Technical Memorandum

To: Audrey Inskeep, OPP Management

From: Marc Mizuta, Mizuta Traffic Consulting

Date: February 24, 2022

Re: Valley View VMT Analysis

Mizuta Traffic Consulting (MTC) has prepared this memo for the proposed Valley View project to evaluate the vehicle miles travelled (VMT) for the project. Senate Bill 743 (SB 743) was approved in 2013 and changes the way transportation impacts are measured under the California Environmental Quality Act (CEQA). The Office of Planning and Research (OPR) has recommended the use of VMT as the required metric to replace the automobile delay-based level of service (LOS). The VMT analysis is needed to meet statewide requirements for transportation analyses conducted under CEQA and can help support the City of Carlsbad's goals and policies related to its General Plan, Climate Action Plan, and City of Carlsbad Core Values. The VMT analysis was based on the criteria outlined in the *City of Carlsbad VMT Analysis Guidelines, September 15, 2020 (City's VMT Analysis Guidelines)*.

Project Description

The proposed Project consists of an 11,404 square foot (sf) industrial office building to be constructed on a portion of an existing 6.34 acre parcel (APN 209-040-43-00) located on the north side of Palmer Way between Cougar Drive and Impala Drive. As part of the project, the parcel will be split into two lots. Lot 1 will be 4.93 acres and remain as open space. Lot 2 will be 1.41 acres and the project's building footprint will cover 22.9 percent of the lot. Access to the Project will be provided by two driveways off of Palmer Way. The Project is providing 46 parking spaces on-site.

Significance Criteria

According to the *City's VMT Analysis Guidelines*, an office project would have a significant transportation impact if the project VMT per employee exceeds a level 15 percent below the regional average VMT per employee.

VMT Analysis

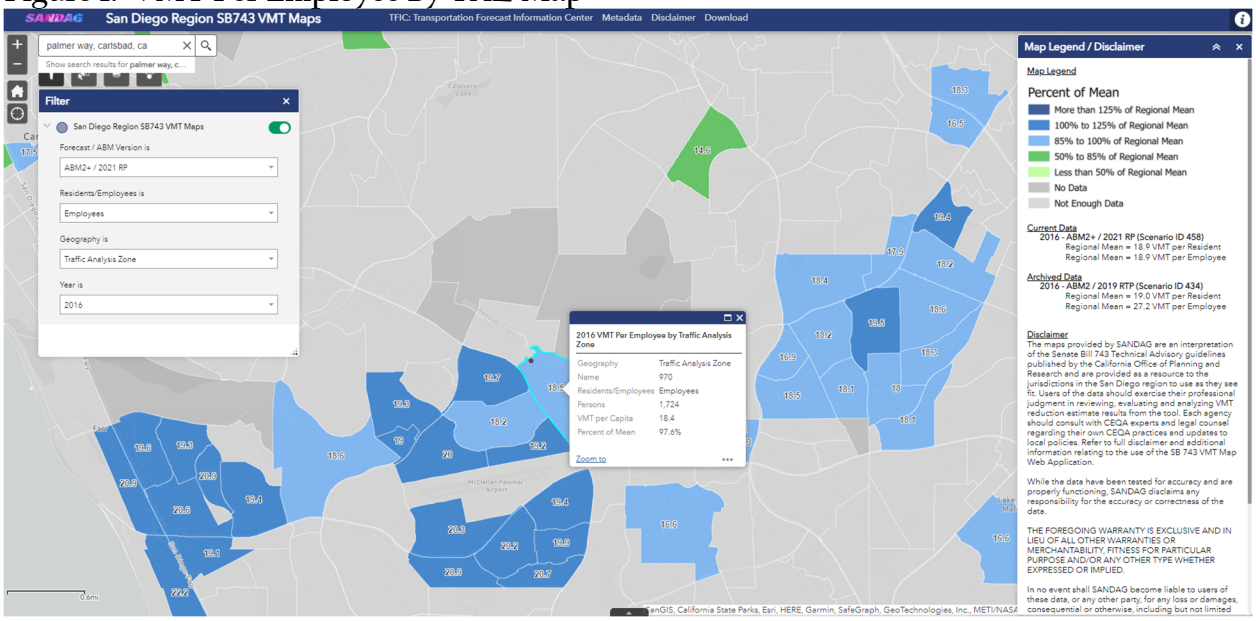
Typical office land use projects generating less than 2,400 daily trips would use the City of Carlsbad's VMT/capita and VMT/employee analysis maps. SANDAG recently released the San Diego Region SB743 VMT Maps, which are based on the ABM2+ forecast and contain VMT/capita and VMT/employee at the Traffic Analysis Zone (TAZ) level. As a result, the VMT/employee of the project is estimated based on the results of the ABM2+ forecast for the TAZ in which the project is located.

The Project is proposing to implement Transportation Demand Management (TDM) measures. The Tier 1 TDM Plan will be implemented throughout the life of the project as a project feature. Some of the specific TDM measures that are incorporated into the project design include the following:

- Ride Sharing Program
- Telecommuting and Alternative Work Schedules
- Commute Trip Reduction Marketing

Figure 1 shows the results of the office VMT per employee by TAZ. The project is located in TAZ 970 and results in a VMT per employee of 18.4, which is 97.6 percent of the regional mean of 18.9. The implementation of the project's TDM program would result in a 12.9 percent reduction in project-generated VMT. Accounting for the 12.9 percent reduction in VMT attributed to the TDM program, the project would generate at net 16.0 VMT per employee (18.4 * (1 – 12.9%) = 16.0). This amount is 15.3 percent below the regional average of 18.9 VMT per employee (1 – (16.0 / 18.9) = 15.3%). Accordingly, the project's VMT/employee is 15 percent or more below the regional average and impacts would be less than significant.

Figure 1: VMT Per Employee By TAZ Map



Project Features

The Project proposes to implement the Tier 1 TDM Plan (prepared under separate cover) and the TDM measures included in the TDM plan will be required for the life of the project.

According to the *City's TDM Handbook*, new non-residential projects generating 110 or more employee daily trips are subject to the TDM ordinance and are required to complete and implement a TDM Plan. The project is estimated to generate 149 daily trips based on the employee daily trip rate of 13 ADT per 1,000 sf for all office uses. For projects generating between 110 and

220 ADT, a Tier 1 TDM Plan is required. The Tier 1 TDM Plan will be implemented as a project feature and the VMT reduction measures proposed will be required measures in the TDM Plan.

TDM Effectiveness and Adjustments

TDM strategies must have sufficient evidence to quantify the level of VMT reduction that a strategy could achieve. Many TDM strategies can be quantified using the methodologies contained in the *California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures, August 2010*. TDM strategies can be combined with others to increase the effectiveness of VMT reductions. However, the interaction between the various strategies is complex and sometimes counterintuitive. When multiple strategies are being applied, the following formula is used to quantify the VMT reduction:

$$Total\ VMT\ Reduction = 1 - (1 - P_a) * (1 - P_b) * (1 - P_c) * \dots$$

Where:

P_x = Percent reduction of each VMT reduction strategy

The project is proposing to use a variety of commute trip reduction strategies. The global maximum reduction for a combination of all measures in a suburban setting is expected to have a maximum feasible overall reduction of 15 percent. The maximum subcategory reduction associated with the Commute Trip Reduction measures is also 15 percent.

The VMT output referenced from the SANDAG SB 743 VMT maps are based on the SANDAG Activity-Based Model 2+ (ABM2+), which is used to support the 2021 Regional Plan. The ABM system has been continuously updated to ensure that the regional transportation planning process can rely on forecasting tools that are adequate for socioeconomic environments and emerging transportation planning challenges. The output of the ABM2+ includes an employee's work tour and VMT reduction measures can be applied directly from *CAPCOA*.

TDM Measures

There are many transportation measures that can achieve a reduction in VMT. The following list summarizes the various types of measures:

- Land Use / Location
- Neighborhood / Site Enhancement
- Parking Policy / Pricing
- Transit System Improvements
- Commute Trip Reduction

Commute trip reduction measures were determined to be appropriate to reduce the commute VMT. The individual TDM measures contained in the TDM Plan will be implemented as project features. **Table 1** summarizes the various trip reduction programs. It should be noted that a few strategies do not quantify the reduction of commute VMT and are noted. The project will utilize a combination of the trip reduction strategies, which are summarized in the Tier 1 TDM Plan. The

Tier 1 TDM Plan will be implemented as the project feature and the VMT reduction measures proposed will be required measures in the TDM Plan.

Table 1: Trip Reduction Programs

Measure Number	Trip Reduction Strategy	Range of Effectiveness	
		% Reduction in GHG Emissions	Basis
TRT-1	Voluntary CTR Programs	1.0 – 6.2	Commute VMT
TRT-2	Mandatory CTR Programs	4.2 – 21.0	Commute VMT
TRT-3	Ride-Sharing Programs	1 – 15	Commute VMT
TRT-4	Subsidized or Discounted Transit Program	0.3 – 20.0	Commute VMT
TRT-5	End of Trip Facilities	n/a	
TRT-6	Telecommuting and Alternative Work Schedules	0.07 – 5.50	Commute VMT
TRT-7	CTR Marketing	0.8 – 4.0	Commute VMT
TRT-8	Preferential Parking Permit Program	n/a	
TRT-9	Car-Sharing Program	0.4 – 0.7	VMT
TRT-10	School Pool Program	7.2 – 15.8	School VMT
TRT-11	Employer-Sponsored Vanpool/Shuttle	0.3 – 13.4	Commute VMT
TRT-12	Bike-Sharing Program	n/a	
TRT-13	School Bus Program	38 – 63	School VMT
TRT-14	Price Workplace Parking	0.1 – 19.7	Commute VMT
TRT-15	Employee Parking "Cash-Out"	0.6 – 7.7	Commute VMT

Notes:
Values shown in table were referenced from Table 6-2 of the *CAPCOA Quantifying Greenhouse Gas Mitigation Measures, August 2010.*

Ride Sharing Program (TRT-3)
The ride sharing program would increase the vehicle occupancy and result in fewer cars driving the same trip resulting in a decrease in VMT. Some of the ways that the project will promote ride sharing programs include the following:

- Designating a certain percentage of parking spaces for ride sharing vehicles
- Designating adequate passenger loading, unloading, and waiting areas for ride sharing vehicles
- Providing a website or message board for coordinating rides

The range of effectiveness for this measure ranges between 1 and 15 percent commute VMT reduction.

The following formula is used to quantify the VMT reduction for implementing a ride sharing program:

$$\%\, VMT\ Reduction = A * B$$

Where:

A: 5% reduction in commute VMT for a low-density suburb

B: 80% employees eligible since some may be part time employees

$$\%\ VMT\ Reduction = (.05) * (.80) = 4.0\%$$

Project Implementation

The Project will designate up to 10 parking spaces, which equates to approximately 20 percent of the available parking spaces as ride-sharing parking spaces. Signs will be installed in front of each designated parking space.

The Project will designate an area in the parking structure for passenger loading, unloading, and waiting areas for ride sharing vehicles.

The TDM Coordinator will work with each employer's HR department and provide ride sharing options like iCommute for employees to use to find ride sharing opportunities. Another option is to promote ridesharing opportunities that are part of the City of Carlsbad's Commuter program (https://www.carlsbadcommuter.com/).

Telecommuting and Alternative Work Schedules (TRT-6)

The encouragement of telecommuting and alternate work schedules would reduce the number of commute trips and therefore VMT traveled by employees. Alternate work schedules could take the form of staggered start times, flexible schedules, or compressed work weeks.

The range of effectiveness for this measure ranges between 0.07 and 5.50 percent commute VMT reduction.

According to *Fehr & Peers Moving Cooler Technical Appendices*, the percent reduction in commute VMT can be correlated to employee participation and the number of days telecommuting. The employee participation ranged from 1 to 25 percent. Assuming an employee participation of 25 percent and telecommuting 1.5 days a week results in a 5.5 percent reduction in commute VMT.

The following formula is used to quantify the VMT reduction for encouraging telecommuting and alternate work schedules:

$$\%\ VMT\ Reduction = A$$

Where:

A: 5.5% reduction in commute VMT

$$\%\ VMT\ Reduction = (.055) = 5.5\%$$

Project Implementation

The TDM Coordinator will work with each employer's HR department and obtain a monthly summary of the work schedule of each employee. The participation requirement of at least 25

percent of employees telecommuting 1.5 or more days a week will be checked and validated on a quarterly basis.

CTR Marketing (TRT-7)
Implementing commute trip reduction (CTR) marketing would reduce the number of commute trips. Information sharing and marketing are important components to successful commute trip reduction strategies. Some of the marketing strategies may include the following:

- New employee orientation of trip reduction and alternative mode options
- Event promotions
- Publications

The range of effectiveness for this measure ranges between 0.8 and 4.0 percent commute VMT reduction.

The following formula is used to quantify the VMT reduction for encouraging telecommuting and alternate work schedules:

$$\%\, VMT\ Reduction = A * B$$

Where:

A: 4.0% reduction in commute VMT
B: 100% employees eligible

$$\%\, VMT\ Reduction = (.04) * (1.00) = 4.0\%$$

Project Implementation
The TDM Coordinator will develop marketing material summarizing the benefits of commute trip reduction. The marketing material will be distributed to each employer's HR department and requested to be provided to each employee as part of their orientation. The TDM Coordinator will have a yearly event on-site that will promote the benefits of commute trip reduction. This yearly event will also be coordinated with the City to ensure that it occurs on a permanent basis. The TDM Coordinator will also provide surveys (printed and/or electronic) to each employer's HR department on a quarterly basis (with the intent to be distributed to each employee) to determine preferences, knowledge, barriers, and opportunities for changing travel behavior and providing TDM services. The main purpose of the outreach and marketing is to provide employees with options and monetary incentives to use alternate forms of transportation, as well as to clearly and deliberately promote and educate employees of the various options available.

Project VMT Reductions
The individual VMT reduction for each respective measure should be dampened when combining with other measures. The main purpose of the dampening is to provide a mechanism for minimizing the possibility of overstating VMT reduction effectiveness. Additionally, the maximum subcategory and overall global maximum was checked to ensure that the reductions

did not exceed the allowable reductions. The maximum feasible overall reduction would be 15 percent with the combination of all measures.

The following equation summarizes how the 12.9 percent total VMT reduction was calculated:

$$Total\ \%\ VMT\ Reduction = 1 - (1 - .040) * (1 - .055) * (1 - .040) = 12.9\%$$

Table 2 summarizes the VMT reductions that the Project would achieve by implementing and incorporating the various TDM strategies and how it complies with the maximum reductions. As shown in the table, the Project's TDM plan would result in an overall 12.9 percent VMT reduction and would not exceed the maximum subcategory or global maximum reductions.

Table 2: Summary of VMT Reductions

Measure Number	VMT Reduction (%)	Max Subcategory Reduction (‹15%)[2]	Global Max Reduction (‹15%)[2]
TRT-3	4.0	✓	✓
TRT-6	5.5		
TRT-7	4.0		
Project VMT Reduction[1]	**12.9**	**Measures did not exceed max subcategory or global maximum reductions**	

Notes:

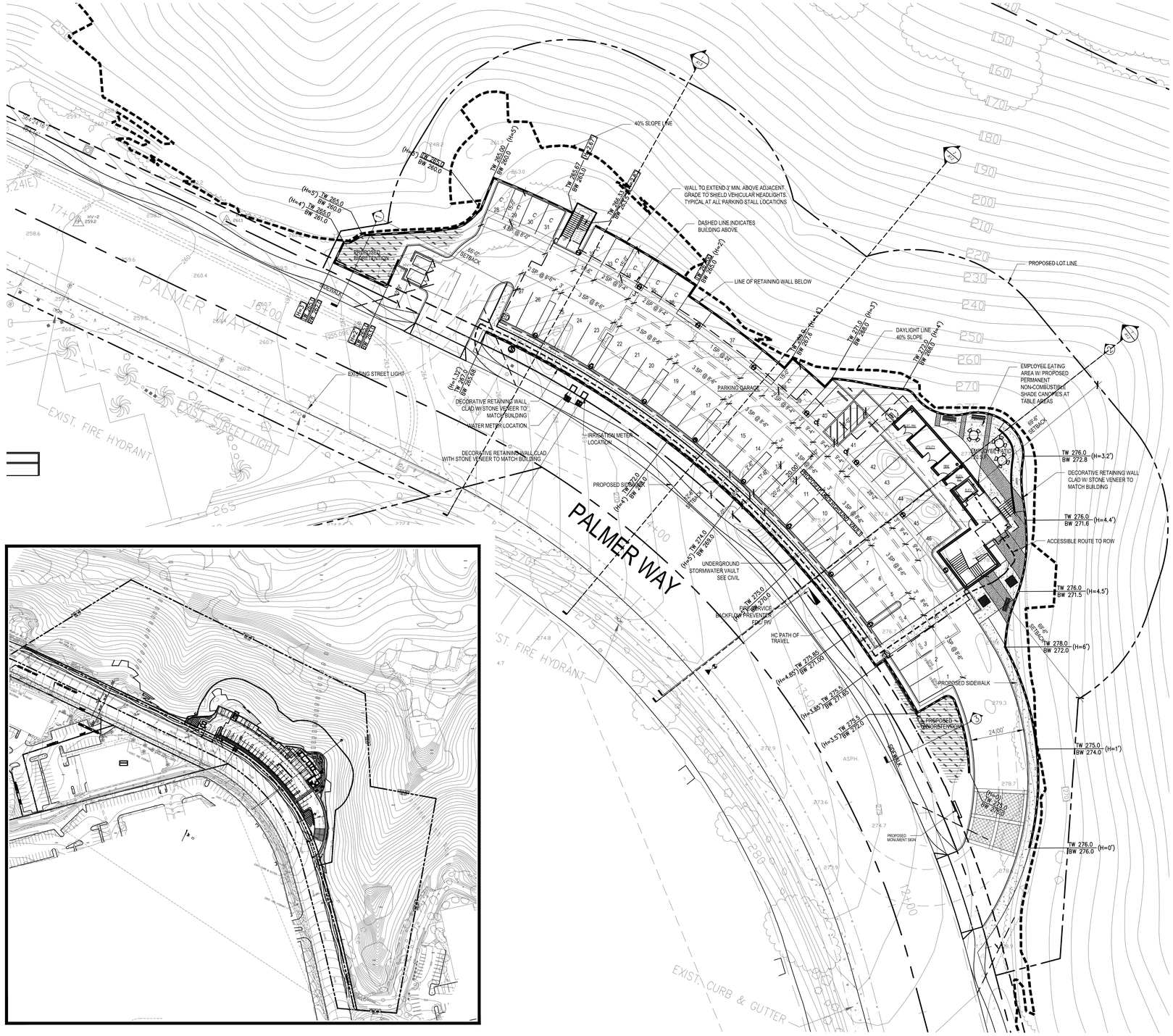
1. The combination of VMT reduction strategies was calculated by the following formula: $1-(1-P_a)*(1-P_b)*(1-P_c)*...$, where P_x is the percent reduction of each VMT reduction strategy. When multiple VMT strategies are combined, the sum of the individual VMT reduction percentages will not equal the Total VMT reduction.
2. The maximum subcategory reduction for the Commute Trip Reduction is 15% and the global maximum reduction for a suburban area is 15%. These values were referenced from *CAPCOA's Quantifying Greenhouse Gas Mitigation Measures, August 2010*. According to CAPCOA.

Summary and Conclusions

The implementation of the project's TDM program would achieve a 12.9 percent reduction in project-generated VMT. As a result, the project's VMT/employee is 15 percent or more below the regional average and impacts would be considered to be less than significant.

Attachments

- Project Site Plan
- Excerpts from CAPCOA
- Excerpts from SANDAG's RTCIP Impact Fee Nexus Study



OVERALL SITE PLAN

0 50' 100' 200'

SCALE: 1" = 100'-0"

N

SITE PLAN

0 10' 20' 30'

SCALE: 1" = 20'-0"

N

OWNER:

LAND DEVELOPMENT L.L.C.
CONTACT: SOLOMON LEVY
P.O. BOX 12409
EL CAJON, CA 92022
T619-482-0363

APPLICANT:

LAND DEVELOPMENT L.L.C.
CONTACT: SOLOMON LEVY
P.O. BOX 12409
EL CAJON, CA 92022
T619-482-0363

ASSESSOR'S PARCEL:

209-040-43-00

SITE ADDRESS

PALMER WAY
CARLSBAD, CA. 92008
2005 THOMAS BROTHERS PG. 1128 1-F

LEGAL DESCRIPTION:

PARCELS 4 AS SHOWN ON PARCEL MAP NO. 18059, IN THE CITY OF CARLSBAD, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, JULY 2, 1998

ZONING DATA:

GENERAL PLAN DESIGNATION:	PI
SITE ZONE:	M-Q
EXISTING USE:	VACANT LOT
PROPOSED USE:	OFFICE
SITE AREA:	276,123 S.F./6.34 ACRES
LOT COVERAGE:	14,064 S.F. (22.9%)

LOT AREAS:

PARCEL 1 (NOT DEVELOPABLE)	4.93 AC.
PARCEL 2 (DEVELOPABLE)	1.41 AC.
TOTAL EXISTING LOT	6.34 AC.

BUILDING DATA:

G.F.A.:	APPROX. 11,404 S.F.
1ST FLOOR:	1,067 S.F.
2ND FLOOR:	10,337 S.F.
OCCUPANCY:	B-OFFICE
STORIES:	2
MAX. HEIGHT:	31'-0"
TYPE OF CONSTRUCTION:	V-B
FIRE SPRINKLERS/ ALARM:	YES
BUILDING SETBACKS:	FRONT- 12'-6" REAR- 69'-6" SIDE (SOUTH)- 69'-6" SIDE (NORTH)- 65'-0"

PARKING DATA:

USE:	OFFICE
RATIO:	1:250
PARKING REQUIRED:	46 SPACES
TOTAL PARKING PROVIDED:	46 SPACES
COMPACT STALLS: (COMPACT STALLS INCLUDED IN TOTAL)	11 SPACES
ACCESSIBLE STALLS REQUIRED:	2 SPACES
ACCESSIBLE STALLS PROVIDED: (ACCESSIBLE STALLS INCLUDED IN TOTAL)	2 SPACES
EVCS STALLS PROVIDED: (EVCS STALLS INCLUDED IN TOTAL)	4 SPACES
LOADING SPACES REQUIRED:	0 SPACES
LOADING SPACES PROVIDED:	0 SPACES
ADT:	228

UTILITY PURVEYORS:

WATER/SEWER:	CITY OF CARLSBAD 1-760-438-2722
ELECTRICITY/GAS:	SDGE 1-800-411-7343
TELEPHONE:	AT&T 1-888-944-0447
CABLE:	TIME WARNER 1-760-707-1000
SCHOOL DIST.:	CARLSBAD UNIFIED 1-760-331-5000

APPLICATION TYPES SUBMITTED:

GENERAL PLAN AMENDMENT (GPA)
ZONE CHANGE (ZC)
SITE DEVELOPMENT PLAN (SDP)
HILLSIDE DEVELOPMENT PERMIT (HDP)
HABITAT MANAGEMENT PLAN PERMIT (HMP)
MINOR SUBDIVISION (MS)

EMPLOYEE EATING AREA:

300 S.F./ 5,000 S.F. OF BUILDING AREA: 740 S.F. PROVIDED
300/5,000 S.F.=.06 X 11,404 GROSS S.F. = 684 S.F.

AVERAGE DAILY TRAFFIC (ADT):

COMMERCIAL (OFFICE) ADT:
20/1,000 S.F.=.02 X 11,404 GROSS S.F. = 228 ADT

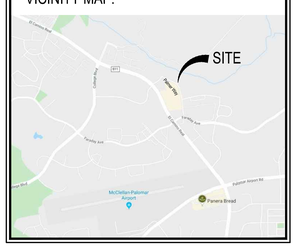
PROJECTED WATER USAGE:

OFFICE: .23 GFD PER SF X 11,404 SF= 2,623 GPD
2623 GPD / 1,440 = 1.82 GPM

PROJECTED SEWER USAGE:

OFFICE: 1 EDU / 1,800 SF = 11,404 SF / 1,800 = 6.3 X 220= 1,394 GAL/DAY

VICINITY MAP:



KIRK MOELLER ARCHITECTS, INC.
2888 LOKER AVE. EAST, STE 220
CARLSBAD, CA 92010
KIRK@KMARCHITECTSINC.COM
760-814-8128

GPA 2018-0001
ZC 2018-0001
SDP 2018-0007
HDP 2018-0004
HMP 2018-0004
MS 2018-0007
(DEV2018-0099)

VALLEY VIEW
PALMER WAY
CARLSBAD, CA.

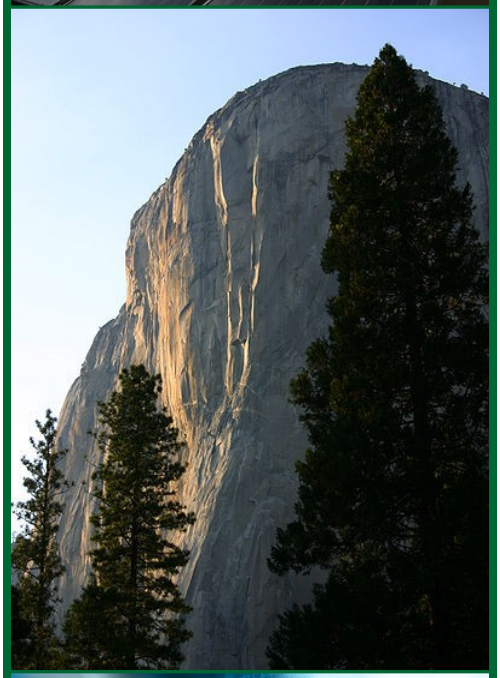
Date:	6-4-20
Project:	19-121 VALLEY VIEW
File:	06119-A1.1
Revisions:	
1	10-25-18
2	10-10-19
3	3-3-20
4	6-4-20

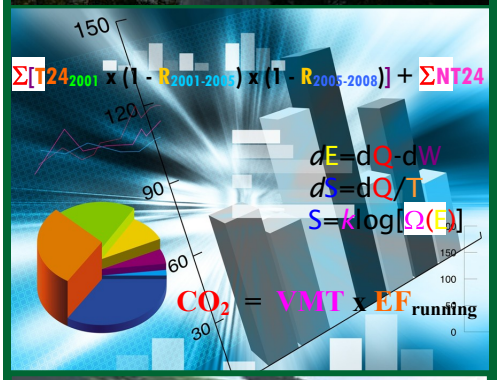
Sheet Title:
SITE PLAN

Sheet Number:
A1.1

CAPCOA

CALIFORNIA AIR POLLUTION CONTROL OFFICERS ASSOCIATION





Quantifying Greenhouse Gas Mitigation Measures

A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures

August, 2010

Chart 6-2: Transportation Strategies Organization

Transportation Measures (Five Subcategories) Global Maximum Reduction (all VMT): urban = 75%; compact infill = 40%; suburban center or suburban with NEV = 20%; suburban = 15%

Global Cap for Road Pricing needs further study

Transportation Measures (Four Categories) Cross-Category Max Reduction (all VMT): urban = 70%; compact infill = 35%; suburban center or suburban with NEV = 15%; suburban = 10%

Max Reduction = 15% overall; work VMT = 25%; school VMT = 65%;

Max Reduction = 25% (all VMT)

Land Use / Location	Neighborhood / Site Enhancement	Parking Policy / Pricing	Transit System Improvements	Commute Trip Reduction (assumes mixed use)	Road Pricing Management	Vehicles
Max Reduction: urban = 65%; compact infill = 30%; suburban center = 10%; suburban = 5%	Max Reduction: without NEV = 5%; with NEV = 15%	Max Reduction = 20%	Max Reduction = 10%	Max Reduction = 25% (work VMT)	Max Reduction = 25%	
Density (30%)	Pedestrian Network (2%)	Parking Supply Limits (12.5%)	Network Expansion (8.2%)	CTR Program Required = 21% work VMT Voluntary = 6.2% work VMT	Cordon Pricing (22%)	Electrify Loading Docks
Design (21.3%)	Traffic Calming (1%)	Unbundled Parking Costs (13%)	Service Frequency / Speed (2.5%)	Transit Fare Subsidy (20% work VMT)	Traffic Flow Improvements (45% CO_2)	Utilize Alternative Fueled Vehicles
Location Efficiency (65%)	NEV Network (14.4) <NEV Parking>	On-Street Market Pricing (5.5%)	Bus Rapid Transit (3.2%)	Employee Parking Cash-out (7.7% work VMT)	Required Contributions by Project	Utilize Electric or Hybrid Vehicles
Diversity (30%)	Car Share Program (0.7%)	Residential Area Parking Permits	Access Improvements	Workplace Parking Pricing (19.7% work VMT)		
Destination Accessibility (20%)	Bicycle Network <Lanes> <Parking> <Land Dedication for Trails>		Station Bike Parking	Alternative Work Schedules & Telecommute (5.5% work VMT)		
Transit Accessibility (25%)	Urban Non-Motorized Zones		Local Shuttles	CTR Marketing (5.5% work VMT)		
BMR Housing (1.2%)			Park & Ride Lots*	Employer-Sponsored Vanpool/Shuttle (13.4% work VMT)		
Orientation Toward Non-Auto Corridor				Ride Share Program (15% work VMT)		
Proximity to Bike Path				Bike Share Program		
				End of Trip Facilities		
				Preferential Parking Permit		
				School Pool (15.8% school VMT)		
				School Bus (6.3% school VMT)		

Note: Strategies in bold text are primary strategies with reported VMT reductions; non-bolded strategies are support or grouped strategies.

Table 6-2: Transportation Category

Transportation						
Category	Measure Number	Strategy	BMP	Grouped With #	Range of Effectiveness	
					Percent Reduction in GHG Emissions	Basis
Land Use / Location	LUT-1	Increase Density			1.5-30.0%	VMT
	LUT-2	Increase Location Efficiency			10-65%	VMT
	LUT-3	Increase Diversity of Urban and Suburban Developments (Mixed Use)			9-30%	VMT
	LUT-4	Incr. Destination Accessibility			6.7-20%	VMT
	LUT-5	Increase Transit Accessibility			0.5-24.6%	VMT
	LUT-6	Integrate Affordable and Below Market Rate Housing			0.04-1.20%	VMT
	LUT-7	Orient Project Toward Non-Auto Corridor			NA	
	LUT-8	Locate Project near Bike Path/Bike Lane			NA	
	LUT-9	Improve Design of Development			3.0-21.3%	VMT
Neighborhood / Site Design	SDT-1	Provide Pedestrian Network Improvements			0-2%	VMT
	SDT-2	Traffic Calming Measures			0.25-1.00%	VMT
	SDT-3	Implement a Neighborhood Electric Vehicle (NEV) Network			0.5-12.7%	VMT
	SDT-4	Urban Non-Motorized Zones		SDT-1	NA	
	SDT-5	Incorporate Bike Lane Street Design (on-site)		LUT-9	NA	
	SDT-6	Provide Bike Parking in Non-Residential Projects		LUT-9	NA	
	SDT-7	Provide Bike Parking in Multi-Unit Residential Projects		LUT-9	NA	
	SDT-8	Provide EV Parking		SDT-3	NA	
	SDT-9	Dedicate Land for Bike Trails		LUT-9	NA	
Parking Policy / Pricing	PDT-1	Limit Parking Supply			5-12.5%	
	PDT-2	Unbundle Parking Costs from Property Cost			2.6-13%	
	PDT-3	Implement Market Price Public Parking (On-Street)			2.8-5.5%	
	PDT-4	Require Residential Area Parking Permits		PDT-1, 2 & 3	NA	

Transportation - continued

Category	Measure Number	Strategy	BMP	Grouped With #	Range of Effectiveness	
					Percent Reduction in GHG Emissions	Basis
Trip Reduction Programs	TRT-1	Implement Voluntary CTR Programs			1.0-6.2%	Commute VMT
	TRT-2	Implement Mandatory CTR Programs – Required Implementation/Monitoring			4.2-21.0%	Commute VMT
	TRT-3	Provide Ride-Sharing Programs			1-15%	Commute VMT
	TRT-4	Implement Subsidized or Discounted Transit Prog.			0.3-20.0%	Commute VMT
	TRT-5	Provide End of Trip Facilities		TRT-1, 2 & 3	NA	
	TRT-6	Telecommuting and Alternative Work Schedules			0.07-5.50%	Commute VMT
	TRT-7	Implement Commute Trip Reduction Marketing			0.8-4.0%	Commute VMT
	TRT-8	Implement Preferential Parking Permit Program		TRT-1, 2 & 3	NA	
	TRT-9	Implement Car-Sharing Program			0.4-0.7%	VMT
	TRT-10	Implement School Pool Program			7.2-15.8%	School VMT
	TRT-11	Provide Employer-Sponsored Vanpool/Shuttle			0.3-13.4%	Commute VMT
	TRT-12	Implement Bike-Sharing Program		SDT-5, LUT-9	NA	
	TRT-13	Implement School Bus Program			38-63%	School VMT
	TRT-14	Price Workplace Parking			0.1-19.7%	Commute VMT
	TRT-15	Implement Employee Parking “Cash-Out”			0.6-7.7%	Commute VMT

Transportation - continued						
Category	Measure Number	Strategy	BMP	Grouped With #	Range of Effectiveness	
					Percent Reduction in GHG Emissions	Basis
Transit System Improvements	TST-1	Provide a Bus Rapid Transit System			0.02-3.2%	VMT
	TST-2	Implement Transit Access Improvements		TST-3, TST-4	NA	
	TST-3	Expand Transit Network			0.1-8.2%	VMT
	TST-4	Increase Transit Service Frequency/Speed			0.02-2.5%	VMT
	TST-5	Provide Bike Parking Near Transit		TST-3, TST-4	NA	
	TST-6	Provide Local Shuttles		TST-3, TST-4	NA	
Road Pricing / Management	RPT-1	Implement Area or Cordon Pricing			7.9-22.0%	VMT
	RPT-2	Improve Traffic Flow			0-45%	VMT
	RPT-3	Require Project Contributions to Transportation Infrastructure Improvement Projects		RPT-2, TST-1 to 6	NA	
	RPT-4	Install Park-and-Ride Lots		RPT-1, TRT-11, TRT-3, TST-1 to 6	NA	
Vehicles	VT-1	Electrify Loading Docks and/or Require Idling-Reduction Systems			26-71%	Truck Idling Time
	VT-2	Utilize Alternative Fueled Vehicles			Varies	
	VT-3	Utilize Electric or Hybrid Vehicles			0.4-20.3%	Fuel Use

3.4.3 Provide Ride-Sharing Programs

Range of Effectiveness: 1 – 15% commute vehicle miles traveled (VMT) reduction and therefore 1 - 15% reduction in commute trip GHG emissions.

Measure Description:

Increasing the vehicle occupancy by ride sharing will result in fewer cars driving the same trip, and thus a decrease in VMT. The project will include a ride-sharing program as well as a permanent transportation management association membership and funding requirement. Funding may be provided by Community Facilities, District, or County Service Area, or other non-revocable funding mechanism. The project will promote ride-sharing programs through a multi-faceted approach such as:

- Designating a certain percentage of parking spaces for ride sharing vehicles
- Designating adequate passenger loading and unloading and waiting areas for ride-sharing vehicles
- Providing a web site or message board for coordinating rides

Measure Applicability:

- Urban and suburban context
- Negligible impact in many rural contexts, but can be effective when a large employer in a rural area draws from a workforce in an urban or suburban area, such as when a major employer moves from an urban location to a rural location.
- Appropriate for residential, retail, office, industrial, and mixed-use projects

Baseline Method:

See introduction to transportation section for a discussion of how to estimate trip rates and VMT. The CO_2 emissions are calculated from VMT as follows:

$$CO_2 = VMT \times EF_{running}$$

Where:

VMT = vehicle miles traveled

$EF_{running}$ = emission factor for running emissions

Inputs:

The following information needs to be provided by the Project Applicant:

- Percentage of employees eligible

- Location of project site: low density suburb, suburban center, or urban location

Mitigation Method:

% VMT Reduction = Commute * Employee

Where

Commute = % reduction in commute VMT (from [1])
Employee = % employees eligible

Detail:

- Commute: 5% (low density suburb), 10% (suburban center), 15% (urban) annual reduction in commute VMT (from [1])

Assumptions:

Data based upon the following references:

[1] VTPI. *TDM Encyclopedia*. http://www.vtpi.org/tdm/tdm34.htm; Accessed 3/5/2010.

Emission Reduction Ranges and Variables:

Pollutant	Category Emissions Reductions[58]
CO_2e	1 – 15% of running
PM	1 – 15% of running
CO	1 – 15% of running
NOx	1 – 15% of running
SO_2	1 – 15% of running
ROG	0.6 – 9% of total

Discussion:

This strategy is often part of Commute Trip Reduction (CTR) Program, another strategy documented separately (see TRT-1 and TRT-2). The Project Applicant should take care not to double count the impacts.

Example:

Sample calculations are provided below:

[58] The percentage reduction reflects emission reductions from running emissions. The actual value will be less than this when starting and evaporative emissions are factored into the analysis. ROG emissions have been adjusted to reflect a ratio of 40% evaporative and 60% exhaust emissions based on a statewide EMFAC run of all vehicles.

- Low Range % VMT Reduction (low density suburb and 20% eligible) = 5% * 20% = 1%
- High Range % VMT Reduction (urban and 100% eligible) = 15% * 1 = 15%

Preferred Literature:

- 5 – 15% reduction of commute VMT

The *Transportation Demand Management (TDM) Encyclopedia* notes that because rideshare passengers tend to have relatively long commutes, mileage reductions can be relatively large with rideshare. If ridesharing reduces 5% of commute trips it may reduce 10% of vehicle miles because the trips that are reduced are twice as long as average. Rideshare programs can reduce up to 8.3% of commute VMT, up to 3.6% of total regional VMT, and up to 1.8% of regional vehicle trips (Apogee, 1994; TDM Resource Center, 1996). Another study notes that ridesharing programs typically attract 5-15% of commute trips if they offer only information and encouragement, and 10-30% if they also offer financial incentives such as parking cash out or vanpool subsidies (York and Fabricatore, 2001).

Alternative Literature:

- Up to 1% reduction in VMT (if combined with two other strategies)

Per the Nelson\Nygaard report [2], ride-sharing would fall under the category of a minor TDM program strategy. The report allows a 1% reduction in VMT for projects with at least three minor strategies.

Alternative Literature References:

[2] Nelson\Nygaard, 2005. *Crediting Low-Traffic Developments* (p.12). http://www.montgomeryplanning.org/transportation/documents/TripGenerationAnalysisUsingURBEMIS.pdf

Criteron Planner/Engineers and Fehr & Peers Associates (2001). Index 4D Method. *A Quick-Response Method of Estimating Travel Impacts from Land-Use Changes*. Technical Memorandum prepared for US EPA, October 2001.

Other Literature Reviewed:

None

3.4.4 Implement Subsidized or Discounted Transit Program

Range of Effectiveness: 0.3 – 20.0% commute vehicle miles traveled (VMT) reduction and therefore a 0.3 – 20.0% reduction in commute trip GHG emissions.

Measure Description:

This project will provide subsidized/discounted daily or monthly public transit passes. The project may also provide free transfers between all shuttles and transit to participants. These passes can be partially or wholly subsidized by the employer, school, or development. Many entities use revenue from parking to offset the cost of such a project.

Measure Applicability:

- Urban and suburban context
- Negligible in a rural context
- Appropriate for residential, retail, office, industrial, and mixed-use projects

Baseline Method:

See introduction to transportation section for a discussion of how to estimate trip rates and VMT. The CO_2 emissions are calculated from VMT as follows:

$$CO_2 = VMT \times EF_{running}$$

Where:

VMT = vehicle miles traveled

$EF_{running}$ = emission factor for running emissions

Inputs:

The following information needs to be provided by the Project Applicant:

- Percentage of project employees eligible
- Transit subsidy amount
- Location of project site: low density suburb, suburban center, or urban location

Mitigation Method:

$$\% \text{ VMT Reduction} = A * B * C$$

Where

A = % reduction in commute vehicle trips (VT) (from [1])

B = % employees eligible

C = Adjustment from commute VT to commute VMT

Detail:

- A:

	Daily Transit Subsidy			
	$0.75	$1.49	$2.98	$5.96
Worksite Setting	**% Reduction in Commute VT**			
Low density suburb	**1.5%**	**3.3%**	**7.9%**	**20.0%***
Suburban center	**3.4%**	**7.3%**	**16.4%**	**20.0%***
Urban location	**6.2%**	**12.9%**	**20.0%***	**20.0%***
* Discounts greater than 20% will be capped, as they exceed levels recommended by TCRP 95 Draft Chapter 19 and other literature.				

- C: 1.0 (see Appendix C for detail)

Assumptions:

Data based upon the following references:

[1] Nelson\Nygaard, 2010. *City of Santa Monica Land Use and Circulation Element EIR Report, Appendix – Santa Monica Luce Trip Reduction Impacts Analysis* (p.401).

[2] Nelson\Nygaard used the following literature sources: VTPI, Todd Litman, *Transportation Elasticities, http://www.vtpi.org/elasticities.pdf.* Comsis Corporation (1993), *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*, USDOT and Institute of Transportation Engineers (www.ite.org); www.bts.gov/ntl/DOCS/474.html.

Emission Reduction Ranges and Variables:

Pollutant	Category Emissions Reductions[59]
CO_2e	0.3 - 20% of running
PM	0.3 - 20% of running
CO	0.3 - 20% of running
NOx	0.3 - 20% of running
SO_2	0.3 - 20% of running
ROG	0. 18 - 12% of total

[59] The percentage reduction reflects emission reductions from running emissions. The actual value will be less than this when starting and evaporative emissions are factored into the analysis. ROG emissions have been adjusted to reflect a ratio of 40% evaporative and 60% exhaust emissions based on a statewide EMFAC run of all vehicles.

Discussion:

This strategy is often part of a Commute Trip Reduction (CTR), another strategy documented separately (see TRT-1 and TRT-2). The Project Applicant should take care not to double count the impacts.

The literature evaluates this strategy in relation to the employer, but keep in mind that this strategy can also be implemented by a school or the development as a whole.

Example:

Sample calculations are provided below:

- Low Range % VMT Reduction ($0.75, low density suburb, 20% eligible) = 1.5% * 20% = 0.3%
- High Range % VMT Reduction ($5.96, urban, 100% eligible) = 20% * 100% = 20%

Preferred Literature:

Commute Vehicle Trip Reduction	**Daily Transit Subsidy**			
Worksite Setting	**$0.75**	**$1.49**	**$2.98**	**$5.96**
Low density suburb, rideshare oriented	0.1%	0.2%	0.6%	1.9%
Low density suburb, mode neutral	1.5%	3.3%	7.9%	21.7%*
Low density suburb, transit oriented	2.0%	4.2%	9.9%	23.2%*
Activity center, rideshare oriented	1.1%	2.4%	5.8%	16.5%
Activity center, mode neutral	3.4%	7.3%	16.4%	38.7%*
Activity center, transit oriented	5.2%	10.9%	23.5%*	49.7%*
Regional CBD/Corridor, rideshare oriented	2.2%	4.7%	10.9%	28.3%*
Regional CBD/Corridor, mode neutral	6.2%	12.9%	26.9%*	54.3%*
Regional CBD/Corridor, transit oriented	9.1%	18.1%	35.5%*	64.0%*

* Discounts greater than 20% will be capped, as they exceed levels recommended by *TCRP 95 Draft Chapter 19* and other literature.

Nelson\Nygaard (2010) updated a commute trip reduction table from VTPI Transportation Elasticities to account for inflation since the data was compiled. Data regarding commute vehicle trip reductions was originally from a study conducted by Comsis Corporation and the Institute of Transportation Engineers (ITE).

Alternative Literature:

Alternate:

- 2.4-30.4% commute vehicle trip reduction (VTR)

TCRP 95 Draft Chapter 19 [2] indicates transit subsidies in areas with good transit and restricted parking have a commute VTR of 30.4%; good transit but free parking, a commute VTR of 7.6%; free parking and limited transit 2.4%. Programs with transit subsidies have an average commute VTR of 20.6% compared with an average commute VTR of 13.1% for sites with non-transit fare subsidies.

Alternate:

- 0.03-0.12% annual greenhouse gas (GHG) reduction

Moving Cooler [3] assumed price elasticities of -0.15, -0.2, and -0.3 for lower fares 25%, 33%, and 50%, respectively. *Moving Cooler* assumes average vehicle occupancy of 1.43 and a VMT/trip of 5.12.

Alternative Literature References:

[2] Pratt, Dick. Personal Communication Regarding the Draft of TCRP 95 Traveler Response to Transportation System Changes – Chapter 19 Employer and Institutional TDM Strategies.

[3] Cambridge Systematics. *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions.* Technical Appendices. Prepared for the Urban Land Institute. (Table D.3) http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendix%20B_Effectiveness_102209.pdf

Other Literature Reviewed:

None

3.4.6 Encourage Telecommuting and Alternative Work Schedules

Range of Effectiveness: 0.07 – 5.50% commute vehicle miles traveled (VMT) reduction and therefore 0.07 – 5.50% reduction in commute trip GHG emissions.

Measure Description:

Encouraging telecommuting and alternative work schedules reduces the number of commute trips and therefore VMT traveled by employees. Alternative work schedules could take the form of staggered starting times, flexible schedules, or compressed work weeks.

Measure Applicability:

- Urban, suburban, and rural context
- Appropriate for retail, office, industrial, and mixed-use projects

Baseline Method:

See introduction to transportation section for a discussion of how to estimate trip rates and VMT. The CO_2 emissions are calculated from VMT as follows:

$$CO_2 = VMT \times EF_{running}$$

Where:

VMT = vehicle miles traveled

$EF_{running}$ = emission factor for running emissions

Inputs:

The following information needs to be provided by the Project Applicant:

- Percentage of employees participating (1 – 25%)
- Strategy implemented: 9-day/80-hour work week, 4-day/40-hour work week, or 1.5 days of telecommuting

Mitigation Method:

% Commute VMT Reduction = Commute

Where

Commute = % reduction in commute VMT (See table below)

	Employee Participation				
	1%	**3%**	**5%**	**10%**	**25%**
	% Reduction in Commute VMT				
9-day/80-hour work week	0.07%	0.21%	0.35%	0.70%	1.75%
4-day/40-hour work week	0.15%	0.45%	0.75%	1.50%	3.75%
telecommuting 1.5 days	0.22%	0.66%	1.10%	2.20%	5.5%
Source: Moving Cooler Technical Appendices, Fehr & Peers Notes: The percentages from Moving Cooler incorporate a discount of 25% for rebound effects. The percentages beyond 1% employee participation are linearly extrapolated.					

Assumptions:

Data based upon the following references:

[1] Cambridge Systematics. *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions.* Technical Appendices. Prepared for the Urban Land Institute. (p. B-54)
http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendix%20B_Effectiveness_102209.pdf

Emission Reduction Ranges and Variables:

Pollutant	Category Emissions Reductions[60]
CO_2e	0.07 – 5.50% of running
PM	0.07 – 5.50% of running
CO	0.07 – 5.50% of running
NOx	0.07 – 5.50% of running
SO_2	0.07 – 5.50% of running
ROG	0.04 – 3.3% of total

Discussion:

This strategy is often part of a Commute Trip Reduction Program, another strategy documented separately (see TRT-1 and TRT-2). The Project Applicant should take care not to double count the impacts.

The employee participation rate should be capped at a maximum of 25%. *Moving Cooler* [1] notes that roughly 50% of a typical workforce could participate in alternative

[60] The percentage reduction reflects emission reductions from running emissions. The actual value will be less than this when starting and evaporative emissions are factored into the analysis. ROG emissions have been adjusted to reflect a ratio of 40% evaporative and 60% exhaust emissions based on a statewide EMFAC run of all vehicles.

work schedules (based on job requirements) and roughly 50% of those would choose to participate.

The 25% discount for rebound effects is maintained to provide a conservative estimate and support the literature results. The project may consider removing this discount from their calculations if deemed appropriate.

Example:

N/A – no calculations are needed.

Preferred Literature:

- 0.07% - 0.22% reduction in commuting VMT

Moving Cooler [1] estimates that if 1% of employees were to participate in a 9 day/80 hour compressed work week, commuting VMT would be reduced by 0.07%. If 1% of employees were to participate in a 4 day/40 hour compressed work week, commuting VMT would reduce by 0.15%; and 1% of employees participating in telecommuting 1.5 days per week would reduce commuting VMT by 0.22%. These percentages incorporate a discounting of 25% to account for rebound effects (i.e., travel for other purposes during the day while not at the work site). The percentages beyond 1% employee participation are linearly extrapolated (see table above).

Alternative Literature:

Alternate:

- 9-10% reduction in VMT for participating employees

As documented in *TCRP 95 Draft Chapter 19* [2], a Denver federal employer's implementation of compressed work week resulted in a 14-15% reduction in VMT for participating employees. This is equivalent to the 0.15% reduction for each 1% participation cited in the preferred literature above. In the Denver example, there was a 65% participation rate out of a total of 9,000 employees. *TCRP 95* states that the compressed work week experiment has no adverse effect on ride-sharing or transit use. Flexible hours have been shown to work best in the presence of medium or low transit availability.

Alternate:

- 0.5 vehicle trips reduced per employee per week
- 13 – 20 VMT reduced per employee per week

As documented in *TCRP 95 Draft Chapter 19* [2], a study of compressed work week for 2,600 Southern California employees resulted in an average reduction of 0.5 trips per week (per participating employee). Participating employees also reduced their VMT by 13-20 miles per week. This translates to a reduction of between 5% and 10% in commute VMT, and so is lower than the 15% reduction cited for Denver government employees.

Alternative Literature References:

[2] Pratt, Dick. Personal Communication Regarding the Draft of TCRP 95 Traveler Response to Transportation System Changes – Chapter 19 Employer and Institutional TDM Strategies.

Other Literature Reviewed:

None

3.4.7 Implement Commute Trip Reduction Marketing

Range of Effectiveness: 0.8 – 4.0% commute vehicle miles traveled (VMT) reduction and therefore 0.8 – 4.0% reduction in commute trip GHG emissions.

Measure Description:

The project will implement marketing strategies to reduce commute trips. Information sharing and marketing are important components to successful commute trip reduction strategies. Implementing commute trip reduction strategies without a complementary marketing strategy will result in lower VMT reductions. Marketing strategies may include:

- New employee orientation of trip reduction and alternative mode options
- Event promotions
- Publications

CTR marketing is often part of a CTR program, voluntary or mandatory. CTR marketing is discussed separately here to emphasis the importance of not only providing employees with the options and monetary incentives to use alternative forms of transportation, but to clearly and deliberately promote and educate employees of the various options. This will greatly improve the impact of the implemented trip reduction strategies.

Measure Applicability:

- Urban and suburban context
- Negligible in a rural context
- Appropriate for residential, retail, office, industrial and mixed-use projects

Baseline Method:

See introduction to transportation section for a discussion of how to estimate trip rates and VMT. The CO_2 emissions are calculated from VMT as follows:

$$CO_2 = VMT \times EF_{running}$$

Where:

VMT = vehicle miles traveled
$EF_{running}$ = emission factor for running emissions

Inputs:

The following information needs to be provided by the Project Applicant:

- Percentage of project employees eligible (i.e. percentage of employers choosing to participate)

Mitigation Method:

$$\% \text{ Commute VMT Reduction} = A * B * C$$

Where

A = % reduction in commute vehicle trips (from [1])

B = % employees eligible

C = Adjustment from commute VT to commute VMT

Detail:

- A: 4% (per [1])
- C: 1.0 (see Appendix C for detail)

Assumptions:

Data based upon the following references:

[1] Pratt, Dick. Personal communication regarding the *Draft of TCRP 95 Traveler Response to Transportation System Changes – Chapter 19 Employer and Institutional TDM Strategies.* Transit Cooperative Research Program.

Emission Reduction Ranges and Variables:

Pollutant	Category Emissions Reductions[61]
CO_2e	0.8 – 4.0% of running
PM	0.8 – 4.0% of running
CO	0.8 – 4.0% of running
NOx	0.8 – 4.0% of running
SO_2	0.8 – 4.0% of running
ROG	0.5 – 2.4% of total

[61] The percentage reduction reflects emission reductions from running emissions. The actual value will be less than this when starting and evaporative emissions are factored into the analysis. ROG emissions have been adjusted to reflect a ratio of 40% evaporative and 60% exhaust emissions based on a statewide EMFAC run of all vehicles.

Discussion:

The effectiveness of commute trip reduction marketing in reducing VMT depends on which commute reduction strategies are being promoted. The effectiveness levels provided below should only be applied if other programs are offered concurrently, and represent the total effectiveness of the full suite of measures.

This strategy is often part of a CTR Program, another strategy documented separately (see strategy T# E1). Take care not to double count the impacts.

Example:

Sample calculations are provided below:

- Low Range % VMT Reduction (20% eligible) = 4% * 20% = 0.8%
- High Range % VMT Reduction (100% eligible) = 4% * 100% = 4.0%

Preferred Literature:

- 4-5% commute vehicle trips reduced with full-scale employer support

TCRP 95 Draft Chapter 19 notes the average empirically-based estimate of reductions in vehicle trips for full-scale, site-specific employer support programs alone is 4-5%. This effectiveness assumes there are alternative commute modes available which have on-going employer support. For a program to receive credit for such outreach and marketing efforts, it should contain guarantees that the program will be maintained permanently, with promotional events delivered regularly and with routine performance monitoring.

Alternative Literature:

- 5-15% reduction in commute vehicle trips
- 3% increase in effectiveness of marketed transportation demand management (TDM) strategies

VTPI [2] notes that providing information on alternative travel modes by employers was one of the most important factors contributing to mode shifting. One study (Shadoff,1993) estimates that marketing increases the effectiveness of other TDM strategies by up to 3%. Given adequate resources, marketing programs may reduce vehicle trips by 5-15%. The 5 – 15% range comes from a variety of case studies across the world. U.S. specific case studies include: 9% reduction in vehicle trips with TravelSmart in Portland (12% reduction in VMT), 4-8% reduction in vehicle trips from four cities with individualized marketing pilot projects from the Federal Transit Administration (FTA). Averaged across the four pilot projects, there was a 6.75% reduction in VMT.

Alternative Literature References:

[2] VTPI, TDM Encyclopedia – TDM Marketing; http://www.vtpi.org/tdm/tdm23.htm; accessed 3/5/2010. Table 7 (citing FTA, 2006)

Other Literature Reviewed:

None

RTCIP IMPACT FEE NEXUS STUDY – FINAL REPORT

NOVEMBER 26, 2007

PREPARED FOR THE SAN DIEGO ASSOCIATION OF GOVERNMENTS

MuniFinancial Oakland Office
1700 Broadway, 6th Floor
Oakland, California 94612
Tel: (510) 832-0899
Fax: (510) 832-0898

Anaheim, CA
Industry, CA
Lancaster, CA
Oakland, CA
Orlando, FL
Phoenix, AZ
Sacramento, CA
Seattle, WA
Temecula, CA

www.muni.com

Table 2: Occupant Density

Land Use		
Commercial	500	Square feet per employee
Office/Services	300	Square feet per employee
Industrial[1]	900	Square feet per employee

Note: Source data based on random sample of 2,721 developed parcels across five Los Angeles area counties (Los Angeles, Orange, Riverside, San Bernardino, and Ventura). MuniFinancial estimated weighting factors by land use categories used in the survey to calculate average employment densities by major category (commercial, office, industrial).

[1] Adjusted to correct for over-sampling of industrial parcels in Ventura County.

Source: The Natelson Company, Inc., *Employment Density Study Summary Report,* prepared for the Southern California Association of Governments; October 31, 2001, Table 2-A, p. 15. MuniFinancial.

Travel Demand By Land Use Category

To estimate travel demand by type of land use the nexus study uses vehicle trips rather than vehicle miles traveled (VMT) that were used in the initial SANDAG calculation. Vehicle trips can be calculated in a consistent manner across land use categories based on population and employment estimates by land use category. This enables the impact of development to be distinguished between land use categories, a key requirement of the *Mitigation Fee Act*. VMT, on the other hand, is available from transportation models only for a limited number of "production and attraction" categories: home-work, home-school, home-college, home-other, and non-home.

A reasonable measure of vehicle trips is weekday average daily vehicle trips ends. Because automobiles are the predominant source of traffic congestion, vehicle trips are a reasonable measure of demand for new capacity even though the measure excludes demand for alternative modes of transportation (transit, bicycle, pedestrian).

The following two adjustments are made to vehicle trip generation rates to better estimate travel demand by type of land use:

- Pass-by trips are deducted from the trip generation rate. Pass-by trips are intermediates stops between an origin and a final destination that require no diversion from the route, such as stopping to get gas on the way to work.
- The trip generation rate is weighted by the average length of trips for a specific land use category compared to the average length of all trips on the street system.

Table 3 shows the calculation of travel demand factors by land use category based on the adjustments described above. Data is based on extensive and detailed trip surveys conducted in the San Diego region by SANDAG. The surveys provide a robust database of trip generation rates, pass-by trips factors, and average trip length for a wide range of land uses.