

## Appendix B: Trip Generation Analysis Letter

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# KUNZMAN ASSOCIATES, INC.

OVER 40 YEARS OF EXCELLENT SERVICE

August 31, 2016

Ms. Cecilia So, Assistant Project Manager  
FIRSTCARBON SOLUTIONS  
250 Commerce, Suite 250  
Irvine, CA 92602

Dear Ms. So:

## INTRODUCTION

The firm of Kunzman Associates, Inc. is pleased to provide this trip generation analysis for the 2850 Mesa Verde Drive East project located in the City of Costa Mesa.

Although this is a technical report, every effort has been made to write the report clearly and concisely. To assist the reader with those terms unique to transportation engineering, a glossary of terms is provided within Appendix A.

## PROPOSED PROJECT

The approximately 2-acre project site is currently developed with a fully occupied 24,267 square foot general office building. The proposed project consists of redeveloping the project site with 11 single-family detached residential dwelling units. The project will continue to provide access at Mesa Verde Drive East.

## TRIP GENERATION

Trip generation rates were determined for daily trips, morning peak hour inbound and outbound trips, and evening peak hour inbound and outbound trips for the existing and proposed land uses. The number of trips forecast to be generated by the existing and proposed land uses are determined by multiplying the applicable trip generation rates by the land use quantities. Table 1 shows the net project trip generation based upon rates obtained from the Institute of Transportation Engineers, Trip Generation Manual, 9th Edition, 2012.

As shown in Table 1, the proposed residential dwelling units are forecast to generate approximately 105 daily trips, 8 trips of which will occur during the morning peak hour and 11 trips of which will occur during the evening peak hour.

As also shown in Table 1, the existing office building currently generates approximately 268 existing daily trips forecast to be displaced, 38 trips of which will be displaced during the morning peak hour and 36 trips of which will be displaced during the evening peak hour.

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Therefore, as shown in Table 1, the proposed project is forecast to result in a net decrease of approximately 163 daily trips, of which 30 fewer trips will occur during the morning peak hour and 25 fewer trips will occur during the evening peak hour.

## CONCLUSIONS

Since the proposed project is forecast to result in a decrease in trips generated by the project site, analysis of off-site intersections, including locations monitored by the Congestion Management Program, would not be warranted.

It has been a pleasure to service your needs on this project. Should you have any questions or if we can be of further assistance, please do not hesitate to call at (714) 973-8383.

Sincerely,

KUNZMAN ASSOCIATES , INC.



Giancarlo Ganddini, T.E.  
Manager of Traffic Engineering

#6695



**Table 1**

**Project Trip Generation**

Land Use	Source <sup>1</sup>	Quantity	Units <sup>2</sup>	Peak Hour						Daily
				Morning			Evening			
				Inbound	Outbound	Total	Inbound	Outbound	Total	
<u>Trip Generation Rates</u>										
Single-Family Detached Housing	ITE 210	-	DU	0.19	0.56	0.75	0.63	0.37	1.00	9.52
General Office Building	ITE 710	-	TSF	1.37	0.19	1.56	0.25	1.24	1.49	11.03
<u>Proposed Project Trips</u>										
Single-Family Detached Housing	ITE 210	11	DU	2	6	8	7	4	11	105
<u>Existing Trips To Be Displaced</u>										
General Office Building	ITE 710	24.267	TSF	33	5	38	6	30	36	268
Net Project Trips Generated (Proposed Less Existing)				-31	+1	-30	+1	-26	-25	-163

<sup>1</sup> Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 9th Edition, 2012, Land Use Codes 210 and 710.

<sup>2</sup> DU = Dwelling Units; TSF = Thousand Square Feet

## **APPENDIX A**

### **GLOSSARY OF TRANSPORTATION TERMS**

## GLOSSARY OF TRANSPORTATION TERMS

### COMMON ABBREVIATIONS

AC:	Acres
ADT:	Average Daily Traffic
Caltrans:	California Department of Transportation
DU:	Dwelling Unit
ICU:	Intersection Capacity Utilization
LOS:	Level of Service
TSF:	Thousand Square Feet
V/C:	Volume/Capacity
VMT:	Vehicle Miles Traveled

### TERMS

**AVERAGE DAILY TRAFFIC:** The total volume during a year divided by the number of days in a year. Usually only weekdays are included.

**BANDWIDTH:** The number of seconds of green time available for through traffic in a signal progression.

**BOTTLENECK:** A constriction along a travelway that limits the amount of traffic that can proceed downstream from its location.

**CAPACITY:** The maximum number of vehicles that can be reasonably expected to pass over a given section of a lane or a roadway in a given time period.

**CHANNELIZATION:** The separation or regulation of conflicting traffic movements into definite paths of travel by the use of pavement markings, raised islands, or other suitable means to facilitate the safe and orderly movements of both vehicles and pedestrians.

**CLEARANCE INTERVAL:** Nearly same as yellow time. If there is an all red interval after the end of a yellow, then that is also added into the clearance interval.

**CORDON:** An imaginary line around an area across which vehicles, persons, or other items are counted (in and out).

**CYCLE LENGTH:** The time period in seconds required for one complete signal cycle.

**CUL-DE-SAC STREET:** A local street open at one end only, and with special provisions for turning around.

**DAILY CAPACITY:** The daily volume of traffic that will result in a volume during the peak hour equal to the capacity of the roadway.

**DELAY:** The time consumed while traffic is impeded in its movement by some element over which it has no control, usually expressed in seconds per vehicle.

**DEMAND RESPONSIVE SIGNAL:** Same as traffic-actuated signal.

**DENSITY:** The number of vehicles occupying in a unit length of the through traffic lanes of a roadway at any given instant. Usually expressed in vehicles per mile.

**DETECTOR:** A device that responds to a physical stimulus and transmits a resulting impulse to the signal controller.

**DESIGN SPEED:** A speed selected for purposes of design. Features of a highway, such as curvature, superelevation, and sight distance (upon which the safe operation of vehicles is dependent) are correlated to design speed.

**DIRECTIONAL SPLIT:** The percent of traffic in the peak direction at any point in time.

**DIVERSION:** The rerouting of peak hour traffic to avoid congestion.

**FORCED FLOW:** Opposite of free flow.

**FREE FLOW:** Volumes are well below capacity. Vehicles can maneuver freely and travel is unimpeded by other traffic.

**GAP:** Time or distance between successive vehicles in a traffic stream, rear bumper to front bumper.

**HEADWAY:** Time or distance spacing between successive vehicles in a traffic stream, front bumper to front bumper.

**INTERCONNECTED SIGNAL SYSTEM:** A number of intersections that are connected to achieve signal progression.

**LEVEL OF SERVICE:** A qualitative measure of a number of factors, which include speed and travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience, and operating costs.

**LOOP DETECTOR:** A vehicle detector consisting of a loop of wire embedded in the roadway, energized by alternating current and producing an output circuit closure when passed over by a vehicle.



**MINIMUM ACCEPTABLE GAP:** Smallest time headway between successive vehicles in a traffic stream into which another vehicle is willing and able to cross or merge.

**MULTI-MODAL:** More than one mode; such as automobile, bus transit, rail rapid transit, and bicycle transportation modes.

**OFFSET:** The time interval in seconds between the beginning of green at one intersection and the beginning of green at an adjacent intersection.

**PLATOON:** A closely grouped component of traffic that is composed of several vehicles moving, or standing ready to move, with clear spaces ahead and behind.

**ORIGIN-DESTINATION SURVEY:** A survey to determine the point of origin and the point of destination for a given vehicle trip.

**PASSENGER CAR EQUIVALENTS (PCE):** One car is one Passenger Car Equivalent. A truck is equal to 2 or 3 Passenger Car Equivalents in that a truck requires longer to start, goes slower, and accelerates slower. Loaded trucks have a higher Passenger Car Equivalent than empty trucks.

**PEAK HOUR:** The 60 consecutive minutes with the highest number of vehicles.

**PRETIMED SIGNAL:** A type of traffic signal that directs traffic to stop and go on a predetermined time schedule without regard to traffic conditions. Also, fixed time signal.

**PROGRESSION:** A term used to describe the progressive movement of traffic through several signalized intersections.

**SCREEN-LINE:** An imaginary line or physical feature across which all trips are counted, normally to verify the validity of mathematical traffic models.

**SIGNAL CYCLE:** The time period in seconds required for one complete sequence of signal indications.

**SIGNAL PHASE:** The part of the signal cycle allocated to one or more traffic movements.

**STARTING DELAY:** The delay experienced in initiating the movement of queued traffic from a stop to an average running speed through a signalized intersection.

**TRAFFIC-ACTUATED SIGNAL:** A type of traffic signal that directs traffic to stop and go in accordance with the demands of traffic, as registered by the actuation of detectors.

**TRIP:** The movement of a person or vehicle from one location (origin) to another (destination). For example, from home to store to home is two trips, not one.

**TRIP-END:** One end of a trip at either the origin or destination; i.e. each trip has two trip-ends. A trip-end occurs when a person, object, or message is transferred to or from a vehicle.

**TRIP GENERATION RATE:** The quality of trips produced and/or attracted by a specific land use stated in terms of units such as per dwelling, per acre, and per 1,000 square feet of floor space.

**TRUCK:** A vehicle having dual tires on one or more axles, or having more than two axles.

**UNBALANCED FLOW:** Heavier traffic flow in one direction than the other. On a daily basis, most facilities have balanced flow. During the peak hours, flow is seldom balanced in an urban area.

**VEHICLE MILES OF TRAVEL:** A measure of the amount of usage of a section of highway, obtained by multiplying the average daily traffic by length of facility in miles.