

MEMORANDUM

Date: September 23, 2020

Project #: 24900

To: Kim Katz, Costco Wholesale

Sean Anderson, Barghausen Consulting Engineers

From: Amy Lopez

Project: Novato Costco Gasoline Addition

Subject: Maximum Queues at Fuel Station and Queue Management Plan

Costco Wholesale is proposing to add a fuel station with 28 vehicle fueling positions (i.e., 28 dispensers) as an ancillary use to their existing warehouse located at 300 Vintage Way, Novato, CA. The Costco Gasoline fuel station addition is proposed to be located at the south end of the site, across from the existing Tire Center. Kittelson & Associates, Inc. (Kittelison) prepared this memorandum in response to comments and questions raised by the Design Review Commission during the August 19, 2020 hearing. This memorandum documents fuel station operational features and efficiencies of Costco fuel stations; the expected maximum queue length during typical busy periods at the Novato fuel station (e.g., midday on a typical Saturday); and a queue management plan for unusually busy periods, such as before a holiday weekend.

DISPENSER OPERATIONAL FEATURES AND EFFICIENCIES

Costco has refined the site layout, traffic flow, and operations of its fuel stations over the years, learning from feedback from members and Costco employees and through conducting direct observations of fuel station activity. Design and operational elements planned for the Novato fuel station that would contribute to efficient use of the facility include:

- Spacing between dispensers
- Green/Red light display
- Number of dispensers

Spacing between dispensers. The layout of the fuel dispensers provides optimal spacing to allow members to drive from the queue area, pull through a center drive aisle between the dispenser islands, and pull head-first into any of the fueling positions. This means that if one of the fuel positions in the middle rows becomes available, a member can drive around other vehicles actively fueling and move

into position without making a parallel parking maneuver. This ensures a smooth, efficient flow of vehicles into the fueling positions, and it reduces the amount of time needed to serve each member.

Green/Red light display. Costco will install a green/red light system like the illustration shown in Figure 1. This display is positioned for members in queue to see which fueling positions are available (green) and which ones are in-use (red). Since large vehicles can interfere with members' sightlines within the fuel station area, the real-time display informs members when a fueling position in the middle or front rows is available. This way, members can pull forward as soon as a position frees up, facilitating an efficient use of each fueling position.

Number of dispensers. Costco plans the size of its fuel stations based on the anticipated demand for that site. To that end, Costco provides several dispensers at its fuel stations to expedite the processing of vehicles waiting in the queue. This involves developing the most efficient use of the space available on the site to provide both an adequate number of dispensers to meet the demand as well as to provide a queue storage area sufficient to accommodate the number of members waiting. By providing 28 dispensers at the Novato site, the facility will serve more members at one time, thereby ensuring the demand for gas purchases is met without queues spilling into the drive aisles within the site. Providing fewer dispensers would result in longer queues, potential spillback and site circulation issues, and less than optimal use of the site.

Figure 1: Green/Red Light Display



ANTICIPATED QUEUING AT FUEL STATION

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 average and maximum queues behind the fuel pumps, 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 travel data become available to Kittelson.

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

- Rancho del Ray, CA
- Northeast San Jose, CA
- Concord, CA
- Rohnert Park, CA
- Cypress, CA
- Portland, OR
- Tustin, CA

Queuing data were collected at each of the sites between 2016 and 2018 for weekday p.m. peak hour and Saturday midday peak hour. Based on the data, the largest queues are expected on Saturdays

during midday with an expected maximum of 29 vehicles in the queue at once. **Figure 2** illustrates this expected maximum queue during a Saturday midday peak hour. As shown in the figure, the maximum queue would be accommodated within the designated queue storage area and is not expected to spill back into the internal drive aisle or to Vintage Way.

QUEUE MANAGEMENT PLAN

Costco prioritizes operating its fuel stations effectively to serve members as efficiently as possible while maintaining queues within the queue storage area and avoiding queue spillback that would affect circulation in the parking field or at driveways. To that end, Costco takes a three-tiered approach to queue management.



Tier 1. At all of Costco's sites and during all hours a fuel station is open, a trained employee staffs the fuel station to manage incoming vehicles and direct members either to vacant pumps or to the shortest individual queue behind the pumps.

Tier 2. When activity at the fuel station is busier, a second trained employee staffs the fuel station to provide more targeted management of the queues. This person walks within the queues, guiding members to move forward and keep vehicles more closely spaced end-to-end, thereby maximizing the use of the queue storage area.

Tier 3. On rare occasions, the fuel station may experience an atypical surge in members arriving to buy gas, causing the queues behind the pumps to exceed the queue storage area (typically observed before a holiday weekend). In this situation, Costco implements a temporary queue management plan. **Figure 3** presents the queue management plan Costco would implement at the Novato site if ever the queue exceeded the queue storage area. As shown in the figure, Costco would place temporary orange cones across the Vintage Way driveway near the fuel station queue area entrance to restrict in/out access and place a temporary sign (e.g., sandwich board style) at the driveway directing members to the adjacent driveways to the north and south. Once within the site, Costco members would approach the fuel station from within the parking field as shown in the figure. The temporary restriction at the driveway would maintain the queue within the parking field and prevent any temporary queue spillback from interfering with the flow of traffic on Vintage Way.

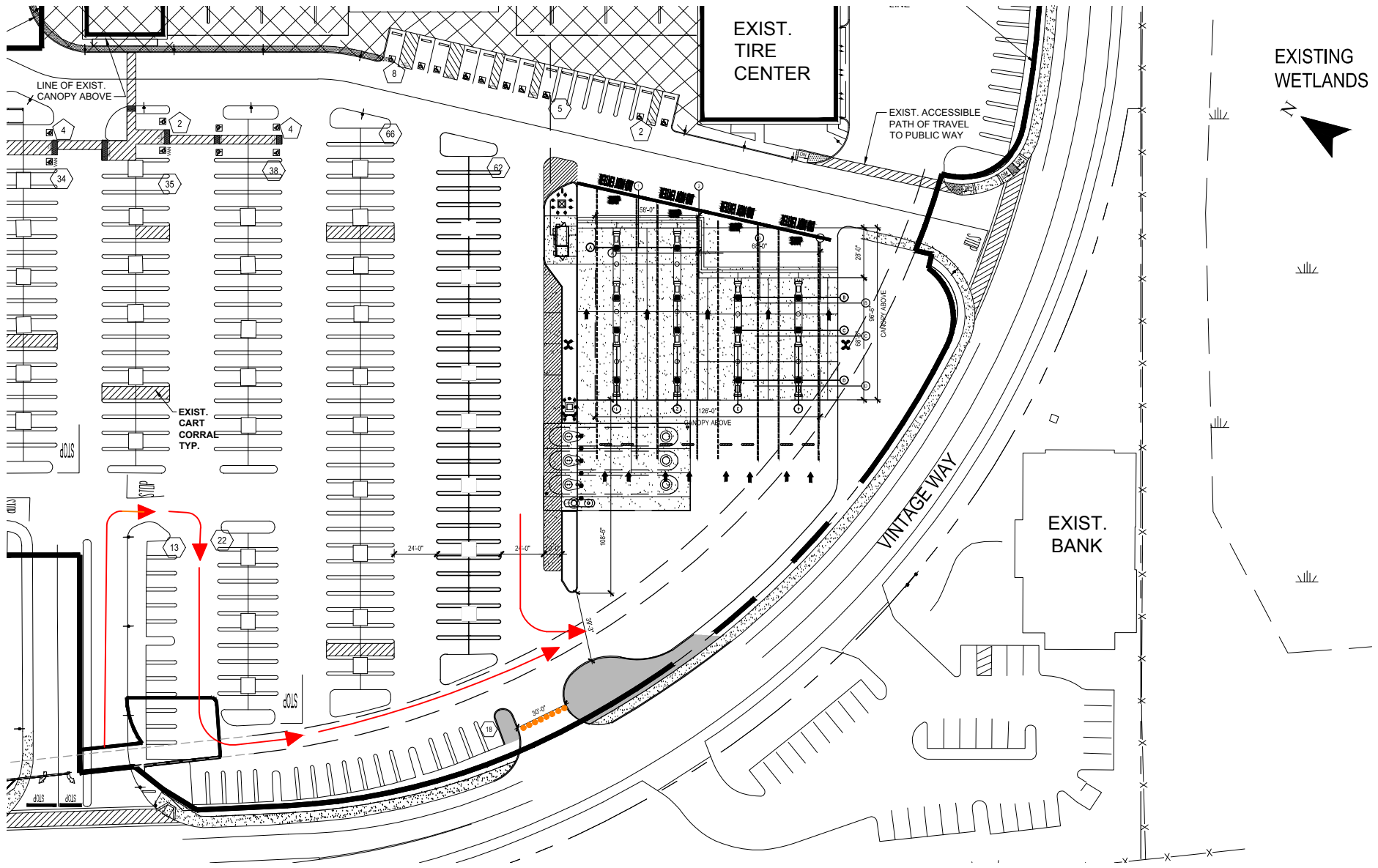
We trust that this memorandum addresses the DRC's questions and comments regarding fuel station operational features and efficiencies of Costco fuel stations as well as the on-site queuing expected at the Novato Costco fuel station. If you have any questions or require any additional information, please contact Amy Lopez at alopez@kittelso.com.



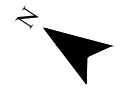
-  VEHICLE AT FUELING POSITION
-  VEHICLE IN QUEUE

Maximum Queue
Saturday Midday Peak Hour
Novato, CA

Figure
2



EXISTING WETLANDS



- Temporary Orange Cone
- ➔ Managed Entry to Queue Storage Area

Costco Fuel Station
Queue Management Plan
Novato, CA

Figure
3