

MEMORANDUM

Date: March 28, 2020

Project #: 24900

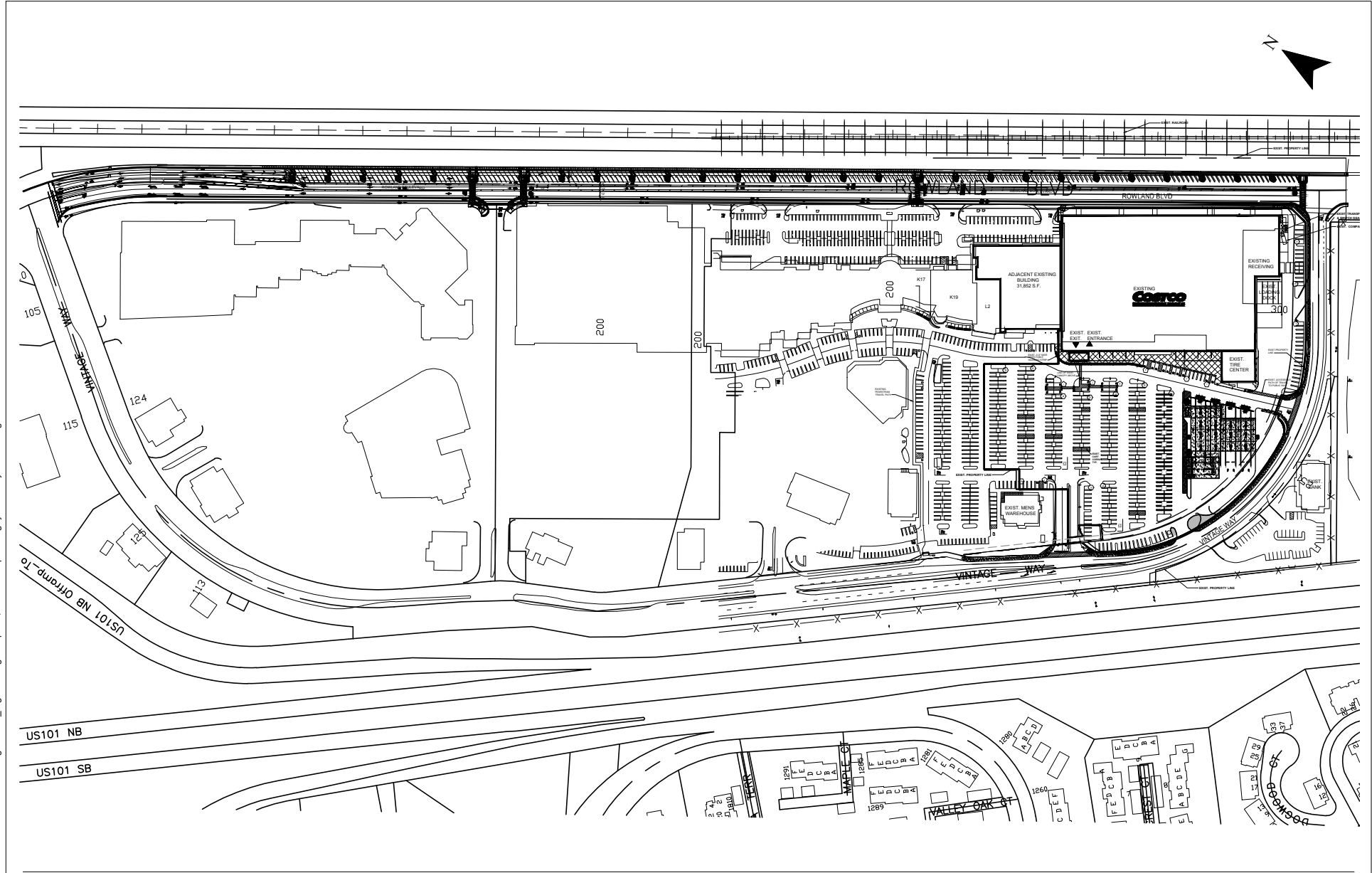
To: Kim Katz, Costco Wholesale
Sean Anderson, Barghausen Consulting Engineers

From: Amy Lopez

Project: Novato Costco Gasoline Addition

Subject: Costco Gasoline Fuel Station Trip Generation and Queuing Estimates

Kittelison & Associates, Inc. (Kittelison) has prepared a trip generation estimate for the proposed Costco Gasoline fuel station addition at the Costco warehouse in Novato, California. Costco Wholesale is proposing to add a fuel station with 28 vehicle fueling positions as an ancillary use to their existing warehouse. The Costco Gasoline fuel station addition is proposed to be located at the south end of the site, across from the Tire Center. **Figure 1** provides the proposed Costco Gasoline fuel station site plan. **Figure 2** provides a detailed view of the fuel station area. This memorandum provides documentation of the expected trip generation and trip characteristics as well as the anticipated vehicle circulation and queuing for the proposed Costco Gasoline fuel station.



Overall Site Plan
Novato, CA

Figure
1

COSTCO GASOLINE TRIP GENERATION ESTIMATE

For the past 18 years, Kittelson has maintained a database of traffic data and travel characteristics for Costco Wholesale. The database contains transportation information such as trip rates, trip type percentages, and parking demand for Costco locations in the United States as well as Canada and Mexico. The database is updated and refined each time new Costco traffic counts or information become available to Kittelson. In order to best evaluate the anticipated transportation characteristics of the proposed fuel station addition to the existing Costco in Novato, California, the Costco database was used to develop the trip generation estimate since it provides use-specific data that most accurately represents the anticipated traffic characteristics of the unique development type.

Evaluating the transportation-related impact of the Costco Gasoline addition in Novato requires special consideration as there is an existing Costco warehouse that has been in operation for several years. As such, the site vicinity currently generates traffic based on the existing Costco development's characteristics, market, and Costco membership base. In evaluating the fuel station addition, it is essential to isolate out the new uses and characteristics of the project as these are the elements that will affect trip generation. Costco Gasoline fuel stations all function as ancillary uses to the main Costco warehouses. The fuel stations are only available for members and require a Costco membership card to activate the pumps for dispensing gasoline. Payment can only be made with credit card and, unlike traditional gas/service station operations, there are no other automotive services (such as repairs) or other type of sales (such as food or sundries) associated with the Costco Gasoline facility. All Costco Gasoline facilities always have a minimum of one attendant present who is responsible for expediting members' use of the fuel pumps, directing entering vehicles to open pump locations, and managing on-site queues.

The Costco transportation database contains a large quantity of data related to Costco Gasoline fuel stations. Trip generation rates and trip type information for over 35 Costco Gasoline facilities located throughout the U.S. are included. Costco has invested significant effort into developing this use-specific trip generation database for both their warehouses and their fuel stations because of the unique characteristics of Costco customer travel that exist due to membership requirements and the nature of Costco sales. These unique elements apply to the trip generation for Costco warehouses, Costco Gasoline fuel stations, and the interaction of trips between the two.

Costco Gasoline Trip Characteristics

The data collected at existing Costco Gasoline sites indicate the trip generation characteristics described below for internal trip capture between the fuel station and the warehouse, as well as pass-by trips and diverted capture from the surrounding street system. The unique nature of Costco operations and its membership requirements result in different trip characteristics than those observed at the standard fuel stations summarized in the ITE Trip Generation Manual. The percentage of pass-by or diverted trips at Costco fuel stations is considerably lower than that quoted in the ITE manual for typical fuel stations. Correspondingly, membership requirements also have a significant effect on trip

internalization (or sharing of trips) between the warehouse and the fuel station. Fewer people exclusively visit a Costco fuel station (in comparison to a typical standalone fuel station) because they have another primary purpose for visiting the site (that being a trip to the warehouse).

Internal Trips

A key finding from the studies conducted at Costco facilities is the fact that approximately 34% of the p.m. peak hour trips and 35% of the Saturday midday peak hour trips to and from Costco fuel stations are internal capture trips. Internal capture trips account for those members who shop at both the warehouse and the gasoline pumps during a single visit to the Costco site. As such, although they account for a trip to both the warehouse and the fuel station, they only account for one overall vehicle trip to the site and on the surrounding transportation system. Based on surveys at Costco fuel stations and membership card transaction data, on average 33% of the members buying gas during the weekday p.m. peak hour and 36% of members buying gas during the Saturday midday peak hour are members whose main purpose for traveling to the site is to shop at the warehouse. At some sites, this number ranges as high as 75%; however, Kittelson's analysis assumes the average.

Pass-by Trips

Another key trip characteristic that must be considered is that of pass-by trip capture. Pass-by trips represent members (and trips) that are currently traveling on the surrounding street network for some other primary purpose (such as a trip from work to home) and stop into the site en route during their normal travel. As such, pass-by trips do not result in a net increase in traffic on the surrounding transportation system and, typically, their only effect occurs at the immediate intersections and site access driveways where they become turning movements. Based on studies of customer surveys at Costco Gasoline fuel stations, on average 37% of the members buying gas during the weekday p.m. peak hour and 33% of the members buying gas during the Saturday midday peak hour can be classified as pass-by trip capture from the surrounding street system. This is lower than the average pass-by rate quoted in the ITE Trip Generation Manual for typical service stations (45%) and, again, is attributable to the unique travel characteristics that result from Costco's membership requirements. While it is possible there will be some pass-by trips to this proposed Novato site, its location at the end of Vintage Way makes it unlikely that there will be a large portion of true pass-by trips at this site. In order to be conservative, Kittelson assumed no direct pass-by trip reduction at this location. Instead of pass-by trips, it is likely that there will be a higher percentage than typical of diverted trips from existing traffic on Vintage Way, elsewhere on Roland Boulevard, and from traffic destined to the Vintage Oaks Shopping Center.

Diverted Trips

Diverted trips are similar to pass-by trips in that they represent members (and trips) that are currently traveling on the surrounding street network for some other primary purpose and stop into the site en route during their travel. However, as the name indicates, diverted trips divert from the normal

roadways they would be traveling on to go to the Costco site. In the case of the Novato Costco, diverted trips will likely occur from traffic already on roadways in the surrounding area, such as Vintage Way, Roland Boulevard, and US 101, which make a short diversion from their normal route to go to the Costco site. Based on studies of member surveys at Costco Gasoline fuel stations, on average 37% of the members buying gas during the weekday p.m. peak hour and 36% of the members buying gas during the Saturday midday peak hour can be classified as diverted trip capture from the surrounding street system. As outlined above, because of this site’s location, it is likely that there will be a higher than average percentage of diverted trips at this location. In order to remain conservative, Kittelson assumed the average percentage of diverted trips. This likely represents a conservative approach to trip generation.

Costco Gasoline Trip Generation Estimate

Table 1 presents a trip generation estimate for the proposed Novato Costco Gasoline fuel station based on the assumptions mentioned previously.

TABLE 1 NOVATO COSTCO GASOLINE TRIP GENERATION

Costco Gasoline Fuel Station	Size (positions)	Weekday PM Peak Hour Trip Ends	Saturday Midday Peak Hour Trip Ends
Total Trip Ends (50/50 split)	28	561	663
<i>Internal Trips (34% weekday, 35% Sat.)</i>		<i>(191)</i>	<i>(232)</i>
Total External Trips		370	431
<i>Diverted Trips (37% weekday, 36% Sat.)</i>		<i>(137)</i>	<i>(155)</i>
Net New Trip Ends		233	276

Source: Kittelson & Associates, Inc. 2020

As shown in **Table 1**, it is anticipated that the proposed Costco Gasoline addition will generate approximately 233 net new weekday p.m. peak hour trip ends (or 117 vehicles) and approximately 276 net new Saturday midday peak hour trip ends (or 138 vehicles). Again, this represents a conservative estimate for net new trip generation as no accommodation for pass-by trips was taken and no adjustment to the percentage of diverted trips was made to account for this site’s specific location and the surrounding network travel characteristics.

Anticipated Queuing at Gas Station

To forecast the anticipated queue at the new fuel station, Kittelson has identified six Costco fuel station locations that have 22 to 24 fueling positions as comparable sites, and they are as follows:

- Tustin, California
- Rancho del Ray, California
- Rohnert Park, California
- Concord, California
- Northeast San Jose, California
- Portland, Oregon

Queuing data were collected at each of the sites between 2016 and 2018 for weekday p.m. peak hour and Saturday midday peak hour. The 95th percentile queue length and the maximum queue length observed at each of the sites are summarized in **Table 2**.

TABLE 2 SUMMARY OF OBSERVED QUEUE LENGTHS

Location	Size (Fueling Positions)	Weekday P.M. Peak Hour		Saturday Midday Peak Hour	
		95 th Percentile Queue Length (vehicles)	Maximum Queue Length Observed (vehicles)	95 th Percentile Queue Length (vehicles)	Maximum Queue Length Observed (vehicles)
Rancho del Ray, CA	24	47	49	36	40
Northeast San Jose, CA	24	3	6	29	31
Concord, CA	24	8	10	28	32
Rohnert Park, CA	24	7	8	16	22
Cypress, CA	24	15	17	19	19
Portland, OR	24	8	12	16	20
Tustin, CA	22	34	35	35	38
Average		17	20	26	29

Source: Kittelson & Associates, Inc. 2020



*Queue length are defined as vehicles waiting behind the fueling positions

As summarized in **Table 2**, Saturday midday peak hour has an average 95th percentile queue length of 26 vehicles, and an average maximum queue length of 29 vehicles.

Figure 3 and **Figure 4** illustrate the projected maximum queues at the Novato Costco Gas Station during the weekday p.m. and Saturday midday peak hours, respectively. As shown in the figures, the anticipated 95th percentile queues can be accommodated within the designated queuing area for the gas station and are not anticipated to spill back into internal drive aisle.

We trust that this memorandum addresses the trip generation and on-site queuing associated with the proposed Novato Costco Gasoline addition. If you have any questions or require any additional information, please contact us at alopez@kittelson.com.



 VEHICLE AT FUELING POSITION
 VEHICLE IN QUEUE

Maximum Queue
Weekday PM Peak Hour
Novato, CA

Figure
3



Maximum Queue
Saturday Midday Peak Hour
Novato, CA

Figure
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