Appendix G – Transportation Supporting Information

Contains:

- 2020 Z-Best Traffic Operations and Site Access Analysis (Hexagon Transportation Consultants), Peer Review (Keith Higgins, Traffic Engineer), and Response to Peer Review (Hexagon Transportation Consultants)
- 2020 Supplemental Vehicle Miles Traveled Clarification and Analysis (Hexagon Transportation Consultants)
- 2023 Traffic Safety Memorandum (AECOM)

Hexagon Transportation Consultants, Inc.

Memorandum

Date: March 30, 2020

To: John Doyle, Z-best

From: Robert Del Rio, T.E.

Subject: Response to Peer Review Letter for the Z-Best Compost Facility Application (File No. 6498-17P)

This memo is being provided in response to the second peer review letter prepared for the proposed Z-Best Compost Facility Expansion. The peer review letter dated March 17, 2020 and prepared by Keith Higgins, consisted of a review of the January 30, 2020 traffic operations study. The peer review listed a total of 16 comments. The following is a summary of responses to the peer review comments.

- Comment 1 discusses existing and projected peak hour traffic and congestion along SR 25. The referenced traffic conditions currently exist and are projected to occur without the proposed project. The comment is noted, however there are no additional issues identified in the comment that warrant addressing in a revised operations study.
- Comment 2 references the future widening of SR 25 and associated improvements. The comment is noted, however there are no additional issues identified in the comment that warrant addressing in a revised operations study.
- The project's trip generation estimates and alignment with peak traffic conditions along SR 25 are discussed in Comment 3. The comment is noted, however there are no additional issues identified in the comment that warrant addressing in a revised operations study.
- The proposed relocation of the project site's access point from its existing location along SR 25 to the Bolsa Road intersection with SR 25 are discussed in Comment 4. The comment discusses the planned access point configuration and anticipated safety and operations of the relocated site access point. The future operations and safety at the site access point are accurately described in the comment. There are no additional issues identified in the comment that warrant addressing in a revised operations study.
- The use of Bolsa Road by existing site traffic as wells as traffic associated with the proposed project expansion are discussed in Comments 5 and 6. The comments note that the proposed relocation of the project access point to Bolsa Road may result in a minimal increase in the use of Bolsa Road by project traffic. However, the project proposes to continue to prohibit the use of Bolsa Road by trucks originating from and bound for the project site. Thus, as stated in the comment, the project will result in little to no increased usage of Bolsa Road by employees and trucks associated with the project.
- Comments 7 and 11-16 reference the planned design of the relocated project access point to Bolsa Road. The comments will be considered in the ultimate access point design along with Caltrans review. However, there are no additional issues identified in the comment that warrant addressing in a revised operations study.
- The remaining comments, 8-10, address minor textual and formatting considerations. However, the comments do not identify significant issues that warrant addressing in a revised operations study.

8070 Santa Teresa Boulevard, Suite 230 · Gilroy, California 95020 · phone 408.846.7410 · fax 408.846.7418 · www.hextrans.com

Keith Higgins

Traffic Engineer

March 20, 2020

Ron Sissem
EMC Planning Group
301 Lighthouse Avenue, Suite C
Monterey, CA 93940

Re: Z-Best Traffic Operations and Site Access Analysis Peer Review, Santa Clara County, CA

Dear Ron,

As you requested, this is a peer review of the "Z-Best Traffic Operations and Site Access Analysis," State Route 25, Santa Clara County, California, prepared by Hexagon Transportation Consultants, Inc., January 30, 2020 (herein referred to as the "Operations Analysis"). Supplemental information was also reviewed, including the "Response to Peer Review Comments on the Z-Best Compost Facility Application (File No. 6498-17P), Hexagon Transportation Consultants, Inc., January 25, 2019 (herein referred to as the "Response to Comments").

General comments are also provided for the latest version of "Figure 4 - Conceptual Bolsa Road/Relocated Project Driveway Improvements," Ruggeri-Jensen-Azar (herein referred to as the "Conceptual Plan"), which is dated January 14, 2020. This supersedes the November 16, 2019 version included in the Operation Analysis.

The following are my comments on the above-referenced Operations Analysis.

1. Pg. 1, Scope of Study – Changes in shift hours will occur that move the arrival and departure times further from the traditional 7-9 am and 4-6 pm street peak hours of traffic. However, peak traffic conditions occur much earlier and for a longer time along SR 25. This is due to its regional function and because commuters leave Hollister as early as 5 am to avoid northbound US 101 traffic congestion and/or to arrive at employment centers in Silicon Valley before traditional work starting times. The study intersections should be analyzed during Project peak hour conditions.

2. Pg. 4, Potential SR 25 Widening and Realignment - The study includes analyzing the existing highway network and the existing SR 25 after its conversion to a frontage road with the proposed SR 152 Trade Corridor. That project includes the US 101 / SR 25 interchange reconstruction, widening US 101 to 6 lanes and the realignment and widening of SR 25 to 4 lanes in Santa Clara County near Z-Best. It only has funding through the environmental phase. With the recent passage of San Benito County Measure G, the SR 25 Widening and Realignment portion in San Benito County has funding and is expected to be constructed by 2030. In order to expedite the major widening project, it will require issuing bonds and obtaining matching State funds. However, the San Benito County Council of Governments

2060 ROCKROSE COURT, GILROY, CA 95020
T 408.201.2752 KEITH@KEITHHIGGINSTE.COM WWW.KEITHHIGGINSTE.COM

(SBCOG), the project sponsor, has limited bonding capacity. It therefore must implement the project in phases. At this time, SBCOG is considering constructing an interchange at the State Route 25/State Route 156 intersection. This will be discussed at the SBCOG Board meeting on March 19, 2020. SBCOG has an ad-hoc committee with Caltrans District 4 (Santa Clara County, in which Z-Best is located), Caltrans District 5 (San Benito County), Santa Clara Valley Transportation Authority (VTA) to finalize the strategic plan for delivery of Measure G projects in cooperation with VTA improvements at the US 101 / State Route 25 interchange. A final strategic plan that addresses funding limitations is expected to be delivered to the SBCOG Board for adoption in early summer, 2020.

3. Pg. 3, Existing Trip Generation Estimates – Truck scale data is now 4 to 5 years old. The applicant has stated that project activity levels have not changed over the past four years. It would be helpful for the applicant to provide documentation.

4. Pg. 3, Existing Trip Generation – Study intersection traffic counts were collected in August 2015, which is over 4 years old. It would be helpful for the validity of intersection volumes to be documented as well. For informational purposes, the daily traffic volumes on Highway 25 along the project frontage for the most recent five years reported on the Caltrans Traffic Volumes website are tabulated below. This indicates that Highway 25 traffic volumes increased by 20.8% over the most recent four-year period for which data is available. It is likely that the trend has continued since 2017 to the present time. Increased traffic demand on Highway 25 would likely result in more peak spreading. In other words, peak traffic conditions may now extend for longer periods during the day, including earlier in the morning and the afternoon when the project is proposing to have its work shifts occur.

   Traffic volume increases on Highway 25 would likely not appreciably change the findings and conclusions. However, provision of current traffic volume data would be helpful for informational purposes.

   The proposed driveway improvements including channelization on Highway 25 will require a Caltrans Encroachment Permit. Caltrans may require updated traffic forecasts during its plan check process.

Year	AADT	Percent Change from Previous Year	Percent Change Since 2013
2017	27,300	5.0%	20.8%
2016	26,000	9.2%	15.0%
2015	23,800	3.0%	5.3%
2014	23,100	2.2%	2.2%
2013	22,600		

Highway 25 Average Annual Daily Traffic (AADT) at Project

5. Pg. 8, Proposed SR 25 Site Access Improvements – The project driveway is proposed to be realigned to become a fourth (south) leg at the existing Bolsa Road intersection. The proposed improvement includes a westbound Highway 25 left turn lane for traffic entering the project as well as a westbound left turn acceleration lane for traffic exiting the project and heading westbound on Highway 25. An eastbound Highway 25 right turn lane is also proposed. An eastbound Highway 25 left turn lane is not included due to the very low volume that makes this movement.

   The proposed westbound left turn lane will provide a refuge for westbound Highway 25 vehicles waiting for gaps in eastbound traffic to turn into the Project. This will be a safety improvement compared to existing conditions.

   The proposed westbound median acceleration lane will allow vehicles making a left turn as they exit the Project to cross one direction of Highway 25 traffic at a time, which is considered a two-step left turn movement. This will be a safety improvement compared to existing conditions.

   No eastbound Highway 25 left turn lane at Bolsa Road is proposed. This is a very low existing movement that may be reduced because exiting Project traffic destined to Bolsa Road that currently turns right followed by an eastbound left onto Bolsa Road would become a through movement directly onto Bolsa Road. The lack of a left turn would essentially be equivalent to existing conditions.

   No eastbound median acceleration lane is proposed to be provided for vehicles exiting Bolsa Road to proceed eastbound on Highway 25. This is similar to existing conditions. However, these vehicles will be required to yield to westbound left turns waiting to enter the Project. These vehicles currently enter the Project downstream (west) of Bolsa Road, so have already cleared the Bolsa Road intersection. This will result in a slight increase in delay for Bolsa Road traffic attempting to proceed eastbound on Highway 25. Very few westbound left turns will be entering the Project during the PM peak hours when peak demand on Bolsa Road occurs, so this should only result in a slight increase in delay and corresponding reduced safety for this movement from the Project driveway relocation. When considering the beneficial safety effects of the channelization improvements, the proposed driveway relocation plus shift changes will result in an overall improvement in safety.

   The Highway 25 / Bolsa Road intersection already meets peak hour signal warrants. The relocation of the Project driveway will result in some increase in delay for the Bolsa Road movement. This would further indicate more consideration being given to signalization. However, given that there are 8-hour warrants as well as other warrants and operational considerations, Caltrans has typically had a policy of not installing traffic signals based only on the peak hour warrant. Caltrans' decision to not install a traffic signal at this intersection is consistent with their decision to not signalize other intersections along Highway 25, including Wright Road, Flynn Road and Shore Road in the "Route 25 Safety and Operations Project Study Report" prepared by Caltrans in 2005. In that study Caltrans recommended

acceleration and deceleration lanes on Highway 25 at Bolsa Road and median left turn lane at the Z-Best and Uesugi Farms driveways.

In this case, the intersection will need to be monitored to determine if a signal is the appropriate traffic control.

6. Pg. 8, Proposed SR 25 Site Access Improvements – The relocation of the Project driveway to be directly across from Bolsa Road could result in some additional Project traffic using Bolsa Road. However, Project trucks are currently prohibited from using Bolsa Road. The Project employee volumes are low. Traffic entering the site from the north via Bolsa Road can currently turn left into the site. Any Project traffic that would use Bolsa Road would need to cross both directions of Highway 25 traffic. This is a major disincentive for inbound Project traffic to use Bolsa Road. Outbound traffic will have a median acceleration lane to assist in heading westbound on Highway 25. This will be an easier movement than attempting to cross both directions of Highway 25 traffic to enter northbound Bolsa Road. Very few, if any, additional Project trips would use Bolsa Road with the proposed realignment of the Project driveway to be the fourth leg at Bolsa Road.

7. Pg. 11, Figure 3, “Trip Distribution and Traffic Volumes Under Project Conditions” – A small amount of through traffic may occur between the north leg of Bolsa Road and the Proposed Project Entrance. This would affect the volume diagram for the Proposed Bolsa Road Project Entrance. This will not affect the levels of service but should be noted on Figure 3.

8. Pg. 13, Existing and Project Conditions Traffic Volumes - The Existing and Project traffic volumes reflect project volumes during the peak hours between 7 and 9am and 4 and 6pm. The project’s street morning peak hour volumes will total 1 inbound and 1 outbound trip. The project’s street evening peak hour volumes will total 0 inbound and 20 outbound trips. However, the project’s morning peak hour will occur between 6 and 7am and will total 40 inbound trips and 7 outbound trips. The project’s afternoon peak hour volume will occur between 3 and 4pm and total 0 inbound trips and 47 outbound trips. The study already indicates that the project driveway will operate at Level of Service F at certain times, so no additional level of service analysis is required. However, the project volumes during the project’s peak hours should be used to determine channelization storage requirements. Project peak hourly truck volumes should also be included in the storage requirement determination.

9. Pg. 14, Figure 5 “Conceptual Existing Project Driveway Improvements” – Consider removing this from the report if it is no longer a proposed alternative or provide a discussion regarding why it is no longer a consideration.

10. Pg. 16, Existing Project Entrance Alternative, first sentence – Add “during the PM peak hour” after LOS F.

11. Pg. 16, Signal Warrant Analysis – The second paragraph indicates that the SR 25 / Bolsa Road intersection currently meets peak hour signal warrants. A traffic signal is not recommended in the report or apparently supported by Caltrans with the proposed relocation of the project entrance to this intersection. However, given that a signal is warranted, traffic conditions should be monitored

12. Pg. 17, Intersection Operations (Queuing) Analysis – The analysis should include storage requirements during project peak hours as well as street peak hours to ensure that the maximum queues are considered in the design of the left turn storage.

13. Pg. 17, Intersection Operations (Queuing) Analysis – The assumed length of the queue should include one truck plus one car. Each car should be assumed to have a length of 25 feet. Measurements of on-site trucks using Google Earth indicate that trucks are over 70 feet in length. The minimum storage may need to be 100 feet. Deceleration and storage lengths will be reviewed and approved by Caltrans during the Encroachment Permit plan check process.

14. Pg. 18, Highway Design Manual Standards – The Caltrans Highway Design Manual Index 101.1 indicates that the design speed should be above the observed operating speed. This often is higher than the posted speed limit. The design speed will be reviewed and approved by Caltrans during the Encroachment Permit plan check process. This applies to sight distance, approach taper lengths and deceleration lane lengths.

15. Pg. 19, Lane Width – The minimum lane width is 10 feet. However, the turn lanes will carry a moderate amount of truck traffic. This is more important for the westbound left turn acceleration lane because trucks entering this lane from the Project could not be parallel to the travel lanes for a distance along the acceleration lane. Lane widths will be approved by Caltrans.

16. Pg. 19, Storage Length – See Comment 14 above.

17. Pg. 20, Potential SR 25 Widening and Realignment – See Comment 2 above.

At the request of the County, Keith Higgins, Traffic Engineer, has conducted an independent peer review of the “Z-Best Traffic Operations and Site Access Analysis,” State Route 25, Santa Clara County, California, prepared by Hexagon Transportation Consultants, Inc., January 30, 2020 (herein referred to as the “Operations Analysis”). Supplemental information was also reviewed, including the “Response to Peer Review Comments on the Z-Best Compost Facility Application (File No. 6498-17P), Hexagon Transportation Consultants, Inc., January 25, 2019 (herein referred to as the “Response to Comments”) submitted by Z-Best Products to verify the technical accuracy of the information, and identify any apparent deficiencies, errors and omissions affecting the completeness, methodologies, findings and adequacies of the analysis. The ultimate goal of the peer review is to help ensure that the information contained in the report met accepted professional standards for use in the EIR.

Ron Sissem
March 20, 2020

As part of the peer review, Keith Higgins, Traffic Engineer, advised County staff of any revisions or additions to the report that were necessary. Keith Higgins, Traffic Engineer, has submitted this peer review letter to the County to document its comments. In turn, Hexagon Transportation Consultants, Inc. will respond to the peer review comments and/or revise the analysis. The primary requested information is updated traffic count data for purposes of Caltrans' future encroachment permit process. The latest status of the major Highway 25 widening project is also provided in this comment letter, indicating that the proposed Z-Best driveway improvements will be handling main line Highway 25 traffic, rather than located on a frontage road, for a longer period than initially anticipated. This will not materially change the conclusions of the Hexagon reports.

This peer review letter and anticipated responses/analysis revisions from Hexagon Transportation Consultants, Inc. are part of the administrative record for the EIR. Based on the peer review conducted; Keith Higgins, Traffic Engineer, concludes that the "Z-Best Traffic Operations and Site Access Analysis," State Route 25, Santa Clara County, California, prepared by Hexagon Transportation Consultants, Inc., January 30, 2020 (herein referred to as the "Operations Analysis") with supplemental information included in the "Response to Peer Review Comments on the Z-Best Compost Facility Application (File No. 6498-17P), Hexagon Transportation Consultants, Inc., January 25, 2019 (herein referred to as the "Response to Comments") as revised is anticipated to be appropriate for use as reference in the EIR.

Please call me if you have any questions. Thank you for the opportunity to assist you.

Sincerely,

Keith Higgins

Keith Higgins, PE, TE

HEXAGON TRANSPORTATION CONSULTANTS, INC.

Memorandum

Date: January 30, 2020

To: John Doyle, Z-Best Products

From: Robert Del Rio. T.E.

Subject: Z-Best Traffic Operations and Site Access Analysis

Introduction

Hexagon Transportation Consultants, Inc. has completed a traffic operations and site access analysis for the proposed facility expansion and site operations at the existing Z-Best Compost Facility located along State Route (SR) 25, south of the City of Gilroy in southern Santa Clara County, California. The proposed project consists of material processing operation improvements on the existing site to more efficiently process a larger volume of material. Access to the project site is currently provided via one stop-controlled full access entrance along the south side of SR 25 (for ease of reference, SR 25 will be referred to as an east/west roadway within this report) located approximately 600 feet west of the Bolsa Road intersection with SR 25. As part of the proposed facility expansion, the project also is proposing to replace the existing access point along SR 25 with a new access point that will align with Bolsa Road via a new fourth leg at the existing SR 25 and Bolsa Road intersection. The project site location is presented in Figure 1.

The purpose of the traffic operations analysis is to determine the magnitude of project traffic currently on the adjacent roadway system and estimate the amount of additional traffic that would be added to the roadway system as a result of the proposed facility and operations expansion (hereafter referred to as the proposed project). Existing operational and/or safety constraints at the existing site access point and the proposed new access point at Bolsa Road and on the surrounding roadways and intersections also was evaluated. The analysis of the transportation system is based on applicable local and regional standards.

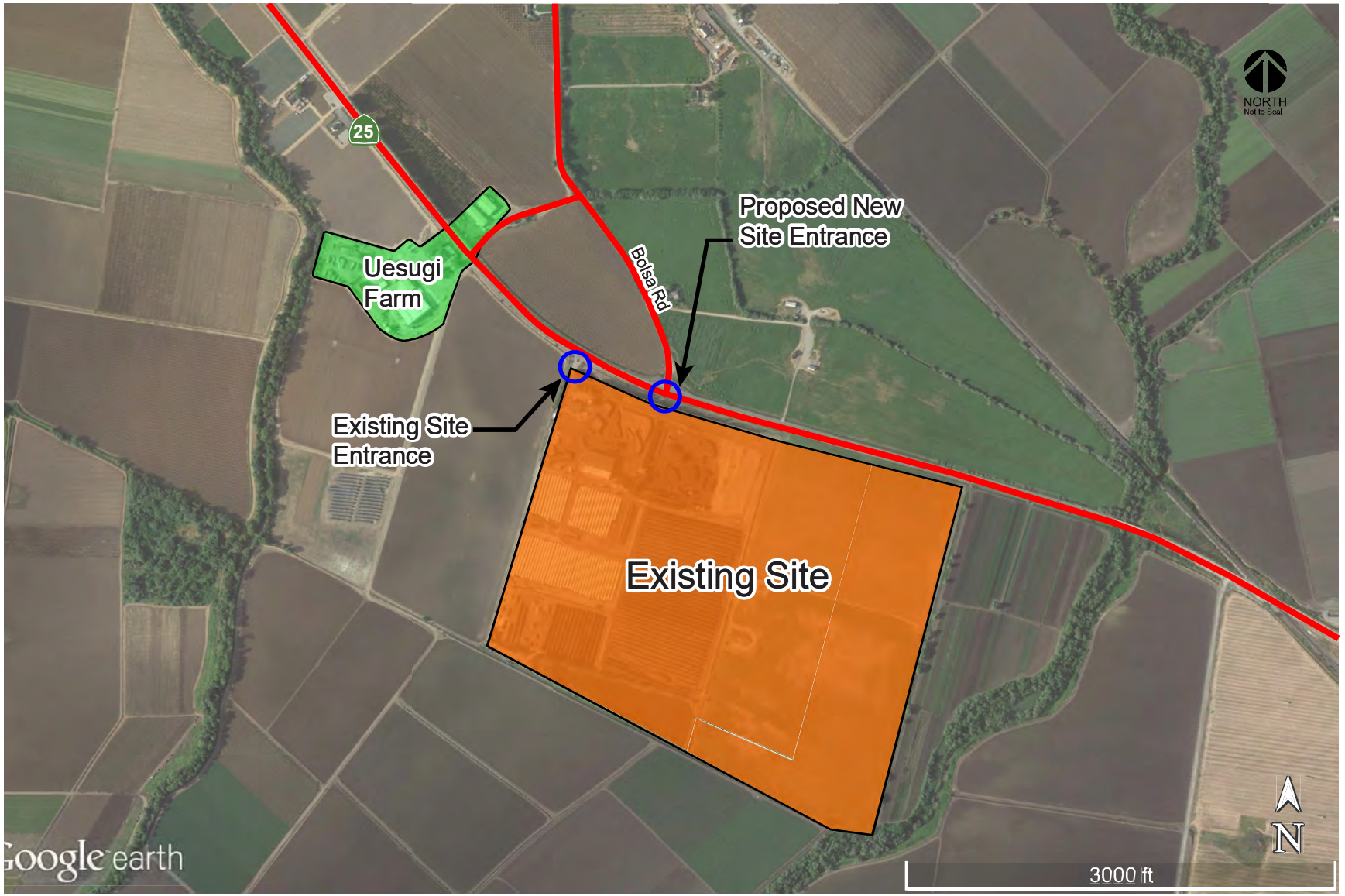
Scope of Study

The traffic operations analyses at the site access points consist of peak hour level of service analysis, signal warrant checks, and queuing analysis. The analysis includes an evaluation of traffic conditions during the AM (7:00AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak commute periods at the following two intersections:

SR 25 and Existing Project Entrance
SR 25 and Bolsa Road/Proposed Bolsa Road Project Entrance

Additionally, highway segments along SR 25, east and west of the project site, also were evaluated to identify any existing deficiencies and to quantify the amount of additional traffic that is projected to be added by the proposed project.

Figure 1
Z-Best Site Location



Study Scenarios

The following study scenarios study were evaluated:

Existing Conditions: Existing conditions represent existing peak-hour traffic volumes obtained from intersection turn movement counts completed in 2015.

Existing Plus Project Conditions: Existing plus project conditions represent existing peak-hour traffic volumes with the addition of the traffic estimated to be generated by the proposed facility expansion. This scenario assumes no changes to the existing roadway network or the existing project access.

Existing Plus Project with a Proposed Access Point at Bolsa Road Conditions: Existing plus project conditions with the adjustment of traffic volumes to reflect a new project access point at Bolsa Road.

Trip Generation, Distribution, and Assignment

Existing Facility Operations

Currently, the Z-Best facility is permitted to receive up to 1500 tons per day of feedstock material, inert material for facility maintenance, and additives used in finished products. Feedstock includes both green waste and municipal solid waste (MSW). Up to 2,500 tons per day of material may be received a maximum of 15 days per year and subset peak tonnages are set at 1,300 tons per day for green waste, 700 tons per day of MSW, and 500 tons per day of other material. The current hours of operation for the Z-Best facility are Monday through Friday 6 AM to 5 PM and Saturday 6 AM to 12 PM. The existing use permit allows the processing building to operate from 6 AM to 10 PM, the overall facility from 6 AM to 6 PM, and the windrow materials receiving, screening and turning (on-site) to be 24 hours a day. The facility is currently operated by 58 full-time employees (allowable maximum number of employees by current use permit is 60 employees) in five shift times (5 AM to 5 PM, 7 AM to 5 PM, 5 PM to 5 AM, 5 PM to 1:30 AM, and 6 AM to 5 PM), with the majority of the employees (30 employees) working between 5 AM and 5 PM. The existing work shift times and number of employees per shift are summarized in Table 1.

Existing Trip Generation Estimates

Project trips currently utilizing the project entrance and on the surrounding roadway system were determined based upon truck scale data provided by Z-Best and count data collected at the project entrance.

The truck scale data provided by Z-Best includes the daily number of inbound and outbound trucks by hour that passed over the on-site scales during the period of October 2013 through September 2014, which, according to Z-Best staff, represent peak operations of the facility over the past two years. The existing count data was collected in August 2015 and consists of (1) peak-hour intersection turn-movement counts collected at the site's entrance during the AM peak period (7:00 AM to 9:00 AM) and the PM peak period (4:00 PM to 6:00 PM) and (2) 24-hour vehicle composition video counts also collected at the site's entrance. The new 24-hour vehicle composition data were compared with the truck data provided by Z-Best to validate the truck scale data. The number of daily and peak hour trips to the site associated with all other non-truck traffic also were obtained from the new traffic counts.

Other non-truck vehicular trips associated with the site include cars or smaller trucks driven by employees or vendors and parts and supply deliveries. Both the truck scale data provided by Z-Best and new count data are contained in the Appendix. The existing site trip generation data is summarized in Table 2.

Table 1
Existing and Proposed Employee Work Shift Times

Hours of Operation	Existing Conditions [1]					Proposed Daily Conditions [2]					Peak Season Conditions [2]		
12:00 AM to 1:00 AM			SHIFT 3	SHIFT 4				SHIFT 3	SHIFT 4				SHIFT 3
1:00 AM to 2:00 AM				4									
2:00 AM to 3:00 AM													
3:00 AM to 4:00 AM													
4:00 AM to 5:00 AM	30 *					47 *			13		45 *		
5:00 AM to 6:00 AM	SHIFT 1		5		2 *	SHIFT 1		10		2 *	SHIFT 1		15
6:00 AM to 7:00 AM		17 *			SHIFT 5		18*			SHIFT 5		30 *	
7:00 AM to 8:00 AM		SHIFT 2					SHIFT 2					SHIFT 2	
8:00 AM to 9:00 AM													
9:00 AM to 10:00 AM													
10:00 AM to 11:00 AM													
11:00 AM to 12:00 PM													
12:00 PM to 1:00 PM													
1:00 PM to 2:00 PM													
2:00 PM to 3:00 PM													
3:00 PM to 4:00 PM						47							
4:00 PM to 5:00 PM			5 *	4 *				10 *			45		
5:00 PM to 6:00 PM	30	17	SHIFT 3	SHIFT 4	2		18	SHIFT 3		2		30	15 *
6:00 PM to 7:00 PM													SHIFT 3
7:00 PM to 8:00 PM									13*				
8:00 PM to 9:00 PM									SHIFT 4				
9:00 PM to 10:00 PM													
10:00 PM to 11:00 PM													
11:00 PM to 12:00 AM													

Notes:
[1] Existing facility shift times and number of employees per shift (assumes employees will arrive at the site 15 minutes prior to the beginning of their work shifts and leave the site 15 minutes after completion of their work shift).
[2] Proposed facility shift times and assumed number of employees per shift (assumes employees will arrive at the site 15 minutes prior to the beginning of their work shifts and leave the site 15 minutes after completion of their work shift).
* Number of employees per work shift.

Table 2
Existing Site-Generated Trips

Type	Daily			Peak Hours					
				AM			PM		
	In	Out	Total	In	Out	Total	In	Out	Total
Total Vehicle Trips									
Driveway Counts[1]	192	198	390	10	9	19	9	27	36
Heavy Truck Trips									
Truck Trips (Counts)[2]	104	105	209	6	8	14	5	5	10
Truck Trips (Scale Data)[3]	132	132	264	13	13	26	10	10	20

Notes:
AM = one peak-hour between 7:00 - 9:00 am
PM = one peak-hour between 4:00 - 6:00 pm
Daily = 24-hour total
[1] Based on peak hour intersection turn-movement and 24-hour daily counts completed at the project site entrance in August 2015.
[2] Based on vehicle composition obtained from 24-hour daily counts completed ar project site entrance in August 2015.
[3] Based on truck scale data provided by Z-Best (October 1st, 2013 to December 31st, 2013).

The count data collected at the site entrance indicates that the facility currently generates 390 daily vehicle trips with 19 trips occurring during the AM peak hour and 36 trips occurring during the PM peak hour.

Based on the vehicle composition data collected at the site entrance, approximately 209 daily truck trips are currently generated by the facility. The truck scale data indicated a peak of 264 daily truck trips. The number of truck trips obtained from the traffic counts is approximately 20% less than that indicated by the truck scale data. However, the truck scale data is reflective of a period of peak operations for the facility over the past two years.

Hourly site-generated trips, both truck and non-truck trips, were estimated by correlating the 24-hour count information collected at the site entrance with the current number of employees and their shift-times. Based on this information, all components of traffic currently accessing and leaving the project site throughout the day were estimated (see Table 3). It is estimated that approximately 208 truck trips and 182 non-truck trips (116 employee trips and 66 “other” trips), for a total of 390 total trips, are currently generated by the Z-Best Facility on an average weekday.

Proposed Facility Expansion Operations – Typical Day

The proposed facility and operations expansion (the project), involves replacing the current method of composting MSW with a more advanced, far more efficient method of composting. The current CTI composting system is proposed to be replaced with a “State of the Art” ECS composting method. With these proposed improvements, Z-Best will be able to compost more than double the amount of MSW feedstock within the same time period and within the same footprint on the site. Subsequently, Z-Best is proposing an increase in the daily feedstock tonnage limit from 1,500 tons per day to 2,750 tons per day. The additional feedstock tonnage is proposed to be received only during non-peak traffic hours (9:00 am to 3:00 pm and 8:00 pm to 4:00 am).

The number of employees also is proposed to increase from the current 58 employees (60 allowed by the use permit) to 80-85 employees (with a maximum of 90 employees allowed by the use permit). The

Table 3
Typical Daily Site-Generated Trips

Hours of Operation		Existing Conditions [1]						Proposed Conditions [2]													
								Non-Truck Trips				Truck Trips									
		Non-Truck Trips (Based on Driveway Counts)	Truck Trips (Based on Driveway Counts)	Total	Total Site Trips			Additional Employee Trips	Existing Employee Trips/New Shift Times	Other Non-Truck Trips	Total Future Non-Truck Trips	Additional Truck Trips	Existing Truck Trips/Off-Peak Hours Restriction	Total Future Truck Trips	Total	Total Site Trips			Net Additional Trips		
					In	Out	Total									In	Out	Total	In	Out	Total
12:00 AM	Arrivals	0	1	1	1	0	1			0	0	7	7	14	14	14	14	28	13	14	27
to 1:00 AM	Departures	0	0	0						0	0	7	7	14	14						
1:00 AM	Arrivals	0	0	0	0	1	1			0	0	7	7	14	14	14	14	28	14	13	27
to 2:00 AM	Departures	0	1	1						0	0	7	7	14	14						
2:00 AM	Arrivals	0	0	0	0	0	0			0	0	7	7	14	14	14	14	28	14	14	28
to 3:00 AM	Departures	0	0	0						0	0	7	7	14	14						
3:00 AM	Arrivals	0	3	3	3	5	8			0	0	7	7	14	14	14	14	28	11	9	20
to 4:00 AM	Departures	4	1	5						0	0	7	7	14	14						
4:00 AM	Arrivals	5	5	10	10	5	15	17	30	0	47		5	5	52	52	18	70	42	13	55
to 5:00 AM	Departures	0	5	5				9	4	0	13		5	5	18						
5:00 AM	Arrivals	2	5	7	7	3	10		2	0	2		5	5	7	7	15	22	0	12	12
to 6:00 AM	Departures	0	3	3				5	5	0	10		5	5	15						
6:00 AM	Arrivals	33	7	40	40	7	47	1	17	0	18		5	5	23	23	5	28	-17	-2	-19
to 7:00 AM	Departures	0	7	7						0	0		5	5	5						
7:00 AM	Arrivals	**4**	**6**	**10**	**10**	**11**	**21**			0	0			0	0	0	0	0	-10	-11	-21
to 8:00 AM	Departures	**3**	**8**	**11**						0	0			0	0						
8:00 AM	Arrivals	6	6	12	12	5	17			**1**	**1**			**0**	**1**	**1**	**1**	**2**	-11	-4	-15
to 9:00 AM	Departures	3	2	5						**1**	**1**			**0**	**1**						
9:00 AM	Arrivals	6	13	19	19	20	39			6	6	8	5	13	19	19	20	39	0	0	0
to 10:00 AM	Departures	7	13	20						7	7	8	5	13	20						
10:00 AM	Arrivals	9	7	16	16	23	39			9	9	7	5	12	21	21	23	44	5	0	5
to 11:00 AM	Departures	11	12	23						11	11	7	5	12	23						
11:00 AM	Arrivals	4	8	12	12	16	28			4	4	7	5	12	16	16	18	34	4	2	6
to 12:00 PM	Departures	6	10	16						6	6	7	5	12	18						
12:00 PM	Arrivals	4	10	14	14	15	29			4	4	7	5	12	16	16	17	33	2	2	4
to 1:00 PM	Departures	5	10	15						5	5	7	5	12	17						
1:00 PM	Arrivals	3	12	15	15	13	28			3	3	7	6	13	16	16	17	33	1	4	5
to 2:00 PM	Departures	4	9	13						4	4	7	6	13	17						
2:00 PM	Arrivals	3	8	11	11	10	21			2	2	7	6	13	15	15	14	29	4	4	8
to 3:00 PM	Departures	3	7	10						1	1	7	6	13	14						
3:00 PM	Arrivals	3	5	8	8	13	21			0	0			0	0	0	47	47	-8	34	26
to 4:00 PM	Departures	6	7	13				17	30	0	47			0	47						
4:00 PM	**Arrivals**	**5**	**5**	**10**	**10**	**27**	**37**	5	5	0	10			0	10	10	0	10	0	-27	-27
to 5:00 PM	**Departures**	**22**	**5**	**27**						0	0			0	0						
5:00 PM	Arrivals	0	1	1	1	20	21			**0**	**0**			**0**	**0**	**0**	**20**	**20**	**-1**	**0**	**-1**
to 6:00 PM	Departures	18	2	20				**1**	**19**	**0**	**20**			**0**	**20**						
6:00 PM	Arrivals	1	0	1	1	2	3			1	1			0	1	1	0	1	0	-2	-2
to 7:00 PM	Departures	1	1	2						0	0			0	0						
7:00 PM	Arrivals	0	0	0	0	0	0	9	4	0	13			0	13	13	0	13	13	0	13
to 8:00 PM	Departures	0	0	0						0	0			0	0						
8:00 PM	Arrivals	0	1	1	1	1	2			0	0	8	8	16	16	16	16	32	15	15	30
to 9:00 PM	Departures	0	1	1						0	0	8	8	16	16						
9:00 PM	Arrivals	0	0	0	0	0	0			0	0	7	7	14	14	14	14	28	14	14	28
to 10:00 PM	Departures	0	0	0						0	0	7	7	14	14						
10:00 PM	Arrivals	0	1	1	1	1	2			0	0	7	7	14	14	14	15	29	13	14	27
to 11:00 PM	Departures	1	0	1						1	1	7	7	14	15						
11:00 PM	Arrivals	0	0	0	0	0	0			0	0	7	7	14	14	14	14	28	14	14	28
to 12:00 AM	Departures	0	0	0						0	0	7	7	14	14						
TOTAL DAILY TRIPS:		**182**	**208**	**390**	**192**	**198**	**390**	**64**	**116**	**66**	**246**	**200**	**208**	**408**	**654**	**324**	**330**	**654**	**132**	**132**	**264**

Notes:

[1] Existing hourly project site traffic activity was estimated based on the existing 24-hour vehicle composition traffic counts conducted at the project site entrance in August 2015, in combination with information provided by Z-Best on their current number of employees, employee shift times, and hours of operation.

[2] Hourly site traffic projections associated with the proposed Z-Best facility operations expansion. These projections are based on the anticipated increase in the number of employees and number of trucks accessing the site daily, the proposed new employee shift times, and the restriction of all inbound truck traffic to the site during the off-peak hours only (8:00PM - 4:00AM) and outbound truck traffic to the hours of (4:00AM - 7:00AM and 9:00 AM to 3:00 PM).

proposed new work shift times would be the following: 5 AM to 3 PM, 7 AM to 5 PM, 5 PM to 5 AM, 8 PM to 4:30 AM and 6 AM to 5 PM. The work shift times are used to estimate the peak hour traffic that may be generated by the proposed facility expansion. The proposed work shift times and assumed number of employees per shift are summarized in Table 1.

Proposed Facility Expansion Trip Generation Estimates – Typical Day

The additional traffic associated with the expansion of the facility operations were estimated and assigned to the roadway network based on anticipated increase in the number of employees, employee work shift times, additional truck traffic, and assuming all new additional truck traffic would be generated outside of the commute hours between 9:00 am to 3:00 pm and 8:00 pm to 4:00 am.

It is anticipated that with the expanded operations, the facility would generate an additional 100 trucks per day including 57 trucks associated with Green Waste and 43 trucks associated with the delivery of finished product and landfill material (trash/ADC). The existing and additional truck trips would access the site throughout the entire day, with the exception of the commute periods between 7-9 AM and 3-8PM. However, there are currently truck trips that occur between the hours of 4-7 AM that would continue to occur with the proposed facility expansion. Based on this assumption, the time restrictions truck trips represent no more than an additional 16 truck trips per hour.

The proposed expansion would also increase the number of employees from the existing 58 employees to a maximum of 90 employees (although the applicant anticipates the plant to operate with no more than 85 employees). This represents an increase of 32 additional employees. The additional employees would result in the addition of 64 daily trips (32 inbound and 32 outbound trips) to the project site. Employee trips were estimated based on the proposed work shift times (5 AM to 3 PM, 7 AM to 5 PM, 5 PM to 5 AM, 8 PM to 4:30 AM and 6 AM to 5 PM) and assuming employees would arrive at the site within 15 minutes before the beginning of their shift time and leave the site within 15 minutes of the end of their shift time. The proposed new shift times were assumed to also apply to all current employees.

With the proposed expansion, the Z-Best Facility is projected to generate a total of two trips during the morning peak hour (7:00 AM to 9:00 AM) and 20 trips during the evening peak hour (4:00 PM to 6:00 PM). This represents a decrease of approximately 19 trips during the AM peak hour and 17 trips during the PM peak hour when compared to existing conditions. The projected decrease in peak hour trips is due to the change in work shift times associated with the proposed expansion. The hourly trip generation estimates with the proposed facility expansion are summarized in Table 3.

It should be noted that a maximum of 47 trips are currently generated in the morning hours between 4:00-9:00 AM and 37 trips during the early evening hours between 3:00-8:00 PM. With the proposed facility expansion and operations, the maximum number of trips during the morning hours would increase to 70 trips while the maximum number of trips during the early evening hours would increase to 47 trips. However, these increases in trips would occur outside of the standard morning and evening commute periods.

Proposed Facility Operations and Trip Generation Estimates – Peak Season Day

Work shift times could be adjusted up to 20 days per year to handle peak leaf season in the fall and heavy volume in the spring. The daily work shift times may be adjusted during the peak season to occur between 5:00 AM and 4:00 PM, 8:00 AM and 6:00 PM, and 6:00 PM and 5:00 AM. The adjusted peak season shift times along with anticipated employees for each shift are also shown in Table 1.

In addition, the project proposes to increase the daily feedstock tonnage limit from the 2,750 tons per day during typical daily operations to 3,500 tons per day for up to 20 days per year to handle peak leaf season in the fall and heavy volume in the spring. The increased tonnage during these 20 days would

result in an additional 57 truck trips. However, the increase in tonnage and associated additional truck trips during peak season would have no effect on peak hour traffic conditions since the proposed expansion includes the restriction of all existing as well as the additional truck trips due to the proposed expansion to the hours outside the morning commute period between 7:00-9:00 AM and evening commute period between 3:00-8:00 PM.

The peak season operations of the proposed expansion would result in 9 and 8 additional trips during the morning peak hour (7:00 AM – 9:00 AM) and the evening peak hour (4:00 PM – 6:00 PM), respectively, when compared to the currently generated 21 and 37 trips during the same periods. However, the addition of the additional trips that would be added to the roadway network during the peak hours would occur infrequently, up to a maximum of 20 days per year during peak season operations. The small number of additional trips due to the peak season operations would not have a significant effect on roadway operations.

The hourly trip generation estimates with the proposed facility expansion during the peak season are summarized in Table 4.

Trip Distribution and Assignment

The distribution of employee, non-truck traffic, is currently distributed equally to SR 25 north and south of the project site. The majority of trucks originating from and bound for the project site currently use SR 25 to and from US 101. A smaller number of trucks use SR 25 to SR 156. The proposed expansion is not proposing significant changes to the existing travel routes used by employees or trucks. The existing directional distribution was applied to the future volume projections, with implementation of the proposed expansion, to assign new project traffic at the project entrance and to the roadway network. The distribution of all project traffic during the peak season would be the same as the traffic distribution during the non-peak season. The existing and anticipated trip distribution patterns are presented in Figures 2 and 3, respectively.

Project Access Improvement Operations Evaluation

A traffic operations analyses at the site access points consisting of peak hour level of service analysis, signal warrant checks, and queuing analysis was completed. Each of the components of the site access operations analyses are described in the following sections.

Proposed SR 25 Site Access Improvements

As part of the proposed facility expansion, the project also is proposing to replace its existing access point along SR 25 with a new access point that will align with Bolsa Road via a new fourth leg at the existing SR 25 and Bolsa Road intersection. The new access point has been discussed with Caltrans and they have preliminarily agreed that the proposed alignment of a new the project access point with Bolsa Road would improve operations along SR 25 in the vicinity of Bolsa Road and the existing project access point by providing a controlled access point to the project site. The proposed new intersection also would include exclusive left-turn lanes along SR 25 that would not only increase intersection capacity but also would minimize the disruption of through traffic along SR 25. Providing access to the project site that aligns with Bolsa Road via a four-legged intersection would improve operations and safety for project traffic, in particular since the majority of vehicular trips generated by the project site are large trucks. The existing project site access point will be closed with the implementation of the new project access point at the Bolsa Road intersection. A conceptual plan for the proposed project access point at the SR 25 and Bolsa Road intersection is shown in Figure 4.

Z-Best also has developed plans for safety/operational improvements at the existing project site entrance on SR 25 in coordination with Caltrans should the proposed new access point at Bolsa Road

Table 4
Peak Season Site-Generated Trips

Hours of Operation		Existing Conditions [1]						Peak Season Conditions [2]													
								Non-Truck Trips				Truck Trips									
		Non-Truck Trips (Based on Driveway Counts)	Truck Trips (Based on Driveway Counts)	Total	Total Site Trips			Additional Employee Trips	Existing Employee Trips/New Shift Times	Other Non-Truck Trips	Total Future Non-Truck Trips	Additional Truck Trips	Existing Truck Trips/Off-Peak Hours Restriction	Total Future Truck Trips	Total	Total Site Trips			Net Additional Trips		
					In	Out	Total									In	Out	Total	In	Out	Total
12:00 AM	Arrivals	0	1	1	1	0	1			0	0	11	7	18	18	18	18	36	17	18	35
to 1:00 AM	Departures	0	0	0						0	0	11	7	18	18						
1:00 AM	Arrivals	0	0	0	0	1	1			0	0	11	7	18	18	18	18	36	18	17	35
to 2:00 AM	Departures	0	1	1						0	0	11	7	18	18						
2:00 AM	Arrivals	0	0	0	0	0	0			0	0	11	7	18	18	18	18	36	18	18	36
to 3:00 AM	Departures	0	0	0						0	0	11	7	18	18						
3:00 AM	Arrivals	0	3	3	3	5	8			0	0	11	7	18	18	18	18	36	15	13	28
to 4:00 AM	Departures	4	1	5						0	0	11	7	18	18						
4:00 AM	Arrivals	5	5	10	10	5	15	17	28	0	45		5	5	50	50	5	55	40	0	40
to 5:00 AM	Departures	0	5	5						0	0		5	5	5						
5:00 AM	Arrivals	2	5	7	7	3	10			0	0		5	5	5	5	20	25	-2	17	15
to 6:00 AM	Departures	0	3	3				5	10	0	15		5	5	20						
6:00 AM	Arrivals	33	7	40	40	7	47			0	0		5	5	5	5	5	10	-35	-2	-37
to 7:00 AM	Departures	0	7	7						0	0		5	5	5						
7:00 AM	**Arrivals**	**4**	**6**	**10**	**10**	**11**	**21**	**10**	**20**	**0**	**30**			**0**	**30**	**30**	**0**	**30**	**20**	**-11**	**9**
to 8:00 AM	**Departures**	**3**	**8**	**11**						**0**	**0**			**0**	**0**						
8:00 AM	Arrivals	6	6	12	12	5	17			1	1			0	1	1	1	2	-11	-4	-15
to 9:00 AM	Departures	3	2	5						1	1			0	1						
9:00 AM	Arrivals	6	13	19	19	20	39			6	6	13	5	18	24	24	25	49	5	5	10
to 10:00 AM	Departures	7	13	20						7	7	13	5	18	25						
10:00 AM	Arrivals	9	7	16	16	23	39			9	9	11	5	16	25	25	27	52	9	4	13
to 11:00 AM	Departures	11	12	23						11	11	11	5	16	27						
11:00 AM	Arrivals	4	8	12	12	16	28			4	4	11	5	16	20	20	22	42	8	6	14
to 12:00 PM	Departures	6	10	16						6	6	11	5	16	22						
12:00 PM	Arrivals	4	10	14	14	15	29			4	4	11	5	16	20	20	21	41	6	6	12
to 1:00 PM	Departures	5	10	15						5	5	11	5	16	21						
1:00 PM	Arrivals	3	12	15	15	13	28			3	3	11	6	17	20	20	21	41	5	8	13
to 2:00 PM	Departures	4	9	13						4	4	11	6	17	21						
2:00 PM	Arrivals	3	8	11	11	10	21			2	2	11	6	17	19	19	18	37	8	8	16
to 3:00 PM	Departures	3	7	10						1	1	11	6	17	18						
3:00 PM	Arrivals	3	5	8	8	13	21			0	0			0	0	0	0	0	-8	-13	-21
to 4:00 PM	Departures	6	7	13						0	0			0	0						
4:00 PM	**Arrivals**	**5**	**5**	**10**	**10**	**27**	**37**			**0**	**0**			**0**	**0**	**0**	**45**	**45**	**-10**	**18**	**8**
to 5:00 PM	**Departures**	**22**	**5**	**27**				**17**	**28**	**0**	**45**			**0**	**45**						
5:00 PM	Arrivals	0	1	1	1	20	21	5	10	0	15			0	15	15	0	15	14	-20	-6
to 6:00 PM	Departures	18	2	20						0	0			0	0						
6:00 PM	Arrivals	1	0	1	1	2	3			1	1			0	1	1	30	31	0	28	28
to 7:00 PM	Departures	1	1	2				10	20	0	30			0	30						
7:00 PM	Arrivals	0	0	0	0	0	0			0	0			0	0	0	0	0	0	0	0
to 8:00 PM	Departures	0	0	0						0	0			0	0						
8:00 PM	Arrivals	0	1	1	1	1	2			0	0	12	8	20	20	20	20	40	19	19	38
to 9:00 PM	Departures	0	1	1						0	0	12	8	20	20						
9:00 PM	Arrivals	0	0	0	0	0	0			0	0	11	7	18	18	18	18	36	18	18	36
to 10:00 PM	Departures	0	0	0						0	0	11	7	18	18						
10:00 PM	Arrivals	0	1	1	1	1	2			0	0	11	7	18	18	18	19	37	17	18	35
to 11:00 PM	Departures	1	0	1						1	1	11	7	18	19						
11:00 PM	Arrivals	0	0	0	0	0	0			0	0	11	7	18	18	18	18	36	18	18	36
to 12:00 AM	Departures	0	0	0						0	0	11	7	18	18						
TOTAL DAILY TRIPS:		**182**	**208**	**390**	**192**	**198**	**390**	**64**	**116**	**66**	**246**	**314**	**208**	**522**	**768**	**381**	**387**	**768**	**189**	**189**	**378**

Notes:
[1] Existing hourly project site traffic activity was estimated based on the existing 24-hour vehicle composition traffic counts conducted at the project site entrance in August 2015, in combination with information provided by Z-Best on their current number of employees, employee shift times, and hours of operation.
[2] Hourly site traffic projections associated with the proposed Z-Best facility operations expansion during peak season. These projections are based on the anticipated increase in the number of employees and number of trucks accessing the site daily during peak season up to 20 days per year, the anticipated employee shift times during peak season, and the restriction of all inbound truck traffic to the site during the off-peak hours only (8:00PM - 4:00AM) and outbound truck traffic to the hours of (4:00AM - 7:00AM and 9:00 AM to 3:00 PM).

Figure 2
Trip Distribution and Traffic Volumes Under Existing Conditions

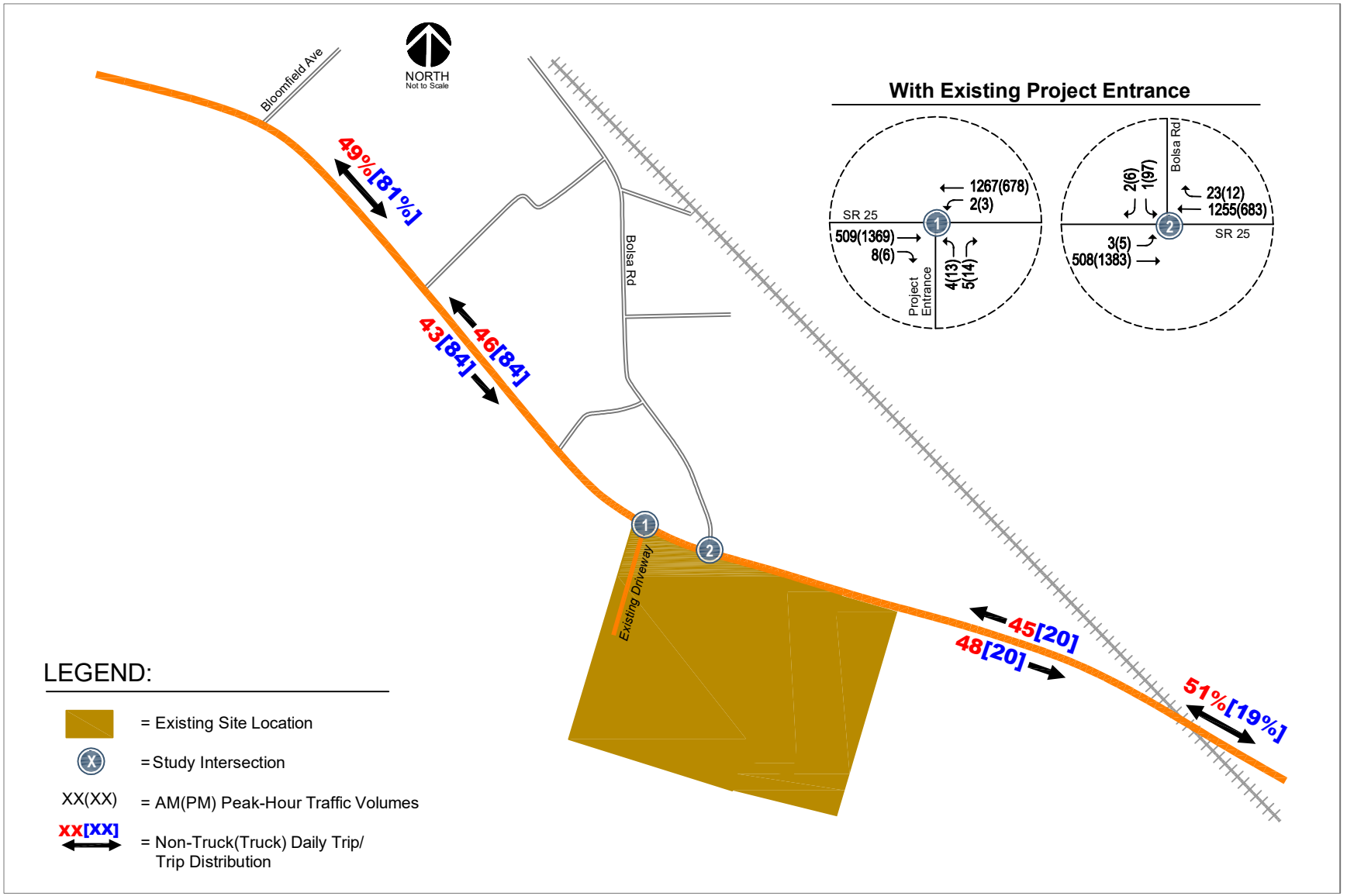


Figure 3
Trip Distribution and Traffic Volumes Under Project Conditions

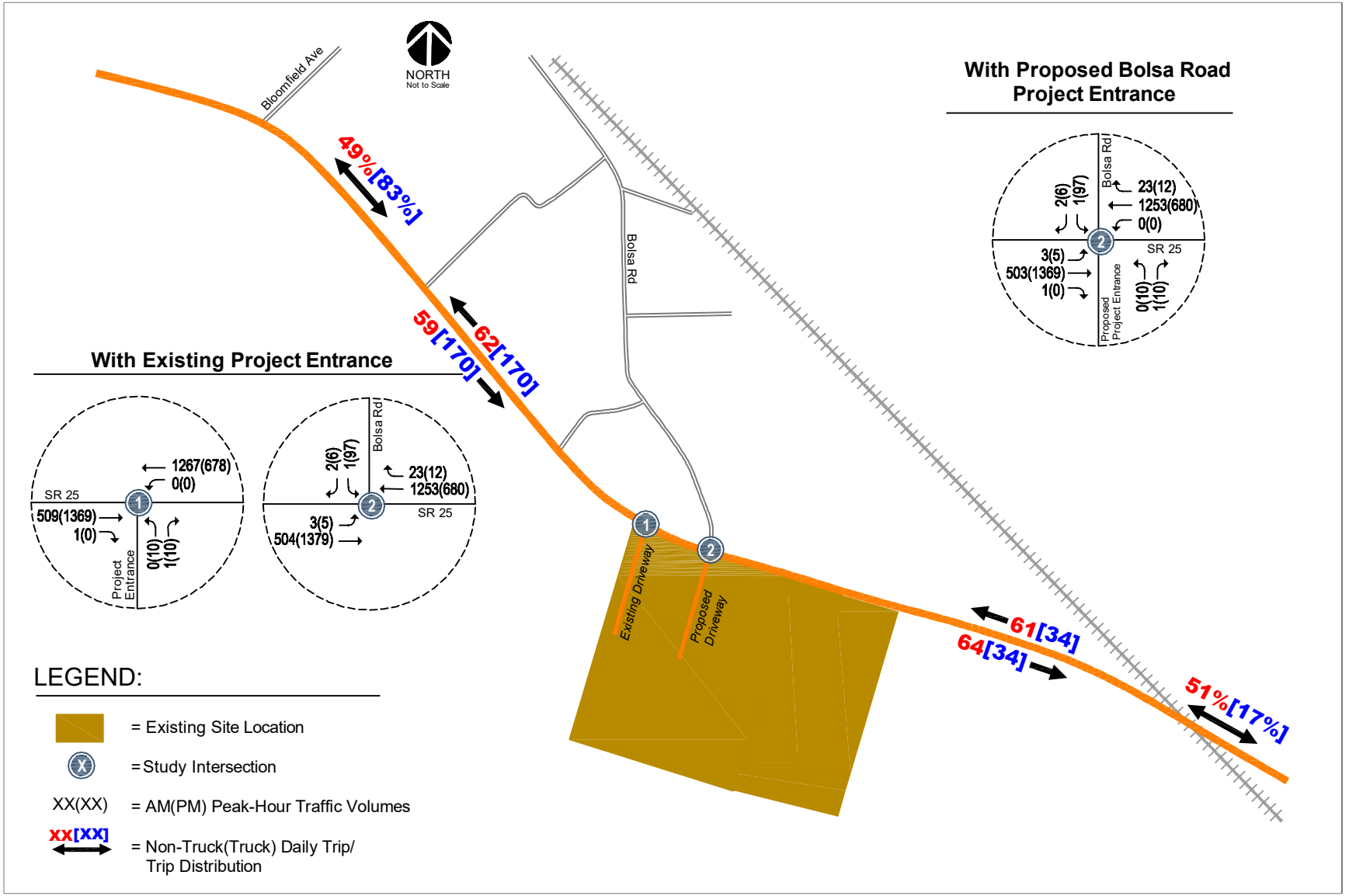
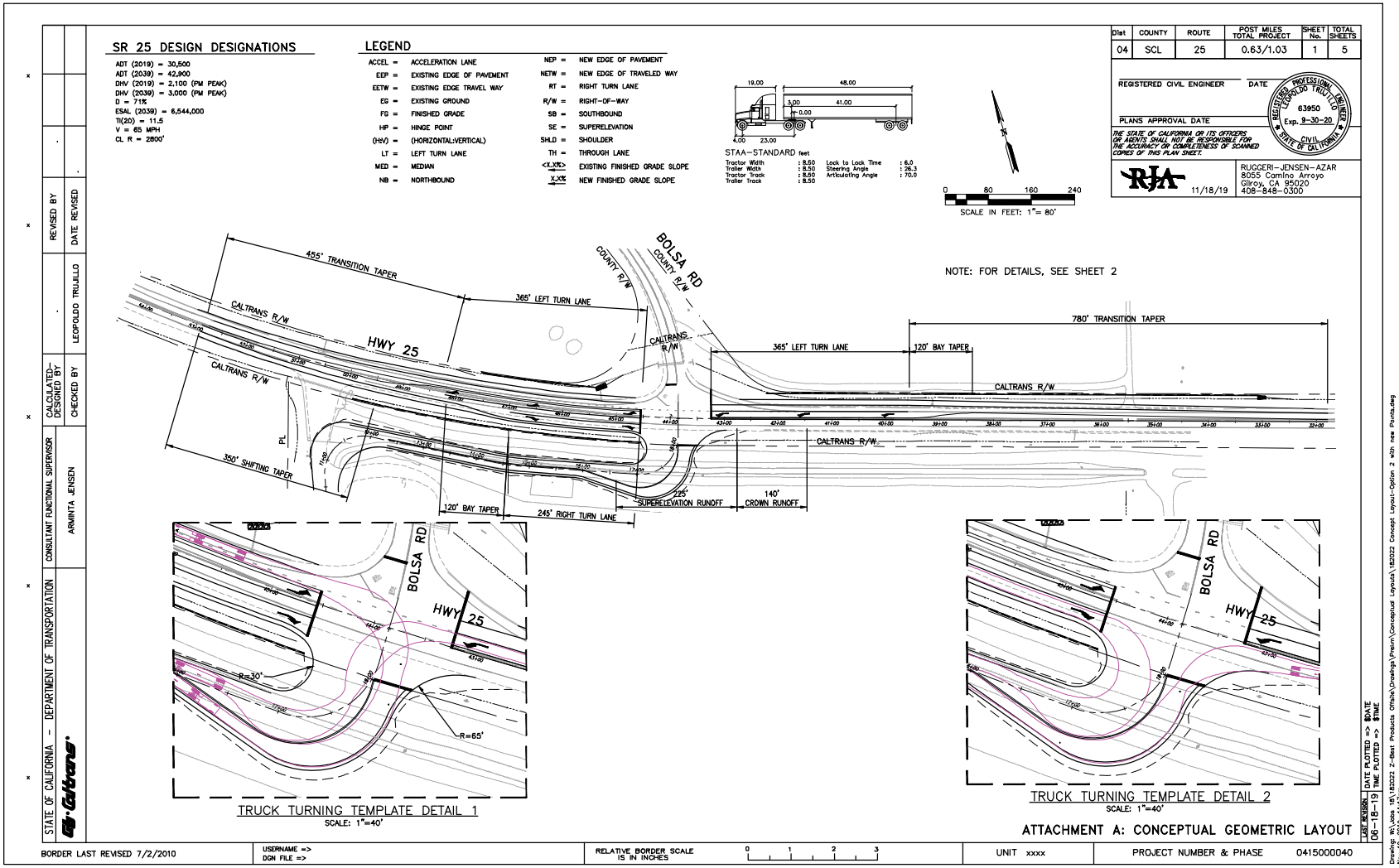


Figure 4
Conceptual Bolsa Road/Relocated Project Driveway Improvements



not be implemented. The proposed improvements include the addition of an eastbound deceleration lane into the project site, westbound left-turn lane into the project site, and acceleration lane to serve traffic exiting the project site. The proposed entrance improvements would not only improve truck access into the project site but would also result in improved highway segment operations by minimizing the disruption of through traffic along SR 25. A conceptual plan for the existing site entrance improvements is shown in Figure 5.

The site access improvements will be coordinated with Caltrans and they will determine whether the proposed site access improvements are adequate and meet Caltrans design standards.

Existing and Project Conditions Traffic Volumes

Existing plus project traffic volumes are comprised of the existing peak-hour traffic volumes and the net addition of the traffic estimated to be generated by the proposed facility expansion project.

The existing and projected peak-hour traffic volumes with the proposed facility expansion (project conditions) for each site access point alternative are shown on Figures 2 and 3, respectively.

Passenger Car Equivalent Trips

Because a significant portion of the traffic associated with the project would be truck traffic, a more conservative analysis was conducted for this study in which the truck trips were converted to passenger car equivalent (PCE) trips. This is founded on the observation that trucks impact traffic operations at intersections more significantly than passenger cars do. For this analysis, it is assumed that each truck trip is equivalent to 1.5 passenger car trips.

Intersection Level of Service Analysis

Level of Service is a qualitative description of operating conditions ranging from LOS A, or free-flow conditions with little or no delay, to LOS F, or jammed conditions with excessive delays. The study intersections were analyzed using TRAFFIX software, which is based on the *Highway Capacity Manual* (HCM) 2000 method for computing level of service at intersections. Two-way-stop controlled intersection levels of service are evaluated based on worst approach stop control delay time for all vehicles at the intersection.

Traffic conditions were analyzed for the weekday AM and PM peak hours. The weekday AM peak hour of traffic is generally between 7:00 AM and 9:00 AM, and the weekday PM peak hour is typically between 4:00 PM and 6:00 PM. It is during these periods that the most congested traffic conditions occur on a typical weekday. The level of service results are discussed below and summarized in Table 5. The level of service calculations are included in the Appendix.

Significant Impact Criteria

Each of the study facilities are located along SR 25. The California Department of Transportation (Caltrans) has jurisdiction of all State maintained facilities, including SR 25. Therefore, the study intersections were evaluated based on Caltrans significance criteria. The criteria described below apply to the weekday AM and PM peak hours.

Caltrans Definition of Significant Impacts

All roadway facilities studied are under the jurisdiction of Caltrans, and therefore, are required to meet the Caltrans Level of Service (LOS) standard. Caltrans level of service standard is LOS C or better. The Caltrans Guide for the Preparation of Traffic Impact Studies (Caltrans 2002) defines a significant impact to occur when:

Figure 5
Conceptual Existing Project Driveway Improvements

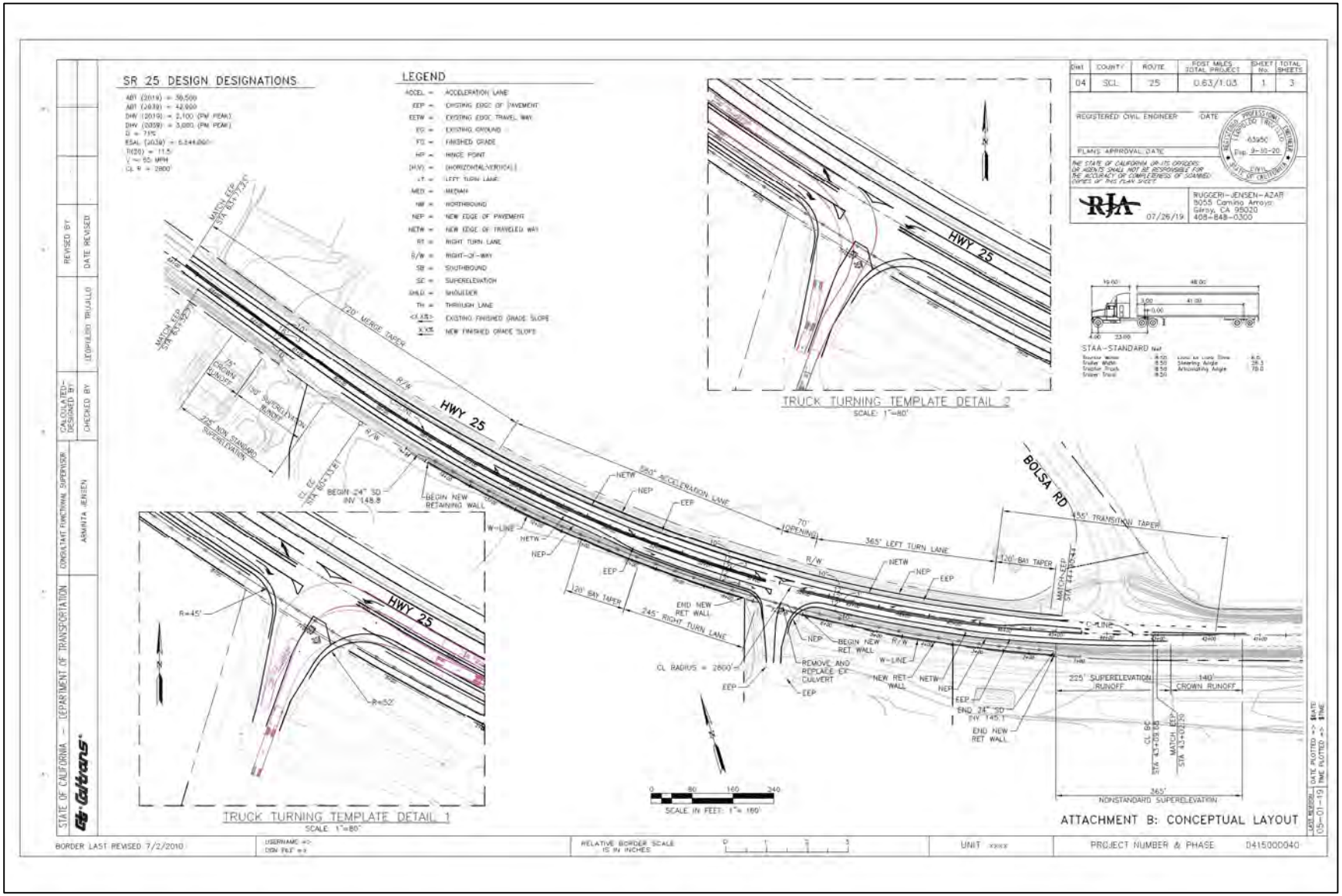


Table 5
Operations Analysis Result Summary

Intersection	LOS Standard	Peak Hour	Existing Warrant Met?	Existing Average Delay[1]	Existing Average LOS	Existing Worst Delay[2]	Existing Worst LOS	Existing + Project Warrant Met?	Existing + Project Average Delay[1]	Existing + Project Average LOS	Existing + Project Average Change	Existing + Project Worst Delay[2]	Existing + Project Worst LOS	Existing + Project Worst Change
Existing Project Entrance Alternative														
SR 25 and Existing Project Entrance	C	AM	No	0.2	A	**28.7**	**D**	No	0.0	A	-0.2	11.4	B	-17.3
		PM	No	0.9	A	**62.9**	**F**	No	0.5	A	-0.4	**54.2**	**F**	-8.7
SR 25 and Bolsa Road	C	AM	No	0.1	A	**30.3**	**D**	No	0.1	A	0.0	**30.1**	**D**	-0.2
		PM	**Yes**	22.1	C	**468.6**	**F**	**Yes**	21.7	C	-0.4	**458.0**	**F**	-10.6
Relocated Project Entrance to Bolsa Road Alternative														
SR 25 and Bolsa Road/Proposed Project Entrance	C	AM	--	--	--	--	--	No	0.1	A	--	**35.2**	**E**	--
(Stop-Controlled)		PM	--	--	--	--	--	**Yes**	**43.8**	**E**	--	**914.3**	**F**	--

Notes:
[1]Whole intersection weighted average control delay.
[2]The worst case delay is normally the time it would take a vehicle on the minor street of an unsignalized intersection to make a left-turn onto the major street.
Bold indicates unacceptable level of service or signal warrant met.

1. The addition of project traffic causes roadway (or intersection) operations to degrade from an acceptable level (LOS C or better) to an unacceptable level (LOS D or worse) or,
2. Project traffic is added to a roadway (or intersection) operating at an unacceptable level (LOS D or worse).

Existing Conditions

The results of the level of service analysis show that, measured against the Caltrans level of service standards, both the existing project entrance and Bolsa Road intersections with SR 25 currently operate at an unacceptable LOS F during the PM peak hour based on the worst approach delay. The worst-case approach is typically the minor street approach that is stop-controlled.

Project Conditions

Existing Project Entrance Alternative

The results of the level of service analysis show that when measured against the Caltrans level of service standards, the existing project entrance intersection with SR 25 would improve to LOS B during the AM peak hour and remain at LOS F under project conditions. The SR 25 and Bolsa Road intersection is projected to continue to operate at LOS D and LOS F conditions during the AM and PM peak hours, respectively, under project conditions. Each intersection would experience a slight reduction in delay on the worst approach during the peak hours with the project. The improvement in delay at each location is a result of the net reduction in trips due to the proposed expansion during the peak hours.

The proposed project would not result in the addition of traffic to the existing site access or SR 25 and Bolsa Road intersections during the peak hours, therefore, based on Caltrans impact criteria, the proposed project would not result in a significant project impact at the study intersections.

Relocated Project Access

The results of the level of service analysis show that the SR 25 and Bolsa Road intersection with stop-control on Bolsa Road and the relocated project entrance is projected to have worst-case approach operations of LOS E and F during the AM and PM peak hours, respectively, under project conditions.

Signal Warrant Analysis

The level of service analysis at the study intersections were supplemented with an assessment of the need for signalization of the intersections. The need for signalization of unsignalized intersections is assessed based on the Peak-Hour Volume Warrant (Warrant 3) described in the *California Manual on Uniform Traffic Control Devices for Streets and Highways (CA MUTCD)*, Part 4, Highway Traffic Signals, 2014. This method makes no evaluation of intersection level of service, but simply provides an indication whether vehicular peak hour traffic volumes are, or would be, sufficient to justify installation of a traffic signal. Intersections that meet the peak hour warrant are subject to further analysis before determining that a traffic signal is necessary. Additional analysis may include unsignalized level of service analysis and/or operational analysis such as evaluating vehicle queuing and delay. Other options such as traffic control devices, signage, or geometric changes may be preferable based on existing field conditions. The results of the signal warrant analysis are summarized in Table 5. The signal warrant sheets are included within the Appendix.

The results of the peak-hour volume warrants indicate that the peak-hour volumes at the existing project entrance intersection with SR 25 currently and are projected to fall below the threshold that warrant signalization with the proposed facility expansion. The peak hour volumes at the SR 25 and

Bolsa Road intersection currently meet and are projected to continue to meet the threshold for signalization during the PM peak hour with the relocation of the site access to Bolsa Road. However, a traffic signal at the new project access point at Bolsa Road is not recommended, or supported by Caltrans, since a traffic signal would adversely affect traffic operations along SR 25.

Intersection Operations (Queuing) Analysis

The operations analysis is based on vehicle queuing for left-turn movements at intersections. Vehicle queues obtained from TRAFFIX were utilized for this analysis. The basis of the analysis is as follows: (1) TRAFFIX is used to estimate the 95th percentile maximum number of queued vehicles during the peak hour for a particular movement; (2) the estimated maximum number of vehicles in the queue is translated into a queue length, assuming 25 feet per vehicle; and (3) the estimated maximum queue length is compared to the existing or planned available storage capacity for the movement. This analysis thus provides a basis for estimating future storage requirements at the selected locations.

Under project conditions, the queuing analysis results show that, the eastbound and westbound left-turn lanes at the relocated SR 25/Bolsa Road project access intersection would experience queue lengths of no more than one vehicle during the peak hours. The southbound (Project Entrance) approach would experience queue lengths of two vehicles, or 50 feet assuming an average vehicle length of 25 feet per vehicle. The northbound (Bolsa Road) approach currently experiences lengthy queues due to the large number of left-turns from Bolsa Road to SR 25 during the PM peak hour.

During the off-peak hours, as many as 52 trips (47 non-truck and 5 truck trips) are projected to access the project site from 4:00 AM to 5:00 AM. Approximately half of the 52 trips or 26 trips would access the site from the east. Assuming an even distribution of traffic arriving throughout the hour, this would equate to approximately one trip every two to three minutes or a queue of no more than one vehicle in the westbound left-turn lane.

Collision History

The collision history along SR 25 in the vicinity of the project entrance and Bolsa Road intersections with SR 25 was reviewed. A review of collision data received from Caltrans indicates a total of 29 collisions over a 3-year span along SR 25 between Bloomfield Road and the beginning of the highway divider (located approximately 1.5 miles east of the project site entrance). The number of collisions along this highway segment exceeds the statewide average for similar facilities. However, only two collisions occurred in the vicinity of the project entrance and Bolsa Road intersections with SR 25 over that same 3-year period.

Highway Segment Operations

The highway segments located immediately east and west of the project entrance were evaluated based on the *Highway Capacity Manual* (HCM) 2010 methodology and using the Highway Capacity Software (HCS). The results of the highway segment peak hour level of service analysis show that the segments along SR 25 currently operate at an unacceptable LOS E during the AM and PM peak hours.

According to the Caltrans definition of impact on highway segments, the addition of any traffic to a facility currently operating unacceptably would be considered an impact. The proposed project would result in a reduction of traffic volumes to and from the project site during the peak hours.

Therefore, the proposed project would not result in a significant project impact on highway segments of SR 25.

Proposed SR 25 Site Access Improvements

The operations and site access analysis shows that although the proposed project would not result in traffic impacts at the site access points and Bolsa Road intersections with SR 25, both the intersections and the study highway segments currently operate at unacceptable levels. The improvements at the existing site access point would improve traffic operations along SR 25 and the project site entrance.

The proposed relocation of the project access point to the SR 25/Bolsa Road intersection would provide a controlled access point to the project site from SR 25. Providing access to the project site from SR 25 via a controlled intersection would improve operations and safety for both project traffic and through traffic along SR 25, in particular since the majority of vehicular trips generated by the project site are large trucks. Along with the proposed relocated project access point, exclusive left-turn lanes along SR 25 which would not only increase intersection capacity but also minimize the disruption of through traffic along SR 25. Overall, the proposed site access improvements on SR 25 would improve traffic conditions at the project site access and along SR 25.

Each of the design requirements that would be applicable to the relocated project access point at the SR 25/Bolsa Road intersection are discussed below.

Highway Design Manual Standards

The Caltrans Highway Design Manual (HDM) makes the following recommendations regarding intersection design standards.

Sight Distance

A clear line of sight should be provided between the driver on the minor street (crossroad) and the approaching traffic (major street). At a minimum, adequate stopping sight distance should be provided at all unsignalized intersections. Corner sight distance and decision sight distance also should be provided when possible and/or applicable. In some cases, the cost of providing the required corner sight distance may be excessive. When restrictive conditions exist, the minimum value for corner sight distance shall be equal to the stopping sight distance. Decision sight distance is required at intersections where the State route turns or crosses another State route.

Based on the design speed along SR 25 (posted speed limit of 55 mph), the required stopping sight distance must be no less than 500 ft. (Table 201.1 of the HDM) and the minimum corner sight distance should be 605 ft.

The available sight distances on SR 25 at Bolsa Road would exceed both the minimum stopping and corner sight distances because SR 25 is relatively straight and has no driver view obstruction in the vicinity of the intersection

Acceleration Lanes

According to the HDM, at rural intersections with stop control on the local cross street, acceleration lanes for left and right turn onto the State facility should be considered.

Left-Turn Channelization

The HDM recommends left-turn lanes be provided at intersections to expedite the movement of

through traffic, control the movement of turning traffic, increase intersection capacity, and improve safety. At a minimum, the left-turn lane should meet the following requirements:

Lane Width – The lane width for both single and double left-turn lanes on State highways shall be 12 ft. However, under certain circumstances, left-turn lane widths of 11 ft. or as narrow as 10 ft. may be used. Based on Caltrans design criteria, the left-turn lanes at the new intersection should be a minimum of 10 ft. wide.

Approach Taper – The approach taper provides space for a left-turn lane by moving traffic laterally to the right. In all situations where space is available (usually in rural and semi-rural areas on in urban areas with high traffic speeds and/or volumes), the standard left-turn channelization design in which all widening is to the right of approaching traffic and the deceleration lane begins at the end of the approach taper should be used. However, alternate designs with the deceleration lane beginning at the 2/3 point of the approach taper (so that part of the deceleration takes place in the through traffic lane) may be used in urban areas where constraints exist, speeds are moderate, and traffic volumes are relatively low. The required approach taper (Figure 405.2A) for the left-turn lanes on SR 25, based on a design speed of 55 mph and assuming the proposed left-turn lane would be 12 ft. wide, is 660 ft.

Deceleration Lane Length – Deceleration lane length are based on the roadway's design speed. It is desirable that deceleration take place entirely off the through traffic lanes. Based on Table 405.2B of the HDM, the required deceleration lane length for a 55-mph roadway is approximately 485 ft. (including bay taper). Bay tapers of 120 ft. are normally used on rural high-speed highways. As described above, alternate left-turn channelization designs allow the deceleration lane beginning at the 2/3 point of the approach taper, so part of the deceleration takes place in the through traffic lane. In cases where partial deceleration is permitted on the through lanes, designs speeds may be reduced 10 to 20 mph for a lower entry speed.

Storage Length – As a minimum, storage space for two passenger cars should be provided at 25 ft. per car within turn-pockets. However, if 10 percent (%) or more of the peak hour traffic is composed of large trucks, space for one passenger car and one truck should be provided.

Vehicular queue estimates for left-turns at the SR 25/Bolsa Road intersection show 95th percentile queue lengths of no more than one vehicle for left-turn movements along SR 25 during the peak hours. However, traffic volumes along SR 25 are composed of a significant amount of heavy trucks since it serves as the primary route to US 101 from a primarily agricultural area. Therefore, based on the estimated queue length calculations and Caltrans standards, a minimum of 75 ft. (one vehicle and one truck length) of queue storage capacity should be provided in the left-turn pockets along SR 25 at the intersection with Bolsa Road. Ultimately, Caltrans will decide whether the proposed intersection layouts are adequate and meets Caltrans design standards.

Supplemental Evaluation of Vehicle-Miles-Traveled (VMT)

Historically, transportation analysis has utilized delay and congestion on the roadway system as the primary metric for the identification of traffic impacts and potential roadway improvements to relieve traffic congestion that may result due to proposed/planned growth. However, the State of California has recognized the limitations of measuring and mitigating only vehicle delay at intersections and in 2013 passed Senate Bill (SB) 743, which requires jurisdictions to stop using congestion and delay metrics, such as Level of Service (LOS), as the measurement for CEQA transportation analysis. With the adoption of SB 743 legislation, public agencies will soon be required to base the determination of transportation impacts on VMT rather than level of service. The intent of this change is to shift the focus of transportation analysis under CEQA from vehicle delay and roadway

auto capacity to a reduction in vehicle emissions, and the creation of robust multimodal networks that support integrated land uses.

An estimate of Vehicle-Miles-Traveled (VMT) was completed for the proposed facility expansion. VMT is typically calculated for common land uses such as residential, office, and industrial developments. However, the proposed project consists of an uncommon land use, a composting facility, that will primarily generate truck traffic for which evaluation tools such as a Transportation Demand Forecasting (TDF) model are not applicable for the estimation of VMT. Therefore, the estimates of VMT for the project were derived based on the anticipated number of employees and truck loads as well as origin/destination information provided by the applicant.

A comparison of VMT currently generated by the existing site operations versus the VMT that could be generated by the proposed expansion of site operations was completed. VMT is calculated as the number of vehicle trips multiplied by the length of the trips in miles. VMT per employee is a measure of the daily vehicle miles traveled divided by the number of employees of the project site.

As shown in Tables 6 and 7, the proposed expansion and adjustment of site operations will result in a decrease in VMT per employee and VMT per truck load, when compared to the VMT currently generated by the existing site operations.

Table 6
VMT per Employee Estimates

			Existing		Existing + Project	
Origin-Destination	Distance (mi)	% Distribution[1]	Daily Trips[2]	Daily VMT	Daily Trips[2]	Daily VMT
Hollister	11	51%	92	1012	127	1397
Los Banos	47	12%	22	1034	30	1410
Gilroy	5	26%	47	235	64	320
San Jose	35	6%	11	385	15	525
Morgan Hill	16	1%	2	32	2	32
Gustine	52	1%	2	104	2	104
Modesto	83	1%	2	166	2	166
Watsonville	21	1%	2	42	2	42
Santa Cruz	40	1%	2	80	2	80
Total			**182**	**3090**	**246**	**4076**
Daily VMT per Employee				**51.5**		**45.3**

[1] Source: Z-Best Products.

[2] Total daily trips as shown in the hourly trip generation table.

Table 7
VMT per Truck Load Estimates

Origin-Destination	Distance (mi)	Existing				Existing + Project					Existing + Project (Peak 20-Day Season)[2]				
		Daily Loads[1]	Daily Trips	Daily VMT	Daily VMT per load	Daily Loads	Daily Trips	Daily VMT	Distribution	Daily VMT per load	Daily Loads	Daily Trips	Daily VMT	Distribution	Daily VMT per load
Green Waste															
GreenWaste Recovery - San Jose	38	32.73	65.46	2487.4		89.73	179.46	6819.4			122.73	245.46	9327.4		
ZeroWaste Energy - San Jose	45	9.04	18.08	813.7		9.04	18.08	813.7			9.04	18.08	813.7		
Blue Line Transfer - South San Francisco	75	1.64	3.28	245.8		1.64	3.28	245.8			1.64	3.28	245.8		
Bay Counties SMART - Sunnyvale	48	3.99	7.97	382.7		3.99	7.97	382.7			3.99	7.97	382.7		
Sub-Total		47.39	94.79	**3929.5**	**82.9**	104.39	208.79	**8261.5**		**79.1**	137.39	274.79	**10769.5**		**78.4**
Finished Product (Mulch/Compost)															
100-mile Radius	50	20.75	41.50	**2074.8**	**100.0**	28.75	57.50	**2874.8**		**100.0**	33.75	67.50	**3374.8**		**100.0**
Landfill (Trash/ADC)															
Billy Wright Landfill - Los Banos	43	5.47	10.93	470.1		15.96	31.92	1372.5	30%		21.98	43.95	1890.0	30%	
Marina Landfill - Marina	29	8.06	16.13	467.7		23.54	47.09	1365.5	44%		32.42	64.84	1880.4	44%	
Newby Island Landfill - Milpitas	45	4.44	8.87	399.2		12.95	25.90	1165.7	24%		17.83	35.67	1605.1	24%	
John Smith Landfill - Hollister	17	0.20	0.41	6.9		0.59	1.18	20.1	1%		0.82	1.63	27.7	1%	
		18.17	36.33	**1343.8**	**74.0**	53.05	106.09	**3923.9**		**74.0**	73.05	146.09	**5403.2**		**74.0**
Total		86.31	172.62	**7348.1**	**85.1**	186.19	372.38	**15060.2**		**80.9**	244.19	488.38	**19547.6**		**80.1**

[1] Source: Z-Best Products. Average daily load estimated using total number of loads recorded in 2018.

[2] Peak leaf season in the fall and heavy volume in the spring. The increased tonnage during these 20 days would result in an additional 58 truck trips.

Potential SR 25 Widening and Realignment

Caltrans has identified operational problems during the peak commute hours along the SR 25 corridor and at the US 101/SR 25 interchange, which are due primarily to the capacity constraints of the highway and interchange. Thus, Caltrans has initiated the study for the widening and realignment of SR 25 that will include the segment along the project's frontage and realignment of Bolsa Road. In the vicinity of the project site, SR 25 consists of an undivided two-lane State highway with a posted speed limit of 55 miles per hour (mph) in both directions of travel.

In June 2016, Caltrans approved the Hollister to Gilroy State Route 25 Route Adoption project. In the Route Adoption study, Caltrans identifies two alternatives (plus a No Build alternative) to eventually replace 11.2 miles of the existing SR 25 two-lane highway with a four-lane expressway in San Benito and Santa Clara Counties. A route adoption would require San Benito and Santa Clara Counties to adopt a specific corridor for the future expressway into their General Plans, for the purpose of acquiring most or all parcels within the defined corridor area. The route adoption study extends from San Felipe Road (in Hollister) to the end of SR 25 at US 101 in Santa Clara County.

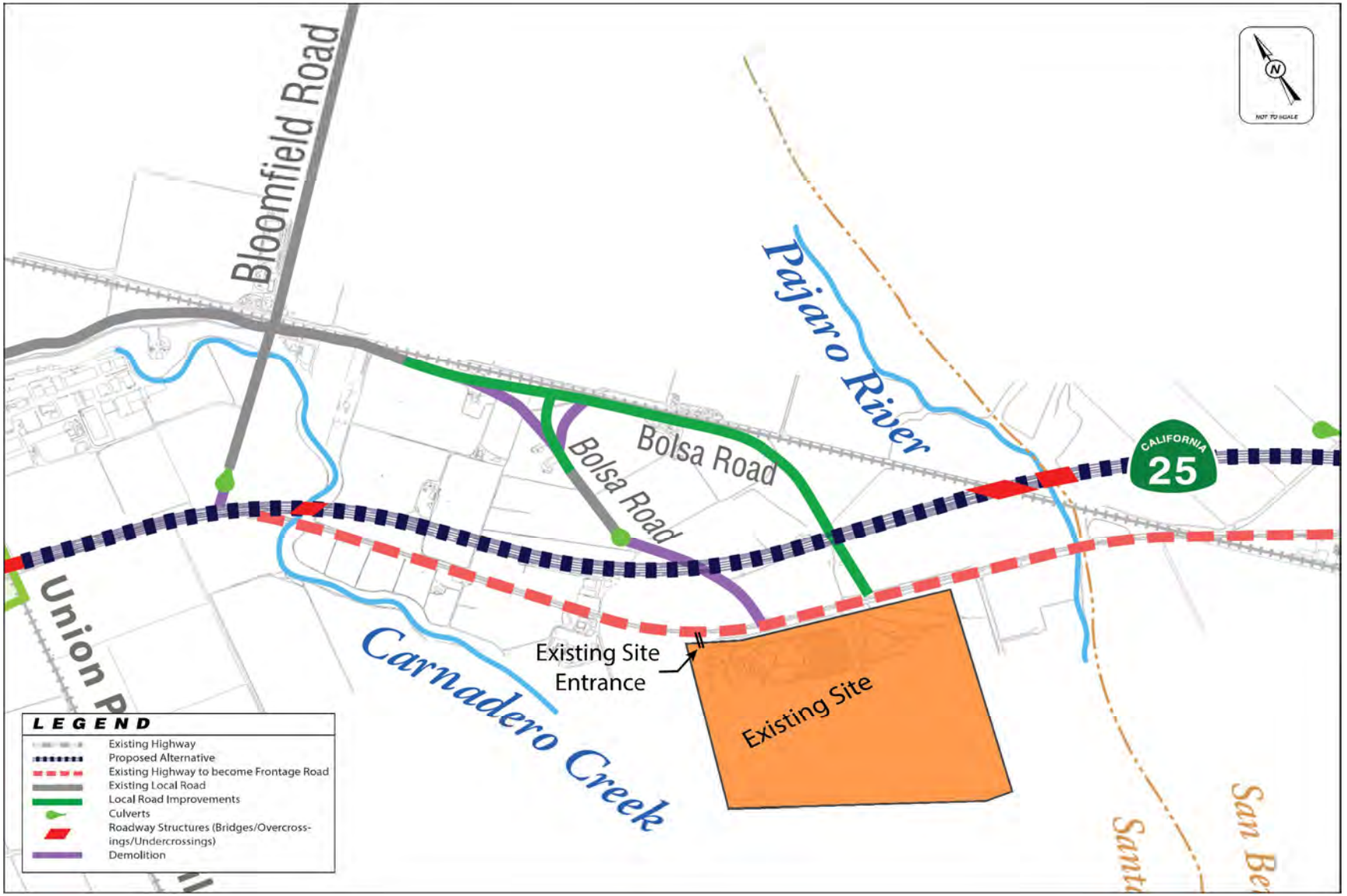
Both route adoption alternatives are 11.2 miles long and share the same alignment from US 101 to approximately ½ mile east of Shore Road. The project site entrance is located within this area. The proposed improvements would include the realignment of both SR 25 and Bolsa Road, which would result in a new intersection of Bolsa Road with the new realigned SR 25.

Although the actual SR 25 widening and realignment project has yet to be designed, approved, and funded, if constructed, it will affect project site access. The exact SR 25 realignment and location of the potential new intersection with Bolsa Road is not known at this time. However, the Route Adoption Alternatives 1 and 2 plans (prepared by Caltrans and shown on Figure 6) indicate the following:

- The realignment of SR 25 would begin east of Bloomfield Road and run north of and parallel to the existing SR 25 alignment from this point past Shore Road.
- The existing SR 25 would become a frontage road and would continue to provide direct access to the adjacent parcels/land uses, including the project site.
- The existing segment of Bolsa Road, between the existing SR 25 and north of the realigned SR 25 would be abandoned, eliminating the existing Bolsa Road/SR 25 intersection. The new Bolsa Road realignment would extend eastward adjacent to the existing Union Pacific Railroad tracks and intersect with both the realigned SR 25 and the existing SR 25 just east of the project site.

With the potential realignment of SR 25 and Bolsa Road, all project traffic bound for and originating from the Z-Best facility would utilize the new Bolsa Road intersection with the realigned SR 25.

Figure 6
Potential SR 25 Widening and Realignment



Conclusions

The proposed expansion of the existing facility operations on the site will include an increase in the number of employees from the current 58 employees (60 allowed by the use permit) to 80-85 employees (with a maximum of 90 employees allowed by the use permit). It is also anticipated that with the expanded operations, the facility would be able to serve an additional 100 trucks per day. However, based on the proposed new work shift times and all new truck trips being proposed to access the project site outside of the standard peak commute hours, the proposed expansion of the existing Z-Best facility operations would result in a decrease in the number of peak-hour trips generated by the project site when compared to existing conditions. Therefore, the proposed project would not result on impacts to any of the study facilities on SR 25.

The operations and site access analysis shows that although the proposed project would not result in traffic impacts at the study intersections and highway segments along SR 25, the existing project access point and SR 25/Bolsa Road intersection and the study highway segments currently operate at unacceptable levels. The proposed relocation of the project access point to the SR 25/Bolsa Road intersection would provide a controlled access point to the project site from SR 25. Providing access to the project site from SR 25 via a controlled intersection would improve operations and safety for both project traffic and through traffic along SR 25, in particular since the majority of vehicular trips generated by the project site are large trucks. Along with the proposed relocated project access point, exclusive left-turn lanes along SR 25 which would not only increase intersection capacity but also minimize the disruption of through traffic along SR 25. Overall, the proposed site access improvements on SR 25 would improve traffic conditions at the project site access and along SR 25.

HEXAGON TRANSPORTATION CONSULTANTS, INC.

Memorandum

Date: August 11, 2020

To: John Doyle, Z-Best Products

From: Robert Del Rio. T.E.

Subject: Z-Best Supplemental VMT Clarification and Analysis

This memo is being provided to clarify and substantiate conclusions related to the VMT analyses that were provided within the *Operations and Site Access* Analysis dated January 30, 2020 for the proposed expansion of the Z-Best Compost Facility Expansion. Revisions and additional information are provided below at the request of County staff.

VMT for Non-Truck Trips

An estimate of Vehicle-Miles-Traveled (VMT) was completed for the proposed facility expansion as part of the traffic operations and site access analysis. Existing daily VMT estimates as shown in Table 6 of the report are based on vehicle composition data collected at the site entrance. Non-truck traffic includes traffic generated by employees and non-employees. Therefore, the title of the table is revised and shown below.

Table 1
VMT for Non-Truck Trips

			Existing		Existing + Project	
Origin-Destination	Distance (mi)	% Distribution[1]	Daily Trips[2]	Daily VMT	Daily Trips[2]	Daily VMT
Hollister	11	51%	92	1012	127	1397
Los Banos	47	12%	22	1034	30	1410
Gilroy	5	26%	47	235	64	320
San Jose	35	6%	11	385	15	525
Morgan Hill	16	1%	2	32	2	32
Gustine	52	1%	2	104	2	104
Modesto	83	1%	2	166	2	166
Watsonville	21	1%	2	42	2	42
Santa Cruz	40	1%	2	80	2	80
Total			**182**	**3090**	**246**	**4076**

[1] Source: Z-Best Products.

[2] Total daily trips as shown in the hourly trip generation table.

Employee-Only VMT

A supplemental estimate of VMT generated by only the employees of the proposed facility was completed using the same methodology as utilized for VMT estimates of non-truck traffic. The assumptions of the methodology include the following:

- Employee daily trips are two trips consisting of one inbound trip before the employee's shift and one outbound trip after the employee's shift
- Distance and distribution of trips are constant
- Linear growth of employee per employee origin. The total employee growth is approximately 55% (from the existing 58 employees to a proposed 90 employees) and each location would experience a 55% increase in employee.

The results of the analysis show that daily VMT per employee would not result in an increase from existing conditions as a result of the proposed expansion.

Table 2
VMT for Employees Only

			Existing		Existing + Project	
Origin-Destination	Distance (mi)	% Distribution[1]	Daily Trips[2]	Daily VMT	Daily Trips[2]	Daily VMT
Hollister	11	51%	58	639.8	90	992.731
Los Banos	47	12%	13	607.2	20	942.269
Gilroy	5	26%	29	145.8	45	226.241
San Jose	35	6%	6	208.6	9	323.69
Morgan Hill	16	1%	2	34.6	3	53.6276
Gustine	52	1%	2	112.3	3	174.29
Modesto	83	1%	2	179.3	3	278.193
Watsonville	21	1%	2	45.4	3	70.3862
Santa Cruz	40	1%	2	86.4	3	134.069
Total			**116**	**2059**	**180**	**3195**
Daily VMT per Employee				**35.5**		**35.5**

[1] Source: Z-Best Products.

[2] The facility has 58 employees under existing conditions (116 daily trips) and is proposed to have 90 employees (180 daily trips) with the proposed expansion.

Estimate of Baseline and Project Truck Trips

Table 7 of the operations report provides an estimate of VMT per truck load under existing and proposed conditions. Truck loads under existing conditions were estimated using on-site scale report data provided by Z-Best in 2018 and shown below in Table 3. Z-best is required to provide the scale report data to its designated LEA inspector on a monthly basis to show that the site operations are in compliance with allowable material types and daily limits defined in its Solid Waste Facility Permit.

Table 3
VMT per Truck Load Estimates

		Existing					Existing + Project						Existing + Project (Peak 20-Day Season)[3]				
Origin-Destination	Distance (mi)	Annual Loads (2018)[1]	Daily Loads	Daily Trips	Daily VMT	Daily VMT per load	Proposed Additional Loads[2]	Daily Loads	Daily Trips	Daily VMT	Distribution	Daily VMT per load	Proposed Additional Loads[2]	Daily Loads	Daily Trips	Daily VMT	Daily VMT per load
Green Waste																	
GreenWaste Recovery - San Jose	38	11,946	32.73	65.46	2487.4		57.0	89.73	179.46	6819.4			90.0	122.73	245.46	9327.4	
ZeroWaste Energy - San Jose	45	3,300	9.04	18.08	813.7			9.04	18.08	813.7				9.04	18.08	813.7	
Blue Line Transfer - South San Francisco	75	598	1.64	3.28	245.8			1.64	3.28	245.8				1.64	3.28	245.8	
Bay Counties SMART - Sunnyvale	48	1,455	3.99	7.97	382.7			3.99	7.97	382.7				3.99	7.97	382.7	
Sub-Total		17,299	47.39	94.79	**3929.5**	**82.9**	57.0	104.39	208.79	**8261.5**		**79.1**	90.0	137.39	274.79	**10769.5**	**78.4**
Finished Product (Mulch/Compost)																	
100-mile Radius	50	7,573	20.75	41.50	**2074.8**	**100.0**	8.0	28.75	57.50	**2874.8**		**100.0**	13.0	33.75	67.50	**3374.8**	**100.0**
Landfill (Trash/ADC)																	
Billy Wright Landfill - Los Banos	43	1,995	5.47	10.93	470.1		10.5	15.96	31.92	1372.5	30%		16.5	21.98	43.95	1890.0	
Marina Landfill - Marina	29	2,943	8.06	16.13	467.7		15.5	23.54	47.09	1365.5	44%		24.4	32.42	64.84	1880.4	
Newby Island Landfill - Milpitas	45	1,619	4.44	8.87	399.2		8.5	12.95	25.90	1165.7	24%		13.4	17.83	35.67	1605.1	
John Smith Landfill - Hollister	17	74	0.20	0.41	6.9		0.4	0.59	1.18	20.1	1%		0.6	0.82	1.63	27.7	
		6,631	18.17	36.33	**1343.8**	**74.0**	34.9	53.05	106.09	**3923.9**		**74.0**	54.9	73.05	146.09	**5403.2**	**74.0**
Total			86.31	172.62	**7348.1**	**85.1**	100	186.19	372.38	**15060.2**		**80.9**	158	244.19	488.38	**19547.6**	**80.1**
								Increase in Trucks	**Increase in Trips**					**Increase in Trucks**	**Increase in Trips**		
								100	**200**					**158**	**316**		

[1] Source: Z-Best Products. Total number of truck loads sent and received in 2018 as recorded by on-site scale reports.

[2] Additional truck loads compared to existing conditions.

[3] Peak leaf season in the fall and heavy volume in the spring. The increased tonnage during these 20 days would result in an additional 58 truck trips.

Average Existing Daily Truck Loads

The total number of truck loads sent or received to each origin/destination facility for the entire year were divided by 365 to estimate average daily truck loads.

Average Daily Truck Loads under Project Conditions (Non-Peak Season)

Based on estimates provided by Z-Best, the proposed expansion of the facility would result in an average increase of 100 daily trucks/loads (200 daily trips) during the non-peak season. Trucks loads are estimated to increase to/from the following origin/destination facilities and are shown in Table 3:

- An average increase of 57 daily loads (114 daily trips) received from GreenWaste Recovery San Jose.
- An average increase of 8 daily loads (16 daily trips) of finished products delivered to customers within a 100-mile radius.
- An average increase of 35 daily loads (70 daily trips) split in the same proportion to the four landfill facilities currently being served. This estimate is based on approximately 12,731 loads of additional trash/ADC generated per year with the proposed project.

Average Daily Truck Loads under Project Conditions (Peak Season)

Based on estimates provided by Z-Best, the proposed expansion of the facility would result in an average increase of 158 daily trucks loads (316 daily trips) during the peak 20-day season. Trucks loads are estimated to increase to/from the following origin/destination facilities and are shown in Table 3:

- An average increase of 90 daily loads (180 daily trips) received from GreenWaste Recovery San Jose. The estimated increase is 33 loads (66 trips) more than the estimate for the non-peak season.
- An average increase of 13 daily loads (26 daily trips) of finished products delivered within a 100-mile radius. The estimated increase is 5 loads (10 trips) more than the estimate for the non-peak season.
- An average increase of 55 daily loads (110 daily trips) split in the same proportion to the four landfill facilities currently being served. The estimated increase is 20 loads (40 trips) more than the estimate for the non-peak season.

AECOM
300 Lakeside Drive
Suite 400
Oakland
CA 94612
aecom.com

To: Ms. Valerie Negrete
County of Santa Clara
Department of Planning and Development
70 West Hedding Street, 7th Floor East Wing
San Jose, CA 95110

CC: Sam Gutierrez
Emmanuel Ursu
Lizanne Reynolds

Project name: Z-Best Composting Facility – CEQA Services

Project ref: 60666256

From: Scott Shea, Senior Traffic Engineer
Emma Rawnsley, Project Manager

Date: April 6, 2023

Memorandum: Traffic Safety Analysis

1. Introduction and Summary of Findings

This memorandum provides an analysis of the traffic safety impacts of the proposed driveway relocation for the Z-Best Composting facility. The driveway is proposed to be relocated to form the fourth leg of the Bolsa Road and State Route 25 (SR-25) intersection in Gilroy, California, located approximately at postmile SCL 0.639 and SR-25 statewide odometer: 72.71. Additionally, center deceleration and acceleration lanes and a right turn deceleration lane are proposed as part of the driveway relocation.

Collision data from the Statewide Integrated Traffic Records System (SWITRS) was used to analyze crashes in the project study limits on SR-25 and Bolsa Road for the 5-year period between January 1, 2016, and December 31, 2020. The evaluation looked at crashes extending 250-feet from each intersection approach and along the existing Z-Best driveway approximately 600-feet northwest of the intersection. The 5-year combined crash history shows an average of 2.8 crashes a year for the area.

The study applies the Highway Safety Manual (HSM) predictive method and safety performance function (SPF) to predict average crash frequency under the following scenarios and assuming increase in traffic volumes associated with the Project:

- Proposed Project: 4-leg minor-approach stop-controlled intersection with northbound center deceleration and acceleration lanes and southbound right turn deceleration lane accessing the relocated Z-Best driveway.
- Alternative 3: Project without driveway realignment but with addition of a center northbound deceleration and acceleration lane and a southbound right turn deceleration lane for accessing Z-Best at the original driveway location. No changes to Bolsa Road intersection.

In addition, due to a proposal by Caltrans to install a center acceleration lane (refuge lane) for left turns from Bolsa Road onto southbound SR-25 and a center deceleration lane for left turns from southbound SR-25 onto Bolsa Road, the following cumulative scenarios were also analyzed:

- Proposed Project with Caltrans Project (Cumulative Condition): 4-leg minor-approach stop-controlled intersection with northbound and southbound center deceleration and acceleration lanes and a southbound right turn deceleration lane accessing the relocated Z-Best driveway.
- Alternative 3 with Caltrans Project: Project without driveway realignment but with addition of a center northbound deceleration and acceleration lane and a southbound right turn deceleration lane for accessing Z-Best at the original driveway location. Caltrans to restripe the Bolsa Road intersection to include a center acceleration lane (refuge lane) for left turns from Bolsa Road onto southbound SR-25 and a center deceleration lane for left turns from southbound SR-25 onto Bolsa Road.

In addition, a signalized intersection option was analyzed for comparison with the other scenarios:

- Project with Signal: 4-leg signalized intersection with left turn lanes and intersection lighting.

A crash frequency summary under the existing condition and for the five scenarios is summarized in Table 1, below. The study finds that the Proposed Project will reduce the predicted number of annual crashes in the study area, from an average of 2.8 crashes per year to 1.77 crashes per year for the study area.

Given the large discrepancy between actual crash distribution for the study area and typical values for intersection types based on more generalized data, it is difficult to draw quantitative conclusions about the impact the Project would have on crash type and injury severity distribution in the study area. In general, realigning two 3-leg intersections to become a single 4-leg stop-controlled intersection is expected to increase the proportion of broadside crashes, which are more likely to be severe crashes. Therefore, the proportion of higher severity crash types (broadside/angle crashes) could occur as a result of the Project as a 4-leg stop-controlled intersection. Mitigation for broadside crashes at intersections is most effective by the installation of a traffic signal.

Furthermore, a large proportion of crashes in the study area have occurred during dark conditions, and the project would substantially increase the volume of night-time trips.

Utilizing the existing driveway location but adding acceleration and deceleration lanes (i.e., Alternative 3 from the Draft EIR) is predicted to decrease the number of crashes at the existing driveway location, but slightly increase the number of crashes at the Bolsa Road intersection due to the increase in vehicles through the intersection. Adding intersection lighting to the existing driveway and Bolsa Road intersection (in addition to other Alternative 3 improvements) is predicted to decrease the crash rate at both locations to below the existing crash rates for each intersection and the total project area but is unlikely to substantially change the proportion of existing higher severity crash types.

Signalization of the 4-leg intersection (including intersection lighting and left turn-lanes) would result in a total crash frequency of 2.1 crashes per year and is predicted to decrease the number the of broadside crashes, which are typically more severe than other crash types.

Table 1: Existing and Predicted Crash Frequency Summary

Scenario	Crashes per Year[1]		
	Driveway	**Intersection**	**Total**
Existing Conditions, Historical Crashes	1	1.8	2.8
Proposed Project[2] • 4-leg Minor Approach Stop-Controlled	0	1.77	1.77
Alternative 3[3] • No driveway relocation	0.8	1.81	2.61
Proposed Project Plus Cumulative[4] • 4-leg Minor Approach Stop-Controlled	0	1.49	1.49
Alternative 3 Plus Cumulative[5] • No driveway relocation	0.8	1.3	2.1
Proposed Project with Traffic Signals[6]	0	2.1	2.1

Notes:

1. *Values for Existing Conditions based on 5-year crash history from 2016 through 2020. For other scenarios, values are predicted using HSM predictive method and SPF.*
2. *This scenario may increase the proportion of high severity crashes compared to existing conditions.*
3. *This scenario is not anticipated to substantially change the proportion of high severity crashes.*
4. *Geometry in this layout is not typical. The safety benefits may not be realized due to unfamiliar driver expectancy. This scenario may also increase the proportion of high severity crashes compared to existing conditions.*
5. *This scenario is not anticipated to substantially change the proportion of high severity crashes.*
6. *This scenario is anticipated to reduce the proportion of high severity crashes compared to existing conditions.*

2. Geometric Conditions

Existing Conditions

The existing 3-leg intersection is shown in Figure 1, with Bolsa Road connecting to SR-25. SR-25 is a two-lane, two-way principal arterial roadway and is the main through movement for the intersection. Bolsa Road is a two-lane, two-way roadway and is currently stop-controlled as the minor approach leg for the intersection. Visible in Figure 1 is queueing on southbound Bolsa Road to turn onto SR-25. The posted speed limit on SR-25 is 55 miles per hour (mph), and 40 mph on Bolsa Road. The existing Z-Best driveway is located northwest of the 3-leg intersection by approximately 600-feet.

Figure 1: Existing 3-leg intersection of Bolsa Road and SR-25.

Proposed Project

The Proposed Project would relocate the existing Z-Best driveway to become the fourth leg of the Bolsa Road intersection. Figure 2 shows a simplified intersection layout representing this scenario. The new 4-leg intersection would have the following geometry:

- Minor Stop-Controlled 4-Leg Intersection
- Center deceleration lane for left turns into relocated Z-Best driveway from northbound SR-25
- Center acceleration lane for left turns out of relocated Z-Best driveway onto northbound SR-25
- Shoulder deceleration lane for right turns into relocated Z-Best driveway from southbound SR-25.

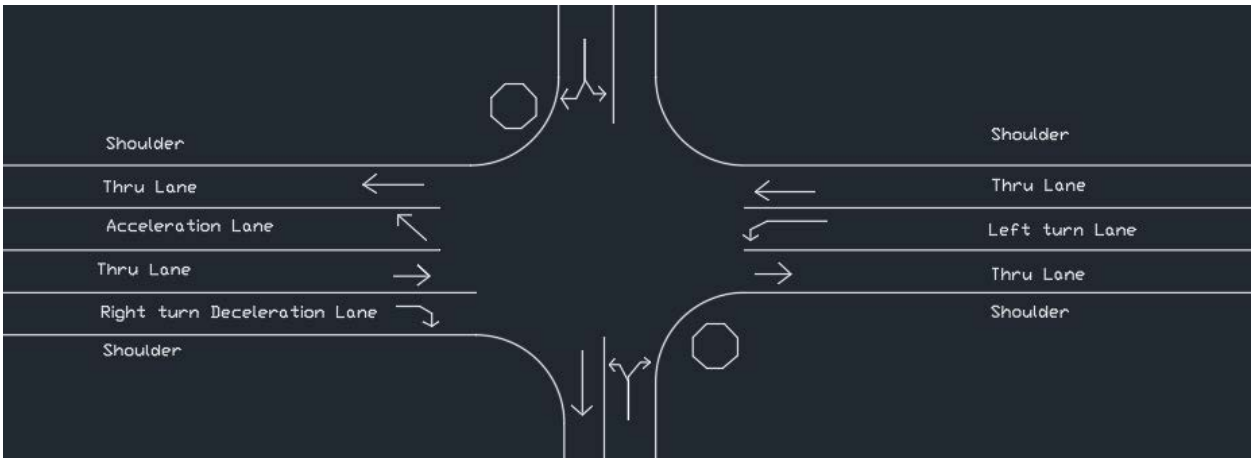


Figure 2: Conceptual Intersection Layout for Proposed Project (not to scale)

Alternative 3

The Alternative 3 scenario assumes the following intersection geometry:

- No driveway relocation
- No changes to Bolsa Road intersection
- Center deceleration lane for left turns into existing Z-Best driveway from northbound SR-25
- Center acceleration lane for left turns out of existing Z-Best driveway onto northbound SR-25
- Shoulder deceleration lane for right turns into existing Z-Best driveway from southbound SR-25

Figure 3 shows a simplified intersection layout representing this scenario.

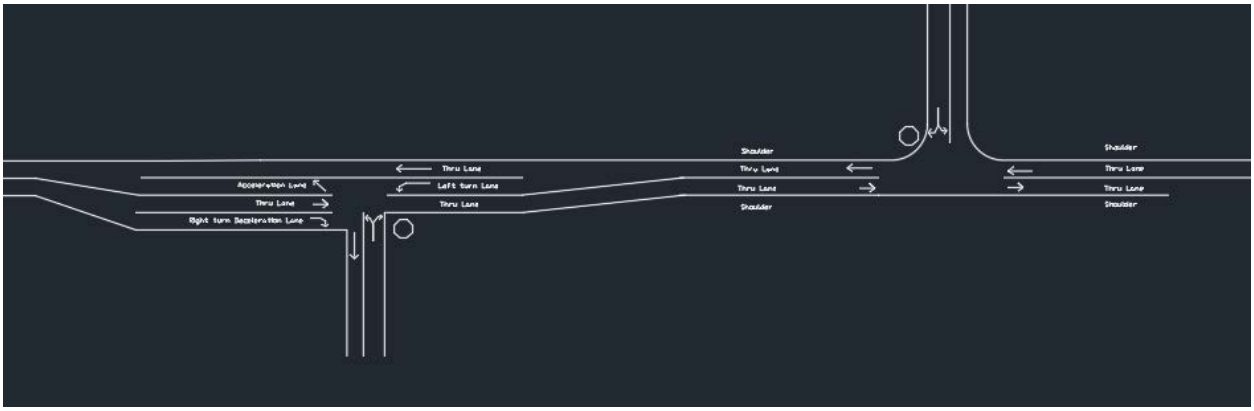


Figure 3: Conceptual Intersection Layout for Alternative 3 Scenario (not to scale)

Cumulative Conditions

To improve traffic operations and safety at the SR-25/Bolsa Road intersection, Caltrans intends to restripe the intersection to include a central receiving lane (refuge lane) for traffic turning left out of Bolsa Road onto southbound SR-25[1], and a central left turn deceleration lane for traffic turning left from southbound SR-25 onto Bolsa Road. A conceptual layout of the proposed restriping is shown in Figure 4.

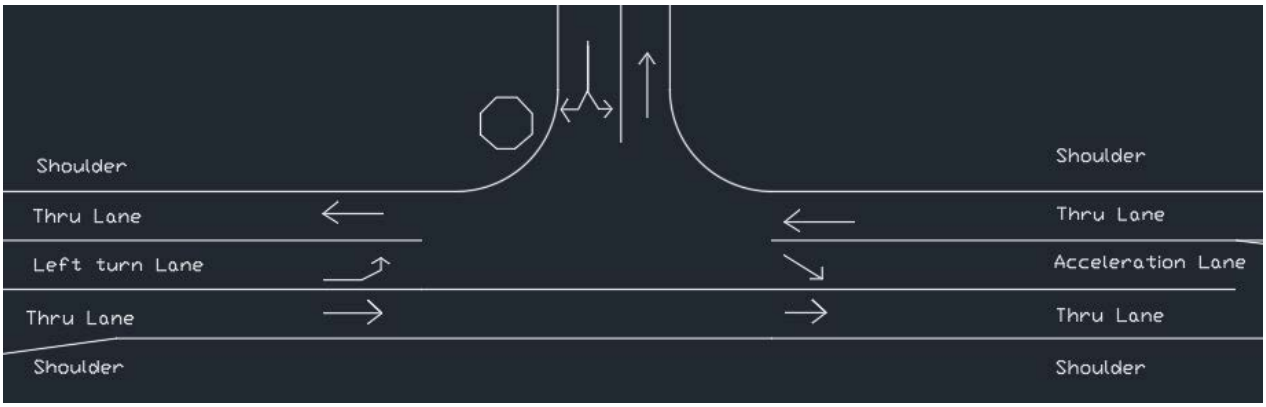


Figure 4: Conceptual Layout of Caltrans' Proposed Restriping Project (not to scale)

Although this new intersection layout is not currently part of the existing conditions, Caltrans has indicated it will be constructed during the summer of 2023, which is prior to construction of Z-Best's Proposed Project. Therefore, this memorandum considers a "Project plus Cumulative" scenario where both the improvements proposed by Z-Best and the Caltrans' proposed restriping project would be installed. In addition, an "Alternative 3 plus Cumulative" scenario is also considered.

Project + Cumulative

Figure 5 shows a simplified intersection layout representing the Project + Cumulative scenario, which assumes the following intersection geometry:

- Minor Stop-Controlled 4-Leg Intersection
- Center deceleration lane for left turns into relocated Z-Best driveway from northbound SR-25
- Center acceleration lane for left turns out of relocated Z-Best driveway onto northbound SR-25
- Shoulder deceleration lane for right turns into relocated Z-Best driveway from southbound SR-25.
- Center deceleration lane for left turns into Bolsa Road from southbound SR-25.
- Center acceleration lane for left turns out of Bolsa Road onto southbound SR-25

[1] Email from Arun Guduguntla, Caltrans Project Manager to Bharat Singh, County of Santa Clara Planning Department. Subject: Bolsa Rd./SR 25 Intersection – Proposed Project. Date: August 31, 2022. Attachment: Bolsa Rd_Rte 25_Re-stripe Option rev red.pdf.

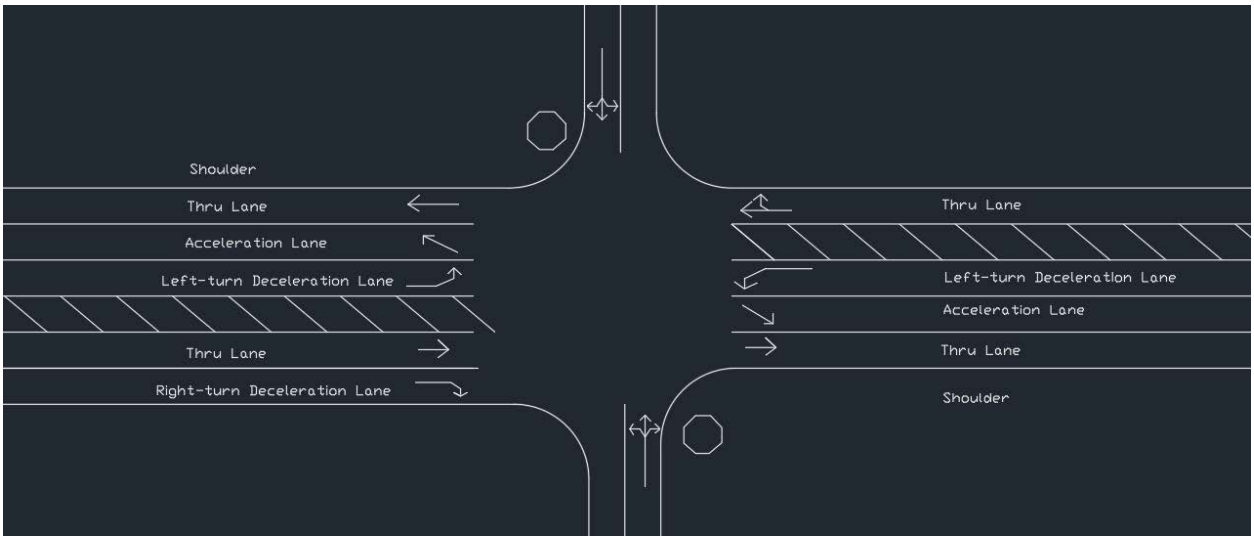


Figure 5: Conceptual Intersection Layout for Project + Cumulative Scenario (not to scale)

Alternative 3 plus Cumulative

Figure 6 shows a simplified intersection layout representing the Alternative 3 + Cumulative scenario, which assumes the following intersection geometry:

- No driveway relocation.
- Center deceleration lane for left turns into existing Z-Best driveway from northbound SR-25.
- Center acceleration lane for left turns out of existing Z-Best driveway onto northbound SR-25.
- Shoulder deceleration lane for right turns into existing Z-Best driveway from southbound SR-25.
- Shoulder acceleration lane for right turns out of existing Z-Best driveway onto southbound SR-25.
- Center acceleration lane for left turns out of Bolsa Road onto southbound SR-25.
- Center deceleration lane for left turns onto Bolsa Road from southbound SR-25.

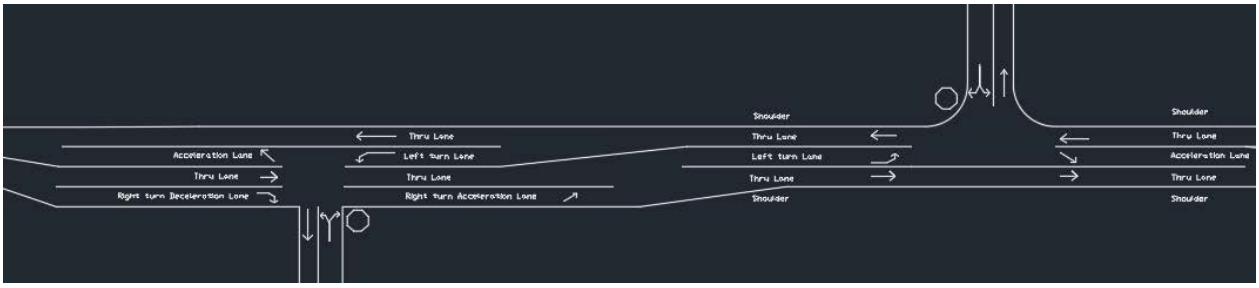


Figure 6: Conceptual Intersection Layout for Alternative 3 + Cumulative Scenario (not to scale)

3. Previous Traffic Impact Assessment and Peer Review

The Intersection Control Evaluation (ICE) report dated May 27, 2020, reviewed five options modifying the intersection. The preferred operational alternative from the ICE included relocating the driveway to intersection and to maintain stop-control for the minor streets of Bolsa Road and the driveway.

The original Draft EIR prepared for the Z-Best Composting Facility Upgrade and Expansion Project (released for public comment in January 2021) determined that relocating the Z-Best driveway to form the fourth leg of the Bolsa Road/SR-25 intersection would not have a significant safety impact due to the proposed provision of receiving lanes and deceleration lanes and because most of the additional traffic associated with the Project would not occur during peak hours.

AECOM met with the County Roads and Airports (R&A) staff to understand concerns regarding the Proposed Project access and applicable safety standards. The R&A staff indicated the original Draft EIR did not acknowledge the existing traffic safety issues at the Bolsa Road intersection and did not adequately consider the impacts of existing Z-Best traffic movements which would be relocated to the new intersection (in addition to the proposed increase in traffic movements) which may amplify existing safety issues. R&A staff also indicated concern regarding non-peak hour traffic safety impacts, as the previous analysis only considered peak-hour movements, and concern regarding dark and fog conditions.

4. Crash History

Collision data from SWITRS was utilized to analyze crashes in and around the project study limits on SR-25 and Bolsa Road for a 5-year period between January 1, 2016 and December 31, 2020. The safety evaluation looked at all crashes extending 250-feet along each approach leg of the intersection. The southbound SR-25 approach was extended to the existing Z-Best driveway to account for similar interactions that could take place if the driveway is moved to the Bolsa Road intersection.

A total of 21 crashes were identified to be within the intersection study area during the 5-year study period. A total of 9 crashes were flagged in crash reports as intersection related crashes at Bolsa Road, and 5 crashes occurred near the existing Z-Best driveway. The AM peak period had 3 crashes while the PM peak period had 11 crashes. Late night or early morning crashes have not been a concern, as no crashes were reported before 5:00AM or after 10:00PM, however, 9 crashes were flagged as having occurred in dark conditions. None of the crashes involved pedestrians and none of the crashes were reported as having alcohol involved. Table 2 shows the study intersection crash frequency count by year and indicates how many were intersection related.

Table 2: Crash History Frequency by Year

Year	Crash Count	Intersection Related
2016	5	3
2017	3	1
2018	5	2
2019	5	2
2020	3	1
Total	21	9

Table 3 provides the breakdown of crash frequency by injury severity. There were two reported fatal crashes. One fatal crash occurred in fog conditions, at approximately 7:30AM, near the existing Z-Best driveway location and involved a heavy truck. The second fatality occurred at 5:50PM in dark conditions with no street lighting. All the intersection related crashes were identified as injury crashes.

Table 3: Crash History by Injury Severity

Injury Severity	Crash Count
Fatal	2
Severe Injury	1
Apparent Injury	3
Possible Injury	15
Property Damage Only	0
Total Crashes	21
Total Fatal Injuries	2

Table 4 provides the breakdown of crash frequency and proportion of crash type. Twelve (12) of the 21 crashes were broadside (angle) crashes, where one vehicle hits the side of another vehicle commonly from turning onto the roadway from a side street or driveway. Eight (8) of the 12 broadside crashes were marked as intersection related, however of the remaining 4 broadside crashes, 2 of them are likely incorrectly marked due to their location being less than 100 feet from the intersection and the other 2 were at the Z-Best driveway. All 5 rear end crashes occurred during the PM peak hours of 4:00PM and 7:00PM. Both fatalities were broadside crashes caused by failure to yield the right-of-way.

Crash type proportions for 3-leg intersections are typically 27% broadside crashes (Highway Safety Manuel, 2010). The study area is essentially two separate 3-leg intersections and has historically seen 57% of crashes as broadside crashes– more than double the proportion for typical 3-leg intersections.

Table 4: Crash History by Crash Type

Crash Type	Crash Count	Proportion
Head-On (A)	1	4.8%
Sideswipe (B)	2	9.5%
Rear End (C)	5	23.8%
Broadside (D)	12	57.1%
Overturned (F)	1	4.8%
Total	21	100%

5. Nighttime / Off-Peak Considerations

The study area has a large proportion of crashes that are marked with lighting condition as "Dark - No Street Lights." Nine (9) of the 21 study crashes occurred in dark conditions, and an additional crash occurred near dawn. Dark or near dawn condition crashes accounted for 43% of the total crashes in the study area. Two (2) of the crashes were between 5:05AM and 6:45AM, while the remaining 7 crashes were between 5:49PM and 9:50PM. Of the 9 crashes in dark conditions, 4 were broadside crashes. Of those crashes that were marked as intersection related, 2 of the 9 crashes (22 percent) occurred in dark conditions. Of the crashes that occurred near the Z-Best driveway, 4 of the 5 crashes occurred in the dark (80 percent). In general, however, only an estimated 25% of all driving is at night[2].

6. Safety Analysis Predictive Method

The Highway Safety Manual (HSM) provides a predictive method and safety performance function (SPF) for estimating the expected average crash frequency for rural two-lane, two-way roadways and intersections. The predictive method is based on the average annual daily traffic of the major and minor roadways at an intersection which is then calibrated to local conditions. The appendix provides a review of the HSM predictive method and calculations used in the safety analysis. Results are presented in Section 8 below.

7. Other Factors for Consideration

In addition to the predicted number of crashes that might result from the Project and other scenarios, the crash type and the proportion of broadside crashes may change due to different roadway configuration. Table 5 shows the proportion of crash types for various intersection configurations, based on generalized crash history data for rural roads in California from 2002 to 2006, as well as the actual proportion of crash types that occurred in the study area between 2016 and 2020.

Broadside crashes are typically more severe than other crash types at intersections such as side swipe or rear-end crashes. Crash type proportions for 3-leg intersections are typically 23.7% broadside crashes; however, the study area, which is essentially two separate 3-leg

[2] https://www.nsc.org/road-safety/safety-topics/night-driving

intersections, has historically seen more than double the proportion of broadside crashes than for typical 3-leg intersections.

Table 5: Actual and Predicted Crash Distribution

Crash Type	Study Area Crash History	Typical 3-leg	Typical 4-leg (stop control)	Typical 4-leg (signalized)
Head-On (A)	4.8%	3.2%	4.0%	5.4%
Sideswipe (B)	9.5%	9.7%	10.1%	11.8%
Rear End (C)	23.8%	27.8%	24.2%	42.6%
Broadside (D)	57.1%	23.7%	43.1%	27.4%
Overturned (F)	4.8%	1.3%	0.5%	0.3%

Source: Study area crash history from SWITRS; other values from Highway Safety Manual, 2010.

Typical 4-leg stop controlled intersections have 43% broadside crashes, which is more than typical 3-leg stop controlled intersections but less than the actual crash history for the study area. Typical 4-leg signalized intersections have 27% broadside crashes.

In general, realigning two 3-leg intersections to become a single 4-leg strop-controlled intersection would be expected to result in an overall higher proportion of broadside crashes. Given the large discrepancy between historic crash distribution for the study area and typical values based on more generalized data, it is difficult to draw quantitative conclusions about the impact the Project would have on crash distribution.

The severity of crashes is typically associated with the type of crash. Higher proportions of broadside and head-on crashes will typically result in corresponding proportions of higher severity crashes. Table 6 shows the proportion of injury severity crashes for the existing study area crash history, as well as typical proportions for other 3-leg, 4-leg stop controlled, and 4-leg signalized intersections. The existing proportion of fatal and incapacitating injuries is almost 15% of all crashes, which is nearly 3 times the normal rate. The proposed realignment of the Z-Best driveway to become the fourth leg of the Bolsa Road intersection will likely result in an increase in the proportion of higher severity crashes as is typical for a change in intersection geometry from a 3-leg to a 4-leg stop controlled. The proportion of fatal and incapacitating injuries is greatly reduced when installing a signal at typical 4-leg intersections.

Table 6: Actual and Predicted Crash Severity

Crash Type	Study Area Crash History	Typical 3-leg	Typical 4-leg (stop control)	Typical 4-leg (signalized)
Fatal (K)	9.5%	1.7%	1.8%	0.9%
Incapacitating (A)	4.8%	4.0%	4.3%	2.1%
Non-Incapacitating (B)	14.3%	16.6%	16.2%	10.5%
Possible Injury (C)	71.4%	19.2%	20.8%	20.5%
Property Damage Only (PDO)	0.0%	58.5%	56.9%	66.0%

Source: Study area crash history from SWITRS; other values from Highway Safety Manual, 2010.

Alternative 3, which would retain both the existing driveway and Bolsa Road intersection and would add deceleration and acceleration lanes at the existing Z-Best driveway location is not anticipated to substantially change the proportion of broadside or severe injury crashes, as both would continue to operate as separate 3-leg intersections.

8. Safety Analysis Results

Safety Analysis of Proposed Project

Caltrans reports the AADT at the study location on SR-25 as 27,300 vehicles (major roadway). With the additional 264 trips generated by the Proposed Project, the major road AADT for this scenario is estimated at 27,564. Based on vehicle counts performed for the ICE report, the estimated AADT for the Bolsa Road is 1,500. Under project conditions, the traffic volume coming from the relocated Z-Best driveway would be 654 (390 existing site traffic plus 264 additional trips generated by the project), as reported in the operational traffic assessment undertaken by Hexagon in 2020. The minor road AADT with the redevelopment will be estimated at 2,154

The calibrated crash frequency prediction for the study intersection as a 4-leg minor-stop controlled intersection (with no other changes to the geometry) is 2.86 crashes per year (see Appendix A). The average 5-year crash history for the existing 3-leg intersection is 1.8 crash per year and the Z-Best driveway has an average crash frequency of 1.0 crashes per year, making a combined total of 2.8 crashes per year for the study location. The result of combining the 3-leg intersection and the Z-Best driveway to a single 4-leg intersection (with no other changes to the geometry) would be an estimated average increase of 1.06 crashes per year.

However, the Proposed Project includes adding a center northbound deceleration and acceleration lane into and out of the relocated driveway, as well as a southbound right turn deceleration lane into the relocated driveway. Installing a left turn lane on the major roadway of a 4-leg stop controlled intersection has a CMF of 0.72 for all crashes.[3] Adding a left turn lane on one major roadway approach provides the space for a receiving acceleration lane for the left turns entering the major roadway, however no specific CMF is available to quantify the effect of an acceleration lane on an undivided highway. Installing a right turn lane on the major roadway of a 4-leg stop-controlled intersection has a CMF of 0.86.[4] The resulting calculated average annual crash frequency for the Proposed Project is 1.77, shown in Table 7 (see appendix for detailed calculations). This represents a decrease of 0.03 crashes per year at the Bolsa Road intersection (from 1.8 to 1.77) and a decrease of 1.03 crashes per year in the overall study area (from 2.8 to 1.77) due to the elimination of crashes at the existing driveway location.

Table 7: Predicted Crash Frequency for Proposed Project

Scenario	**Predicted Crash Frequency (crashes per year)**		
	Existing Driveway	**Bolsa Intersection**	**Total**
Existing Conditions	1	1.8	2.8
Proposed Project	0	1.77	1.77
Change compared to Existing	-1	-0.27	-0.27

[3] Highway Safety Manual Table 10-13
[4] Highway Safety Manual Table 10-14

Note that the addition of intersection lighting is not part of the Proposed Project, but if added to the reconfigured intersection would further reduce the predicted crash frequency (particularly for those occurring during dark conditions) at the Bolsa Road intersection (and the study area overall) to 1.62 crashes per year.

Safety Analysis of Alternative 3

Under the Alternative 3 scenario, all existing (390 trips per day) and proposed (264 trips per day) Z-Best traffic would continue to use the existing Z-Best driveway, with approximately half traveling to/from the north and half to/from the south. The major and minor road AADT at the Z-Best intersection under Alternative 3 would therefore be 27,564 and 654, respectively. The major and minor road AADT at the Bolsa Road intersection under Alternative 3 would be 27,432 and 1500, respectively.

The Alternative 3 layout is predicted to decrease the existing annual crashes in the study area from 2.8 annual crashes to 2.61 crashes per year, shown in Table 8 (see appendix for detailed calculations). Specifically, the crashes at the Z-Best driveway are predicted to decrease from 1.0 annual crashes to 0.8 crashes per year, or a reduction of 0.2 crashes per year. The predicted crash rate at the Bolsa Road intersection would increase slightly (0.01 crashes per year) due to the slight increase in through-traffic associated with the Project. This small increase in crashes at the Bolsa Rd intersection would be offset by the larger decrease in crashes at the driveway location.

Table 8: Predicted Crash Frequency for Alternative 3

Scenario	**Predicted Crash Frequency (crashes per year)**		
	Existing Driveway	**Bolsa Intersection**	**Total**
Existing Conditions	1	1.8	2.8
Alternative 3	0.8	1.81	2.61
Change compared to Existing	-0.2	+0.01	-0.19

If specific mitigation is desired at the Bolsa Road intersection to address the slight increase in predicted crash frequency, adding intersection lighting would further improve safety, particularly for crashes occurring during dark conditions. During a meeting between County and Caltrans staff in March 2023, Caltrans staff requested that a right turn acceleration lane be included for traffic turning right out of the existing Z-Best driveway onto southbound SR-25 if this option were recommended, to allow traffic exiting the facility to increase speed prior to merging into the through-lane. The predicted crash frequency for Alternative 3 with the addition of intersection lighting and a right turn acceleration lane would be 0.56 crashes per year at the driveway and 1.66 crashes per year at the Bolsa Road intersection (i.e., 2.21 crashes per year for the study area).

Safety Analysis of Project + Cumulative

Consideration was made for combining the Proposed Project and Caltrans' proposed restriping project. Traffic volumes for this scenario would be the same as described for the Proposed Project. A CMF of 0.52 was applied to account for Caltrans' proposed new left turn deceleration

lane on southbound SR-25 into Bolsa and the project's left turn lane from northbound SR-25 into the Z-Best driveway. No specific CMF is related to adding an acceleration lane for a left turn lane on an undivided highway. The resulting calculated average annual crash frequency for the cumulative Project and Caltrans' proposed restriping project is 1.49, shown in Table 9.

Table 9: Predicted Crash Frequency for Project + Cumulative

Scenario	Predicted Crash Frequency (crashes per year)		
	Existing Driveway	Bolsa Intersection	Total
Existing Conditions	1	1.8	2.8
Project + Cumulative	0	1.49	1.49
Change compared to Existing	-1	-0.31	-1.31

If intersection lighting were also installed, the predicted crash frequency for this scenario would reduce to 1.35 crashes per year for the Bolsa Road intersection and the study area as a whole.

NOTE: The combined projects of adding a left turn lane into both Bolsa Road and the Z-Best driveway as well as acceleration lanes for left turns out of both minor approaches will create a complex and unfamiliar driving condition. The typical geometry will overlap when adding both projects and as a result will require additional widening to accommodate the necessary turn lanes and painted medians that would be required to avoid negative offset. This additional widening would be unfamiliar for drivers as the receiving acceleration lane for the left turns would be an additional lane further out. The quantitative expected safety results will likely not be realized for the predicted crash frequency.

Safety Analysis of Alternative 3 + Cumulative Caltrans

An analysis determined the predicted crash frequency if the intersection layout from Alternative 3 (the Z-Best driveway is kept in its current location while also adding traffic from the proposed re-development and associated acceleration/deceleration lanes) and adding a center deceleration lane for vehicles turning left from southbound SR-25 onto Bolsa and a center acceleration lane for vehicles turning left from Bolsa Road onto southbound SR-25, as proposed by Caltrans. This scenario also includes a right turn acceleration lane for trucks exiting the Z-Best driveway onto southbound SR-25, as requested by Caltrans. As noted earlier, a CMF of 0.75 is applicable for the left turn deceleration lane, but no specific CMF is related to adding acceleration lanes. The resulting calculated average annual crash frequency for the cumulative Alternative 3 and Caltrans' proposed restriping project is 1.3, shown in Table 10.

Table 10: Predicted Crash Frequency for Alternative 3 + Cumulative

Scenario	Predicted Crash Frequency (crashes per year)		
	Existing Driveway	Bolsa Intersection	Total
Existing Conditions	1	1.8	2.8
Alternative 3 + Cumulative	0.80	1.3	2.1
Change compared to Existing	-0.2	-0.5	-0.7

If intersection lighting were also installed, the predicted crash frequency for this scenario would reduce to 1.75 crashes per year for the study area.

Safety Analysis of Project plus Signal

As discussed previously, the Proposed Project and Project + Cumulative scenarios are predicted to decrease the overall number of crashes at the Bolsa Road intersection but may increase the proportion of broadside crashes compared to existing conditions. The Alternative 3 and Alternative 3 + Cumulative scenarios would be expected to reduce the number of overall crashes and are unlikely to substantially change the proportion of crash types. Furthermore, the complex and unfamiliar geometry of the Project + Cumulative layout may mean that the predicted reduction in crash frequency may not be realized.

The proportion of fatal and incapacitating injuries is greatly reduced when installing a signal at typical 4-leg intersections, therefore a signalized 4-leg intersection was also analyzed.

Signalization of the Bolsa Road intersection with left turn lanes on SR-25 and at the Z-Best driveway is predicted to result in a crash rate of 2.1 crashes per year, shown in Table 11. This is 0.7 fewer annual crashes than the existing conditions for the overall study area, but an increase of 0.3 annual crashes for the Bolsa Road intersection alone. However, signalization is highly effective at reducing the specific crash types of angle and broadside crashes. The CMF for adding a signal for angle crashes at rural intersections is 0.23 or 77% reduction in angle crashes.[5] The 5-year crash history showing 8 intersection broadside crashes (1.6 broadside crashes/year), including 2 fatalities, would be predicted to reduce to 0.37 broadside crashes per year.

Table 11: Predicted Crash Frequency for Project plus Signals

Scenario	**Predicted Crash Frequency (crashes per year)**		
	Existing Driveway	**Bolsa Intersection**	**Total**
Existing Conditions	1	1.8	2.8
Project + Signals	0	2.1	2.1
Change compared to Existing	-1	+0.3	-0.7

[5] http://www.cmfclearinghouse.org/detail.cfm?facid=326

9. Conclusion

The Proposed Project as a 4-leg stop-controlled intersection would decrease the predicted number of annual crashes in the study area and at the Bolsa Road intersection (see Table 7 above). However, it is predicted to change the type and severity of the crashes that occur. When the minor street is stop-controlled on a 4-leg intersection, the proportion of higher severity crashes typically increases, such as increasing broadside crashes. The study intersection already includes a higher than normal proportion of high severity crashes, and it is uncertain what the proportion of higher severity crashes will be with the Proposed Project.

Utilizing the existing driveway location but adding acceleration and deceleration lanes (i.e., Alternative 3) is predicted to decrease the number of crashes at the existing driveway location, but slightly increase the number of crashes at the Bolsa Road intersection due to the increased traffic volume. Adding intersection lighting to the existing driveway and Bolsa Road intersection (in addition to other Alternative 3 improvements) is predicted to decrease the crash rate at both locations to below the existing crash rates for each intersection and the total project area. Furthermore, this scenario is unlikely to substantially change the proportion of higher severity crash types, as both the Bolsa Road intersection and the Z-Best driveway would continue to operate as separate 3-leg vehicle interactions, However, because the frequency of all crashes is being reduced the number of severe crashes will also reduce proportional to the existing crash history.

The Caltrans' proposal to add acceleration and deceleration lanes for southbound traffic turning left into or out of Bolsa Road, when combined with the Proposed Project, has a qualitative mitigation strategy based on crash and operations history. However, the cumulative project would create an uncommon and less intuitive roadway configuration; therefore, the predicted safety improvements may not be realized due to driver error.

The Caltrans' proposal in conjunction with Alternative 3 would reduce predicted crash frequency at both the existing driveway and Bolsa Road intersection (and the study area overall) and would not be expected to increase the proportion of severe crashes.

Signalizing the 4-leg intersection (Project plus Signals) would increase the number of crashes at the Bolsa Road intersection, but would decrease the overall crash rate in the study area and would also reduce the proportion of crashes that would be higher severity.

A summary of the predicted crash frequency for all scenarios is provided in Table 12.

Table 12: Existing and Predicted Crash Frequency Summary

Scenario	Crashes per Year[1]		
	Driveway	**Intersection**	**Total**
Existing Conditions, Historical Crashes	1	1.8	2.8
Proposed Project[2] • 4-leg Minor Approach Stop-Controlled	0	1.77	1.77
Alternative 3[3] • No driveway relocation	0.8	1.81	2.61
Proposed Project Plus Cumulative[4] • 4-leg Minor Approach Stop-Controlled	0	1.49	1.49
Alternative 3 Plus Cumulative[5] • No driveway relocation	0.8	1.3	2.1
Proposed Project with Traffic Signals[6]	0	2.1	2.1

Notes:

1. *Values for Existing Conditions based on 5-year crash history from 2016 through 2020. For other scenarios, values are predicted using HSM predictive method and SPF.*
2. *This scenario may increase the proportion of high severity crashes compared to existing conditions.*
3. *This scenario is not anticipated to substantially change the proportion of high severity crashes.*
4. *Geometry in this layout is not typical. The safety benefits may not be realized due to unfamiliar driver expectancy. This scenario may also increase the proportion of high severity crashes compared to existing conditions.*
5. *This scenario is not anticipated to substantially change the proportion of high severity crashes.*
6. *This scenario is anticipated to reduce the proportion of high severity crashes compared to existing conditions.*

Appendix – HSM Predictive Method

Base Conditions

Equation 1: HSM Predictive Method for Average Crash Frequency at Intersections

$$N_{predicted\ int} = N_{spf\ int}\ x\ C_i\ x\ CMF_i$$

Where:

$N_{predicted\ int}$ = predicted average crash frequency for an individual intersection for the selected year

$N_{spf\ int}$ = predicted average crash frequency for an intersection with base conditions year

CMF_i = crash modification factors for base conditions at intersections, such as shoulder width, lighting, turn lanes, etc.

C_i = calibration factor for specific intersections for a particular jurisdiction or area

Base conditions will be considered the same for the existing and built conditions, so the CMF will be 1.0 for prediction calculations. CMFs are applied to improve safety if the built conditions are worse than the existing condition.

The calibration factor is determined as a ratio of the predicted number of crashes to the crash history at the intersection for base conditions. The existing Bolsa Road intersection is a 3-leg stop controlled intersection with a crash history of 9 crashes in 5 years, or an average of 1.8 crashes per year.

Equation 2: SPF for Three-Leg Strop-Controlled Intersections in the HSM

$$N_{spf\ 3ST} = \exp[-9.86 + 0.79\ x\ ln(AADT_{maj}) + 0.49\ x\ ln(AADT_{min})]$$

Where:

$N_{spf\ 3ST}$ = estimate of intersection-related predicted average crash frequency for base conditions for three-leg minor stop-controlled intersection

$AADT_{maj}$ = AADT (vehicles per day) on the major road (27,300 for SR-25)

$AADT_{min}$ = AADT (vehicles per day) on the minor road (1,500 for Bolsa)

$$N_{spf\ 3ST} = \exp[-9.86 + 0.79\ x\ ln(27{,}300) + 0.49\ x\ ln(1{,}500)] = 6.01$$

The HSM predicted number of crashes for a similar 3-leg stop-controlled intersection is 6.01. The resulting calibration factor is 1.8 historical / 6.01 predicted = 0.30

$N_{predicted\ 3ST} = 6.01\ x\ 0.30\ x\ 1 = 1.8$ intersection related crashes.

The Z-Best driveway observed 5 crashes in 5 years, indicating an average of 1.0 crashes per year. The driveway crashes are added to the 3-leg predicted crashes to get the average crash

prediction in the study area. The predicted existing annual crashes for the study area (3-leg intersection and driveway) is 1.8+1.0 = 2.8 crashes per year.

4-Leg Intersection (Proposed Project)

Equation 3: SPF for Four-Leg Stop-Controlled Intersections in the HSM

$$N_{spf\ 4ST} = \exp[-8.56 + 0.60xln(AADT_{maj}) + 0.61xln(AADT_{min})]$$

Where:

$N_{spf\ 4ST}$ = estimate of intersection-related predicted average crash frequency for base conditions for four-leg minor stop-controlled intersection

$AADT_{maj}$ = AADT (vehicles per day) on the major road (27,564 on SR-25)

$AADT_{min}$ = AADT (vehicles per day) on the minor road (2,154 on Bolsa Road and Z-driveway)

$$N_{spf\ 4ST} = \exp[-8.56 + 0.60xln(27{,}564) + 0.61xln(2{,}154)] = 9.55$$

Apply the $N_{spf\ 4ST}$ to equation 1 and include the calibration factor with base conditions

$$N_{predicted\ 4ST} = 9.55\ x\ 0.30\ x\ 1 = 2.86$$

The predicted number of crashes for a basic 4-leg minor street stop-controlled intersection of SR-25 and Bolsa Road (i.e., no acceleration or deceleration lanes) is 2.86 crashes per year.

The CMF for adding a center left turn deceleration is 0.72. The CMF for applying a right turn deceleration lane is 0.86. No CMF is available for the proposed addition of a center left-turn acceleration lane on an undivided rural highway. Applying the CMFs for left and right turn deceleration lanes is calculated as:

$$N_{predicted\ 4ST\ with\ left\ and\ right\ turn\ lanes} = 2.86x\ 0.72\ x\ 0.86 = 1.77$$

The predicted number of crashes for the Proposed Project's 4-leg minor street stop-controlled intersection of SR-25 and Bolsa Road with center left turn deceleration lane, right turn deceleration lane, and center left turn acceleration lane) is 1.77 crashes per year.

Note: Adding street lighting to the proposed new intersection would further reduce the expected crash frequency where the CMF is calculated using the equation based on proportion of historic night crashes:

$CMF_{lighting\ –\ Bolsa\ Intersection}$ = 1-0.38(Proportion of night crashes) = 1-0.38(0.22) = 0.916.

The predicted crash frequency when adding street lighting at the intersection is calculated as 1.77 x 0.916 = 1.62.

Existing Layout with Additional Traffic (Alternative 3):

The HSM predicted number of crashes for a 3-leg stop-controlled driveway (i.e., the existing Z-Best driveway) will be similar to the predicted crashes at a 3-leg intersection, however the calibration factor will change based on crash history.

The calibration factor for existing conditions is calculated with Equation 2 (above), but with only the 3-leg intersection crashes. The predicted annual crash count for the existing Z-Best 3-leg driveway is 3.1 crashes, calculated as:

$$N_{spf\ 3ST\ Driveway} = \exp\left[-9.86 + 0.79\ x\ ln(27{,}300) + 0.49\ x\ ln(390)\right] = 3.1$$

The resulting calibration factor for the driveway is 1.0 historical / 3.1 predicted = 0.32.

The HSM predicted number of crashes for a similar 3-leg stop-controlled driveway (i.e., no change to intersection geometry) with the additional traffic generated by the project is 4.03 and is multiplied by the calibration factor 0.32 to arrive at a predicted 1.30 annual crashes. Calculated as:

$$N_{spf\ 3ST\ Driveway} = \exp[-9.86 + 0.79\ x\ ln(27{,}564) + 0.49\ x\ ln(1654)] = 4.03\ x\ 0.32 = \ 1.3$$

$AADT_{maj}$ = 27,564: existing AADT on SR-25 + new AADT generated by Proposed Project

$AADT_{min}$ = 654: existing + proposed AADT on the Z-Best driveway

The CMF for applying a center left turn deceleration lane is 0.72. The CMF for applying a right turn deceleration lane is 0.86. No CMF is available for addition of a center left-turn acceleration lane on an undivided rural highway. When applying both of these CMFs, it reduces the predicted annual crash count as 1.3 x 0.72 x 0.86 = 0.8 at the existing Z-Best driveway with additional site traffic and proposed acceleration and deceleration lanes.

The total crash count for the study area under this scenario will include the Bolsa Road Intersection, where the predicted crash count at the 3-leg stop controlled intersection with future traffic volumes is calculated as:

$$N_{spf\ 3ST\ Int} = \exp\left[-9.86 + 0.79\ x\ ln(27{,}432) + 0.49\ x\ ln(1{,}500)\right] =$$
$$6.03\ x\ calibration\ factor\ of\ 0.3 = \ 1.81$$

$AADT_{maj}$ = 27,432: existing AADT on SR-25 + half of new AADT generated by Proposed Project

$AADT_{min}$ = 1500: existing AADT on Bolsa

The total study area predicted crashes with increased traffic and adding a right turn deceleration lane, and center left turn deceleration and acceleration lanes to the existing Z-Best driveway and maintaining existing Bolsa Road layout is 1.81 (Bolsa intersection) +0.8 (Z-Best driveway) = 2.61 crashes per year.

Note: Adding street lighting to both the Z-Best driveway and Bolsa Road intersections would further reduce the expected crash frequency where the CMF is calculated using the equation based on proportion of historic night crashes at each intersection:

$CMF_{lighting\ -\ Z\text{-}Best}$ = 1-0.38(Proportion of night crashes) = 1-0.38(0.8) = 0.696.

$CMF_{lighting - Bolsa Intersection}$ = 1-0.38(Proportion of night crashes) = 1-0.38(.22) = 0.916.

The predicted crash frequency when adding street lighting (and the proposed left and right turn lanes) at the Z-Best driveway is calculated as: 0.8 x 0.696 = 0.56

The predicted crash frequency when adding street lighting at the Bolsa Road intersection is calculated as 1.81 x 0.9016 = 1.66.

The total study area predicted crashes with increased traffic, and adding a right turn deceleration lane, and center left turn deceleration and acceleration lanes at the Z-Best driveway and adding street lighting at the Bolsa Road intersection is 1.66 (Bolsa intersection) + 0.56 (Z-Best driveway) = 2.21 crashes per year.

Proposed Project + Cumulative:

For the Proposed Project plus Cumulative scenario condition, the predicted crash frequency for a 4-leg intersection (calculated previously) is modified by a CMF of 0.52 to account for left turn center deceleration lanes on both major approaches (i.e., Caltrans' proposed left turn lane from northbound SR-25 into Bolsa Road as well as the proposed project's left turn lane from southbound SR-25 into the Z-Best Driveway. No specific CMF has been determined for addition of an acceleration lane for left turns on an undivided highway.

$$N_{spf\ 4ST\ Bolsa\ Rd} = 2.86\ x\ 0.52 = 1.49$$

Addition of intersection lighting would apply the 0.9 CMF based on night-time proportion of crashes:

$$N_{spf\ 4ST\ Bolsa\ Rd} = 2.86\ x\ 0.52 = 1.49\ x\ 0.9 = 1.35$$

Alternative 3 + Cumulative:

For the Alternative 3 plus Cumulative scenario condition, the predicted crash frequency for the Bolsa Road intersection under Alternative 3 (calculated previously) is further modified by a CMF of 0.72 to account for the inclusion of Caltrans' proposed center deceleration lane on southbound SR-25 for traffic turning left onto Bolsa Road.

As noted above, no specific CMF is related to adding an acceleration lane for a left turn lane on an undivided highway.

$$N_{spf\ 3ST\ Bolsa\ Rd} = 1.81\ x\ 0.72 = 1.3$$

The predicted crash frequency for Bolsa Road (1.3) is then added to the predicted crash frequency for the Z-Best driveway under Alternative 3 (0.8, calculated previously) with no further modifications, to obtain the overall crash frequency for the study area under this scenario of 2.1 crashes per year.

Applying the same CMFs for addition of intersection lighting at each intersection (as described for Alternative 3 above) would further reduce predicted crash frequency to 0.56 at the Z-Best driveway (i.e., 0.8 x 0.696) and 1.19 at the Bolsa Road intersection (1.3 x 0.9016), which equates to 1.75 for the total study area.

Proposed Project with Signal

Equation 4: SPF for Four-Leg Signal-Controlled Intersections in the HSM

$$N_{spf\ 4SG} = \exp[-5.13 + 0.6\ x\ ln(AADT_{maj}) + 0.2\ x\ ln(AADT_{min})]$$

Where:

$N_{spf\ 4SG}$ = estimate of intersection-related predicted average crash frequency for base conditions for four-leg signal-controlled intersection

$AADT_{maj}$ = AADT (vehicles per day) on the major road: 27,564

$AADT_{min}$ = AADT (vehicles per day) on the minor road: 2,154

$$N_{spf\ 4SG} = \exp[-5.13 + 0.6\ x\ ln(27{,}564) + 0.2\ x\ ln(2154)] = 12.67$$

Using calibration of existing 3-leg intersection (0.3)

12.67 x 0.3 = 3.80.

Adding a left turn lane on 3 approaches (SR-25 both directions and the Z-Best driveway) will have a CMF of 0.55.

3.80 x 0.55 = 2.1 crashes per year.