of the design features that are critical for this project.

6.1 Project Specific Criteria

6.1.1 Guide Signing

Guide signing is critical for providing proper direction to drivers as they approach any type of intersection or diverging roadway. Due to the project's proximity to multiple destination communities, guide signing is critical for motorists to select the proper lane as they approach the intersection.

The Roundabout Alternative would require additional guide signage at the approaches and exits to ensure drivers traverse the intersection in the correct lane to safely and efficiently reach their destination.

6.1.2 Truck Accommodation

The design vehicle used to access for the study intersection is the California Legal truck as outlined in Section 3.5 of this report. Attempts were made to accommodate movements among all legs by the design truck's template from the 2014 Caltrans Highway Design Manual. For the Roundabout Alternative, the truck turn templates are illustrated allowing truck aprons to be mounted only by the truck trailer and not the tractor. The exhibits showing the truck turning movements for the Signal and Roundabout Alternatives are located in Appendix B and C respectively.

The Signal and Roundabout Alternatives were compared based on the ability to adequately serve the required design vehicle for all movements. Both the Signal and Roundabout Alternatives serve the CA Legal 50 Standard truck for all movements; therefore, both concepts equally satisfy the performance criteria for accommodating trucks.

6.1.3 Pedestrian/Bike/Equestrian Accommodation

It is a key objective of the proposed improvements to improve access and safety for cyclists, pedestrians, and equestrians at the study intersection. Another need related to modal interrelationships and social considerations include the needs expressed by residents and

businesses regarding safe and efficient ingress and egress to properties adjacent to the project area. The accommodation of bicycles, pedestrians, and equestrians through the study intersection is incorporated into the design of both alternatives and brief descriptions of bike/pedestrian improvements are included below.

6.1.3.1 Signal Alternative

The Signal Alternative accommodates pedestrians, bicycles, and equestrians with standard Caltrans Class II bike lanes, sidewalks, and crosswalks at the intersection along Olde Highway and along the eastside of Lake Jennings Park Road. The crossing is 10 feet wide and extends across the entire intersection length. Due to the number of lanes at each approach, long crosswalks will increase pedestrian crossing times and will affect the traffic signal timing to ensure that pedestrians can safely cross the roadway.

6.1.3.2 Roundabout Alternative

Pedestrian crossings are provided along Olde Highway 80 connecting the proposed commercial development to the existing commercial development as well as on the north leg of the roundabout. Crossings are 10 feet in width and set back a minimum of 20 feet from the roundabout's circulating roadway. Where crosswalks intersect splitter islands or medians, a 6 foot long minimum paved pathway is provided between the travel lanes for safety and refuge when waiting to cross. Shared-use pathways, 10 feet in width and located outside of the roundabout for the southeast side, are setback a minimum of 5 feet from the circulatory road with a landscape strip to increase accessibility and discourage pedestrians from crossing into the central traveled way. Due to right of way constraints, no landscaping area will be provided on the northeast side. Instead, a physical barrier will be added to protect bicyclist and pedestrians from entering the roadway.

Bicycles are accommodated by navigating through the roundabout in two ways. Cyclists may choose to take the travel lane and travel through the roundabout as a vehicle or may choose to take the separated bike ramp onto the shared use path and travel around the roundabout as a pedestrian.

Equestrians will use the crosswalks to navigate through the roundabout. Crosswalks are 10 feet in width and intersect a central refuge island, which allows riders to stop. The central refuge island is 14 feet in length on the east leg and 12 feet in length on the north leg.

The performance of the Signal and Roundabout Alternatives were compared based on the ability to accommodate pedestrians, cyclists, and equestrians through the corridor. In general, both alternatives provide an acceptable level of accommodation and safety; however, the Roundabout Alternative provides better safety as the vehicle/pedestrian/cyclist interactions are separated from the traveled way by a buffer.

7. Non-Conforming Features

Non-conforming geometric design features are identified and compared between the Signal and Roundabout Alternatives. Due to the preliminary planning stage of this ICE document, it needs to be stated and understood that the identified features and the resulting study alternative should not be considered complete and comprehensive. During detailed engineering design, some design parameters and/or elements may change before the intersection concept is approved and constructed.

7.1 Signal Alternative

The Signal Alternative concept was compared to the 2014 Caltrans Highway Design Manual (HDM) to determine any non-conforming features. The non-conforming features for the signal concept include but are not exclusive to the following:

- Section 403.6 "Abrupt changes in alignment or sight distance should be avoided..." The southbound through movement on Lake Jennings Road will experience a 10-12 foot shift in alignment across the intersection. This movement may create confusion and impact the overall efficiency of the intersection. This non-conforming feature is proposed due to right of way constraints and is subject to modification in future phases of the design.

- Section 405.4(1) and (3) The median provided at the westbound approach (Olde Hwy 80) is proposed to be 2 feet wide, which is smaller than the 4 foot minimum width outlined in 405.4(1) and does not provide the necessary refuge of 6 feet for pedestrians to cross per 405.4(3). This non-conforming feature is proposed due to right of way constraints and is subject to modification in future phases of the design.

Other non-conforming features that are not listed in the HDM, but should be noted are as follows:

- The proposed westbound approach leg left turn lane is directly in line with the I-8 eastbound Off-Ramp. This nonconforming feature may mistake the eastbound Off-Ramp as a through lane, resulting in an increase in head-on collisions. Proper signing and marking must be added to guide westbound drivers. This nonconforming feature is proposed due to the existing development on the north side of Olde Highway 80 and right of way/development impacts to the proposed development on the south-east quadrant of the intersection.

7.2 Roundabout Alternative

The Roundabout Alternative concept was compared to the 2014 Caltrans Highway Design Manual (HDM), Caltrans Design Information Bulletin 80-01, and National Cooperative Highway Research Program (NCHRP) Report 672 *Roundabout: An Informational Guide* to determine any non-conforming features. The non-conforming features for the Roundabout concept include but are not exclusive to the following:

- Section 6.8.1.1(NCHRP) The shared-use path does not comply with the 2 foot minimum setback distance due to right-of-way constraints, instead a physical barrier will be installed in order to separate the pedestrian and cyclist from the circulatory roadway. This non-conforming feature will reduce impacts to the existing gas station on the north side of Olde Highway 80 and is subject to modification in future phases of the design.

- Section 405.10 (13) The Roundabout Alternative provides less than the standard 200 foot splitter island length. Reduced splitter island lengths on Lake Jennings Road negates the need to widen the I-8 overcrossing structure and reduce impacts to the existing curve on Ridge Hill Road. Reduced splitter island length on Olde Highway 80 is intended to provide/maintain left turn access to and from the existing and future commercial developments located at the intersection. This non-conforming feature is proposed due to right of way constraints and is subject to modification in future phases of the design.

- Section 405.10 (14) An existing driveway access to the gas station, located on the north side of Olde Highway 80, is 50' from the intersection (standard is 100' minimum). This non-conforming feature is due to existing conditions and is subject to modification in future phases of the design.

Both alternatives include non-conforming features in their respective designs. The Roundabout Alternative ranks higher due to the fact that its design reduces the potential confusion that might lead to wrong way entrance to the off ramp.

8. Traffic Operations & Safety Analysis

The traffic operations of the Signal and Roundabout Alternatives were analyzed for AM and PM peak hours for the Opening Year (assumed to be Existing Plus Project conditions in the July 2015 TIS) and Design Year (assumed to be Cumulative Plus Project conditions in the July 2015 TIS) conditions.

The Signal Alternative was analyzed using Synchro/Sim-traffic traffic analysis software and the roundabout was analyzed using SIDRA analysis software. Analysis procedures from the Highway Capacity Manual (HCM), 2000 were used for Signals to determine the Level of Service (LOS), Volume/Capacity (V/C) ratio and delay. Sim-traffic was utilized to determine the queuing characteristics of the Signal Alternative.

As accepted by Caltrans, SIDRA analysis methodology was used for roundabouts to determine the LOS, V/C, delay and 95th percentile queues.

8.1 Traffic Operations Analysis

Traffic operations have been quantified through the determination of Level of Service (LOS). LOS is a qualitative measure of traffic measuring conditions, whereby a letter grade "A" through "F" is assigned to an intersection or roadway segment representing progressively worsening traffic conditions. LOS was calculated for different intersection control types using the methods documented in the *Highway Capacity Manual 2000 (HCM 2000).* LOS definitions for different types of intersection controls are outlined in Table 5.

TABLE 5
LEVEL OF SERVICE (LOS) CRITERIA

LOS	Type of Flow	Delay	Maneuverability	Stopped Delay/Vehicle	
				Signal/ Rndbt	Unsig-nalized
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

Although Caltrans has not designated a LOS standard, Caltrans' *Guide for the Preparation of Traffic Impact Studies* (December 2002) indicates that Caltrans endeavors to maintain a target LOS at the transition between "C" and "D", however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS.

The County of San Diego has developed a series of thresholds based on allowable increases in volume-to-capacity ratios that become more stringent as level of service worsens. Where roadway segments and intersections operate at LOS D or better impacts are not considered significant.

8.1.1 No Build Alternative Analysis

For the No Build traffic operation evaluation, no study area improvements over what currently exists have been assumed. Table 6 presents Existing, Opening Year and Design Year No Build AM and PM peak hour intersection LOS. The intersection LOS and delay reported in Table 6 are from the July 29 TIS.

TABLE 6
EXISTING AND NO BUILD CONDITIONS: INTERSECTION LEVEL OF SERVICE

Intersection: Jennings Park/I-8 EB Off-Ramp/Olde Highway 80	**Control**	**AM Peak Hour**		**PM Peak Hour**	
Analysis Year	**Type[1,2]**	**Delay**	**LOS**	**Delay**	**LOS**
Existing Conditions	AWSC	9.5	A	15.3	C
Opening Year No Build Conditions	AWSC	12.7	B	**59.4**	**F**
Design Year No Build Conditions	AWSC	13.8	B	**72.2**	**F**

Notes: delay identified as sec/veh

1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout

2. Overall LOS = Average of all approaches for AWSC, Signal, RNDBT

As indicated in Table 6, the study intersection is currently operating at acceptable LOS C or better. For Opening Year No Build conditions, the operations are projected to worsen, based on the overall intersection delay and the corresponding LOS. The wait time for traffic to cross the intersection worsens to about a minute. For Design Year No Build conditions, the operations are projected to worsen further, based on the overall intersection delay and the corresponding LOS from one minute to one and half minutes.

8.1.2 Alternative Comparison of AM Peak Hour Operations

Table 7 presents a summary of AM peak hour operations for the Signal and Roundabout Alternatives for Opening Year 2020 and Design Year 2040 conditions.

TABLE 7
AM PEAK HOUR ALTERNATIVES SUMMARY: INTERSECTION LEVEL OF SERVICE & 95TH PERCENTILE QUEUES

Intersection	*Jennings Park/I-8 EB Off-Ramp/Olde Highway 80*	Alternative 1 - Roundabout				Alternative 2 - Traffic Signal			
Analysis Year	Approach	Improvement[1]	Delay[2]	LOS	95th Percentile Queue/ Lane (ft)[3]	Improvement[1]	Delay[2]	LOS	95th Percentile Queue/ Lane (ft)[3]
Opening Year Conditions (2020) 15% Increase	Eastbound	RNDBT	6.0	A	56.0	Signal	14.4	B	173.0
	Westbound		2.1	A	54.0		13.4	B	136.0
	Northbound		8.4	A	23.0		21.6	C	113.0
	Southbound		5.0	A	42.0		19.2	B	114.0
	Overall		6.0	A	-		15.3	B	-
Design Year Conditions (2040)	Eastbound	RNDBT	5.7	A	56.0	Signal	19.5	B	201.0
	Westbound		5.9	A	56.0		15.8	B	156.0
	Northbound		7.7	A	23.0		23.6	C	120.0
	Southbound		4.7	A	43.0		21.9	C	145.0
	Overall		5.7	A	-		18.7	B	-

Notes: delay identified as sec/veh

1. RNDBT = Roundabout

2. Overall LOS = based on average delay of all approaches for AWSC, Signal, RNDBT

3. 95th Percentile Queue length

As shown in Table 7, both of the alternatives provide acceptable conditions, LOS D or better, for all Years during the AM peak period and improve congestion as well as minimize queues. Both alternatives accommodate the 95th percentile queue lengths during the AM peak period as shown in Table 7.

On average, the Roundabout Alternative is expected to reduce the delay by 9 sec/veh more than the Traffic Signal Alternative in the Opening Year condition and 13 sec/veh in the Design year 2040 condition. The Roundabout Alternative also reduces congestion more than the Traffic Signal Alternative, with significantly less delay and shorter queues during the AM Peak Hour.

8.1.3 Alternative Comparison of PM Peak Hour Operations

Table 8 presents a summary of PM peak hour operations for the Signal and Roundabout Alternatives for Opening Year 2020 and Design Year 2040 conditions.

TABLE 8
PM PEAK HOUR ALTERNATIVES SUMMARY: INTERSECTION LEVEL OF SERVICE & 95TH PERCENTILE QUEUES

Intersection	*Jennings Park/I-8 EB Off-Ramp/Olde Highway 80*	Alternative 1 - Roundabout				Alternative 2 - Traffic Signal			
Analysis Year	Approach	Improvement[1]	Delay[2]	LOS	95th Percentile Queue/ Lane (ft)[3]	Improvement[1]	Delay[2]	LOS	95th Percentile Queue/ Lane (ft)[3]
Opening Year Conditions (2020) 15% Increase	Eastbound	RNDBT	12.8	B	210.0	Signal	23.7	C	317.0
	Westbound		11.3	B	129.0		21.8	C	247.0
	Northbound		18.7	B	53.0		29.5	C	122.0
	Southbound		6.4	A	81.0		29.9	C	210.0
	Overall		11.4	B	-		24.4	C	-
Design Year Conditions (2040)	Eastbound	RNDBT	11.1	B	187.0	Signal	26.6	C	351.0
	Westbound		10.5	B	129.0		24.0	C	255.0
	Northbound		16.1	B	51.0		30.5	C	136.0
	Southbound		5.9	A	79.0		34.4	C	207.0
	Overall		10.2	B	-		27.3	C	-

Notes: delay identified as sec/veh

1. RNDBT = Roundabout

2. Overall LOS = based on average delay of all approaches for AWSC, Signal, RNDBT

3. 95th Percentile Queue length

As shown in Table 8, both of the alternatives provide acceptable conditions, LOS D or better, for all Years during the PM. Both of the alternatives generally accommodate the 95th percentile queue lengths during the PM peak period and improve congestion and minimize queues as seen in Table 8.

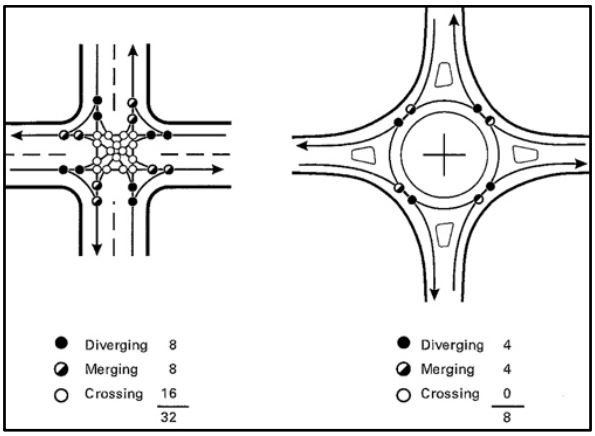
On average, the Roundabout Alternative is expected to reduce the delay by 13 sec/veh more than the Traffic Signal Alternative in the Opening Year condition 17 sec/veh than the Traffic Signal Alternative in the Design Year 2040 condition. Overall, the Roundabout Alternative reduces congestion even more than the Traffic Signal Alternative, with significantly less delay and shorter queues during the PM Peak Hour.

8.2 Safety Analysis

8.2.1 Number of Conflicting Points

The number of conflicting points within the intersection directly correlates to the risk of an incident, especially at intersections. Conflicting points are locations at which a roadway user can cross, merge, diverge, etc. with another roadway user. A diagram of conflict locations at typical intersections are provided in Figure 4.

Figure 4 Typical Conflict Points at Typical Intersections



The analysis above illustrates the advantages that the Roundabout Alternative provide by significantly reducing the number of conflict points between vehicles.

8.2.2 Reduced Speed Potential and Crash Severity Potential

Typically, the roundabout design forces the driver to reduce the speed in the intersection to 25-30 mph. However, drivers can travel an intersection with signal control at speeds higher than posted speed limits due to there being no geometric constraints. Due to reduced travel speeds through the intersection and fewer conflict points, the Roundabout Alternative is likely to eliminate most severe crash types (i.e. head-on, broadside).

8.2.3 Enhanced Safety

When compared to the traditional intersections control, roundabouts have lower number of conflict points for vehicles and pedestrians. This directly correlates to improved safety. Roundabouts also have the potential to reduce the number and severity of severe broadside collisions. The pedestrian and bicycle exposure and vehicle speeds at roundabout intersections is significantly less when compared to traditional intersections. The National Cooperative Research Program Report 672 in a study of 55 roundabouts in United States concluded that roundabouts generally reduce 35% of all crashes, 76% injury crashes and 90% fatal crashes.

9. Life-Cycle Analysis

9.1 Mobility Costs

To calculate the mobility cost for the alternatives, the vehicle operating costs were quantified for the project. The mobility costs (vehicle operating costs) were computed using the delay for the AM and PM peak periods for both the Signal and Roundabout alternatives.

The vehicle operating cost parameters were obtained from Life-Cycle Benefit-Cost Analysis Economic Parameters 2012 published by Caltrans. The cost of average fuel price was

documented as $3.714 for regular unleaded and $3.941 for diesel. An Average cost of $3.83 was utilized for analysis purpose.

- The annualized mobility cost for the Roundabout Alternative was calculated to be $84,921/year
- The annualized total mobility cost for the Signal Alternative is $161,759/year

Therefore, it can be concluded that Roundabout Alternative will result in lower mobility costs when compared to the Signal Alternative.

9.2 Environmental Costs

To calculate the environmental cost for the Alternatives, the greenhouse gas emissions costs were quantified for the project using SIDRA. The vehicle volume is projected to be higher for the PM analysis, so the greenhouse gas emissions for both alternatives were compared for PM analysis. The vehicle operating cost parameters were obtained from Life-Cycle Benefit-Cost Analysis Economic Parameters 2012 published by Caltrans. The cost of Carbon Monoxide (CO) in California urban area was stated to be $70/ton. The cost of Nitrogen Oxide (NO_x) in California rural area was stated to be $12,900/ton.

- The annualized total environmental cost for the Roundabout Alternative was calculated to be $51,781/year
- The annualized total environmental cost for the Signal Alternative is $52,805/year

Therefore, it can be concluded that the Roundabout Alternative will result in slightly lower greenhouse emission costs when compared to the Signal Alternative.

9.3 Other Costs

Besides the collision, environmental and mobility cost, a significant portion of cost associated with both alternatives will be related to its operation & maintenance and pavement rehabilitation costs.

9.3.1 Operation & Maintenance Cost

The maintenance and operation cost for a traffic signal includes providing power service to the signal and street lighting ($1500 annually), signal retiming ($1,000 annually), and signal maintenance for power outages/new detector loops/etc. ($1,500 annually) for a total annual cost of $4,000 per year per signal. The Roundabout Alternative would incur lower operation and maintenance costs and only incurring costs for powering street lighting and maintaining landscaping ($1500 annually).

9.3.2 Landscape Maintenance Cost

It is difficult to quantify the landscape maintenance cost at this level since the maintenance cost is directly proportional to the area covered by the landscape. Roundabouts typically have a central island covered by landscaping, in addition to other landscaping features not typical for a signal. The landscape maintenance cost is projected to be $1,500 annually for the Roundabout Alternative compared to $0 for the Signal Alternative.

9.3.3 Pavement Rehabilitation

Based on the concept-level preliminary project cost estimates. The construction cost would be higher for the Roundabout Alternative since the footprint is larger and a greater degree of control/variation in curb alignments and traveled way cross slopes are necessary for proper roundabout traffic flow. The Signal Alternative maintains much of the existing intersection layout, requiring similar crown locations and traveled way cross slopes. Consistent with the cost estimate for pavement cost, the pavement rehabilitation costs for the Roundabout Alternative are projected to be more than the Signal Alternative.

9.4 Service Life

The Roundabout and Signal Alternatives proposed are projected to accommodate the Design Year; however, additional service life may be provided by the proposed designs based on current growth projections.

The design year volumes were increased by 15% to reflect for General Plan buildout scenario. The 15% growth rate was obtained by comparing the Cumulative Plus Project volumes and General Plan Buildout Plus Project volumes in the July 2015 TIS. After completing a design-life demand sensitivity test in SIDRA for both alternatives, the Signal alternative will provide LOS D, while the roundabout will continue to yield LOS B conditions for the General Plan buildout scenario. Therefore, it can be concluded that the Roundabout Alternative will provide increased benefits with regards to service life when compared to the Signal Alternative.

10. Summary of Findings

Table 9 summarizes the performance for the Roundabout and Signal Alternatives. For more information regarding definitions or the analysis techniques used to generate the Alternative Performance Comparison, see Appendix C.

TABLE 9
ALTERNATIVE PERFORMANCE COMPARISON

Alternatives Performance Comparison

Performance Measure	Signal	Roundabout	Measurement
Cumulative Condition			
Delay - All approaches LOS "D" or better LOS A will be rated at 5 and E will be rated at 1.	**12**	**17** ✓	Quantitative
95th Percentile Queue - Adequate queue storage	✓	✓	Quantitative
Future Investment Needs			
Service Life - will the alternative function acceptably beyond the design year	**LOS D**	**LOS B** ✓	Quantitative
Costs			
Operations & Maintenance - Annualized	**$4,000/yr**	**$2250/yr** ✓	$ costs per year
Delay Costs - Annualized	**$162,000**	**$85,000** ✓	Delay (hrs/yr) * $17.35/hr / with discount rate of 4% over 20 years
Green House Gas Emissions - Annualized	**$53,000**	**$52,000** ✓	$Fuel +$CO + $NOx / with discount rate of 4% over 20 years
Construction Costs - Annualized	**$114,000/yr** ✓	**$177,000/yr**	$Total Construction / with discount rate of 4% over 20 years
Truck Accommodations			
Serves design vehicle for all movements	**100%** ✓	**100%** ✓	Quantitative
Safety			
Predictive Measures - Greatest crash reduction potential For expected fatal and injury crashes		**80% reduction in severe crashes** ✓	Quantitative
Vehicle Conflicts - The number of potential conflict points that may occur at the intersection based on layout geometry	**22**	**9** ✓	Quantitative
Pedestrian Safety - Exposure to traffic in terms of number of lanes, conflict points, and crossing times	**435**	**238** ✓	Qualitative
Bicycle Safety - Exposure to traffic in terms of number of lanes, conflict points, and speed differential	**240**	**87** ✓	Qualitative
Nonconforming Features			
Nonconforming Features. Based on the geometry of the design. They are features that do not follow current standards stated in Highway Design Manual (HDM) and the National Cooperative Highway Research Program (NCHRP). Only the features that may result in **fatalities** are considered.	**1**	**0** ✓	Quantitative
Local Access			
Maintains local access and circulation	**90%**	**100%** ✓	Qualitative
Total Performance Measures Met	**3**	**14**	

Table 10 provides a summary of the life cycle costs for the Roundabout vs. Signal alternative.

TABLE 10
LIFE CYCLE COST SUMMARY PERFORMANCE COMPARISON

Life Cycle Costs (20 year design)	Roundabout	Signal
Collision and Mobility Costs (Roundabout VS Signal)		
Delay Costs	$545,346	$2,066,935
Fuel and GHG Costs	$1,289,776	$1,382,799
Project Costs including design, construction and maintenance (Roundabout VS Signal)		
Operations and Maintenance Costs	$30,578	$54,361
Project Costs (including soft costs)	$2,400,000	$1,550,000
Total Life Cycle Costs (Opening Year $) - Net Present Value	$4,265,700	$5,054,095

11. Recommendations

As shown in Table 9, 14 performance measure points were assigned to the Roundabout Alternative, as compared to 3 for the Signal Alternative.

As shown in Table 10, when compared to a signal alternative, implementation of a roundabout alternative will result in a lower life cycle costs.

Based on these results, we recommend that Roundabout Alternative to be the preferred alternative for the Lake Jennings Park Road/Interstate 8 Eastbound Off-Ramp and Olde Highway 80 intersection.

Appendix

APPENDIX A - SIGNAL ALTERNATIVE

APPENDICES

- SIGNAL LAYOUT
- TRUCK TURNS
- SYNCHRO ANALYSIS
- COST ESTIMATE
- ENVIRONMENTAL COST BACKUP

APPENDIX B - ROUNDABOUT ALTERNATIVE APPENDICES

- ROUNDABOUT LAYOUT
- TRUCK TURNS
- FAST PATH
- SIDRA ANALYSIS
- COST ESTIMATE
- ENVIRONMENTAL COST BACKUP

APPENDIX A –SIGNAL ALTERNATIVE APPENDICES

- SIGNAL LAYOUT
- TRUCK TURNS
- SYNCHRO ANALYSIS
- COST ESTIMATE
- ENVIRONMENTAL COST BACKUP

RIDGE HILL RD

ROUTE 8 EB OFF-RAMP

ROUTE 8 EB ON-RAMP

EB ROUTE 8

WB ROUTE 8

ROUTE 8 WB ON-RAMP

LAKE JENNINGS PARK RD

E SIERRA ALTA WAY

OLDE HWY 80

ROUTE 8 EB ON-RAMP

ROUTE 8 WB ON-RAMP

ROUTE 8 WB OFF-RAMP

BLOSSOM VALLEY RD

100 0 100

(IN FEET)

1 inch = 100 ft.

I-8 & LAKE JENNINGS PARK RD

APPENDIX B

SIGNAL ALTERNATIVE

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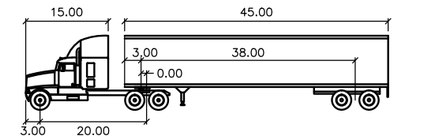
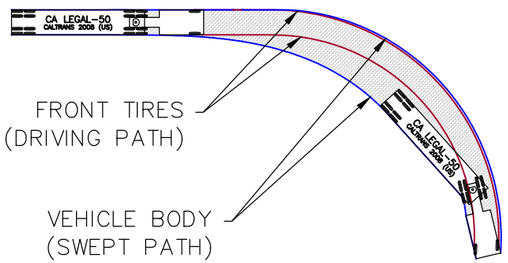
2167



CA LEGAL–50 feet

Tractor Width	: 8.50	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 26.3
Tractor Track	: 8.50	Articulating Angle	: 70.0
Trailer Track	: 8.50		



50 0 50

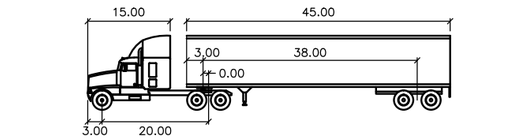
(IN FEET)

1 inch = 50 ft.

I-8 & LAKE JENNINGS PARK ROAD

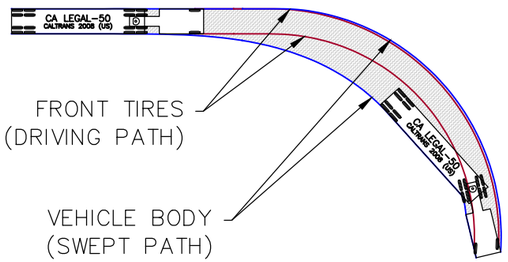
APPENDIX B

CA LEGAL TRUCK TURNING MOVEMENTS (1 OF 2)



CA LEGAL–50 feet

Tractor Width	: 8.50	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 26.3
Tractor Track	: 8.50	Articulating Angle	: 70.0
Trailer Track	: 8.50		



50 0 50

(IN FEET)

1 inch = 50 ft.

I-8 & LAKE JENNINGS PARK ROAD

APPENDIX B

CA LEGAL TRUCK TURNING MOVEMENTS (2 OF 2)

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2167

Intersection: 3:

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	LT	TR	L	R	R	TR	L	LT
Maximum Queue (ft)	193	216	184	87	200	145	142	161	115
Average Queue (ft)	55	141	90	23	99	51	64	92	26
95th Queue (ft)	155	201	165	62	156	102	120	145	73
Link Distance (ft)		1020	1020		370	370	393	346	346
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	500			75					
Storage Blk Time (%)				0	14		7		
Queuing Penalty (veh)				1	4		3		

Network Summary

Network wide Queuing Penalty: 8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	380	22	27	0	693	0	87	29	284	32	0
Future Volume (vph)	199	380	22	27	0	693	0	87	29	284	32	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5		4.5		4.5		4.5	4.5	
Lane Util. Factor	0.91	0.91		1.00		0.88		0.95		0.95	0.95	
Frt	1.00	0.99		1.00		0.85		0.96		1.00	1.00	
Flt Protected	0.95	1.00		0.95		1.00		1.00		0.95	0.96	
Satd. Flow (prot)	1610	3356		1770		2787		3405		1681	1702	
Flt Permitted	0.95	1.00		0.95		1.00		1.00		0.95	0.96	
Satd. Flow (perm)	1610	3356		1770		2787		3405		1681	1702	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	209	400	23	28	0	729	0	92	31	299	34	0
RTOR Reduction (vph)	0	4	0	0	0	501	0	27	0	0	0	0
Lane Group Flow (vph)	188	440	0	28	0	228	0	96	0	164	169	0
Turn Type	Split	NA		Prot		custom		NA		Split	NA	
Protected Phases	4	4		8		8		2		6	6	
Permitted Phases						6						
Actuated Green, G (s)	15.3	15.3		6.4		18.7		7.7		12.3	12.3	
Effective Green, g (s)	15.3	15.3		6.4		18.7		7.7		12.3	12.3	
Actuated g/C Ratio	0.26	0.26		0.11		0.31		0.13		0.21	0.21	
Clearance Time (s)	4.5	4.5		4.5		4.5		4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	412	860		189		872		439		346	350	
v/s Ratio Prot	0.12	c0.13		0.02		c0.03		c0.03		0.10	c0.10	
v/s Ratio Perm						0.05						
v/c Ratio	0.46	0.51		0.15		0.26		0.22		0.47	0.48	
Uniform Delay, d1	18.7	19.0		24.2		15.3		23.3		20.9	20.9	
Progression Factor	1.00	1.00		1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.5		0.4		0.2		0.3		1.0	1.1	
Delay (s)	19.5	19.5		24.5		15.5		23.6		21.9	21.9	
Level of Service	B	B		C		B		C		C	C	
Approach Delay (s)		19.5			15.8			23.6			21.9	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

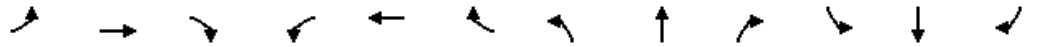
c Critical Lane Group

Intersection: 3:

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	LT	TR	L	R	R	TR	L	LT
Maximum Queue (ft)	346	403	374	100	287	228	161	226	174
Average Queue (ft)	184	258	218	38	171	116	76	138	86
95th Queue (ft)	298	351	318	100	255	207	136	207	174
Link Distance (ft)		1020	1020		370	370	393	346	346
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	500			75					
Storage Blk Time (%)		0		1	44		12		
Queuing Penalty (veh)		0		6	12		6		

Network Summary

Network wide Queuing Penalty: 25



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	434	663	63	27	0	919	0	105	21	424	56	0
Future Volume (vph)	434	663	63	27	0	919	0	105	21	424	56	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5		4.5		4.5		4.5	4.5	
Lane Util. Factor	0.91	0.91		1.00		0.88		0.95		0.95	0.95	
Frt	1.00	0.99		1.00		0.85		0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95		1.00		1.00		0.95	0.96	
Satd. Flow (prot)	1610	3337		1770		2787		3451		1681	1704	
Flt Permitted	0.95	1.00		0.95		1.00		1.00		0.95	0.96	
Satd. Flow (perm)	1610	3337		1770		2787		3451		1681	1704	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	457	698	66	28	0	967	0	111	22	446	59	0
RTOR Reduction (vph)	0	5	0	0	0	480	0	19	0	0	0	0
Lane Group Flow (vph)	398	818	0	28	0	487	0	114	0	250	255	0
Turn Type	Split	NA		Prot		custom		NA		Split	NA	
Protected Phases	4	4		8		8		2		6	6	
Permitted Phases						6						
Actuated Green, G (s)	25.7	25.7		7.1		23.6		10.3		16.5	16.5	
Effective Green, g (s)	25.7	25.7		7.1		23.6		10.3		16.5	16.5	
Actuated g/C Ratio	0.33	0.33		0.09		0.30		0.13		0.21	0.21	
Clearance Time (s)	4.5	4.5		4.5		4.5		4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	533	1105		161		847		458		357	362	
v/s Ratio Prot	c0.25	0.24		0.02		c0.05		c0.03		0.15	c0.15	
v/s Ratio Perm						0.12						
v/c Ratio	0.75	0.74		0.17		0.57		0.25		0.70	0.70	
Uniform Delay, d1	23.1	23.0		32.5		22.8		30.2		28.3	28.3	
Progression Factor	1.00	1.00		1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2	5.7	2.6		0.5		0.9		0.3		6.1	6.1	
Delay (s)	28.7	25.6		33.1		23.7		30.5		34.3	34.4	
Level of Service	C	C		C		C		C		C	C	
Approach Delay (s)		26.6			24.0			30.5			34.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	77.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	413	632	61	25	0	866	0	103	19	394	55	0
Future Volume (vph)	413	632	61	25	0	866	0	103	19	394	55	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5		4.5		4.5		4.5	4.5	
Lane Util. Factor	0.91	0.91		1.00		0.88		0.95		0.95	0.95	
Frt	1.00	0.99		1.00		0.85		0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95		1.00		1.00		0.95	0.96	
Satd. Flow (prot)	1610	3337		1770		2787		3456		1681	1705	
Flt Permitted	0.95	1.00		0.95		1.00		1.00		0.95	0.96	
Satd. Flow (perm)	1610	3337		1770		2787		3456		1681	1705	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	435	665	64	26	0	912	0	108	20	415	58	0
RTOR Reduction (vph)	0	6	0	0	0	472	0	18	0	0	0	0
Lane Group Flow (vph)	378	780	0	26	0	440	0	110	0	237	236	0
Turn Type	Split	NA		Prot		custom		NA		Split	NA	
Protected Phases	4	4		8		8		2		6	6	
Permitted Phases						6						
Actuated Green, G (s)	24.1	24.1		6.2		21.8		8.4		15.6	15.6	
Effective Green, g (s)	24.1	24.1		6.2		21.8		8.4		15.6	15.6	
Actuated g/C Ratio	0.33	0.33		0.09		0.30		0.12		0.22	0.22	
Clearance Time (s)	4.5	4.5		4.5		4.5		4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	536	1112		151		840		401		362	367	
v/s Ratio Prot	c0.23	0.23		0.01		c0.04		c0.03		c0.14	0.14	
v/s Ratio Perm						0.11						
v/c Ratio	0.71	0.70		0.17		0.52		0.28		0.65	0.64	
Uniform Delay, d1	21.0	21.0		30.7		20.9		29.2		25.9	25.8	
Progression Factor	1.00	1.00		1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2	4.2	2.0		0.5		0.6		0.4		4.2	3.8	
Delay (s)	25.2	23.0		31.2		21.5		29.5		30.1	29.6	
Level of Service	C	C		C		C		C		C	C	
Approach Delay (s)		23.7			21.8			29.5			29.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	72.3	Sum of lost time (s)	18.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 3:

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	LT	TR	L	R	R	TR	L	LT
Maximum Queue (ft)	291	354	322	99	280	226	141	243	181
Average Queue (ft)	180	242	198	36	164	111	72	135	79
95th Queue (ft)	279	317	287	92	247	203	122	210	169
Link Distance (ft)		1020	1020		370	370	393	346	346
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	500			75					
Storage Blk Time (%)				1	42		12		
Queuing Penalty (veh)				3	10		6		

Network Summary

Network wide Queuing Penalty: 20

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	362	22	26	0	657	0	84	28	264	31	0
Future Volume (vph)	189	362	22	26	0	657	0	84	28	264	31	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5		4.5		4.5		4.5	4.5	
Lane Util. Factor	0.91	0.91		1.00		0.88		0.95		0.95	0.95	
Frt	1.00	0.99		1.00		0.85		0.96		1.00	1.00	
Flt Protected	0.95	1.00		0.95		1.00		1.00		0.95	0.96	
Satd. Flow (prot)	1610	3355		1770		2787		3408		1681	1703	
Flt Permitted	0.95	1.00		0.95		1.00		1.00		0.95	0.96	
Satd. Flow (perm)	1610	3355		1770		2787		3408		1681	1703	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	199	381	23	27	0	692	0	88	29	278	33	0
RTOR Reduction (vph)	0	7	0	0	0	488	0	27	0	0	0	0
Lane Group Flow (vph)	179	417	0	27	0	204	0	90	0	156	155	0
Turn Type	Split	NA		Prot		custom		NA		Split	NA	
Protected Phases	4	4		8		8		2		6	6	
Permitted Phases						6						
Actuated Green, G (s)	12.1	12.1		4.6		12.4		3.0		7.8	7.8	
Effective Green, g (s)	12.1	12.1		4.6		12.4		3.0		7.8	7.8	
Actuated g/C Ratio	0.27	0.27		0.10		0.27		0.07		0.17	0.17	
Clearance Time (s)	4.5	4.5		4.5		4.5		4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	428	892		178		759		224		288	291	
v/s Ratio Prot	0.11	c0.12		0.02		c0.03		c0.03		c0.09	0.09	
v/s Ratio Perm						0.05						
v/c Ratio	0.42	0.47		0.15		0.27		0.40		0.54	0.53	
Uniform Delay, d1	13.8	14.0		18.7		13.0		20.4		17.2	17.2	
Progression Factor	1.00	1.00		1.00		1.00		1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.4		0.4		0.2		1.2		2.1	1.9	
Delay (s)	14.5	14.4		19.1		13.2		21.6		19.3	19.1	
Level of Service	B	B		B		B		C		B	B	
Approach Delay (s)		14.4			13.4			21.6			19.2	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	45.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 3:

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	LT	TR	L	R	R	TR	L	LT
Maximum Queue (ft)	138	188	161	63	177	115	135	127	77
Average Queue (ft)	26	113	62	22	88	45	62	69	17
95th Queue (ft)	82	173	128	53	136	83	113	114	48
Link Distance (ft)		1020	1020		370	370	393	346	346
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	500			75					
Storage Blk Time (%)					10		9		
Queuing Penalty (veh)					3		4		

Network Summary

Network wide Queuing Penalty: 6

PLANNING LEVEL Cost Estimate

Project ID: ** District 11 - San Diego County **

11-SD-8

Type of Estimate :	Pre-PSR (ICE Study)
Program Code :	N/A
Project Limits :	Route 8 (PM R21.8)
Description:	Install Traffic Signal at I-8 EB Ramps/Lake Jennings Park Rd/Olde Hwy 80
Scope :	Improve existing Stop Controlled intersection to a Traffic Signal controlled intersection
Alternative :	**TRAFFIC SIGNAL ALTERNATIVE**

		Current Cost		Escalated Cost
ROADWAY ITEMS	**$**	**1,023,800**	**$**	**1,023,800**
STRUCTURE ITEMS	**$**	**-**	**$**	**-**
SUBTOTAL CONSTRUCTION COST	**$**	**1,023,800**	**$**	**1,023,800**
RIGHT OF WAY	**$**	**-**	**$**	**-**
TOTAL CAPITAL OUTLAY COST	**$**	**1,024,000**	**$**	**1,024,000**
PR/ED SUPPORT	**$**	**160,000**	**$**	**160,000**
PS&E SUPPORT	**$**	**220,000**	**$**	**220,000**
RIGHT OF WAY SUPPORT	**$**	**25,000**	**$**	**25,000**
CONSTRUCTION SUPPORT	**$**	**110,000**	**$**	**110,000**
OTAL CAPITAL OUTLAY SUPPORT COST*	**$**	**515,000**	**$**	**515,000**
TOTAL PROJECT COST	**$**	**1,550,000**	**$**	**1,550,000**

If Project has been programmed enter Programmed Amount $ -

Date of Estimate (Month/Year) Month / /

Estimated Date of Construction Start (Month/Year) /

Number of Working Days Working Days

Estimated Mid-Point of Construction (Month/Year) Month / Year

Number of Plant Establishment Days Days

Estimated Project Schedule

PID Approval
PA/ED Approval
PS&E
RTL
Begin Construction

Approved by Project Manager

(xxx) xxx-xxxx

Project Manager **Date** **Phone**

I. ROADWAY ITEMS SUMMARY

	Section		Cost	
1	**Earthwork**	$	56,000	
2	**Pavement Structural Section**	$	193,900	
3	**Drainage**	$	45,000	
4	**Specialty Items**	$	-	
5	**Environmental**	$	30,000	
6	**Traffic Items**	$	315,000	Sub-Total $ 639,900.00
7	**Detours**	$	-	
8	**Minor Items**	$	44,800	
9	**Roadway Mobilization**	$	68,500	
10	**Supplemental Work**	$	34,300	
11	**State Furnished**	$	-	
12	**Contingencies**	$	236,300	
13	**Overhead**	$	-	
	TOTAL ROADWAY ITEMS	**$**	**1,023,800**	

Estimate Prepared By _____
Name and Title Date Phone

Estimate Reviewed By _____
Name and Title Date Phone

By signing this estimate you are attesting that you have discussed your project with all functional units and have incorporated all their comments or have discussed with them why they will not be incorporated.

SECTION 1: EARTHWORK

Item code		Unit	Quantity		Unit Price ($)			Cost
160101	Clearing & Grubbing	LS		x		=	$	-
170101	Develop Water Supply	LS		x		=	$	-
190101	Roadway Excavation	CY	800	x	70.00	=	$	56,000
190103	Roadway Excavation (Type Y) ADL	CY		x		=	$	-
190105	Roadway Excavation (Type Z-2) ADL	CY		x		=	$	-
192037	Structure Excavation (Retaining Wall)	CY		x		=	$	-
193013	Structure Backfill (Retaining Wall)	CY		x		=	$	-
193031	Pervious Backfill Material (Retaining Wall)	CY		x		=	$	-
194001	Ditch Excavation	CY		x		=	$	-
198001	Impored Borrow	CY		x		=	$	-
198007	Imported Material (Shoulder Backing)	TON		x		=	$	-
XXXXXX	Some Item			x		=	$	-

TOTAL EARTHWORK SECTION ITEMS	**$**	**56,000**

SECTION 2: PAVEMENT STRUCTURAL SECTION

Item code		Unit	Quantity		Unit Price ($)			Cost
150771	Remove Asphalt Concrete Dike	LF		x		=	$	-
150860	Remove Base and Surfacing	CY		x		=	$	-
153103	Cold Plane Asphalt Concrete Pavement	SQYD		x		=	$	-
1532XX	Remove Concrete (type)	CY		x		=	$	-
250401	Class 4 Aggregate Subbase	CY		x		=	$	-
260201	Class 2 Aggregate Base	CY	500	x	73.00	=	$	36,500
290201	Asphalt Treated Permeable Base	CY		x		=	$	-
365001	Sand Cover	TON		x		=	$	-
374002	Asphaltic Emulsion (Fog Seal Coat)	TON		x		=	$	-
374492	Asphaltic Emulsion (Polymer Modified)	TON		x		=	$	-
3750XX	Screenings (Type XX)	TON		x		=	$	-
377501	Slurry Seal	TON		x		=	$	-
390095	Replace Asphalt Concrete Surfacing	CY		x		=	$	-
390132	Hot Mix Asphalt (Type A)	TON	568	x	120.00	=	$	68,160
390136	Minor Hot Mix Asphalt (AC DIKE)	TON		x	17,000.00	=	$	17,000
390137	Rubberized Hot Mix Asphalt (Gap Graded)	TON		x		=	$	-
393003	Geosynthetic Pavement Interlayer	SQYD		x		=	$	-
39405X	Shoulder Rumber Strip *(HMA, Type XX Inden*	STA		x		=	$	-
394071	Place Hot Mix Asphalt Dike	LF		x		=	$	-
394090	Place Hot Mix Asphalt (Misc. Area)	SQYD		x		=	$	-
397005	Tack Coat	TON		x		=	$	-
401000	Concrete Pavement	CY		x		=	$	-
401108	Replace Concrete Pavement (Rapid Strength	CY		x		=	$	-
404092	Seal Pavement Joint	LF		x		=	$	-
404094	Seal Longitudinal Isolation Joint	LF		x		=	$	-
413112A	Repair Spalled Joints (Polyester Grout)	SQYD		x		=	$	-
413115	Seal Existing Concrete Pavement Joint	LF		x		=	$	-
420102	Groove Existing Concrete Pavement	SQYD		x		=	$	-
420201	Grind Existing Concrete Pavement	SQYD		x		=	$	-
731502	Minor Concrete (Misc. Const)	CY	100	x	700.00	=	$	70,000
731530	Minor Concrete (Textured Paving)	SQFT	400	x	5.50	=	$	2,200
XXXXXX	Some Item			x		=	$	-

TOTAL STRUCTURAL SECTION ITEMS	**$**	**193,900**

SECTION 3: DRAINAGE

Item code		Unit	Quantity		Unit Price ($)		Cost
150206	Abandon Culvert	LF		x		= $	-
150805	Remove Culvert	LF		x		= $	-
150820	Modify Inlet	EA		x		= $	-
152430	Adjust Inlet	LF		x		= $	-
155003	Cap Inlet	EA		x		= $	-
193114	Sand Backfill	CY		x		= $	-
510502	Minor Concrete (Minor Structure)	CY		x		= $	-
510512	Minor Concrete (Box Culvert)	CY		x		= $	-
62XXXX	XXX" APC Pipe	LF		x		= $	-
64XXXX	XXX" Plastic Pipe	LF		x		= $	-
65XXXX	XXX" RCP Pipe	LF		x		= $	-
66XXXX	XXX" CSP Pipe	LF		x		= $	-
68XXXX	Edge Drain	LF		x		= $	-
69XXXX	XXX" Pipe Downdrain	LF		x		= $	-
70XXXX	XXX" Pipe Inlet	LF		x		= $	-
70XXXX	XXX" Pipe Riser	LF		x		= $	-
70XXXX	XXX" Flared End Section	EA		x		= $	-
703233	Grated Line Drain	LF		x		= $	-
72XXXX	Rock Slope Protection (Type and Method)	CY		x		= $	-
721420	Concrete (Ditch Lining)	CY		x		= $	-
721430	Concrete (Channel Lining)	CY		x		= $	-
729010	Rock Slope Protection Fabric	SQYD		x		= $	-
750001	Miscellaneous Iron and Steel	LB		x		= $	-
XXXXXX	Additional Drainage	LS	1	x	45,000.00	= $	45,000
XXXXXX	Some Item			x		= $	-

TOTAL DRAINAGE ITEMS	$	45,000

SECTION 4: SPECIALTY ITEMS

Item code		Unit	Quantity		Unit Price ($)		Cost
070012	Progress Schedule (Critical Path Method)	LS		x		= $	-
150662	Remove Metal Beam Guard Railing	LF		x		= $	-
150668	Remove Terminal Systems	EA		x		= $	-
1532XX	Remove Barrier (*Insert Type)*	LF		x		= $	-
153250	Remove Sound Wall	SQFT		x		= $	-
190110	Lead Compliance Plan	LS		x		= $	-
49XXXX	CIDH Concrete Piling *(Insert Diameter)*	LF		x		= $	-
510060	Structural Concrete (Retaining Wall)	CY		x		= $	-
510133	Class 2 Concrete (Retaining Wall)	CY		x		= $	-
510524	Minor Concrete (Sound Wall)	CY		x		= $	-
5110XX	Architectural Treatment *(Insert Type)*	SQFT	0	x		= $	-
511048	Apply Anti-Graffiti Coating	SQFT		x		= $	-
5136XX	Reinforced Concrete Crib Wall *(Insert Type)*	SQFT		x		= $	-
518002	Sound Wall (Masonry Block)	SQFT		x		= $	-
520103	Bar Reinf. Steel (Retaining Wall)	LB		x		= $	-
80XXXX	Fence (*Insert Type*)	LF		x		= $	-
832001	Metal Beam Guard Railing	LF		x		= $	-
839310	Double Thrie Beam Barrier	LF		x		= $	-
839521	Cable Railing	LF		x		= $	-
83954X	Transition Railing *(Insert Type)*	EA		x		= $	-
8395XX	Terminal System (Type CAT)	EA		x		= $	-
8395XX	Alternative Flared Terminal System	EA		x		= $	-
8395XX	End Anchor Assembly (*Insert Type*)	EA		x		= $	-
839561	Rail Tensioning Assembly	EA		x		= $	-
839XXX	Crash Cushion *(Insert Type)*	EA		x		= $	-
83XXXX	Concrete Barrier *(Insert Type)*	LF		x		= $	-
XXXXXX	Some Item			x		= $	-

TOTAL SPECIALTY ITEMS	$	-

SECTION 5: ENVIRONMENTAL

5A - ENVIRONMENTAL MITIGATION

Item code		Unit	Quantity		Unit Price ($)		Cost
	Biological Mitigation	LS		x		= $	-
071325	TEMPORARY REINFORCED SILT FENCE	LF		x		= $	-
071325	Temporary Fence (Type ESA)						

Subtotal Environmental *$ -*

5B - LANDSCAPE AND IRRIGATION

Item code		Unit	Quantity		Unit Price ($)		Cost
200001	Highway Planting	LS		x		= $	-
20XXXX	XXX" (*Insert Type*) Conduit *(Use for*	LF		x		= $	-
20XXXX	Extend XXX" *(Insert Type)* Conduit	LF		x		= $	-
201700	Imported Topsoil	CY		x		= $	-
2030XX	Erosion Control (Type __)	SQYD		x		= $	-
203021	Fiber Rolls	LF		x		= $	-
203026	Move In/ Move Out (Erosion Control)	EA		x		= $	-
204099	Plant Establishment Work	LS		x		= $	-
204101	Extend Plant Establishment (X Years)	LS		x		= $	-
208000	Irrigation System	LS		x		= $	-
208304	Water Meter	EA		x		= $	-
209801	Maintenance Vehicle Pullout	EA		x		= $	-
XXXXXX		LS				$	-

Subtotal Landscape and Irrigation *$ -*

5C - NPDES

Item code		Unit	Quantity		Unit Price ($)		Cost
074016	Construction Site Management	LS		x		= $	-
074017	Prepare WPCP	LS		x		= $	-
074019	Prepare SWPPP	LS		x		= $	-
074023	Temporary Erosion Control	SQYD		x		= $	-
074027	Temporary Erosion Control Blanket	SQYD		x		= $	-
074028	Temporary Fiber Roll	LF		x		= $	-
074032	Temporary Concrete Washout Facility	EA		x		= $	-
074033	Temporary Construction Entrance	EA		x		= $	-
074035	Temporary Check Dam	LF		x		= $	-
074037	Move In/ Move Out (Temporary Erosion Cont	EA		x		= $	-
074038	Temp. Drainage Inlet Protection	EA		x		= $	-
074041	Street Sweeping	LS		x		= $	-
074042	Temporary Concrete Washout (Portable)	LS		x		= $	-
XXXXXX	Some Item	LS	1	x	30,000.00	= $	30,000

Supplemental Work for NPDES

(These costs are not accounted in total here but under Supplemental Work on sheet 7 of 11).

066595	Water Pollution Control Maintenance Sharing*	LS		x		= $	-
066596	Additional Water Pollution Control**	LS		x		= $	-
066597	Storm Water Sampling and Analysis***	LS		x		= $	-
XXXXXX	Some Item						

Subtotal NPDES (Without Supplemental Work) *$ 30,000*

*Applies to all SWPPPs and those WPCPs with sediment control or soil stabilization BMPs.

**Applies to both SWPPPs and WPCP projects.

*** Applies only to project with SWPPPs.

TOTAL ENVIRONMENTAL $ 30,000

SECTION 6: TRAFFIC ITEMS

6A - Traffic Electrical

Item code		Unit	Quantity		Unit Price ($)			Cost
150760	Remove Sign Structure	EA		x		=	$	-
151581	Reconstruct Sign Structure	EA		x		=	$	-
152641	Modify Sign Structure	EA		x		=	$	-
5602XX	Furnish Sign Structure	LB		x		=	$	-
5602XX	Install Sign Structure	LB		x		=	$	-
56XXXX	XXX" CIDHC Pile (Sign Foundation)	LF		x		=	$	-
860090	Maintain Existing Traffic Management	LS		x		=	$	-
860810	Inductive Loop Detectors	EA		x		=	$	-
86055X	Lighting & Sign Illumination	LS		x		=	$	-
8607XX	Interconnection Facilities	LS		x		=	$	-
8609XX	Traffic Monitoring Stations	LS		x		=	$	-
860XXX	Signals & Lighting	LS	1	x	250,000.00	=	$	250,000
8611XX	Ramp Metering System (Location X)	LS		x		=	$	-
8611XX	Ramp Metering System (Location X)	LS		x		=	$	-
86XXXX	Fiber Optic Conduit System	LS		x		=	$	-
XXXXX	Service Point	LS	1		15,000.00		$	15,000

Subtotal Traffic Electrical *$ 265,000*

6B - Traffic Signing and Striping

Item code		Unit	Quantity		Unit Price ($)			Cost
120090	Construction Area Signs	LS		x		=	$	-
150701	Remove Yellow Painted Traffic Stripe	LF		x		=	$	-
150710	Remove Traffic Stripe	LF		x		=	$	-
150713	Remove Pavement Marking	SQFT		x		=	$	-
150742	Remove Roadside Sign	EA		x		=	$	-
152320	Reset Roadside Sign	EA		x		=	$	-
152390	Relocate Roadside Sign	EA		x		=	$	-
566011	Roadside Sign (One Post)	EA		x		=	$	-
566012	Roadside Sign (Two Post)	EA		x		=	$	-
560XXX	Furnish Sign Panels	SQFT		x		=	$	-
560XXX	Install Sign Panels	SQFT		x		=	$	-
82010X	Delineator (Class X)	EA		x		=	$	-
84XXXX	Permanent Pavement Delineation	LS	1	x	10,000.00	=	$	10,000

Subtotal Traffic Signing and Striping *$ 10,000*

6C - Stage Construction and Traffic Handling

Item code		Unit	Quantity		Unit Price ($)			Cost
120100	Traffic Control System	LS	1	x	40,000.00	=	$	40,000
120120	Type III Barricade	EA		x		=	$	-
120143	Temporary Pavement Delineation	LF		x		=	$	-
12016X	Channelizer	EA		x		=	$	-
128650	Portable Changeable Message Signs	EA		x		=	$	-
129000	Temporary Railing (Type K)	LF		x		=	$	-
129100	Temp. Crash Cushion Module	EA		x		=	$	-
129099A	Traffic Plastic Drum	EA		x		=	$	-
839603A	Temporary Crash Cushion (ADIEM)	EA		x		=	$	-
XXXXXX	Some Item							

Subtotal Stage Construction and Traffic Handling *$ 40,000*

TOTAL TRAFFIC ITEMS **$ 315,000**

SECTION 7: DETOURS

Include constructing, maintaining, and removal

Item code		Unit	Quantity		Unit Price ($)		Cost
0713XX	Temporary Fence (Type X)	LF		x		=	$ -
07XXXX	Temporary Drainage	LS		x		=	$ -
120143	Temporary Pavement Delineation	LF		x		=	$ -
1286XX	Temporary Signals	EA		x		=	$ -
129000	Temporary Railing (Type K)	LF		x		=	$ -
190101	Roadway Excavation	CY		x		=	$ -
198001	Imported Borrow	CY		x		=	$ -
198050	Embankment	CY		x		=	$ -
250401	Class 4 Aggregate Subbase	CY		x		=	$ -
260201	Class 2 Aggregate Base	CY		x		=	$ -
390132	Hot Mix Asphalt (Type A)	TON		x		=	$ -
XXXXXX	DETOUR/MISC TEMP FACILITES	LS		x		=	$ -

TOTAL DETOURS $ -

SUBTOTAL SECTIONS 1-7 $ 639,900

SECTION 8: MINOR ITEMS

8A - Americans with Disabilities Act Items							
	ADA Items				4.0%	$	25,596
8B - Bike Path Items							
	Bike Path Items				1.0%	$	6,399
8C - Other Minor Items							
	Other Minor Items				2.0%	$	12,798
	Total of Section 1-7	$	639,900	x	7.0%	= $	44,793

TOTAL MINOR ITEMS $ 44,800

SECTIONS 9: MOBILIZATION

Item							
999990	Total Section 1-8	$	684,700	x	10%	= $	68,470

TOTAL MOBILIZATION $ 68,500

SECTION 10: SUPPLEMENTAL WORK

Item code		Unit	Quantity		Unit Price ($)		Cost
066015	Federal Trainee Program	LS		x		=	$ -
066063	Traffic Management Plan - Public Informati	LS		x		=	$ -
066090	Maintain Traffic	LS		x		=	$ -
066094	Value Analysis	LS		x		=	$ -
066204	Remove Rock & Debris	LS		x		=	$ -
066222	Locate Existing Cross-Over	LS		x		=	$ -
066670	Payment Adjustments For Price Index Fluct	LS		x		=	$ -
066700	Partnering	LS		x		=	$ -
066866	Operation of Existing Traffic Management S	LS		x		=	$ -
066920	Dispute Review Board	LS		x		=	$ -
XXXXXX	Some Item			x		=	$ -
	*Cost of **NPDES** Supplemental Work specified in Section 5C*					=	$ -
	Total Section 1-8	$	684,700		5%	= $	34,235

TOTAL SUPPLEMENTAL WORK $ 34,300

SECTION 11: STATE FURNISHED MATERIALS AND EXPENSES

Item code		Unit	Quantity		Unit Price ($)		Cost
066063	Public Information	LS		x		=	$0
066105	RE Office	LS		x		=	$0
066803	Padlocks	LS		x		=	$0
066838	Reflective Numbers and Edge Sealer	LS		x		=	$0
066901	Water Expenses	LS		x		=	$0
066062A	COZEEP Expenses	LS		x		=	$0
06684X	Ramp Meter Controller Assembly	LS		x		=	$0
06684X	TMS Controller Assembly	LS		x		=	$0
06684X	Traffic Signal Controller Assembly	LS		x		=	$0
XXXXXX	Some Item						

Total Section 1-8	$	684,700	0%	=	$	-

TOTAL STATE FURNISHED	**$0**

SECTION 12: TIME-RELATED OVERHEAD

Estiamted Time-Releated Overhead (TRO) Percentage (0% to 10%) = 5%

Item code		Unit	Quantity		Unit Price ($)		Cost
070018	Time-Related Overhead	WD	0	X	#DIV/0!	=	$0

TOTAL TIME-RELATED OVERHEAD	**$0**

SECTION 13: CONTINGENCY

(Pre-PSR 30%-50%, PSR 25%, Draft PR 20%, PR 15%, after PR approval 10%, Final PS&E 5%)

Total Section 1-11	$	787,500	x	30%	=	$236,250	

TOTAL CONTINGENCY	**$236,300**

II. STRUCTURE ITEMS

DATE OF ESTIMATE	00/00/00	00/00/00	00/00/00
Name	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx
Bridge Number	57-XXX	57-XXX	57-XXX
Structure Type	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx
Width (Feet) [out to out]	0.00 LF	0.00 LF	0.00 LF
Total Length (Feet)	0.00 LF	0.00 LF	0.00 LF
Total Area (Square Feet)	0 SQFT	0 SQFT	0 SQFT
Structure Depth (Feet)	0.00 LF	0.00 LF	0.00 LF
Footing Type (pile or spread)	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx
Cost Per Square Foot	$0.00	$0.00	$0.00
COST OF EACH STRUCTURE	**$0.00**	**$0.00**	**$0.00**

DATE OF ESTIMATE	00/00/00	00/00/00	00/00/00
Name	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx
Bridge Number	57-XXX	57-XXX	57-XXX
Structure Type	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx
Width (Feet) [out to out]	0.00 LF	0.00 LF	0.00 LF
Total Length (Feet)	0.00 LF	0.00 LF	0.00 LF
Total Area (Square Feet)	0 SQFT	0.00 SQFT	0.0 SQFT
Structure Depth (Feet)	0.00 LF	0.00 LF	0.00 LF
Footing Type (pile or spread)	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxx
Cost Per Square Foot	$0.00	$0.00	$0.00
COST OF EACH STRUCTURE	**$0.00**	**$0.00**	**$0.00**

TOTAL COST OF BRIDGES	**$0.00**
TOTAL COST OF BUILDINGS	**$0.00**
TOTAL COST OF STRUCTURES[1]	**$0.00**

Estimate Prepared By: _____ _____
XXXXXXXXXXXXXXXX ------ Division of Structures Date

[1]Structure's Estimate includes Overhead and Mobilization.
Add more sheets if needed. Call them 9a, 9b, 9c, …, etc

QUANTITIES						COSTS					
					0.00110231:g to to	$ 3.83	$ 70.00	$ 12,900.00	$ 3.83	$ 70.00	$ 12,900.00
		C.Monoxide	NOX	C.Monoxide	NOX						
		193	200	181	193						
		315	324	298	322						
		Traffic Signal	Traffic Signal	Roundabout	Roundabout						
	2015	0.21	0.22	0.20	0.21						
	2035	0.35	0.36	0.33	0.35						
		From Network									
						Gas Traffic Signal	C.Monoxide Traffic Signal	NOX Traffic Signal	Gas Roundabout	C.Monoxide Roundabout	NOX Roundabout
Year 0	2015	0.21	0.22	0.20	0.21	$71,380	$15	$2,844	$66,094	$14	$2,744
Year 1	2016	0.22	0.23	0.21	0.22	$73,685	$15	$2,932	$68,281	$14	$2,836
Year 2	2017	0.23	0.23	0.21	0.23	$75,991	$16	$3,020	$70,467	$15	$2,928
Year 3	2018	0.23	0.24	0.22	0.23	$78,296	$16	$3,108	$72,654	$15	$3,020
Year 4	2019	0.24	0.25	0.23	0.24	$80,602	$17	$3,197	$74,840	$16	$3,111
Year 5	2020	0.25	0.25	0.23	0.25	$82,907	$17	$3,285	$77,027	$16	$3,203
Year 6	2021	0.25	0.26	0.24	0.26	$85,213	$18	$3,373	$79,214	$17	$3,295
Year 7	2022	0.26	0.27	0.24	0.26	$87,518	$18	$3,461	$81,400	$17	$3,386
Year 8	2023	0.27	0.28	0.25	0.27	$89,823	$19	$3,549	$83,587	$18	$3,478
Year 9	2024	0.27	0.28	0.26	0.28	$92,129	$19	$3,637	$85,773	$18	$3,570
Year 10	2025	0.28	0.29	0.26	0.28	$94,434	$20	$3,726	$87,960	$18	$3,662
Year 11	2026	0.29	0.30	0.27	0.29	$96,740	$20	$3,814	$90,146	$19	$3,753
Year 12	2027	0.29	0.30	0.28	0.30	$99,045	$21	$3,902	$92,333	$19	$3,845
Year 13	2028	0.30	0.31	0.28	0.31	$101,351	$21	$3,990	$94,519	$20	$3,937
Year 14	2029	0.31	0.32	0.29	0.31	$103,656	$21	$4,078	$96,706	$20	$4,028
Year 15	2030	0.31	0.32	0.30	0.32	$105,962	$22	$4,166	$98,893	$21	$4,120
Year 16	2031	0.32	0.33	0.30	0.33	$108,267	$22	$4,255	$101,079	$21	$4,212
Year 17	2032	0.33	0.34	0.31	0.33	$110,573	$23	$4,343	$103,266	$22	$4,304
Year 18	2033	0.33	0.34	0.32	0.34	$112,878	$23	$4,431	$105,452	$22	$4,395
Year 19	2034	0.34	0.35	0.32	0.35	$115,184	$24	$4,519	$107,639	$23	$4,487
Year 20	2035	0.35	0.36	0.33	0.35	$117,489	$24	$4,607	$109,825	$23	$4,579
Total		5.88	6.06	5.54	5.96	$ 1,983,122	$ 412	$ 78,237	$ 1,847,155	$ 388	$ 76,894

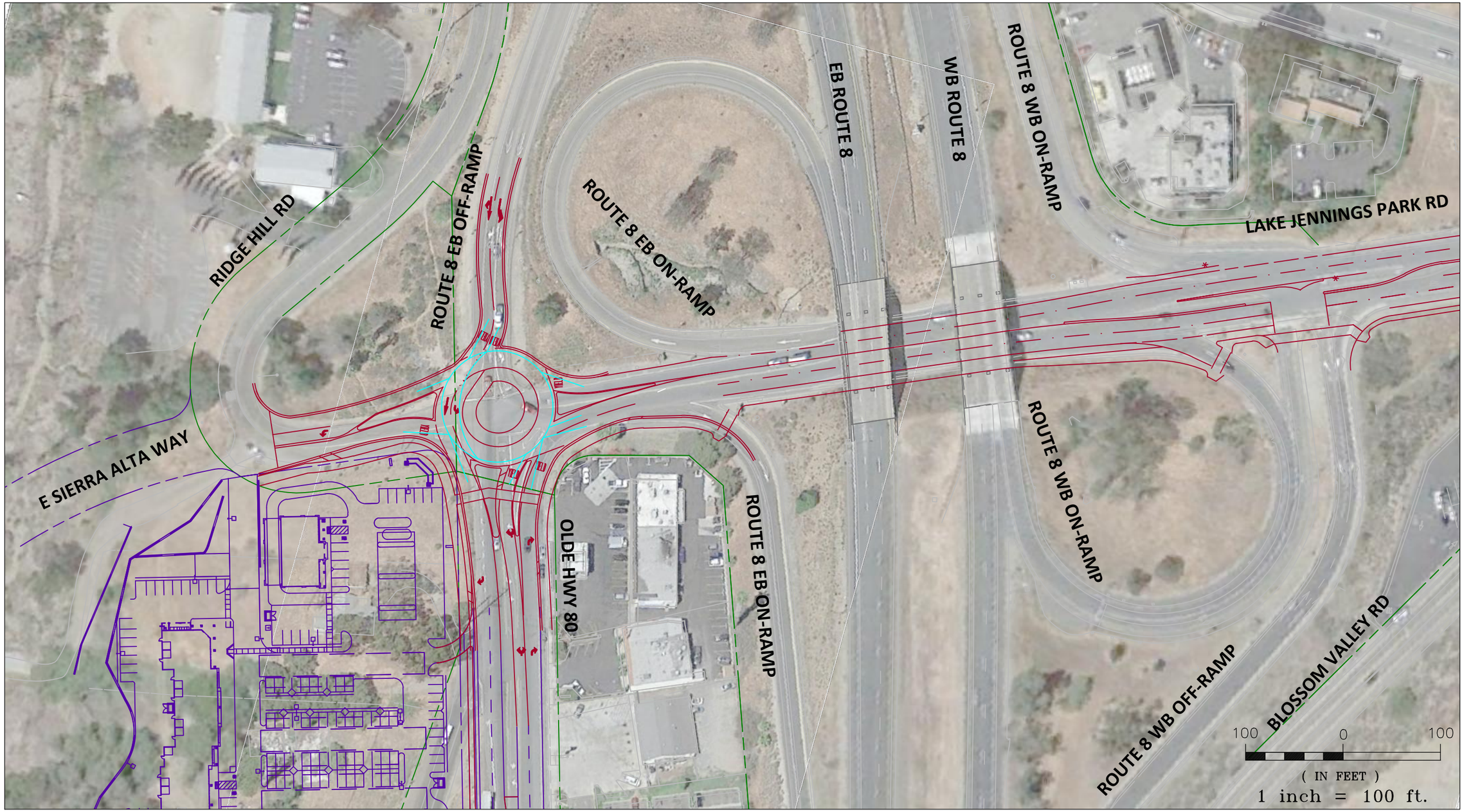
ADJUSTED COSTS with a discount rate of 4%

			Gas Traffic Signal	C.Monoxide Traffic Signal	NOX Traffic Signal	Gas Roundabout	C.Monoxide Roundabout	NOX Roundabout
Year 0	0	1	$71,379.71	$15	$2,844	$66,094.31	$14	$2,744
Year 1	1	0.961538	$70,851	$15	$2,819	$65,655	$14	$2,727
Year 2	2	0.924556	$70,258	$15	$2,792	$65,151	$14	$2,707
Year 3	3	0.888996	$69,605	$14	$2,763	$64,589	$14	$2,684
Year 4	4	0.854804	$68,899	$14	$2,732	$63,974	$13	$2,660
Year 5	5	0.821927	$68,144	$14	$2,700	$63,311	$13	$2,633
Year 6	6	0.790315	$67,345	$14	$2,666	$62,604	$13	$2,604
Year 7	7	0.759918	$66,506	$14	$2,630	$61,857	$13	$2,573
Year 8	8	0.73069	$65,633	$14	$2,593	$61,076	$13	$2,541
Year 9	9	0.702587	$64,729	$13	$2,556	$60,263	$13	$2,508
Year 10	10	0.675564	$63,796	$13	$2,517	$59,422	$12	$2,474
Year 11	11	0.649581	$62,840	$13	$2,477	$58,557	$12	$2,438
Year 12	12	0.624597	$61,863	$13	$2,437	$57,671	$12	$2,402
Year 13	13	0.600574	$60,869	$13	$2,396	$56,766	$12	$2,364
Year 14	14	0.577475	$59,859	$12	$2,355	$55,845	$12	$2,326
Year 15	15	0.555265	$58,837	$12	$2,313	$54,912	$12	$2,288
Year 16	16	0.533908	$57,805	$12	$2,272	$53,967	$11	$2,249
Year 17	17	0.513373	$56,765	$12	$2,229	$53,014	$11	$2,209
Year 18	18	0.493628	$55,720	$12	$2,187	$52,054	$11	$2,170
Year 19	19	0.474642	$54,671	$11	$2,145	$51,090	$11	$2,130
Year 20	20	0.456387	$53,620	$11	$2,103	$50,123	$10	$2,090
			$1,329,994.20	$ 276	$ 52,528	$ 1,237,995	$ 260	$ 51,521

Annual Costs	Roundabout		Traffic Signal	
Operation and Maintenance	**Operation and Maintenance**	**O&M Cost**	**Operation and Maintenance**	**O&M Cost**
Annualized Cost of Signal Retiming		$ -	Signal Retiming Every 3 Years	$ 1,000
Annual Cost of Power for Signal		$ -	Power for Signal	$ 750
Annual Cost of Illumination	Intersection Illumination	$ 750	Intersection Illumination	$ 750
Annual Cost of Maintenance	Landscaping Costs	$ 1,500	Signal Maintenance Costs (power outage, detection, etc.)	$ 1,500
	Total Annual Operation and Maintenance Costs	**$ 2,250**	***Total Annual Operation and Maintenance Costs***	**$ 4,000**

APPENDIX C – ROUNDABOUT ALTERNATIVE APPENDICES

- ROUNDABOUT LAYOUT
- TRUCK TURNS
- FAST PATH
- SIDRA ANALYSIS
- COST ESTIMATE
- ENVIRONMENTAL COST BACKUP



I-8 & LAKE JENNINGS PARK RD

FIGURE 8

ROUNDABOUT ALTERNATIVE

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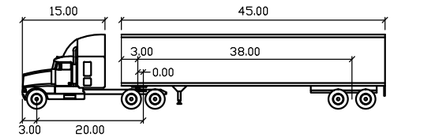
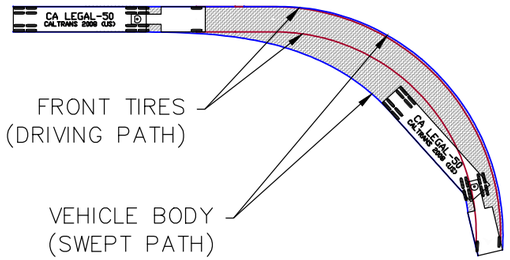


CA LEGAL-50 feet

Tractor Width	: 8.50	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 26.3
Tractor Track	: 8.50	Articulating Angle	: 70.0
Trailer Track	: 8.50		



50 0 50

(IN FEET)

1 inch = 50 ft.

I-8 & LAKE JENNINGS PARK ROAD

APPENDIX C

CA LEGAL TRUCK TURNING MOVEMENTS (EASTBOUND)

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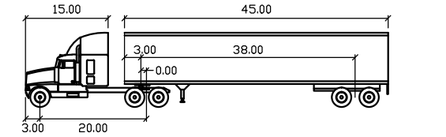
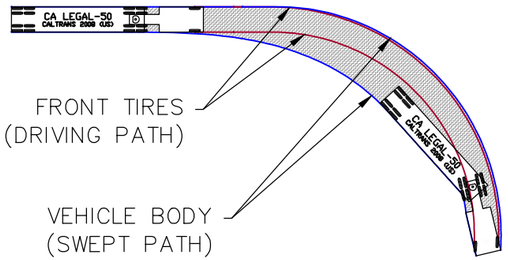
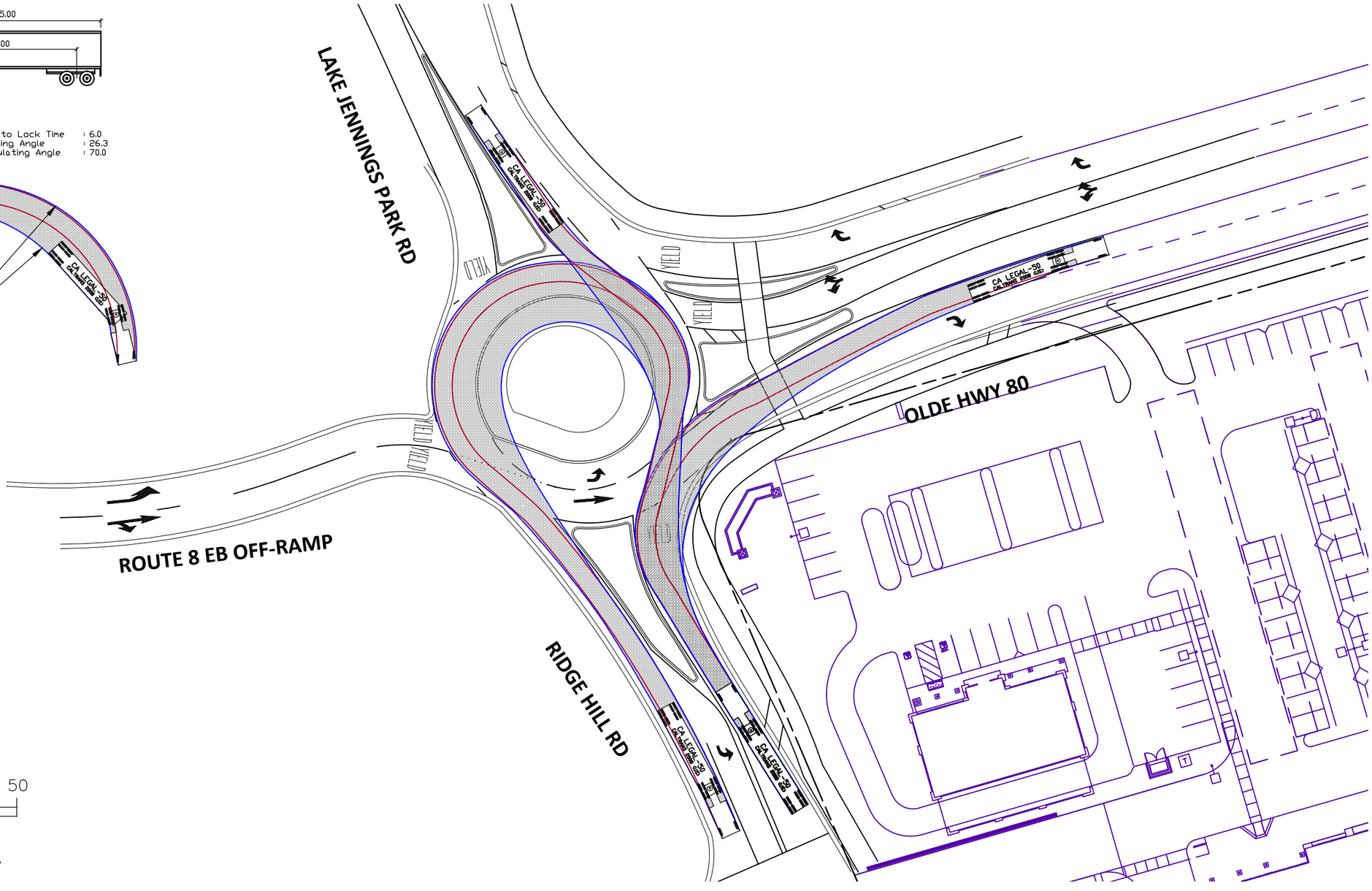


CA LEGAL-50 feet

Tractor Width	: 8.50	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 26.3
Tractor Track	: 8.50	Articulating Angle	: 70.0
Trailer Track	: 8.50		





50 0 50

(IN FEET)

1 inch = 50 ft.

I-8 & LAKE JENNINGS PARK ROAD

APPENDIX C

CA LEGAL TRUCK TURNING MOVEMENTS (NORTHBOUND)

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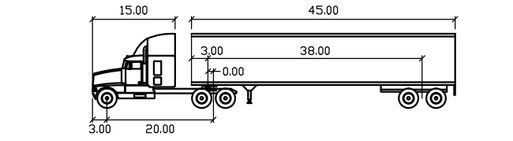
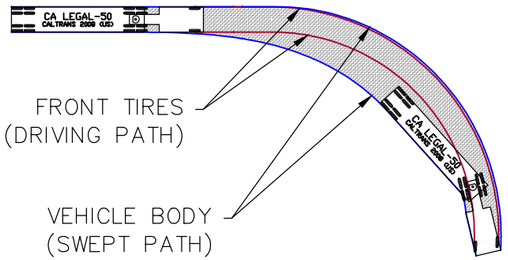
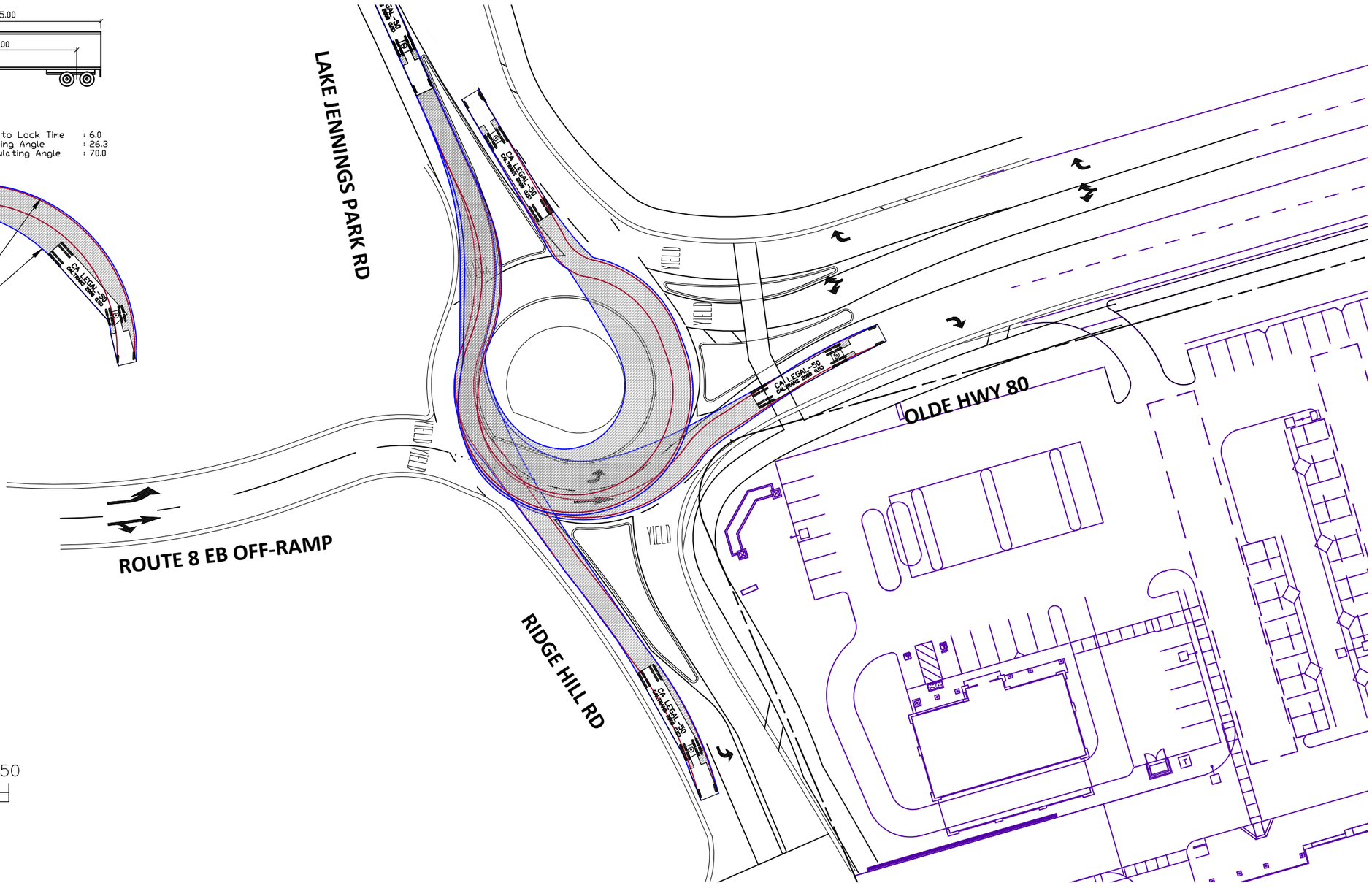


CA LEGAL-50 feet

Tractor Width	: 8.50	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 26.3
Tractor Track	: 8.50	Articulating Angle	: 70.0
Trailer Track	: 8.50		





50 0 50

(IN FEET)

1 inch = 50 ft.

I-8 & LAKE JENNINGS PARK ROAD

APPENDIX C

CA LEGAL TRUCK TURNING MOVEMENTS (SOUTHBOUND)

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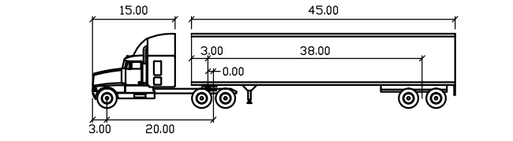
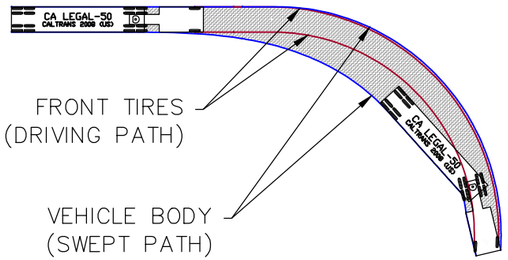
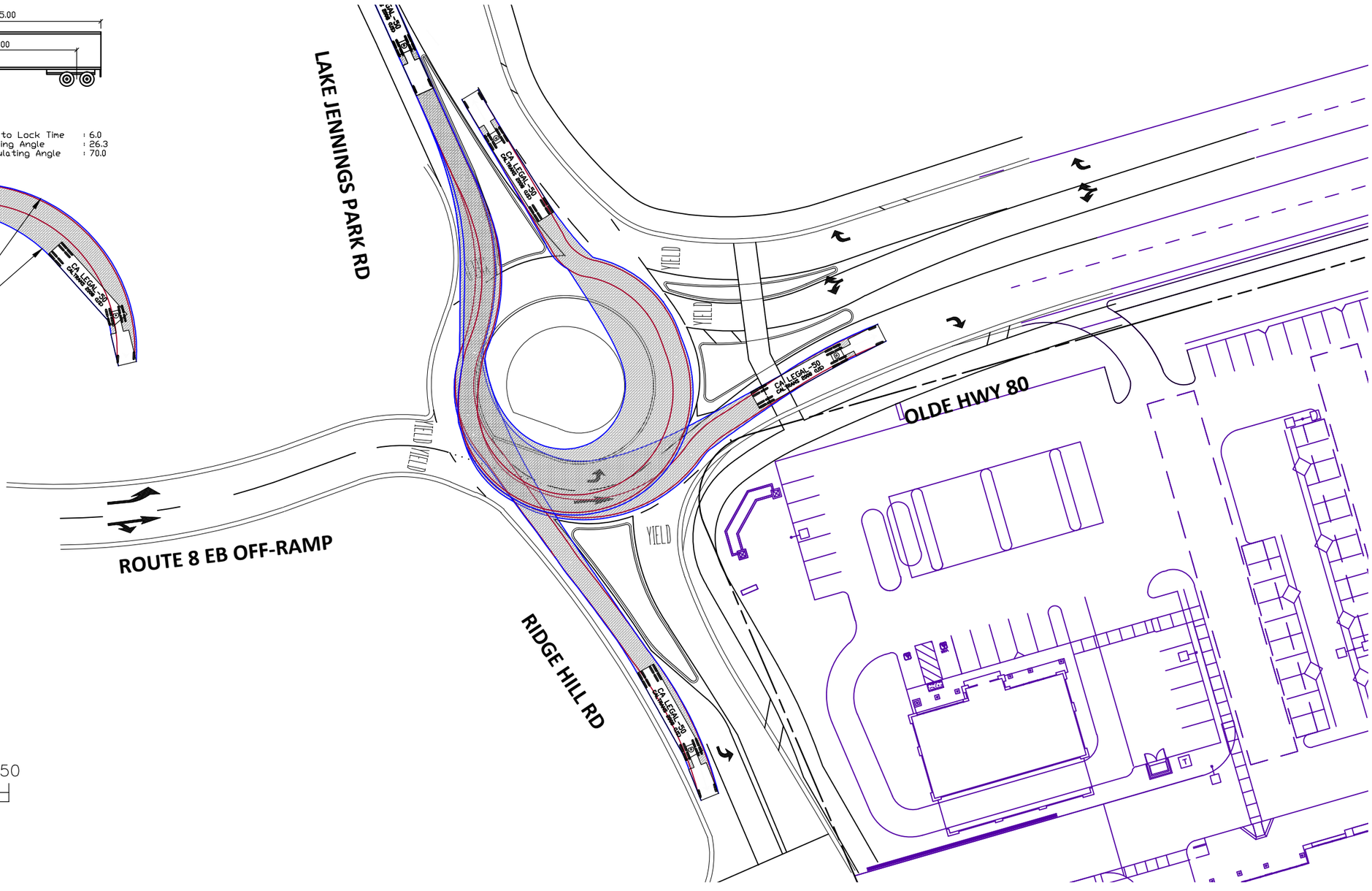


CA LEGAL-50 feet

Tractor Width	: 8.50	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 26.3
Tractor Track	: 8.50	Articulating Angle	: 70.0
Trailer Track	: 8.50		





50 0 50

(IN FEET)

1 inch = 50 ft.

I-8 & LAKE JENNINGS PARK ROAD

APPENDIX C

CA LEGAL TRUCK TURNING MOVEMENTS (SOUTHBOUND)

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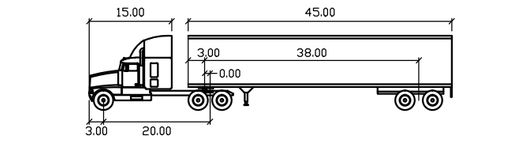
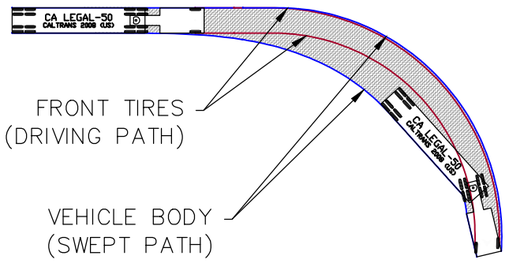
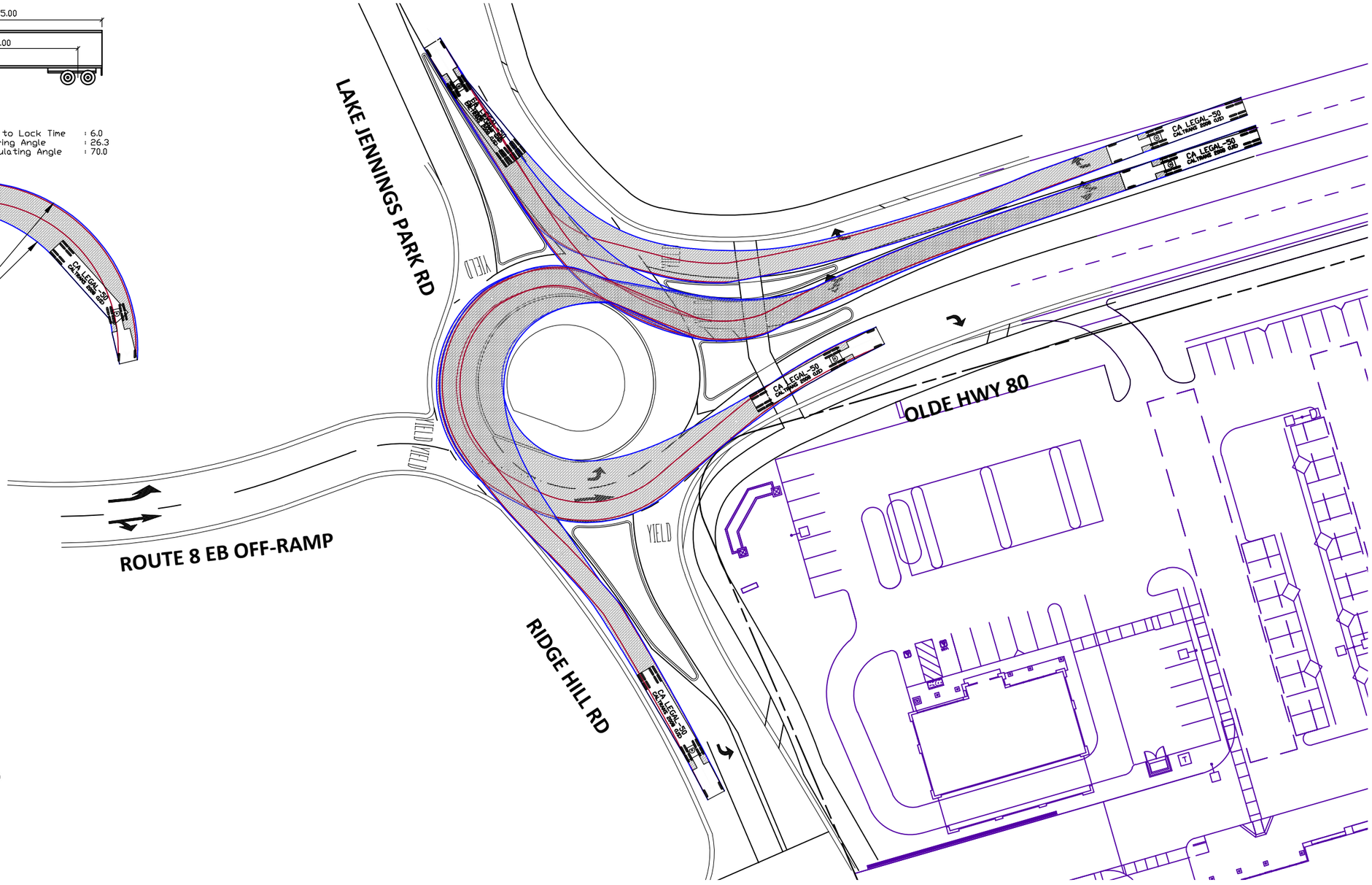
2167



CA LEGAL-50 feet

Tractor Width	: 8.50	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 26.3
Tractor Track	: 8.50	Articulating Angle	: 70.0
Trailer Track	: 8.50		





50 0 50

(IN FEET)

1 inch = 50 ft.

I-8 & LAKE JENNINGS PARK ROAD

APPENDIX C

CA LEGAL TRUCK TURNING MOVEMENTS (WESTBOUND)

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2167

FAST PATH SPEED (MPH)

Movement	Northbound Lake Jenning Park Rd (N#)	Southbound Lake Jenning Park Rd (S#)	Eastbound I-8 Off Ramp (E#)	Westbound Street Name (W#)
Entering (V1)	24.3	20.5	26.8	21.9
Circulating (V2)	14.9	14.2	18.9	N/A
Exiting (V3)	29.3	29.0	31.6	N/A
Left Turn (V4)	N/A	17.1	13.8	14.2
Right Turn (V5)	17.7	N/A	20.6	20.4

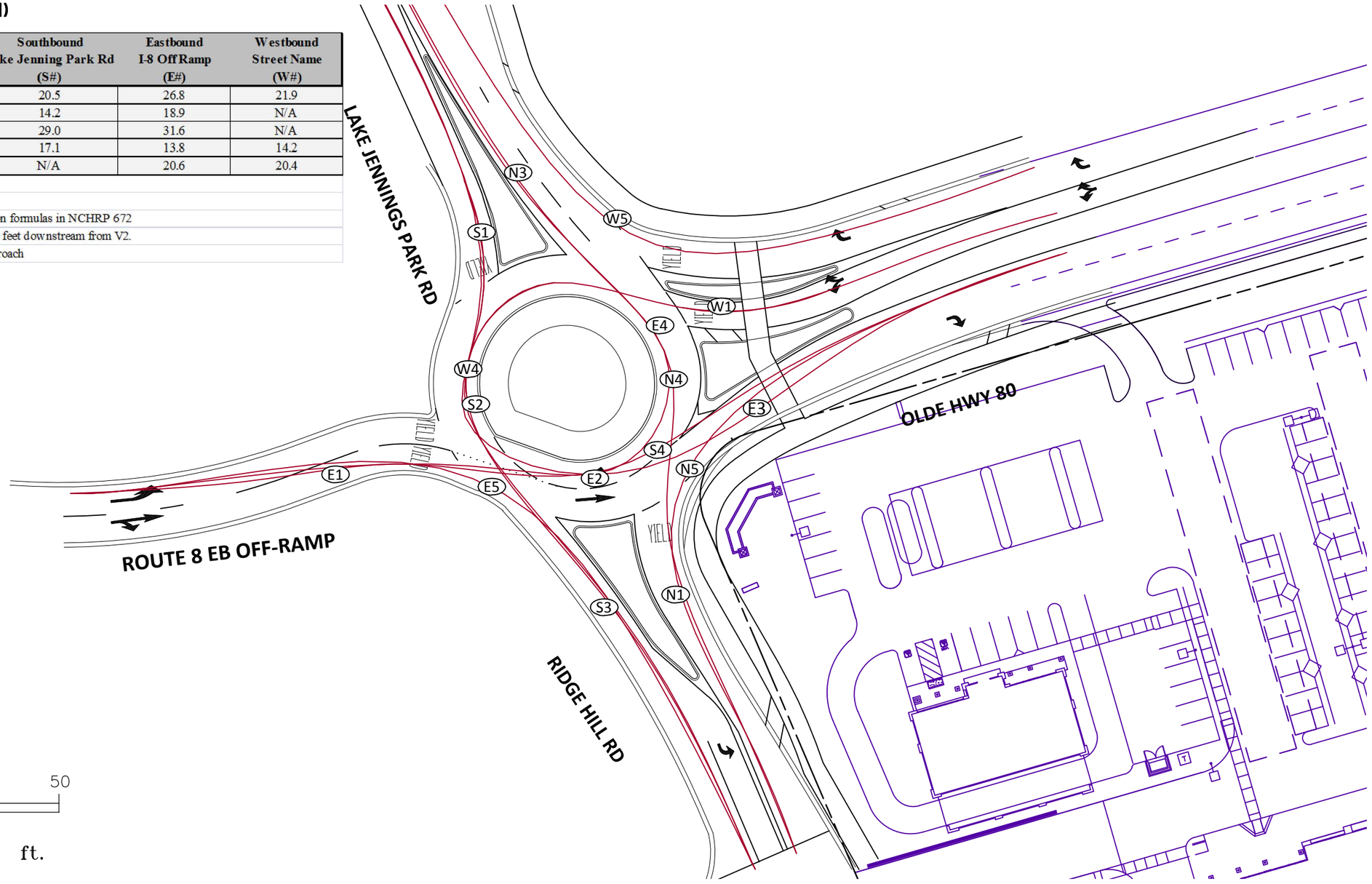
Notes:

All values are in miles per hour

V3 exiting speeds are derived from vehicle acceleration formulas in NCHRP 672

V3 fast path speed measured at exit crosswalk or 100 feet downstream from V2.

N/A = Fastest path speed does not exist for this approach



50 0 50

(IN FEET)

1 inch = 50 ft.

I-8 & LAKE JENNINGS PARK ROAD

APPENDIX C

FAST PATH DESIGN

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2167

LANE SUMMARY

Site: Design Year_I-8 EB Ramps AM

Roundabout
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Ridge Hill Road													
Lane 1[d]	126	3.0	659	0.191	100	7.7	LOS A	0.9	22.5	Full	1000	0.0	0.0
Approach	126	3.0		0.191		7.7	LOS A	0.9	22.5				
East: Olde Highway 80													
Lane 1	365	0.2	1142	0.319	100	6.2	LOS A	2.1	51.9	Full	1000	0.0	0.0
Lane 2[d]	418	5.4	1309	0.319	100	5.6	LOS A	2.1	55.9	Full	1000	0.0	0.0
Approach	783	3.0		0.319		5.9	LOS A	2.1	55.9				
North: Lake Jennings Park Road													
Lane 1[d]	343	3.0	1380	0.249	100	4.7	LOS A	1.7	42.5	Full	950	0.0	0.0
Approach	343	3.0		0.249		4.7	LOS A	1.7	42.5				
West: I- 8 EB Off-Ramp													
Lane 1	216	3.0	1010	0.214	100	5.6	LOS A	1.2	30.8	Full	1000	0.0	0.0
Lane 2[d]	437	3.0	1320	0.331	100	5.7	LOS A	2.2	55.4	Full	1000	0.0	0.0
Approach	653	3.0		0.331		5.7	LOS A	2.2	55.4				
Intersection	1905	3.0		0.331		5.7	LOS A	2.2	55.9				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: Design Year_I-8 EB Ramps PM

Roundabout
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Ridge Hill Road													
Lane 1[d]	137	2.0	387	0.354	100	16.1	LOS B	2.0	50.7	Full	1000	0.0	0.0
Approach	137	2.0		0.354		16.1	LOS B	2.0	50.7				
East: Olde Highway 80													
Lane 1	457	0.1	861	0.531	100	11.5	LOS B	4.8	119.0	Full	1000	0.0	0.0
Lane 2[d]	571	3.5	1075	0.531	100	9.7	LOS A	5.0	128.7	Full	1000	0.0	0.0
Approach	1028	2.0		0.531		10.5	LOS B	5.0	128.7				
North: Lake Jennings Park Road													
Lane 1[d]	522	2.0	1412	0.370	100	5.9	LOS A	3.1	79.0	Full	950	0.0	0.0
Approach	522	2.0		0.370		5.9	LOS A	3.1	79.0				
West: I- 8 EB Off-Ramp													
Lane 1	472	2.0	922	0.512	100	10.5	LOS B	4.1	104.3	Full	1000	0.0	0.0
Lane 2[d]	789	2.0	1216	0.649	100	11.5	LOS B	7.4	186.8	Full	1000	0.0	0.0
Approach	1261	2.0		0.649		11.1	LOS B	7.4	186.8				
Intersection	2948	2.0		0.649		10.2	LOS B	7.4	186.8				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: Opening Year_I-8 EB Ramps AM

Roundabout
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Ridge Hill Road													
Lane 1[d]	122	2.0	613	0.199	100	8.3	LOS A	0.9	22.3	Full	1000	0.0	0.0
Approach	122	2.0		0.199		8.3	LOS A	0.9	22.3				
East: Olde Highway 80													
Lane 1	352	0.2	1109	0.318	100	6.3	LOS A	2.0	50.9	Full	1000	0.0	0.0
Lane 2[d]	390	3.7	1227	0.318	100	5.9	LOS A	2.1	53.6	Full	1000	0.0	0.0
Approach	742	2.0		0.318		6.1	LOS A	2.1	53.6				
North: Lake Jennings Park Road													
Lane 1[d]	321	2.0	1291	0.248	100	5.0	LOS A	1.6	41.6	Full	950	0.0	0.0
Approach	321	2.0		0.248		5.0	LOS A	1.6	41.6				
West: I- 8 EB Off-Ramp													
Lane 1	205	2.0	955	0.215	100	5.9	LOS A	1.2	30.2	Full	1000	0.0	0.0
Lane 2[d]	417	2.0	1230	0.339	100	6.1	LOS A	2.2	55.4	Full	1000	0.0	0.0
Approach	623	2.0		0.339		6.0	LOS A	2.2	55.4				
Intersection	1808	2.0		0.339		6.0	LOS A	2.2	55.4				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: Opening Year_I-8 EB Ramps PM

Roundabout
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Ridge Hill Road													
Lane 1[d]	133	2.0	345	0.384	100	18.7	LOS C	2.1	52.3	Full	1000	0.0	0.0
Approach	133	2.0		0.384		18.7	LOS C	2.1	52.3				
East: Olde Highway 80													
Lane 1	448	0.1	830	0.540	100	12.0	LOS B	4.8	120.1	Full	1000	0.0	0.0
Lane 2[d]	520	3.6	963	0.540	100	10.7	LOS B	5.0	128.1	Full	1000	0.0	0.0
Approach	968	2.0		0.540		11.3	LOS B	5.0	128.1				
North: Lake Jennings Park Road													
Lane 1[d]	488	2.0	1288	0.379	100	6.4	LOS A	3.2	80.6	Full	950	0.0	0.0
Approach	488	2.0		0.379		6.4	LOS A	3.2	80.6				
West: I- 8 EB Off-Ramp													
Lane 1	449	2.0	862	0.521	100	11.2	LOS B	4.2	105.5	Full	1000	0.0	0.0
Lane 2[d]	753	2.0	1094	0.688	100	13.7	LOS B	8.3	209.7	Full	1000	0.0	0.0
Approach	1202	2.0		0.688		12.8	LOS B	8.3	209.7				
Intersection	2791	2.0		0.688		11.4	LOS B	8.3	209.7				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

PLANNING LEVEL Cost Estimate

Project ID: ** District 11 - San Diego County **

11-SD-8

Type of Estimate :	Pre-PSR (ICE Study)
Program Code :	N/A
Project Limits :	Route 8 (PM R21.8)
Description:	Construct Roundabout at I-8 EB Ramps/Lake Jennings Park Rd/Olde Hwy 80
Scope :	Improve existing stop controlled intersection to a roundabout controlled intersection
Alternative :	**ROUNDABOUT ALTERNATIVE**

		Current Cost		Escalated Cost
ROADWAY ITEMS	**$**	**1,624,800**	**$**	**1,624,800**
STRUCTURE ITEMS	**$**	**-**	**$**	**-**
SUBTOTAL CONSTRUCTION COST	**$**	**1,624,800**	**$**	**1,624,800**
RIGHT OF WAY	**$**	**-**	**$**	**-**
TOTAL CAPITAL OUTLAY COST	**$**	**1,625,000**	**$**	**1,625,000**
PR/ED SUPPORT	**$**	**250,000**	**$**	**250,000**
PS&E SUPPORT	**$**	**300,000**	**$**	**300,000**
RIGHT OF WAY SUPPORT	**$**	**25,000**	**$**	**25,000**
CONSTRUCTION SUPPORT	**$**	**160,000**	**$**	**160,000**
OTAL CAPITAL OUTLAY SUPPORT COST*	**$**	**735,000**	**$**	**735,000**
TOTAL PROJECT COST	**$**	**2,400,000**	**$**	**2,400,000**

If Project has been programmed enter Programmed Amount $ -

Date of Estimate (Month/Year) Month / Year /

Estimated Date of Construction Start (Month/Year) /

Number of Working Days Working Days

Estimated Mid-Point of Construction (Month/Year) Month / Year

Number of Plant Establishment Days Days

Estimated Project Schedule

PID Approval
PA/ED Approval
PS&E
RTL
Begin Construction

Approved by Project Manager

(xxx) xxx-xxxx

Project Manager **Date** **Phone**

I. ROADWAY ITEMS SUMMARY

	Section		Cost	
1	Earthwork	$	175,000	
2	Pavement Structural Section	$	535,000	
3	Drainage	$	75,000	
4	Specialty Items	$	-	
5	Environmental	$	115,600	
6	Traffic Items	$	115,000	Sub-Total $1,015,600.00
7	Detours	$	-	
8	Minor Items	$	71,100	
9	Roadway Mobilization	$	108,700	
10	Supplemental Work	$	54,400	
11	State Furnished	$	-	
12	Contingencies	$	375,000	
13	Overhead	$	-	
	TOTAL ROADWAY ITEMS	**$**	**1,624,800**	

Estimate Prepared By

Name and Title Date Phone

Estimate Reviewed By

Name and Title Date Phone

By signing this estimate you are attesting that you have discussed your project with all functional units and have incorporated all their comments or have discussed with them why they will not be incorporated.

SECTION 1: EARTHWORK

Item code		Unit	Quantity		Unit Price ($)			Cost
160101	Clearing & Grubbing	LS		x		=	$	-
170101	Develop Water Supply	LS		x		=	$	-
190101	Roadway Excavation	CY	2,500	x	70.00	=	$	175,000
190103	Roadway Excavation (Type Y) ADL	CY		x		=	$	-
190105	Roadway Excavation (Type Z-2) ADL	CY		x		=	$	-
192037	Structure Excavation (Retaining Wall)	CY		x		=	$	-
193013	Structure Backfill (Retaining Wall)	CY		x		=	$	-
193031	Pervious Backfill Material (Retaining Wall)	CY		x		=	$	-
194001	Ditch Excavation	CY		x		=	$	-
198001	Impored Borrow	CY		x		=	$	-
198007	Imported Material (Shoulder Backing)	TON		x		=	$	-
XXXXXX	Some Item			x		=	$	-

TOTAL EARTHWORK SECTION ITEMS	**$**	**175,000**

SECTION 2: PAVEMENT STRUCTURAL SECTION

Item code		Unit	Quantity		Unit Price ($)			Cost
150771	Remove Asphalt Concrete Dike	LF		x		=	$	-
150860	Remove Base and Surfacing	CY		x		=	$	-
153103	Cold Plane Asphalt Concrete Pavement	SQYD		x		=	$	-
1532XX	Remove Concrete (type)	CY		x		=	$	-
250401	Class 4 Aggregate Subbase	CY		x		=	$	-
260201	Class 2 Aggregate Base	CY	1,515	x	73.00	=	$	110,595
290201	Asphalt Treated Permeable Base	CY		x		=	$	-
365001	Sand Cover	TON		x		=	$	-
374002	Asphaltic Emulsion (Fog Seal Coat)	TON		x		=	$	-
374492	Asphaltic Emulsion (Polymer Modified)	TON		x		=	$	-
3750XX	Screenings (Type XX)	TON		x		=	$	-
377501	Slurry Seal	TON		x		=	$	-
390095	Replace Asphalt Concrete Surfacing	CY		x		=	$	-
390132	Hot Mix Asphalt (Type A)	TON	1,460	x	120.00	=	$	175,200
390136	Minor Hot Mix Asphalt	TON		x		=	$	-
390137	Rubberized Hot Mix Asphalt (Gap Graded)	TON		x		=	$	-
393003	Geosynthetic Pavement Interlayer	SQYD		x		=	$	-
39405X	Shoulder Rumber Strip *(HMA, Type XX Inden*	STA		x		=	$	-
394071	Place Hot Mix Asphalt Dike	LF		x		=	$	-
394090	Place Hot Mix Asphalt (Misc. Area)	SQYD		x		=	$	-
397005	Tack Coat	TON		x		=	$	-
401000	Concrete Pavement	CY		x		=	$	-
401108	Replace Concrete Pavement (Rapid Strength	CY		x		=	$	-
404092	Seal Pavement Joint	LF		x		=	$	-
404094	Seal Longitudinal Isolation Joint	LF		x		=	$	-
413112A	Repair Spalled Joints (Polyester Grout)	SQYD		x		=	$	-
413115	Seal Existing Concrete Pavement Joint	LF		x		=	$	-
420102	Groove Existing Concrete Pavement	SQYD		x		=	$	-
420201	Grind Existing Concrete Pavement	SQYD		x		=	$	-
731502	Minor Concrete (Misc. Const)	CY	320	x	700.00	=	$	224,000
731530	Minor Concrete (Textured Paving)	SQFT	5,600	x	4.50	=	$	25,200
XXXXXX	Some Item			x		=	$	-

TOTAL STRUCTURAL SECTION ITEMS	**$**	**535,000**

SECTION 3: DRAINAGE

Item code		Unit	Quantity		Unit Price ($)		Cost
150206	Abandon Culvert	LF		x		= $	-
150805	Remove Culvert	LF		x		= $	-
150820	Modify Inlet	EA		x		= $	-
152430	Adjust Inlet	LF		x		= $	-
155003	Cap Inlet	EA		x		= $	-
193114	Sand Backfill	CY		x		= $	-
510502	Minor Concrete (Minor Structure)	CY		x		= $	-
510512	Minor Concrete (Box Culvert)	CY		x		= $	-
62XXXX	XXX" APC Pipe	LF		x		= $	-
64XXXX	XXX" Plastic Pipe	LF		x		= $	-
65XXXX	XXX" RCP Pipe	LF		x		= $	-
66XXXX	XXX" CSP Pipe	LF		x		= $	-
68XXXX	Edge Drain	LF		x		= $	-
69XXXX	XXX" Pipe Downdrain	LF		x		= $	-
70XXXX	XXX" Pipe Inlet	LF		x		= $	-
70XXXX	XXX" Pipe Riser	LF		x		= $	-
70XXXX	XXX" Flared End Section	EA		x		= $	-
703233	Grated Line Drain	LF		x		= $	-
72XXXX	Rock Slope Protection (Type and Method)	CY		x		= $	-
721420	Concrete (Ditch Lining)	CY		x		= $	-
721430	Concrete (Channel Lining)	CY		x		= $	-
729010	Rock Slope Protection Fabric	SQYD		x		= $	-
750001	Miscellaneous Iron and Steel	LB		x		= $	-
XXXXXX	Additional Drainage	LS	1	x	75,000.00	= $	75,000
XXXXXX	Some Item			x		= $	-

TOTAL DRAINAGE ITEMS	$	75,000

SECTION 4: SPECIALTY ITEMS

Item code		Unit	Quantity		Unit Price ($)		Cost
070012	Progress Schedule (Critical Path Method)	LS		x		= $	-
150662	Remove Metal Beam Guard Railing	LF		x		= $	-
150668	Remove Terminal Systems	EA		x		= $	-
1532XX	Remove Barrier (*Insert Type)*	LF		x		= $	-
153250	Remove Sound Wall	SQFT		x		= $	-
190110	Lead Compliance Plan	LS		x		= $	-
49XXXX	CIDH Concrete Piling *(Insert Diameter)*	LF		x		= $	-
510060	Structural Concrete (Retaining Wall)	CY		x		= $	-
510133	Class 2 Concrete (Retaining Wall)	CY		x		= $	-
510524	Minor Concrete (Sound Wall)	CY		x		= $	-
5110XX	Architectural Treatment *(Insert Type)*	SQFT	0	x		= $	-
511048	Apply Anti-Graffiti Coating	SQFT		x		= $	-
5136XX	Reinforced Concrete Crib Wall *(Insert Type)*	SQFT		x		= $	-
518002	Sound Wall (Masonry Block)	SQFT		x		= $	-
520103	Bar Reinf. Steel (Retaining Wall)	LB		x		= $	-
80XXXX	Fence (*Insert Type*)	LF		x		= $	-
832001	Metal Beam Guard Railing	LF		x		= $	-
839310	Double Thrie Beam Barrier	LF		x		= $	-
839521	Cable Railing	LF		x		= $	-
83954X	Transition Railing *(Insert Type)*	EA		x		= $	-
8395XX	Terminal System (Type CAT)	EA		x		= $	-
8395XX	Alternative Flared Terminal System	EA		x		= $	-
8395XX	End Anchor Assembly (*Insert Type*)	EA		x		= $	-
839561	Rail Tensioning Assembly	EA		x		= $	-
839XXX	Crash Cushion *(Insert Type)*	EA		x		= $	-
83XXXX	Concrete Barrier *(Insert Type)*	LF		x		= $	-
XXXXXX	Some Item			x		= $	-

TOTAL SPECIALTY ITEMS	$	-

SECTION 5: ENVIRONMENTAL

5A - ENVIRONMENTAL MITIGATION

Item code		Unit	Quantity		Unit Price ($)			Cost
	Biological Mitigation	LS		x		=	$	-
071325	TEMPORARY REINFORCED SILT FENCE	LF		x		=	$	-
071325	Temporary Fence (Type ESA)							

Subtotal Environmental $ -

5B - LANDSCAPE AND IRRIGATION

Item code		Unit	Quantity		Unit Price ($)			Cost
200001	Highway Planting	LS	1	x	30,000.00	=	$	30,000
20XXXX	XXX" (*Insert Type*) Conduit *(Use for*	LF		x		=	$	-
20XXXX	Extend XXX" *(Insert Type)* Conduit	LF		x		=	$	-
201700	Imported Topsoil	CY	260	x	60.00	=	$	15,600
2030XX	Erosion Control (Type __)	SQYD		x		=	$	-
203021	Fiber Rolls	LF		x		=	$	-
203026	Move In/ Move Out (Erosion Control)	EA		x		=	$	-
204099	Plant Establishment Work	LS	1	x	15,000.00	=	$	15,000
204101	Extend Plant Establishment (X Years)	LS		x		=	$	-
208000	Irrigation System	LS	1	x	20,000.00	=	$	20,000
208304	Water Meter	EA	1	x	5,000.00	=	$	5,000
209801	Maintenance Vehicle Pullout	EA		x		=	$	-
XXXXXX		LS					$	-

Subtotal Landscape and Irrigation $ 85,600

5C - NPDES

Item code		Unit	Quantity		Unit Price ($)			Cost
074016	Construction Site Management	LS		x		=	$	-
074017	Prepare WPCP	LS		x		=	$	-
074019	Prepare SWPPP	LS		x		=	$	-
074023	Temporary Erosion Control	SQYD		x		=	$	-
074027	Temporary Erosion Control Blanket	SQYD		x		=	$	-
074028	Temporary Fiber Roll	LF		x		=	$	-
074032	Temporary Concrete Washout Facility	EA		x		=	$	-
074033	Temporary Construction Entrance	EA		x		=	$	-
074035	Temporary Check Dam	LF		x		=	$	-
074037	Move In/ Move Out (Temporary Erosion Cont	EA		x		=	$	-
074038	Temp. Drainage Inlet Protection	EA		x		=	$	-
074041	Street Sweeping	LS		x		=	$	-
074042	Temporary Concrete Washout (Portable)	LS		x		=	$	-
XXXXXX	Some Item	LS	1		30,000.00		$	30,000

Supplemental Work for NPDES

(These costs are not accounted in total here but under Supplemental Work on sheet 7 of 11).

066595	Water Pollution Control Maintenance Sharing*	LS		x		=	$	-
066596	Additional Water Pollution Control**	LS		x		=	$	-
066597	Storm Water Sampling and Analysis***	LS		x		=	$	-
XXXXXX	Some Item							

Subtotal NPDES (Without Supplemental Work) $ 30,000

*Applies to all SWPPPs and those WPCPs with sediment control or soil stabilization BMPs.

**Applies to both SWPPPs and WPCP projects.

*** Applies only to project with SWPPPs.

TOTAL ENVIRONMENTAL $ 115,600

SECTION 6: TRAFFIC ITEMS

6A - Traffic Electrical

Item code		Unit	Quantity		Unit Price ($)			Cost
150760	Remove Sign Structure	EA		x		=	$	-
151581	Reconstruct Sign Structure	EA		x		=	$	-
152641	Modify Sign Structure	EA		x		=	$	-
5602XX	Furnish Sign Structure	LB		x		=	$	-
5602XX	Install Sign Structure	LB		x		=	$	-
56XXXX	XXX" CIDHC Pile (Sign Foundation)	LF		x		=	$	-
860090	Maintain Existing Traffic Management	LS		x		=	$	-
860810	Inductive Loop Detectors	EA		x		=	$	-
86055X	Lighting & Sign Illumination	LS		x		=	$	-
8607XX	Interconnection Facilities	LS		x		=	$	-
8609XX	Traffic Monitoring Stations	LS		x		=	$	-
860XXX	Signals & Lighting	LS	1	x	60,000.00	=	$	60,000
8611XX	Ramp Metering System (Location X)	LS		x		=	$	-
8611XX	Ramp Metering System (Location X)	LS		x		=	$	-
86XXXX	Fiber Optic Conduit System	LS		x		=	$	-
XXXXX	Service Point	LS					$	-

Subtotal Traffic Electrical *$ 60,000*

6B - Traffic Signing and Striping

Item code		Unit	Quantity		Unit Price ($)			Cost
120090	Construction Area Signs	LS	1	x	5,000.00	=	$	5,000
150701	Remove Yellow Painted Traffic Stripe	LF		x		=	$	-
150710	Remove Traffic Stripe	LF		x		=	$	-
150713	Remove Pavement Marking	SQFT		x		=	$	-
150742	Remove Roadside Sign	EA		x		=	$	-
152320	Reset Roadside Sign	EA		x		=	$	-
152390	Relocate Roadside Sign	EA		x		=	$	-
566011	Roadside Sign (One Post)	EA		x		=	$	-
566012	Roadside Sign (Two Post)	EA		x		=	$	-
560XXX	Furnish Sign Panels	SQFT		x		=	$	-
560XXX	Install Sign Panels	SQFT		x		=	$	-
82010X	Delineator (Class X)	EA		x		=	$	-
84XXXX	Permanent Pavement Delineation	LS	1	x	10,000.00	=	$	10,000

Subtotal Traffic Signing and Striping *$ 15,000*

6C - Stage Construction and Traffic Handling

Item code		Unit	Quantity		Unit Price ($)			Cost
120100	Traffic Control System	LS	1	x	40,000.00	=	$	40,000
120120	Type III Barricade	EA		x		=	$	-
120143	Temporary Pavement Delineation	LF		x		=	$	-
12016X	Channelizer	EA		x		=	$	-
128650	Portable Changeable Message Signs	EA		x		=	$	-
129000	Temporary Railing (Type K)	LF		x		=	$	-
129100	Temp. Crash Cushion Module	EA		x		=	$	-
129099A	Traffic Plastic Drum	EA		x		=	$	-
839603A	Temporary Crash Cushion (ADIEM)	EA		x		=	$	-
XXXXXX	Some Item							

Subtotal Stage Construction and Traffic Handling *$ 40,000*

TOTAL TRAFFIC ITEMS **$ 115,000**

SECTION 7: DETOURS

Include constructing, maintaining, and removal

Item code		Unit	Quantity		Unit Price ($)		Cost
0713XX	Temporary Fence (Type X)	LF		x		= $	-
07XXXX	Temporary Drainage	LS		x		= $	-
120143	Temporary Pavement Delineation	LF		x		= $	-
1286XX	Temporary Signals	EA		x		= $	-
129000	Temporary Railing (Type K)	LF		x		= $	-
190101	Roadway Excavation	CY		x		= $	-
198001	Imported Borrow	CY		x		= $	-
198050	Embankment	CY		x		= $	-
250401	Class 4 Aggregate Subbase	CY		x		= $	-
260201	Class 2 Aggregate Base	CY		x		= $	-
390132	Hot Mix Asphalt (Type A)	TON		x		= $	-
XXXXXX	DETOUR/MISC TEMP FACILITES	LS		x		= $	-

TOTAL DETOURS	**$ -**
SUBTOTAL SECTIONS 1-7	$ 1,015,600

SECTION 8: MINOR ITEMS

8A - Americans with Disabilities Act Items							
	ADA Items			4.0%		$	40,624
8B - Bike Path Items							
	Bike Path Items			1.0%		$	10,156
8C - Other Minor Items							
	Other Minor Items			2.0%		$	20,312
	Total of Section 1-7	$	1,015,600	x 7.0%	=	$	71,092

TOTAL MINOR ITEMS	**$ 71,100**

SECTIONS 9: MOBILIZATION

Item							
999990	Total Section 1-8	$	1,086,700	x 10%	=	$	108,670

TOTAL MOBILIZATION	**$ 108,700**

SECTION 10: SUPPLEMENTAL WORK

Item code		Unit	Quantity		Unit Price ($)		Cost
066015	Federal Trainee Program	LS		x		= $	-
066063	Traffic Management Plan - Public Informati	LS		x		= $	-
066090	Maintain Traffic	LS		x		= $	-
066094	Value Analysis	LS		x		= $	-
066204	Remove Rock & Debris	LS		x		= $	-
066222	Locate Existing Cross-Over	LS		x		= $	-
066670	Payment Adjustments For Price Index Fluct	LS		x		= $	-
066700	Partnering	LS		x		= $	-
066866	Operation of Existing Traffic Management S	LS		x		= $	-
066920	Dispute Review Board	LS		x		= $	-
XXXXXX	Some Item			x		= $	-
	*Cost of **NPDES** Supplemental Work specified in Section 5C*					= $	-
	Total Section 1-8	$	1,086,700		5%	= $	54,335

TOTAL SUPPLEMENTAL WORK	**$ 54,400**

SECTION 11: STATE FURNISHED MATERIALS AND EXPENSES

Item code		Unit	Quantity		Unit Price ($)		Cost
066063	Public Information	LS		x		=	$0
066105	RE Office	LS		x		=	$0
066803	Padlocks	LS		x		=	$0
066838	Reflective Numbers and Edge Sealer	LS		x		=	$0
066901	Water Expenses	LS		x		=	$0
066062A	COZEEP Expenses	LS		x		=	$0
06684X	Ramp Meter Controller Assembly	LS		x		=	$0
06684X	TMS Controller Assembly	LS		x		=	$0
06684X	Traffic Signal Controller Assembly	LS		x		=	$0
XXXXXX	Some Item						

Total Section 1-8	$	1,086,700	0%	=	$	-

TOTAL STATE FURNISHED	**$0**

SECTION 12: TIME-RELATED OVERHEAD

Estiamted Time-Releated Overhead (TRO) Percentage (0% to 10%) = 5%

Item code		Unit	Quantity		Unit Price ($)		Cost
070018	Time-Related Overhead	WD	0	X	#DIV/0!	=	$0

TOTAL TIME-RELATED OVERHEAD	**$0**

SECTION 13: CONTINGENCY

(Pre-PSR 30%-50%, PSR 25%, Draft PR 20%, PR 15%, after PR approval 10%, Final PS&E 5%)

Total Section 1-11	$	1,249,800	x	30%	=	$374,940	

TOTAL CONTINGENCY	**$375,000**

II. STRUCTURE ITEMS

DATE OF ESTIMATE	00/00/00			00/00/00			00/00/00	
Name	xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx	
Bridge Number	57-XXX			57-XXX			57-XXX	
Structure Type	xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx	
Width (Feet) [out to out]	0.00	LF		0.00	LF		0.00	LF
Total Length (Feet)	0.00	LF		0.00	LF		0.00	LF
Total Area (Square Feet)	0	SQFT		0	SQFT		0	SQFT
Structure Depth (Feet)	0.00	LF		0.00	LF		0.00	LF
Footing Type (pile or spread)	xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx	
Cost Per Square Foot	$0.00			$0.00			$0.00	
COST OF EACH STRUCTURE	**$0.00**			**$0.00**			**$0.00**	

DATE OF ESTIMATE	00/00/00			00/00/00			00/00/00	
Name	xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx	
Bridge Number	57-XXX			57-XXX			57-XXX	
Structure Type	xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx	
Width (Feet) [out to out]	0.00	LF		0.00	LF		0.00	LF
Total Length (Feet)	0.00	LF		0.00	LF		0.00	LF
Total Area (Square Feet)	0	SQFT		0.00	SQFT		0.0	SQFT
Structure Depth (Feet)	0.00	LF		0.00	LF		0.00	LF
Footing Type (pile or spread)	xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx			xxxxxxxxxxxxxxxxxx	
Cost Per Square Foot	$0.00			$0.00			$0.00	
COST OF EACH STRUCTURE	**$0.00**			**$0.00**			**$0.00**	

TOTAL COST OF BRIDGES	**$0.00**
TOTAL COST OF BUILDINGS	**$0.00**
TOTAL COST OF STRUCTURES[1]	**$0.00**

Estimate Prepared By: _____ _____
XXXXXXXXXXXXXXXX ------ Division of Structures Date

[1]Structure's Estimate includes Overhead and Mobilization.
Add more sheets if needed. Call them 9a, 9b, 9c, …, etc

QUANTITIES						COSTS					
					0.00110231:g to to	$ 3.83	$ 70.00	$ 12,900.00	$ 3.83	$ 70.00	$ 12,900.00
		C.Monoxide	NOX	C.Monoxide	NOX						
		193	200	181	193						
		315	324	298	322						
		Traffic Signal	Traffic Signal	Roundabout	Roundabout						
	2015	0.21	0.22	0.20	0.21						
	2035	0.35	0.36	0.33	0.35						
		From Network									
						Gas Traffic Signal	C.Monoxide Traffic Signal	NOX Traffic Signal	Gas Roundabout	C.Monoxide Roundabout	NOX Roundabout
Year 0	2015	0.21	0.22	0.20	0.21	$71,380	$15	$2,844	$66,094	$14	$2,744
Year 1	2016	0.22	0.23	0.21	0.22	$73,685	$15	$2,932	$68,281	$14	$2,836
Year 2	2017	0.23	0.23	0.21	0.23	$75,991	$16	$3,020	$70,467	$15	$2,928
Year 3	2018	0.23	0.24	0.22	0.23	$78,296	$16	$3,108	$72,654	$15	$3,020
Year 4	2019	0.24	0.25	0.23	0.24	$80,602	$17	$3,197	$74,840	$16	$3,111
Year 5	2020	0.25	0.25	0.23	0.25	$82,907	$17	$3,285	$77,027	$16	$3,203
Year 6	2021	0.25	0.26	0.24	0.26	$85,213	$18	$3,373	$79,214	$17	$3,295
Year 7	2022	0.26	0.27	0.24	0.26	$87,518	$18	$3,461	$81,400	$17	$3,386
Year 8	2023	0.27	0.28	0.25	0.27	$89,823	$19	$3,549	$83,587	$18	$3,478
Year 9	2024	0.27	0.28	0.26	0.28	$92,129	$19	$3,637	$85,773	$18	$3,570
Year 10	2025	0.28	0.29	0.26	0.28	$94,434	$20	$3,726	$87,960	$18	$3,662
Year 11	2026	0.29	0.30	0.27	0.29	$96,740	$20	$3,814	$90,146	$19	$3,753
Year 12	2027	0.29	0.30	0.28	0.30	$99,045	$21	$3,902	$92,333	$19	$3,845
Year 13	2028	0.30	0.31	0.28	0.31	$101,351	$21	$3,990	$94,519	$20	$3,937
Year 14	2029	0.31	0.32	0.29	0.31	$103,656	$21	$4,078	$96,706	$20	$4,028
Year 15	2030	0.31	0.32	0.30	0.32	$105,962	$22	$4,166	$98,893	$21	$4,120
Year 16	2031	0.32	0.33	0.30	0.33	$108,267	$22	$4,255	$101,079	$21	$4,212
Year 17	2032	0.33	0.34	0.31	0.33	$110,573	$23	$4,343	$103,266	$22	$4,304
Year 18	2033	0.33	0.34	0.32	0.34	$112,878	$23	$4,431	$105,452	$22	$4,395
Year 19	2034	0.34	0.35	0.32	0.35	$115,184	$24	$4,519	$107,639	$23	$4,487
Year 20	2035	0.35	0.36	0.33	0.35	$117,489	$24	$4,607	$109,825	$23	$4,579
Total		5.88	6.06	5.54	5.96	$ 1,983,122	$ 412	$ 78,237	$ 1,847,155	$ 388	$ 76,894

ADJUSTED COSTS with a discount rate of 4%

			Gas Traffic Signal	C.Monoxide Traffic Signal	NOX Traffic Signal	Gas Roundabout	C.Monoxide Roundabout	NOX Roundabout
Year 0	0	1	$71,379.71	$15	$2,844	$66,094.31	$14	$2,744
Year 1	1	0.961538	$70,851	$15	$2,819	$65,655	$14	$2,727
Year 2	2	0.924556	$70,258	$15	$2,792	$65,151	$14	$2,707
Year 3	3	0.888996	$69,605	$14	$2,763	$64,589	$14	$2,684
Year 4	4	0.854804	$68,899	$14	$2,732	$63,974	$13	$2,660
Year 5	5	0.821927	$68,144	$14	$2,700	$63,311	$13	$2,633
Year 6	6	0.790315	$67,345	$14	$2,666	$62,604	$13	$2,604
Year 7	7	0.759918	$66,506	$14	$2,630	$61,857	$13	$2,573
Year 8	8	0.73069	$65,633	$14	$2,593	$61,076	$13	$2,541
Year 9	9	0.702587	$64,729	$13	$2,556	$60,263	$13	$2,508
Year 10	10	0.675564	$63,796	$13	$2,517	$59,422	$12	$2,474
Year 11	11	0.649581	$62,840	$13	$2,477	$58,557	$12	$2,438
Year 12	12	0.624597	$61,863	$13	$2,437	$57,671	$12	$2,402
Year 13	13	0.600574	$60,869	$13	$2,396	$56,766	$12	$2,364
Year 14	14	0.577475	$59,859	$12	$2,355	$55,845	$12	$2,326
Year 15	15	0.555265	$58,837	$12	$2,313	$54,912	$12	$2,288
Year 16	16	0.533908	$57,805	$12	$2,272	$53,967	$11	$2,249
Year 17	17	0.513373	$56,765	$12	$2,229	$53,014	$11	$2,209
Year 18	18	0.493628	$55,720	$12	$2,187	$52,054	$11	$2,170
Year 19	19	0.474642	$54,671	$11	$2,145	$51,090	$11	$2,130
Year 20	20	0.456387	$53,620	$11	$2,103	$50,123	$10	$2,090
			$1,329,994.20	$ 276	$ 52,528	$ 1,237,995	$ 260	$ 51,521

Annual Costs	Roundabout		Traffic Signal	
Operation and Maintenance	**Operation and Maintenance**	**O&M Cost**	**Operation and Maintenance**	**O&M Cost**
Annualized Cost of Signal Retiming		$ -	Signal Retiming Every 3 Years	$ 1,000
Annual Cost of Power for Signal		$ -	Power for Signal	$ 750
Annual Cost of Illumination	Intersection Illumination	$ 750	Intersection Illumination	$ 750
Annual Cost of Maintenance	Landscaping Costs	$ 1,500	Signal Maintenance Costs (power outage, detection, etc.)	$ 1,500
	Total Annual Operation and Maintenance Costs	**$ 2,250**	***Total Annual Operation and Maintenance Costs***	**$ 4,000**