Appendix H:
Transportation Analysis

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July 28, 2021

Ms. Mary Bean
First Carbon Solutions (FCS)
1350 Treat Boulevard, Suite 380
Walnut Creek, CA 94597

Focused Transportation Analysis for the BlueWave Carwash Express Project

Dear Ms. Bean;

As requested, W-Trans has prepared a focused transportation analysis for the proposed BlueWave Carwash Express project to be located at 1160 East Leland Road in the City of Pittsburg. The purpose of this letter is to address the project's potential traffic impacts, site access, circulation, and on-site queuing.

Existing Conditions

In the City of Pittsburg, East Leland Road is a four-lane arterial that runs east-west between Railroad Avenue and Century Boulevard. Along the project frontage the roadway has a speed limit of 40 miles per hour (mph) and two 11-foot vehicle travel lanes in each direction separated by a raised median. It also has a 5-foot bicycle lane and continuous sidewalk in both directions of travel.

Project Description

The proposed project would include an automated car wash facility with 22 self-service vacuum stalls on a vacant parcel located between an existing medical office building at 1150 East Leland Road and a gas station at 1190 East Leland Road. Customers would access the project site via an existing driveway on East Leland Road which is shared with the medical office building to the west of the site. Patrons would also have access to the site through the gas station east of the site. The car wash structure consists of a 3,600 square foot building which uses a conveyor style operation. The proposed project site plan is enclosed.

Trip Generation

The anticipated trip generation for the proposed project was estimated using standard rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 10th Edition, 2017 for "Automated Car Wash" (ITE LU 948). The peak hour is anticipated to occur during the weekend midday which is common for similar land uses. The project site is located on a currently vacant lot and therefore no trip credits were assigned for an existing land use.

Pass-by Trips

Some portion of traffic associated with the car wash would be drawn from existing traffic on East Leland Road. These vehicle trips are not considered "new," but would instead be comprised of drivers who are already driving on the adjacent street system and choose to make an interim stop and are referred to as "pass-by." The percentage of these pass-by trips was based on information provided in the *Trip Generation Handbook*, 3rd Edition, Institute of Transportation Engineers, 2017. Since the *Handbook* does not provide a pass-by trip percentage for an Automated Car Wash, the pass-by trip percentages for Gasoline Service Station (ITE LU 944) were used as a reference. To provide a conservative estimate, it was assumed that 25 percent of the proposed car wash trips would be pass-by trips, which is lower than the pass-by trip percentage of 44 percent for the Gasoline Service Station land use.

Total Project Trip Generation

The expected trip generation potential for the proposed project is indicated in Table 1, with deductions taken for pass-by trips. The proposed project is expected to generate an average of 110 trips during the weekend peak hour. After deductions are taken into account, the project would be expected to generate 82 trips during peak hour.

Table 1 – Trip Generation Summary

Land Use	Units	Weekend Peak Hour			
		Rate	Trips	In	Out
Proposed					
Automated Car Wash	3.6 ksf	30.40	110	55	55
Pass-by		*-25%*	*-28*	*-14*	*-14*
Total			**82**	**41**	**41**

Note: ksf = 1,000 square feet

Site Access and Circulation

The site would not result in the construction of any new driveways as access would take place via an existing driveway shared with the medical office as well as from the adjacent gas station.

Sight Distance

At driveways, a substantially clear line of sight should be maintained between the driver of a vehicle waiting to enter the street and the driver of an approaching vehicle. Sight distances along East Leland Road at the project driveway were evaluated based on sight distance criteria contained in the *Highway Design Manual* published by Caltrans. The recommended sight distances for driveway approaches are based on stopping sight distance and use the approach travel speed as the basis for determining the recommended sight distance.

Since East Leland Road has a posted speed limit of 40 mph, the recommended stopping sight distance is 300 feet. Sight distance at the project driveway extends over 300 feet to the west along level and unobstructed terrain. Sight lines to the east were not measured as egress is limited to right turns only by the existing center median island.

Finding – Sight distance along East Leland Road at the project driveway is adequate based on existing conditions.

Recommendation – It is recommended that any trees and vegetation near the project driveway on East Leland Road be trimmed as necessary to maintain adequate sight distance at the driveway.

Emergency Access

Emergency response vehicles would be able to access the site via the project driveway on East Leland Road. The proposed 35-foot wide driveway and drive aisles meet current City standards and so can be expected to accommodate the access requirements for both emergency and passenger vehicles.

Finding – Emergency access is expected to operate acceptably.

On-Site Circulation

The access and circulation associated with the project site was assessed to determine if the site's layout would provide adequate space and drive aisles for vehicles to maneuver throughout the site. Based on a review of the site plan, the internal drive aisle that connects the driveway to the car wash pay stations would have three one-way lanes and a width of 47 feet, which would provide adequate space for vehicles to transition to a single 14-foot lane to access the car vacuum or car wash facility. There would also be a bi-directional 30-foot wide drive aisle between the self-service vacuum stalls that would allow customers to maneuver their vehicles into and out of each service stall. Per the *City of Pittsburg Municipal Code 18.78.050; Parking Facility Design Standards*, the required minimum width of a two-way traffic drive aisle providing access to perpendicular parking spaces is 25 feet. The project drive aisle would meet this requirement.

The transitional area between the pay stations and car wash tunnel includes a relatively small area where three lanes merge into a single lane. To minimize the potential for conflicts if multiple vehicles exit the pay area simultaneously, it is recommended that a gate be installed at the egress of each pay station which is intended to control and spread out the movement of vehicles between these two areas.

Finding – Vehicle access and internal circulation within the project site would be adequate. A gate is recommended at each pay station to control vehicle movements and alleviate the potential for conflicts.

Queuing Analysis

A queuing analysis was conducted to identify the potential queuing of vehicles accessing the project site and to determine whether vehicles waiting to access the car wash would spill back onto East Leland Road. Since the project site includes three distinct areas, an automated car wash, self-service vacuum stations and a pay station, the queuing analysis was divided into three parts.

The 95th-percentile queue is generally applied as the acceptable limit for on-site circulation impacts. To assess the potential queuing for the site, factors such as the storage capacity, arrival rate and service rate were considered. The arrival rate is defined as the number of patrons arriving at the facility per hour. Similarly, the service rate is defined as the number of patrons served within an hour. The applied service rate was based on data regarding the typical time needed to completely service each vehicle.

Pay Station

For the queuing at the three pay stations a storage capacity of 24 vehicles was assumed (three lanes able to store eight vehicles in each lane) before a queue would spill back into the shared drive aisle. A service rate of 20 vehicles per hour was assumed, which is based on the assumption that it takes three minutes to complete a transaction for each car.

Based on the trip generation estimate, a maximum arrival rate of 55 vehicles per hour was applied to the analysis. Applying these rates produced a calculated 95th percentile queue length of 10 vehicles, which can be accommodated by the pay station approach lanes which have a 24-vehicle capacity. The queuing calculation worksheet is enclosed for reference.

Automated Car Wash

The approximately 175-foot drive aisle connecting the pay stations and the entrance to the car wash tunnel can accommodate a queue of seven vehicles. The automated car wash facility would employ a conveyor style operation which has a capacity to wash up to three vehicles in close succession within the tunnel structure. According to the site operator, the car wash tunnel is capable of processing approximately one vehicle per minute (or 60 vehicles per hour) during peak operations. Based on the peak hour trip generation, the maximum arrival rate would be 55 vehicles per hour. If the car wash facility is in use when a customer is at the pay station, they would wait in line within the driveway between the pay station and the car wash entrance, or wait for their turn in one of the three lanes approaching the pay stations.

Applying these rates produced a calculated 95th percentile queue length approaching the car wash entrance of seven vehicles, which is equal to the storage capacity of the drive aisle between the pay stations and car wash entrance. The queuing calculation worksheet is enclosed for reference.

Self-Service Vacuum Area

The vacuum area is comprised of 22 self-service spaces. These spaces can serve at least 88 cars per hour assuming a typical vacuum service can be completed in 15 minutes or less. Therefore, the 22-space service area would provide adequate capacity since the serving capacity of 88 cars per hour is greater than the trip generation of 55 cars per hour. This is a conservative analysis since it is recognized that only a portion of all customers purchasing a car wash would also use the vacuum service.

Finding – Based on the assumed arrival and service rates, the proposed on-site vehicle storage capacity is expected to adequately accommodate the vehicle queue in all areas of the site, and no spillover onto East Leland Road is anticipated.

Conclusions and Recommendations

- The proposed project is expected to generate an average of 82 new peak hour trips during the weekend day.
- Vehicle access and internal circulation at the project site would be adequate. A gate is recommended at each pay station to control vehicle movements and alleviate the potential for conflicts.
- Sight distances at the project driveway are adequate based on existing conditions. It is recommended that any trees and vegetation near the project driveway on East Leland Road be trimmed as necessary to maintain adequate sight distance at the driveway.
- Adequate emergency access to the project site would be provided from East Leland Road.
- The on-site vehicle stacking spaces in each area of the site would be adequate to accommodate the anticipated peak hour demand, and therefore vehicles are not anticipated to back up onto the project driveway at East Leland Road.

Thank you for giving W-Trans the opportunity to provide these services. Please call if you have any questions.

Sincerely,

Kimberly Tellez
Assistant Engineer

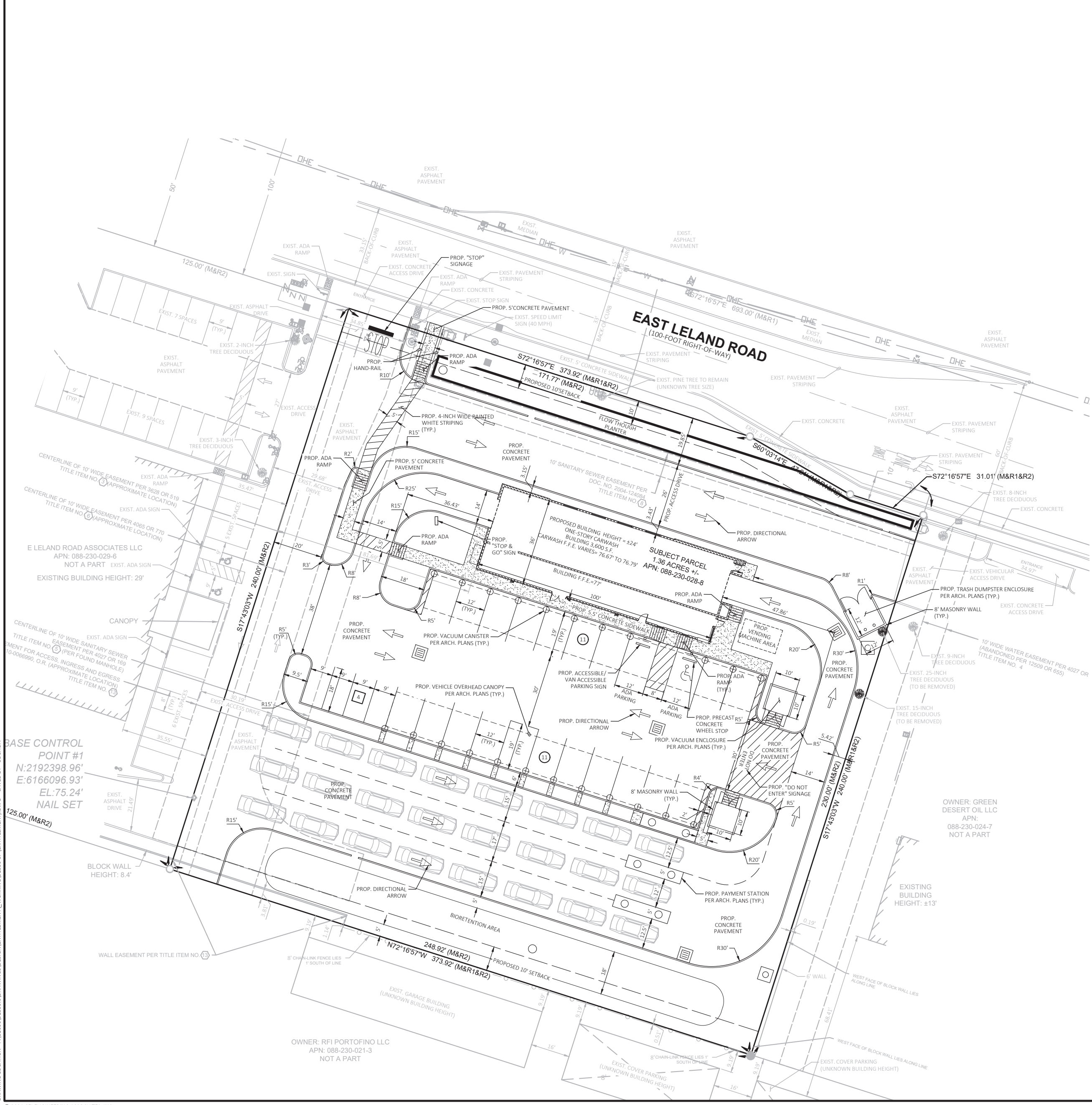
Mark Spencer, PE
Senior Principal

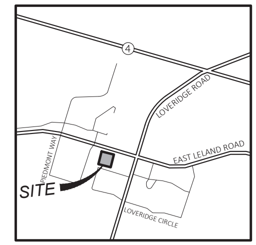
REGISTERED PROFESSIONAL ENGINEER
MARK E. SPENCER
TR001737
TRAFFIC
STATE OF CALIFORNIA

Kenny Jeong, PE
Traffic Engineer

MES/kj-kt/PIT012.L1

Enclosures: Site Plan, Queuing Worksheets





VICINITY MAP
NOT TO SCALE

EXISTING LEGEND

- CONTROL–IRON PIPE
- CONTROL–NAIL SET
- DOME
- ELECTRIC – BOX
- ELECTRIC – RISER
- ELECTRIC – VAULT
- FIRE DEPARTMENT CONNECTION
- FIRE HYDRANT
- IRON PIPE FOUND
- IRON PIPE SET
- IRRIGATION CONTROL VALVE
- LIGHT POLE
- LIGHT POLE – 2 LIGHTS
- POWER – POLE
- ROOF DRAIN
- SANITARY SEWER – MANHOLE
- SIGN
- SIGN – STOP
- STORM DRAIN – GRATE
- STORM DRAIN – MANHOLE
- STRIPING – ARROW RIGHT
- STRIPING – ARROW STRAIGHT
- TELEPHONE – BOX
- TELEPHONE – VAULT
- TRAFFIC SIGNAL – BOX
- TREE – DECIDUOUS
- UNKNOWN – BOX
- WATER – BOX
- WATER – METER
- WATER – VALVE
- ROAD CENTERLINE
- CHAIN LINK FENCE
- UGT TELEPHONE LINE – UNDERGROUND
- OHE ELECTRIC LINE – OVERHEAD
- UGE ELECTRIC LINE – UNDERGROUND
- W WATER LINE – UNDERGROUND
- SS SEWER LINE – UNDERGROUND
- STORM LINE – UNDERGROUND
- PROPERTY BOUNDARY LINE
- BUILDING OUTLINE
- ADJACENT PROPERTY LINE
- EXISTING EASEMENT LINE

PROPOSED LEGEND

- PROPERTY LINE/RIGHT OF WAY LINE
- CONCRETE CURB AND GUTTER. SEE DETAIL 01B.
- LIMITS OF SIDEWALKS AND CONCRETE APRONS (PER ARCH. PLANS)

SITE DATA

SITE AREA	1.36 ACRES
BUILDING AREA	3,600 SF
PARKING PROVIDED	26 SPACES
# OF VACUUM STALLS	20 CUSTOMER, 2 ADA
# OF PAY STATIONS	4 PAY STATIONS
# OF EMPLOYEE PARKING	4 EMPLOYEE PARKING
PERCENT OF LOT COVERAGE	.888
FLOOR AREA RATIO	.061
PERCENT OF LANDSCAPE COVERAGE	.197

CEI
Solutions for Land and Life

CEI ENGINEERING ASSOCIATES, INC.
3030 LBJ FREEWAY, SUITE 100
DALLAS, TX 75234
PHONE: (972) 488-3737
FAX: (972) 488-6732

BLUEWAVE

BLUEWAVE CARWASH EXPRESS
1160 EAST LELAND ROAD
PITTSBURG

PRELIMINARY
NOT FOR
CONSTRUCTION

PROFESSIONAL OF RECORD	POR
PROJECT MANAGER	DAM
DESIGNER	CO
CEI PROJECT NUMBER	31890
DATE	3/18/2021
REVISION	REV-1

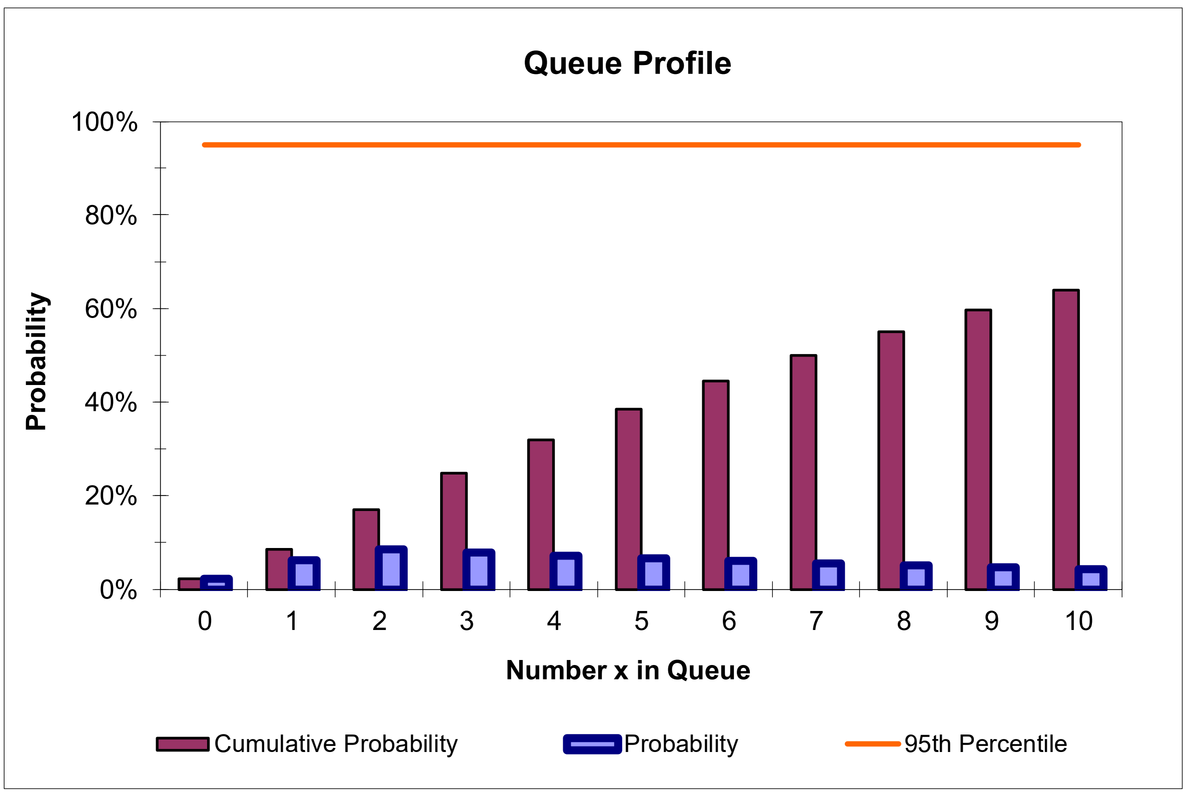
SITE PLAN
SHEET TITLE
SHEET NUMBER
C1

Drive Through Queuing Evaluation Worksheet

Project: Blue Wave Express Carwash
By: KT
Project No: PIT012
Date: 6/18/2021

Arrival Rate (veh/hr):	55	No. of Service Points:	3
Service Rate (veh/hr):	20	Queuing Capacity (veh):	24

Probability the System is Empty	2%	
Probability the System is Full	1%	
Probability That Customer Waits	83%	
Average Time Customer Waits	10.1	minutes
Average Time Customer Waits To Get To Service Point	7.1	minutes
Probability That a Customer Elects Not to Enter the Queue	1%	
Average In System	9.2	vehicles
Average Total Length of Vehicles in System	230	feet
95th Percentile in System	10	vehicles
95th Percentile Total Length of Vehicles in System	250	feet



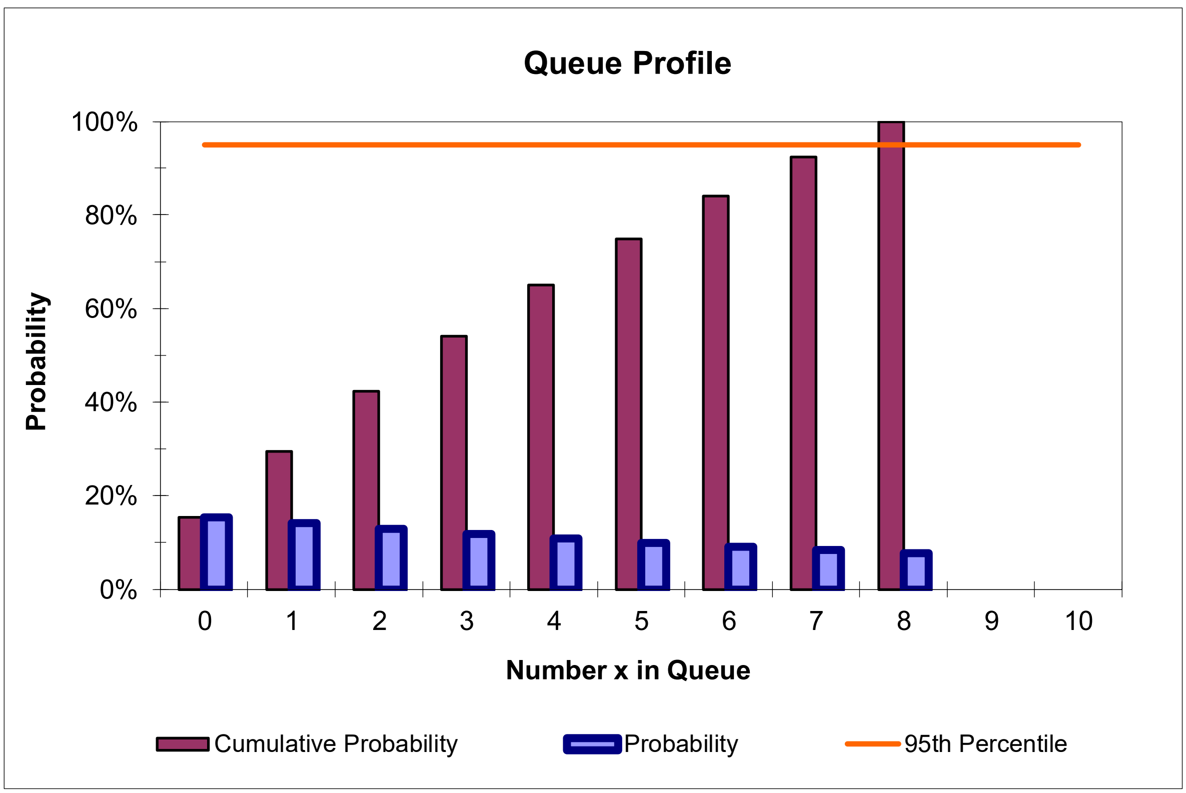
Drive Through Queuing Evaluation Worksheet

Project: Blue Wave Express Carwash
Project No: PIT012

By: KT
Date: 6/18/2021

Arrival Rate (veh/hr):	55	No. of Service Points:	1
Service Rate (veh/hr):	60	Queuing Capacity (veh):	7

Probability the System is Empty	15%
Probability the System is Full	8%
Probability That Customer Waits	85%
Average Time Customer Waits	4.0 minutes
Average Time Customer Waits To Get To Service Point	3.0 minutes
Probability That a Customer Elects Not to Enter the Queue	8%
Average In System	3.4 vehicles
Average Total Length of Vehicles in System	86 feet
95th Percentile in System	7 vehicles
95th Percentile Total Length of Vehicles in System	175 feet



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