Attachment RO-1.1 SB 743 Transportation VMT Analysis

CHEN RYAN

TO: Baldwin & Sons, Inc.
Otay Village (San Diego) ASLI V, L.L.L.P

FROM: Stephen Cook, PE; Chen Ryan Associates
Phuong Nguyen, PE; Chen Ryan Associates

DATE: October 7, 2019

RE: **SB 743 Transportation VMT Analysis – Otay Ranch Resort Village Proposed Project/Alternative H**

This memorandum documents the results of an SB 743 traffic analysis conducted for the proposed Otay Ranch Resort Village (Proposed Project) and related Alternative H. The analysis is based on the recently revised State California Environmental Quality Act (CEQA) Guidelines, which require that after July 1, 2020, lead agencies analyze traffic-related impacts based on vehicle miles traveled (VMT). The analysis presented here provides a quantitative and qualitative discussion of the VMT and VMT per capita (VMT per person) anticipated to be generated by the Proposed Project/Alternative H, and compares it to the average VMT per capita generated throughout the San Diego County region. This method is consistent with the SB-743 related methods recommended in the *Technical Advisory on Evaluating Transportation Impacts in CEQA*, December 2018 *(OPR Technical Advisory),* authored by the Governor's Office of Planning and Research (OPR). "Traffic Impact Study Supplemental Analysis Otay Ranch Resort Village 13 – Alternative H(Note: Because Alternative H includes a comparable amount of development as the Proposed Project and would be developed in the same location as the Proposed Project, and because the Alternative H trip generation would be similar to that of the Proposed Project, it is reasonable to conclude that Alternative H would generate a similar VMT per capita as the Proposed Project and, as such, the results of the analysis presented here apply to both the Proposed Project and Alternative H.

Because lead agencies are not required to conduct a SB 743 VMT analysis as part of their CEQA review prior to July 1, 2020, and because the County of San Diego has not yet adopted guidelines for conducting a SB-743 analysis, the analysis and related results presented in this memorandum are not required by CEQA and, therefore, are provided for informational purposes only. Significant impacts and corresponding mitigation are as identified in the Draft EIR (May 2015) and Recirculated Portions of the Draft EIR (April 2019; RDEIR), including, specific to the Proposed Project and Alternative H, the Chen Ryan Associates technical report dated October 9, 2018, *Traffic Impact Study Supplemental Analysis Otay Ranch Resort Village 13 – Proposed Project*, and *Traffic Impact Study Supplemental Analysis Otay Ranch Resort Village 13 – Alternative H*, both included as Appendix D-12 to the Recirculated Draft Environmental Impact Report (RDEIR).

This memo is organized as follows:

1. **Project Description** – Provides a brief description of the land uses proposed as part of the Otay Ranch Resort Village - Proposed Project and Alternative H.

2. **SB 743 - Proposed Project**
   - 2.1 **Background** – Provides background information regarding SB 743, the related CEQA Guidelines revisions, and the *OPR Technical Advisory*.
   - 2.2 **Analysis** – Provides a comparison of the Proposed Project VMT per capita and the Alternative H VMT per capita relative to the existing VMT per capita of San Diego County

region and sub-regional areas and assesses the results against significance criteria recommended in the OPR Technical Advisory.

2.3 **Induced Vehicle Travel due to Roadway Capacity Expansion** – Provides an analysis of the potential increase in VMT due to Project-related roadway improvements identified as Project features in the Proposed Project and Alternative H.

3. SB 743 - Project Alternatives

3.1 **Analysis** – Provides a comparison of the VMT/VMT per Capita of each of the project Alternatives relative to the Proposed Project/Alternative H.

1. Proposed Project and Alternative H Description

The proposed Otay Ranch Resort Village Specific Plan ("Otay Ranch Resort Village / Village 13") is located at the northeast corner of Lower Otay Reservoir in unincorporated San Diego County. The project area is bordered by State Route 94 to the east, the Jamul Community to the north, Otay Lake to the south, and the City of Chula Vista to the west. Per the County of San Diego General Plan, the Proposed Project is located within the Southwestern subregion of the county. This subregion consists of the communities of Ramona, Lakeside, Alpine, Crest-Dehesa, Valle De Oro, Spring Valley, Sweetwater, Jamul-Dulzura, and Otay.

The proposed Otay Ranch Resort Village/Village 13 project would include 1,881 single-family detached homes, 57 attached homes, up to 20,000 square feet of mixed-use commercial, 28.6 acres of public parks, 2.1 acres of public safety-related land uses, a 10-acre elementary school, and a 200-room resort, including up to 20,000 square feet of ancillary uses such as meeting rooms, a conference center, offices, shops, and restaurants.

Alternative H also would include 1,881 single-family units and 57 multi-family units, an elementary school, a public safety site, and a resort site similar to the Proposed Project. However, Alternative H would be developed on a smaller footprint than the proposed project, thereby resulting in 1,107 acres of Otay Ranch RMP Preserve and 69.8 acres designated as Conserved Open Space. Because the Alternative H land uses are substantially similar to those of the Proposed Project, the total project trip generation for Alternative H will be equal to or less than the Proposed Project. Please refer to Appendix D-12 of the REIR for additional discussion regarding the Alternative H land uses.

2 VMT Analysis – Proposed Project and Alternative H

2.1 Background

On September 27, 2013, Governor Edmund G. Brown, Jr. signed SB 743 into law, starting a process that fundamentally changes the way transportation impact analysis is conducted under CEQA. In December 2018, pursuant to SB 743, the California Resources Agency certified and adopted revised CEQA Guidelines, including new section 15064.3. Under the new section, VMT, which is the amount and distance of automobile traffic attributable to a project, is identified as the "most appropriate measure of transportation impacts." Lead agencies have until July 1, 2020, to include VMT analyses as part of their CEQA review. As such, preparation of an SB 743 compliant analysis consistent with the new guidelines is not required at this time.

ANALYSIS CRITERIA

The CEQA Guidelines recommend use of automobile VMT as the preferred CEQA transportation metric, along with the elimination of auto delay/LOS for CEQA purposes statewide. For land use projects, the *OPR Technical Advisory* reports that research has shown that automobile VMT per capita at the project level should be fifteen percent (15%) below those of existing development in order to help facilitate achievement of the state's greenhouse gas (GHG) emission goals.

In addition to the VMT directly generated by a project, for roadway capacity projects, the CEQA Guidelines provide that lead agencies have discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements.

The *OPR Technical Advisory* contains recommended specifications for VMT analysis methodology and recommendations for thresholds. The proposed Guidelines and related *OPR Technical Advisory* contain sufficient information to inform lead agencies about how to prepare for the upcoming transition to VMT. However, as noted above, compliance with the revised CEQA Guidelines is not mandatory at this time.

In summary, while not required by CEQA, this memorandum presents an evaluation of the potential VMT-related impacts of Proposed Project consistent with the revised *CEQA Guidelines* and related *OPR Technical Advisory*.

METHODOLOGY

Neither the CEQA Guidelines nor *OPR Technical Advisory* require that a specific methodology be used when evaluating a project's VMT. Instead, the CEQA Guidelines state that "lead agency has discretion to choose the most appropriate methodology to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household or in any other measure" and that "a lead agency may use models to estimate a project's vehicle miles traveled, and may revise those estimates to reflect professional judgment based on substantial evidence", and "any assumptions used to estimate vehicle miles traveled and any revisions to model outputs should be documented and explained in the environmental document prepared for the project".

In essence, the CEQA Guidelines defer to a local agency's professional judgment supported by substantial evidence when deciding how best to model VMT, stating that "a lead agency's evaluation of the vehicle miles traveled with a project is subject to a rule of reason". While the CEQA Guidelines were approved and adopted by the Natural Resources Agency, the County of San Diego has not yet adopted methodologies for performing VMT analysis per SB 743. Accordingly, the qualitative and quantitative

analysis presented here is based on the suggested approach presented in the CEQA Guidelines and related *OPR Technical Advisory*.

2.2 Analysis

VMT PER CAPITA ANALYSIS

Proposed Project/Alternative H VMT Per Capita

As recommended in the *OPR Technical Advisory*, an analysis was conducted to compare the Proposed Project/Alternative H VMT per capita to the existing VMT per capita for the San Diego Region and the County of San Diego Southwestern subregion. **Table 1** displays the automobile home-based VMT per Capita for the Proposed Project/Alternative H. VMT output from the SANDAG model is provided in **Attachment A.**

Table 1 Otay Ranch Resort Village – Proposed Project/Alternative H
Vehicle Miles Traveled by Capita

Study area	# of Residents	Total Trips	Vehicle Miles Trips	Vehicle Miles Travelled per Resident
Proposed Project/Alternative H	5,444	19,747	142,925	26.3

Source: SANDAG Series 13 Regional Model, October 2018

As shown on Table 1, the automobile home-based VMT per capita for the Proposed Project is projected to be 26.3 miles per day.

Comparative Baseline and Threshold

As per the guidance included in the *OPR Technical Advisory*, the VMT per capita for the Proposed Project/Alternative H is compared with the San Diego Regional VMT per Capita to identify if it exceeds the recommended thresholds.

According to the *OPR Technical Advisory*, local jurisdictions have the flexibility to utilize alternative thresholds from those provided in the *OPR Technical Advisory*. However, because the County of San Diego has not yet adopted its own VMT thresholds, for the limited purpose of this analysis, the OPR recommended 15% below existing VMT per Capita of the regional average is utilized as the applicable threshold; that is, if the project's VMT per Capita is greater than 15% below the baseline (existing regional VMT per Capita), the project VMT would exceed the standard. The regional average VMT per Capita used in this analysis is based on the aggregate VMT of the 18 cities in San Diego County and the unincorporated portion of San Diego County. As shown in Table 2, the regional average VMT per Capita is 17.60.

As mentioned previously, the Proposed Project is located in the unincorporated Southwestern sub-regional area of San Diego County. In order to provide a comparison of VMT efficiency between the Proposed Project and other projects in the unincorporated area of San Diego County, a comparison of the Proposed Project/Alternative H VMT per Capita against the Southwestern region VMT per Capita also is provided. As shown in Table 2, the Southwestern regional average VMT per Capita is 21.52.

As also shown in **Table 2**, assuming application of the OPR Technical Advisory criteria, the threshold to be applied here is 15% below the existing San Diego Region VMT/capita and the sub-regional Southwestern Region of San Diego County, or 14.96 (17.60 miles * 85%) and 18.29 (21.52 miles *85%), respectively**.**

Table2 San Diego Region Vehicle Miles Traveled per Capita

Study area	Source	Vehicle Miles Trips per Resident	Threshold per Capita (15% below existing VMT)
San Diego Region	Obtained from SANDAG Regional Transportation Plan Year 2012 (RTP) & the 2012 Run Based on the SANDAG ABM Scenario 720 model. (http://sandag.github.io/sb743/sb743_concept_map.htm)	17.60	14.96*
San Diego County Southwestern Region		21.52	18.29*

Source: SANDAG Regional RTP & 2012 Run Base on SANDAG ABM Scenario 720, Retrieved in October 2018

Note: VMT threshold based on 85% of the San Diego Region VMT Year 2012 and the Southwestern Sub-regional VMT Year 2012.

As shown in Table 2, based on the data presented in the table, the Proposed Project/Alternative H VMT per Capita for residential land use types of 26.3 would exceed the corresponding threshold suggested in the *OPR Technical Advisory*[1] when compared to both the regional threshold and the sub-regional threshold.

To reduce the average VMT per Capita, the Proposed Project/Alternative H includes a Transportation Demand Management (TDM) Program. Implementation of the TDM Program is anticipated to reduce the VMT per capita generated by 4.97%; see *Transportation Demand Management Program Evaluation – Otay Ranch Resort Village Proposed Project* (Chen Ryan), included as Appendix C-2 of the Recirculated Draft EIR (also included in **Attachment B** to this memo). Thus, with implementation of the TDM Program, the Proposed Project/Alternative H is forecast to generate 24.9 VMT per Capita (26.3 VMT per Capita * (1 - .0497)), which would continue to be above the OPR threshold.

The VMT per Capita analysis presented above provides a snapshot of the VMT per Capita associated with the Proposed Project/Alternative H. However, both the Proposed Project and Alternative H would be developed as part of the Otay Ranch General Development Plan (GDP) sub-region approved by the City of Chula Vista and County of San Diego as part of the Sub-Regional Plan (SRP) on October 28, 1993. The Otay Ranch GDP land uses are predominantly made up of suburban densities and are similar to the Proposed Project and Alternative H land uses. Since both the Proposed Project and Alternative H would be part of the larger SRP with a mix of uses, it also is appropriate to evaluate the Proposed Project and Alternative H VMT per Capita as part of the Otay Ranch GDP as a whole. **Figure 1** displays the full Otay Ranch GDP area, as compared to the San Diego Region.

To conduct this additional analysis, the VMT per Capita for the Otay Ranch GDP was calculated using the SANDAG Series 13 Year 2035 Regional Model using the VMT methodology developed by SANDAG. Table 3 displays the VMT per capita for the Otay Ranch GDP. VMT output from the SANDAG model is provided in **Attachment C.**

[1] Note: As of the date of this memo, the County of San Diego has not yet adopted a VMT based significance threshold, and is not required to do so until July 1, 2020. (CEQA Guidelines, section 15064.3.) Accordingly, as previously noted, the analysis presented here is provided for informational purposes only. The thresholds utilized in the analysis have not been reviewed or adopted by the County of San Diego. Therefore, the analysis presented here is not based on an adopted threshold by the County and, accordingly, has no precedential value for use in determining CEQA based impacts for County development projects.

Figure 1

Table 3 Otay Ranch Resort Village – Otay Ranch GDP Vehicle Miles Traveled by Capita

Study area	# of Residents	Total Trips	Vehicle Miles Trips	Vehicle Miles Trips per Resident
Otay Ranch GDP	112,487	398,864	1,762,701	15.7

Source: SANDAG Series 13 Regional Model, October 2018

As shown in Table 3, the Otay Ranch GDP VMT per Capita, including the Proposed Project/Alternative H, is projected to be 15.7 miles, which is higher than the 14.96 miles threshold based on the San Diego region. Therefore, when viewed as part of the larger Otay Ranch GDP, the Proposed Project/Alternative H would still exceed the VMT per Capita threshold outlined in the *OPR Technical Advisory*, shown in Table 2. It should be noted, while TDM measures could help to lower the overall VMT per Capita generated by the Otay Ranch GDP, the Proposed Project would not have the authority to implement or enforce these measures; therefore, no TDM plan is recommended in this memo. However, since approval of the Otay Ranch GDP, additional projects have been approved representing over 10,000 residential units and ancillary development. These projects have included TDM measures which would further reduce the VMT per capita for the Otay Ranch GDP. TDM measures for these projects can be found on the City of Chula Vista website (https://www.chulavistaca.gov/departments/development-services/planning/planning-digital-library/eir), which illustrates that a TDM plan is proposed by each of these villages.

However, when compared to the County of San Diego Southwestern VMT per Capita, the Otay Ranch GDP VMT per Capita, including the Proposed Project, is lower than the sub-regional VMT per Capita. Thus, the Otay Ranch GDP sub-region is more efficient than the County of San Diego Southwestern sub-region.

2.3 Induced Vehicle Travel Due to Capacity Expansion

The CEQA Guidelines indicate that a VMT analysis should be conducted for roadway capacity projects and the *OPR Technical Advisory* refers to the potential for induced travel, and its associated effects. Induced travel occurs when improvements to a roadway facility enhance traffic operations and/or relieve congestion to the point at which travelers have a higher incentive to make a vehicular trip in lieu of a different mode of travel, or not taking the trip at all.

GUIDELINES

Appendix 2 of the *OPR Technical Advisory* identifies the following five factors that contribute to overall induced travel:

1. *Changes in Trip Length*: Roadway capacity could result in the ability to travel a longer distance in a shorter period of time, thereby making farther away destinations more attractive and resulting in longer trip lengths and more VMT.
2. *Changes in Mode Choice*: Roadway capacity could result in reduced automobile travel time, causing people to shift to automobile use from other travel modes, resulting in more auto trips and increased VMT.
3. *Route Changes*: Faster travel time may attract more drivers to a route with expanded capacity, which can increase or decrease vehicle travel depending on whether it shortens or lengthens trips.

4. *Newly Generated Trips*: Increasing travel speeds from added roadway capacity could induce additional vehicle trips, resulting in increased VMT.
5. *Land Use Changes*: Faster travel times from added roadway capacity could lead to land development farther out on the corridor, leading to a long-term incremental increase in trip lengths, resulting in increased VMT.

If the Proposed Project or Alternative H were to qualify or align with any of the factors above, the project may result in an increase in VMT from induced travel.

PROPOSED PROJECT/ALTERNATIVE H PROPOSED ROADWAY IMPROVEMENTS

The Proposed Project/Alternative H proposes to implement the following improvements along Otay Lakes Road, some of which would result in higher roadway capacities:

- Improve Otay Lakes Road, between the City of Chula Vista and Project Driveway #2 (approximately 1.5 miles), from its existing 2-lane undivided roadway (LOS E roadway capacity of 16,200 ADT) configuration to a 4-lane Boulevard (4-lanes with a raised median with a LOS E roadway capacity of 30,000 ADT).
- Improve Otay Lakes Road, between Project Driveway #2 and the eastern project limit, from its existing two-lane undivided roadway configuration to a 2-lane Community Collector with Improvement options.
- Construct roundabouts on Otay Lakes Road at each project driveway intersection (three for the Proposed Project and four for Alternative H).
- Implement a multi-purpose trail adjacent to Otay lakes Road.

As to Otay Lakes Road, **Table 4** displays the functional (existing) and proposed roadway classifications on Otay Lakes Road, along the Project frontage.

Table 4 Otay Lakes Road Cross-section and Mobility Element Classification

Otay Lakes Road	Existing Cross-section	County of San Diego Mobility Element Classification	Otay Ranch Resort Village Proposed Classification
Between Chula Vista City Limit and Project Driveway #2	2-lane Undivided Roadway	4-lane Major Road (4.1B)	4-lane Boulevard (4.2A)
Project Driveway #2 and eastern project limit	2-lane Undivided Roadway	2-lane Community Collector with Improvement Options (2.1D)	2-lane Community Collector with Improvement Options (2.1D)

Source: Chen Ryan Associates, July 2019

Alternative H would not include the realignment of Otay Lakes Road from its existing location on the western and southern edges of the Project site to the approximate middle of the site. However, the road would undergo improvements, including a widening from two to a four-lane Boulevard with a Raised Median between the western edge of the Project boundary and the second Project driveway. Otay Lakes Road would be improved to include intermittent turn lanes and an additional drainage within its existing right-of-way from the second Project driveway to the eastern Project boundary. When compared to the Proposed Project, the proposed improvements associated with Alternative H along Otay Lakes Road would result in a slightly greater traffic calming effect due to the additional roundabout, thus further reducing roadway speeds and increasing walkability and safety for cyclists along Otay Lakes Road.

To determine if the improvements listed above could potentially result in induced travel, a roadway travel speed analysis was conducted along Otay Lakes Road. The travel speed analysis helps to determine if the

improvements will allow for higher roadway speeds along Otay Lakes Road, resulting in short travel times, and ultimately incentivizing additional vehicular travel or induced VMT.

EXISTING TRAVEL SPEED – OTAY LAKES ROAD

To determine the average current travel speed along Otay Lakes Road between the Chula Vista City Limit and the eastern project limit, a Streetlight segment analysis was conducted. This method was developed by Streetlightdata.com and uses a sampling of anonymous Global Positioning System (GPS) data, primarily obtained from smart phone apps using the GPS tracking, or from cars with GPS units. The GPS data received by the system provides the origin and destination of the registered vehicle, as well as the average travel speed at various points along the trip. This data is aggregated to the desired time period and geographically selected location of the requested analysis. The data used for the analysis presented here was collected along the Otay Lakes Road project frontage during the months of March, April, September, and October of 2018. Based on the Streetlight segment analysis, the current average travel speed on Otay Lakes Road is 53 miles per hour (mph). The Streetlight analysis results are provided in **Attachment D**.

TRAVEL SPEED WITH PROPOSED PROJECT/ALTERNATIVE H – OTAY LAKES ROAD

A Synchro SimTraffic microsimulation analysis was conducted to project the average travel speed along Otay Lakes Road with implementation of the Proposed Project/Alternative H. The Roadway Improvements proposed by the Proposed Project/Alterative H (discussed in the previous section), as well as the additional traffic that would be generated from its land uses, were included in the Synchro SimTraffic analysis. Based on the Synchro SimTraffic analysis, the average travel speed along the improved section of Otay Lakes Road would be 26 mph. The reduction in average travel speed along the improved segment is due to traffic calming measures along Otay Lakes Road, including the four roundabouts. SimTraffic analysis output are provided in **Attachment E.**

ANALYSIS CONCLUSION

As noted above, due to the proposed roundabouts along Otay Lakes Road, which would calm the traffic flow and increase safety along Otay Lakes Road, the average travel speed along Otay Lakes Road would be reduced from 53 miles per hour under Existing conditions to 26 miles per hour with the roadway improvements proposed by the Proposed Project/Alternative H.

Thus, the proposed improvements to Otay Lakes Road would not result in increased travel speeds making it more attractive to drivers and, instead, would have the opposite effect by resulting in decreased travel speeds and, relatedly, increased travel times.

Since the proposed improvements along Otay Lakes Road would increase travel times along the roadway, it is unlikely that automobile users along Otay Lakes Road would travel to further destinations (i.e. increase their trip length) with the implementation of these improvements. Non-automobile users are also unlikely to switch to automobiles since the slower Otay Lakes Road would be less enticing to drive on than current conditions. At the same time, the slower and safer Otay Lakes Road likely would not attract drivers from other roadways within the area, nor would it create new trips (new drivers who are likely to drive the route due to a fast and efficient roadway). Additionally, the proposed improvements along Otay Lakes Road would not decrease travel times (i.e., create faster travel times), thus the improvements would not encourage new developments east of the Proposed Project/Alternative H site. Additionally, Otay Ranch Village 15, which is located east of Village 13, was acquired by the State of California for conservation purposes, further discouraging development and growth inducement east of the site. Finally, as noted in the Traffic Impact Study, east of the Proposed Project is Planning Area 17, which was designated by the County of San Diego General Plan Update as an open space reserve; therefore, new development is not anticipated to occur east of the project site.

As shown above, the proposed improvements along Otay Lakes Road would not be capacity enhancing and, instead, would be traffic calming in nature. The proposed improvements are anticipated to reduce the excessive vehicular travel speeds along Otay Lakes Road, increase the safety for all users, and increase travel times along the roadway (due to the reduced speeds). From the standpoint of effects related to trip length, travel mode, and routing, the analysis presented above demonstrates that the proposed roadway capacity enhancing improvements would not reduce travel times, or increase travel speeds along Otay Lakes Road. Therefore, the proposed improvements are not anticipated to induce latent travel demand that is currently deterred due to congestion. Additionally, due to the lower travel speeds, traffic is not anticipated to detour from other roadways to Otay Lakes from other parallel routes due to these improvements. Therefore, based on the criteria outlined in Appendix 2 of the *OPR Technical Advisory,* the proposed improvements to Otay Lakes Road would not induce growth or an increase in VMT and, therefore, would not cause a threshold exceedance under the induced growth criteria.

3 VMT Analysis – Project Alternatives

The purpose of this section is to provide a comparison between those Project alternatives other than Alternative H, and the Proposed Project/Alternative H relative to VMT.

3.1 Alternative Description and VMT Comparison

The RDEIR evaluated a total of 6 alternatives other than Alternative H. A description of each alternative, along with comparative VMT analysis, is provided below.

Alternative A – No Build
Alternative A is the no project alternative and would leave the site in its existing state. Because no development would occur there would be no average daily trips and no VMT would be generated. Therefore, VMT would be less than the Proposed Project/Alternative H.

Alternative B

Alternative B would develop the site consistent with the existing Otay Subregional Plan (SRP). This alternative would result in the same number of resident units with less single family and more multi family, resulting in a slightly lower number of ADT. However, Alternative B would implement a golf course of approximately 142 acres and a larger Resort of approximately 134 acres and 800 hotel rooms, significantly more than the Proposed Project. The absence of an on-site elementary school would result in an increase in trip lengths and, consequently, VMT as students within the Village would need to travel off-site and could not bike or walk to school. Overall ADT would be approximately 3,266 trips higher than the Proposed Project with trip lengths being greater for the golf course and Resort due to the type of land use in comparison to residential uses. Therefore, VMT would be greater than the Proposed Project/Alternative H and likely greater on a per capita basis.

Alternative C

Alternative C would implement land uses consistent with the existing Otay SRP on a development footprint that is 296 acres smaller than the Proposed Project. This alternative would result in 697 fewer residential units, a golf course of 83 acres, and a larger Resort of 800 rooms on 114 acres. The absence of an on-site elementary school would result in an increase in trip lengths and, consequently, VMT as students within the Village would need to travel off-site and could not bike or walk to school. Overall ADT would be approximately 3,308 trips lower than the Proposed Project with trip lengths being greater for the golf course and Resort due to the type of land use in comparison to residential uses. Although total ADT would be reduced, the reduction in residential ADT would be offset by an increase in ADT from the non-residential land uses of the golf course and Resort. Therefore, VMT likely would be greater than the Proposed Project/Alternative H and likely greater on a per capita basis.

Alternative D

Alternative D would implement the same number of residential units as the Proposed Project on a development footprint that is 296 acres smaller than the Proposed Project. This alternative would result in 337 fewer single-family residential units and a corresponding increase in multi-family units with a

larger Resort of 800 rooms on 61 acres. As with the Proposed Project, no golf course would be developed. Overall ADT would be approximately 2,974 trips lower than the Proposed Project due to the reduction in single-family units with trip lengths being greater for the Resort due to the type of land use in comparison to residential uses. The reduction in ADT and VMT for residential units would be offset by an increase in ADT from the non-residential land use of the Resort. Therefore, VMT would be greater than the Proposed Project/Alternative H and likely greater on a per capita basis.

Alternative E

Alternative E would implement land uses consistent with the existing Otay SRP on a development footprint that is 230 acres smaller than the Proposed Project. This alternative would result in 547 fewer residential units and a larger Resort of 800 rooms on 20 acres. As with the Proposed Project, no golf course would be developed. Overall ADT would be approximately 5,493 trips lower than the Proposed Project with trip lengths and, consequently, VMT greater for the Resort due to the type of land use in comparison to residential uses. Total ADT would be reduced with the reduction in residential ADT offsetting an increase in ADT from the non-residential land uses of the Resort. Therefore, VMT likely would be comparable to the Proposed Project/Alternative H and VMT per capita would be equal to or slightly higher than.

Alternative F

Alternative F would implement the same number of residential units on a development footprint that is 230 acres smaller than the Proposed Project. This alternative would result in 613 fewer single-family residential units and a corresponding increase in multi-family units with a larger Resort of 800 rooms on 20 acres. As with the Proposed Project, no golf course would be developed. Overall ADT would be approximately 1,196 trips lower than the Proposed Project due to the reduction in single-family units, with trip lengths (VMT) being greater for the Resort due to the type of land use in comparison to residential uses. The reduction in ADT and VMT for residential units would be offset by an increase in ADT from the non-residential land use of the Resort. Therefore, VMT likely would be comparable to the Proposed Project/Alternative H and VMT per capita would be equal to or slightly higher than.

Alternative G

Alternative G would implement 465 single-family residential units (a reduction of 1,473 residential units) on a development footprint that is 556 acres smaller than the Proposed Project. This alternative would implement a larger Resort of 800 rooms on 20 acres. As with the Proposed Project, no golf course would be developed. The absence of an on-site elementary school would result in an increase in trip lengths (VMT) as students within the Village would need to travel off-site and could not bike or walk to school. Overall ADT would be approximately 15,530 trips lower than the Proposed Project due to the large reduction in single-family units that offsets the greater trip lengths resulting from the Resort and the absence of an elementary school. Therefore, VMT likely would be less than the Proposed Project/Alternative H and VMT per capita likely would be equal to the Proposed Project.

ATTACHMENT A

Proposed Project VMT per Capita Output

	Study area	scenario_id	residents	total_trips	pmt	vmt	vmt_per_resident
	TAZ 4612	805	5444	19747	193436	142925	26.3

ATTACHMENT B

Transportation Demand Management Program Evaluation –

Otay Ranch Resort Village Proposed Project memorandum

CHEN RYAN

TO: Baldwin & Sons, Inc.
Otay Village (San Diego) ASLI V, L.L.L.P

FROM: Stephen Cook, PE; Chen Ryan Associates
Phuong Nguyen, PE; Chen Ryan Associates

DATE: January 14, 2019

RE: **Transportation Demand Management Program Evaluation – Otay Ranch Resort Village Alternative H**

This memorandum documents the Vehicle Miles Traveled (VMT) reduction associated with the Transportation Demand Management (TDM) program for the proposed Otay Ranch Resort Village – Alternative H development (Alternative H).

This memo is organized as follows:

1. **Project Description** – Provides a brief description of the land uses proposed as part of the Otay Ranch Resort Village - Alternative H Project.
2. **Alternative H Generated VMT without TDM Program** – Calculates the total VMT associated with the Alternative H using the Year 2035 Series 13 Transportation Forecast model.
3. **Transportation Demand Management (TDM)**
   3.1 **Proposed TDM Program** – Outlines the Alternative H's TDM Program.
   3.2 **TDM Program Evaluation** – Evaluates the VMT reduction strategies associated with the Alternative H, and quantifies the anticipated VMT reductions.
4. **Alternative H VMT with TDM Reductions** – Provides an estimation of the Alternative H VMT with the implementation of the TDM program.

1. Project Description

The proposed Otay Ranch Resort Village Specific Plan ("Otay Ranch Resort Village / Village 13") is located at the northeast corner of Lower Otay Lake in unincorporated San Diego County. The project study area is bordered by State Route 94 to the east, the Jamul Community to the north, Otay Lake to the south, and the City of Chula Vista to the west.

Previously, the Otay Ranch Resort Village proposed to construct 1,881 single-family detached homes, 57 attached homes, up to 20,000 square feet of mixed-use commercial, 28.6 acres of public parks, 2.1 acres of public safety-related land uses, a 10-acre elementary school, and a 200-room resort, including up to 20,000 square feet of ancillary uses such as meeting rooms, a conference center, offices, shops, and restaurants. Most recently, the project proposed to revise the land use plan slightly in order to fit into a more compact project footprint and this alternative is referred to as "Alternative H" in this memorandum. Under Alternative H, the 1,869-acre project site would be developed in accordance with the approved

Preserve and development boundaries shown in the MSCP County Subarea Plan. Development of the project site would consist of 1,881 single-family homes and 57 multi-family homes for a total of 1,938 homes. Resort uses would encompass 16.6 acres in the southeast portion of the project site and includes up to 200 rooms and 20,000 square feet of ancillary retail/commercial uses. A total of 25.1 gross acres of parkland would be provided, which includes a central park in the village core and five neighborhood parks within convenient walking distance from all homes. A 10.1-acre elementary school is proposed adjacent to the central park. While no public safety site was included within Village 13 in the Otay SRP, which located a fire station in Village 15, as with the Proposed Project the Alternative H development plan would include a 2.3-acre Public Safety Site. This alternative also proposes a community homeowner facility (6.1 acres), located in close proximity to the village core, which includes meeting space and fitness center, recreation courts, a swimming pool and picnic areas. Otay Lakes Road would remain in its existing location and would undergo improvements including a widening from two to four lanes between the City/County Boundary and Driveway #2. Alternative H would convey 1,107 acres to the Otay Ranch RMP Preserve and designate 69.3 acres of additional habitat land as Conservation Open Space. Additionally, 76.5 acres would be used for manufactured open space, which consists of homeowner association maintained manufactured slopes, water basin lots, and fuel management zones. Other land uses include 32.3 acres for internal circulation. **Figure 1** displays the Alternative H Alternative H site plan.

As described in the Introduction section, the proposed land uses are largely identical between Alternative H and the previously prepared traffic impact study (dated March 2015) with three minor variations: a 3.5 acres reduction in public parks, a 0.2 acre increase in public safety-related uses, and a 6.1 acres community homeowner association facility (HOA facility). It is important to note that while the acreage for public safety-related uses slightly increased, the actual proposed uses in terms of building size or number of staff on-site would remain the same as previously analyzed. The HOA facility will be internally serving and only open to home owners within the development, thus the HOA facility would not generate any external trips. Therefore, it can be concluded that the total project trip generation for Alternative H will be equal or less than what was studied in the previous traffic impact study. Please refer to the traffic impact study for the total daily trip generation.

2. Alternative H Generated VMT without TDM Program

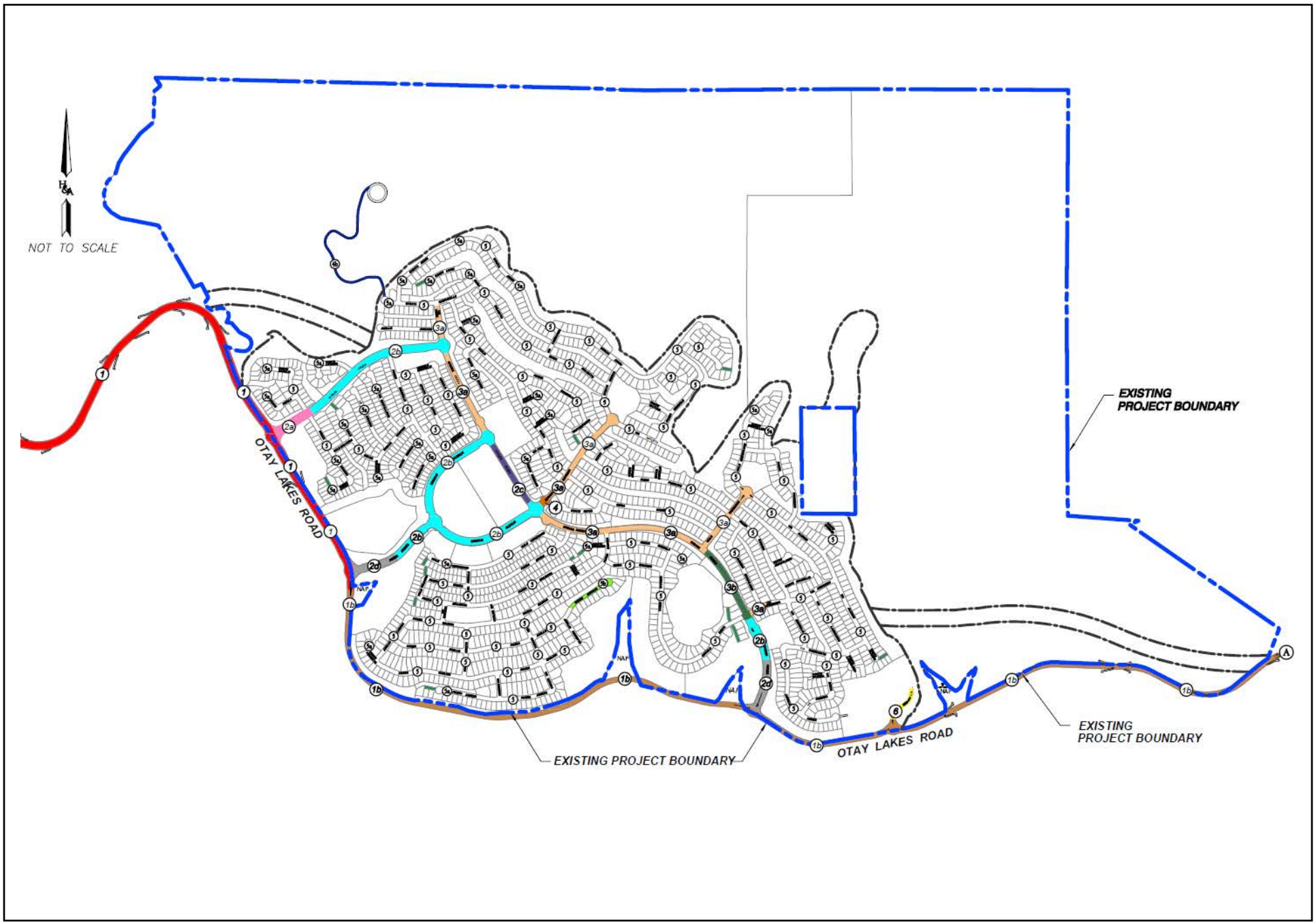
The Alternative H total VMT (without TDM Program) was obtained using the Year 2035 SANDAG Series 13 Transportation Forecast, and derived from the select zone assignment conducted for the Project traffic analysis zones (TAZ), updated to reflect the Alternative H land uses. The VMT calculation for the Alternative H was conducted using the following steps:

- *Select zone assignment* – Select zone assignments are a tool within the transportation forecast model that can track the paths of the vehicle trips produced by one or multiple TAZs, on a daily basis. Select zone assignments allow users to determine the number of trips, generated within a specific group of TAZ(s), that will use a specific roadway segment over a daily period. The Alternative H VMT calculation used a select zone assignment based on the TAZs in the SANDAG Series 13 model which house the Alternative H land uses.

- *Calculate the VMT per roadway segment* – The Alternative H VMT for each roadway segment within the San Diego Region was calculated by multiplying the number of average daily vehicles trips generated by the Alternative H (as determined by the select zone assignment) by the length (in miles) of the specific roadway segments that they were utilizing.

- *Total VMT associated with the Alternative H* – The total project generated VMT was determined by summing the Alternative H segment VMTs along all of the roadways within the San Diego region.

The results of the select zone assignment are provided in **Attachment 1.** Based upon the results of the select zone assignment, the Alternative H would generate approximately 212,097 VMT per day.



Otay Ranch Resort Village - Alternative H Transportation Demand Management Program Evaluation

CHEN RYAN

Figure 1
Project Site Plan

3. Transportation Demand Management (TDM)

3.1 Proposed TDM Program

With the goal reducing vehicle trips in favor of alternative modes of transportation, the project applicant proposes to implement the TDM measures and strategies listed below. The TDM program will facilitate increased opportunities for transit, bicycling, and pedestrian travel, as well as provide the resources, means and incentives for ridesharing and carpooling opportunities. The following measures are included in the TDM program:

1. A comprehensive trails network designed to provide safe bicycle and pedestrian access between the various Alternative H phases, land uses, parks/open space, schools and the Village Core area. The trails network shall also provide connections to the various recreational trails and multi-modal facilities accessing the Alternative H site, including the multi-purpose trail along Otay Lakes Road.

2. The provision of bicycle racks along main travel corridors, adjacent to commercial developments, and at public parks and open spaces within the Alternative H site.

3. Coordination with SANDAG's iCommute program for Carpool, Vanpool, and rideshare programs that are specific to the Alternative H.

4. Promotion of available websites providing transportation options for residents and businesses.

5. Creation and distribution of a "new resident" information packet addressing alternative modes of transportation.

6. Provision of a "School Pool" program to coordinate school-related carpool activities with the local school district and SANDAG. As part of the program, dedicated parking spaces for the School Pool program will be provided at the Village Core area.

7. Implementation of a "Walking School Bus" program, whereby neighborhood students are accompanied by a "chaperone" (e.g., parental supervision) to safely walk to and from the on-site elementary school. Relatedly, the Project applicants also shall coordinate with the local school district to encourage the provision of bicycle storage facilities at the on-site elementary school.

8. Implementation of traffic calming features throughout the project site, as well as along Otay Lakes Road. The measures will be designed to reduce motor vehicle speeds and encourage walking and biking within the project site. Traffic calming features may include, but are not limited to: curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.

In addition to the TDM measures stated above, which were utilized to determine the total VMT reduction associated with the Alternative H TDM Program, a series of smaller TDM measures (outlined below) will also be incorporated into the program. However these TDM measures were not utilized to quantify VMT reductions:

1. The HOA will coordinate with the on-site elementary school located in the Village Core Area to provide a Walking School Bus Program. A walking school bus program is an adult-supervised walk-to-school program where one or more adults lead a group of students to-and-from the school.

2. The Resort operator will provide a bike-sharing program at the Resort for guests to use throughout the duration of their stay in order to link the resort to the rest of Alternative H.

3.2 TDM Program Evaluation

The methods and strategies contained in the CAPCOA Report were used to quantify the reductions in Alternative H generated VMT. The CAPCOA Report provides a series of strategies to reduce Greenhouse Gas (GHG) emissions at both the project and regional levels. The GHG reduction strategies outlined in the CAPCOA Report are divided into energy, transportation, water resources, landscaping, solid waste, vegetation construction, and other miscellaneous categories. The transportation strategies contained in the CAPCOA Report primarily target VMT reductions to reduce GHG emissions.
Chapter 7 of the CAPCOA report provides a series of fact sheets that outline the relevant literature used to develop each strategy, how and where the strategy is applicable, the method to apply the strategy, and sample calculations. The CAPCOA Report provides caps limiting the total VMT reductions that are allowed for each individual strategy, or category of strategies, or as a total project site. To quantify the potential reduction in project generated VMT, the VMT based reduction strategies were applied to the relevant features contained in the Alternative H's design and TDM Program.

Chen Ryan Associates correlated the proposed TDM measures, outlined in Section 3, with the appropriate mitigation measures contained in the *CAPCOA Report*. The CAPCOA fact sheets for each applicable TDM measure are provided in **Attachment 2**.

Table 1 provides a summary of the Project's TDM Program strategies, the corresponding CAPCOA transportation strategies, analysis of the VMT reduction associated with each, and the resulting VMT reduction.

To ensure the TDM Program strategies outlined below are implemented, a Transportation Coordinator (such as board member of the home owner's association, a consultant, or a property management company) shall be established to monitor the TDM Program. Coordinators are responsible for developing, marketing, implementing, and evaluating TDM Programs; dedicated personnel makes the TDM Program more robust, consistent and reliable. Additionally, residents and employees would have a designated point of contact for questions regarding the various TDM measures, which would allow them to easily stay informed of various TDM functions and eligibility. The Transportation Coordinator's duties would include, but not be limited to, the following:

- Provide information and resources regarding transit options and SANDAG's iCommute program on a quarterly basis.
- Act as source of information regarding the TDM Program, including compliance with regulatory requirements and new potential TDM benefits.
- Coordinate TDM Program monitoring (administer surveys and coordinate data collection).

To ensure that the Project is implementing the TDM Program consistent with the analysis presented in this memorandum, monitoring would start once the community is 85% occupied and occur every 3-5 years. The Transportation Coordinator would submit a monitoring report to the County of San Diego to document the implementation of the TDM Program. The details of the monitoring/reporting would be determined in collaboration with the County, but potentially would include administering and summarizing community surveys and documenting TDM measures in operation/level of participation. Table 2 sets forth the applicable performance metrics and targets for each strategy identified for implementation in this memorandum. The purpose of the performance metrics is to ensure implementation of the VMT reduction strategies are consistent with the analysis presented in this evaluation.

Table 1 – Resort Village TDM Evaluation and Corresponding VMT reductions

TDM Program Strategies	Corresponding CAPCOA Strategies	Analysis	VMT Reduction
VMT Reductions Associated with the Resort Village TDM Program			
TDM #1: Provide a comprehensive trails network designed to provide safe bicycle (and pedestrian) access between the various Alternative H phases, land uses, parks/open space, schools and the Village Core area. The trails network shall also provide connections to the various recreational trails and multi-modal facilities accessing the Alternative H site. TDM #2: The provision of bicycle racks along main travel corridors, adjacent to commercial developments, and at public parks and open spaces within the Alternative H site.	SDT-9: Dedicate Land for Bike Trails - Larger projects may be required to provide for, contribute to, or dedicate land for the provision of off-site bicycle trails linking the project to designated bicycle commuting routes in accordance with an adopted citywide or countywide bikeway plan. Refer to Improve Design of Development (LUT-9) strategy for ranges of effectiveness in this category. The benefits of Land Dedication for Bike Trails have not been quantified and should be grouped with the Improve Design of Development strategy to strengthen street network characteristics and improve connectivity to off-site bicycle networks.	Note: No specific methodology is provided in the CAPCOA Report for this strategy. The Lessons from the Green Lanes: Evaluating Protected Bike Lanes in the U.S., NITC-RR-583, June 2014 found that when protected bike facilities are implemented 11% of the riders on those facilities would have made the trip using another mode (10%) or would not have made the trip at all (1%). Based on WHERE WE RIDE Analysis of bicycle commuting in American cities, the San Diego Region has a bicycle commute mode share of 0.82%. http://bikeleague.org/sites/default/files/ACS_report_2014_forweb_edit.pdf Calculation: If the 11% growth is new ridership with protected bike facilities is applied to the 0.82% bike mode share, we would see the bicycle mode share increase to 0.92%, resulting in a 0.1% decrease in project vehicular trips. This 0.1% decrease can also be applied to the project generated VMT. 0.82% bike mode share + (.82% bike mode share x 11% increase) = 0.92%, an increase of 0.1% in bike mode share.	0.1%
	LUT-8: Locate Project Near Bike Path/Bike Lane - A Project that is designed around an existing or planned bicycle facility encourages alternative mode use. The project will be located adjacent to a within 1/2 mile of an existing Class I path or Class II bike lane. The project design should include a comparable network that connects the project uses to the existing offsite facilities. This measure is most effective when applied in combination of multiple design elements that encourage this use. Refer to Increase Destination Accessibility (LUT-4) strategy. The benefits of Proximity to Bike Path/Bike Lane are small as a standalone strategy. The strategy should be grouped with the Increase Destination Accessibility strategy to increase the opportunities for multi-modal travel.	As per page 181 of the CAPCOA Report: As a rule of thumb, *the Center for Clean Air Policy (CCAP) Guidebook* attributes a 1% to 5% reduction associated with comprehensive bicycle programs. Based on the CCAP guidebook, the TIAX report allots 2.5% reduction for all bicycle-related measures and a 1/4 of that for this measure alone. (This information is based on a TIAX review for (SMAQMD). Calculation: Therefore, the CAPCOA Report recommend a 0.625% reduction for this measure (2.5% reduction for bike improvements X 0.25 for the measure) = 0.625%	0.625%

Table 1 – Resort Village TDM Evaluation and Corresponding VMT reductions

TDM Program Strategies	Corresponding CAPCOA Strategies	Analysis	VMT Reduction
TDM #1 & TDM #2 (Continue)	SDT-1: Provide Pedestrian Network Improvements - Providing a pedestrian access network to link areas of the Project site encourages people to walk instead of drive. This mode shift results in people driving less and thus a reduction in VMT. The project will provide a pedestrian access network that internally links all uses and connects to all existing or planned external streets and pedestrian facilities contiguous with the project site. The project will minimize barriers to pedestrian access and interconnectivity. Physical barriers such as walls, landscaping, and slopes that impede pedestrian circulation will be eliminated.	The reduction factor for this measure was derived from the Mitigation Method table provided on page 187 of the CAPCOA Report. A 2% factor was selected since the Alternative H will be located in a suburban context and will provide a multi-use path along Otay Lakes Road, connecting the Project to the City of Chula Vista.	2%
TDM #3: Coordination with SANDAG's iCommute program for Carpool, Vanpool, and rideshare programs that are specific to the Alternative H.	TRT-3: Provide Ride-Sharing Programs - 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	As per page 228 of the CAPCOA Report, the formula to derive the reduction for this measure is as follows: % VMT Reduction = Commute * Employee Commute = % reduction in commute VMT • 5% (low density suburb) • 10% (suburban center) • 15% (urban) annual reduction in commute VMT Employee = % employees eligible Calculation: 5% Low density suburb * 100% of working residents * 15% Home-Work Trips (Based on SANDAG Trip Generation for Smart Growth, SANDAG Smart Growth Trip Generation Spreadsheet Tool, and associated NCHRP researches - https://www.sandag.org/index.asp?projectid=378&fuseaction=projects.detail) = 0.75% The VMT reduction above applied to the residential commute trips only. For a conservative analysis, this reduction was not applied to the mixed used commercial and hotel trips.	0.75%
TDM #4: Promotion of available websites providing transportation options for residents and businesses. TDM #5: Creation and distribution of a "new resident" information packet addressing alternative modes of transportation.	TRT-7: Implement Commute Trip Reduction Marketing - 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, or Publications.	As per page 241 of the CAPCOA Report, the formula to derive the reduction for this measure is as follows: % Commute VMT Reduction = 4% * Employees Eligible * 1 Calculation: % Commute VMT Reduction = 4% * 100% of working residents * 15% Home-Work Trips (Based on SANDAG Trip Generation for Smart Growth, SANDAG Smart Growth Trip Generation	0.6%

Table 1 – Resort Village TDM Evaluation and Corresponding VMT reductions

TDM Program Strategies	Corresponding CAPCOA Strategies	Analysis	VMT Reduction
	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.	Spreadsheet Tool, and associated NCHRP researches - https://www.sandag.org/index.asp?projectid=378&fuseaction=projects.detail) = 0.6% The VMT reduction above applied to the residential commute trips only. For a conservative analysis, this reduction was not applied to the mixed used commercial and hotel trips.	
TDM #6: Provision of a "School Pool" program to coordinate school-related carpool activities with the local school district and SANDAG. As part of the program, dedicated parking spaces for the School Pool program will be provided at the Village Core area. TDM #7: Implementation of a "Walking School Bus" program, whereby neighborhood students are accompanied by a "chaperone" (e.g., parental supervision) to safely walk to and from the on-site elementary school. Relatedly, the Project applicants also shall coordinate with the local school district to encourage the provision of bicycle storage facilities at the on-site elementary school.	TRT-10: Implement a School Pool Program - This project will create a ridesharing program for school children. Most school districts provide bussing services to public schools only. School Pool helps match parents to transport students to private schools, or to schools where students cannot walk or bike but do not meet the requirements for bussing.	As per page 250 of the CAPCOA Report, the formula to derive the reduction for this measure is as follows: % VMT Reduction = Families * 45% Families: 16% (moderate implementation), 35% (aggressive implementation). Calculation: 16% (moderate implementation) *45% * 3.3% home to school trips (based on outputs from the SANDAG Regional Model – a copy of the output is provided in Attachment 1) = 0.24%	0.24%
TDM #8: Implement traffic calming features throughout the project sites as well as along Otay Lakes Road to reduce motor vehicles speed and encourage walking and biking. Traffic calming features may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.	SDT-2: Provide Traffic Calming Measures - Providing traffic calming measures encourages people to walk or bike instead of using a vehicle. This mode shift will result in a decrease in VMT. Project design will include pedestrian/bicycle safety and traffic calming measures in excess of jurisdiction requirements. Roadways will be designed to reduce motor vehicle speeds and encourage pedestrian and bicycle trips with traffic calming features. Traffic calming features may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.	The reduction factor for this measure was derived from the Mitigation Method table provided on page 191 of the CAPCOA Report. A 0.750% factor was developed based on an interpolation of the data included in the table. The Alternative H will control 3 of its 4-project driveways along Otay Lakes Road via roundabouts (75.0%).	0.750%

Source: CAPCOA 2010, Chen Ryan Associates; November 2018

Table 2 – Resort Village TDM Program Performance Metrics, Target, and Monitoring

TDM Program Strategies	Metric/Performance Measure	Target	Collection Method	Collection Frequency	When Target Should be Met
TDM #1: Provide a comprehensive trails network designed to provide safe bicycle (and pedestrian) access between the various Alternative H phases, land uses, parks/open space, schools and the Village Core area. The trails network shall also provide connections to the various recreational trails and multi-modal facilities accessing the Alternative H site.	Pedestrian and bike network build-out that provides internal pedestrian and bike facilities that connect land uses within the project site as well as construction of the multi-purpose trail along Otay Lakes Road, connecting Alternative H to the regional network.	Full build-out of the planned pedestrian and bike trails network proposed within Alternative H	Field Verification	One time	After full build-out of Alternative H
TDM #2: The provision of bicycle racks along main travel corridors, adjacent to commercial developments, and at public parks and open spaces within the Alternative H site.	Provide bicycle racks along major travel corridors, adjacent to the commercial core, public parks, and open spaces within the Alternative H. The total number of bicycle parking spaces should be at least 5% of the total vehicle parking capacity, with a minimum of one two-bike capacity rack (per the City of Chula Vista Bikeway Master plan provision 5.106.4.1)	Bicycle racks along main travel corridor within 100 feet of visitor entrance of each commercial building, public parks, and open spaces. Total number of bicycle parking spaces and types of bicycle parking spaces should be in conformance with City of Chula Vista Bikeway Master Plan.	Field Verification	One time	After full build-out of Alternative H
TDM #3: Coordination with SANDAG's iCommute program for Carpool, Vanpool, and rideshare programs that are specific to the Alternative H.	Provide information regarding transit options and promote information regarding SANDAG's iCommute program on a quarterly basis in the HOA newsletters.	Materials created and maintained.	To be included in the Transportation Coordinator Annual Report & Resident Surveys	Annually	After full build-out of Alternative H
TDM #4: Promotion of available websites providing transportation options for residents and businesses.	Provide information regarding transit options and promote information regarding SANDAG's iCommute program on a quarterly basis in the HOA newsletters and employee newsletter.	Materials created and maintained.	To be included in the Transportation Coordinator Annual Report	Annually	After full build-out of Alternative H

Table 2 – Resort Village TDM Program Performance Metrics, Target, and Monitoring

TDM Program Strategies	Metric/Performance Measure	Target	Collection Method	Collection Frequency	When Target Should be Met
TDM #5: Creation and distribution of a "new resident" information packet addressing alternative modes of transportation.	Provide information regarding transit options and promote information regarding SANDAG's iCommute program on a quarterly basis in the HOA newsletters.	Materials created and maintained.	To be included in the Transportation Coordinator Annual Report	Annually	After full build-out of Alternative H
TDM #6: Provision of a "School Pool" program to coordinate school-related carpool activities with the local school district and SANDAG. As part of the program, dedicated parking spaces for the School Pool program will be provided at the Village Core area. TDM #7: Implementation of a "Walking School Bus" program, whereby neighborhood students are accompanied by a "chaperone" (e.g., parental supervision) to safely walk to and from the on-site elementary school. Relatedly, the Project applicants also shall coordinate with the local school district to encourage the provision of bicycle storage facilities at the on-site elementary school.	Program implemented and utilized.	Program implemented and 16% of students traveling to off-site schools utilizing program.	To be included in the Transportation Coordinator Annual Report & Resident Surveys	Annually	After full build-out of Alternative H
TDM #8: Implement traffic calming features throughout the project sites as well as along Otay Lakes Road to reduce motor vehicles speed and encourage walking and biking. Traffic calming features may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.	Presence of traffic calming features.	At least 25% of roadways and 75% of intersections have traffic calming features.	Field Verification	One time	After full build-out of Alternative H

The CAPCOA Report notes that when determining the overall VMT reduction associated with a project, the VMT reduction for each individual strategy should be dampened, that is adjusted to reflect the fact that some of the strategies may be redundant or applicable to the same populations. The CAPCOA report provides the following dampening formula:

Overall % VMT Reduction = 1-(1-First Strategy)*(1-Second Strategy)*(1-Third Strategy)…

Based on the VMT reduction results provided in Table 1, the Alternative H would have the following overall VMT reduction:

1-(1-0.00625)*(1-0.02)*(1-0.0075)*(1-0.001)*(1-0.0075) *(1-0.006) *(1-0.0024)
LUT-8 SDT-1 SDT-2 SDT-9 TRT-3 TRT-7 TRT-10

Overall VMT Reduction = 4.97%

Based on the VMT reduction results, the TDM Program for the Resort Village – Alternative H would have 4.97% VMT reduction.

4 Alternative H VMT with TDM Reductions

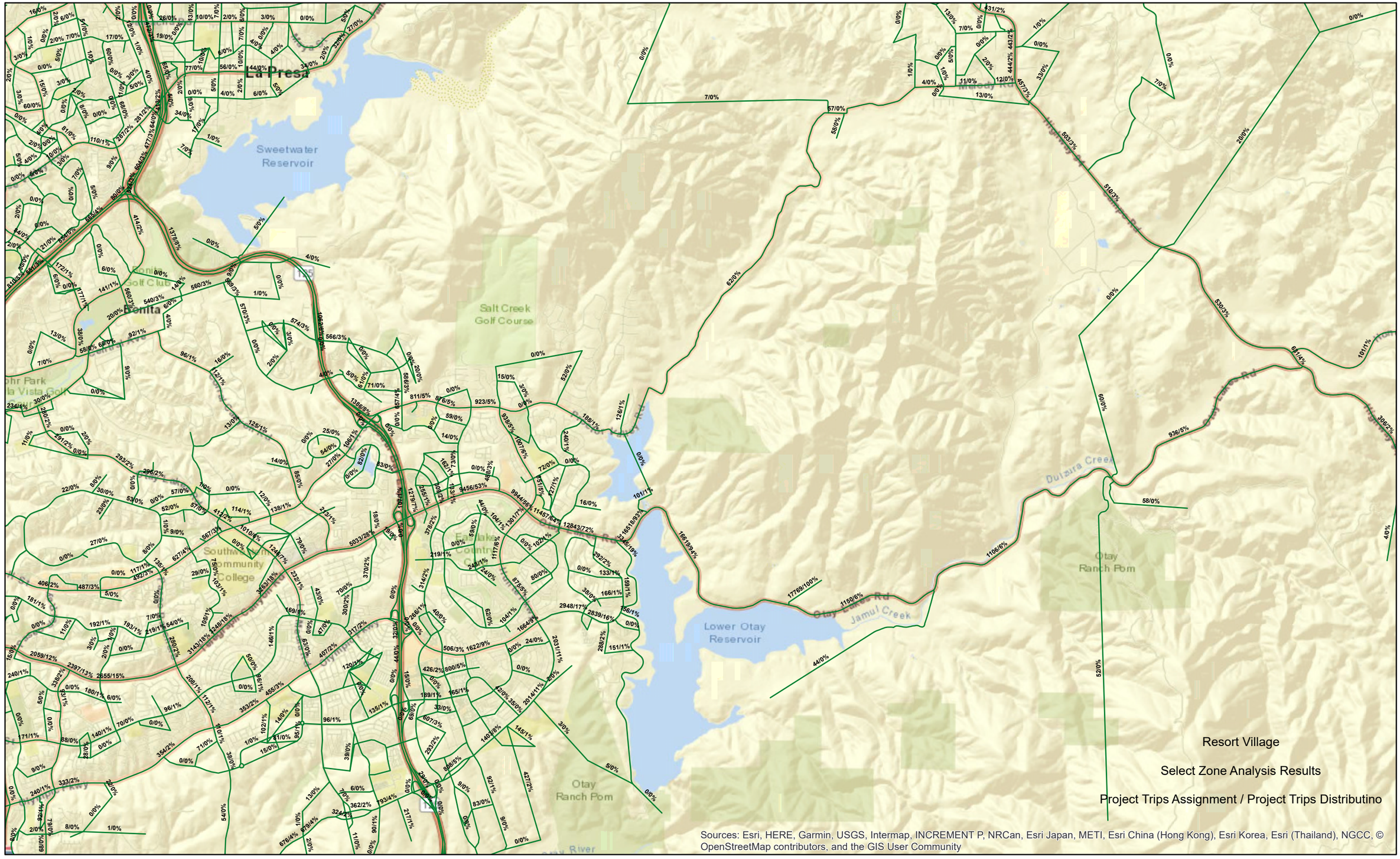
To derive the VMT generated by the Alternative H, the VMT reductions calculated in Table 1 and then dampened (i.e., 4.97% for Resort Village – Alternative H) were applied to the VMT outputs from the SANDAG Model provided in Section 2, Alternative H VMT – Without TDM Program. The calculations below show the Alternative H generated VMT after the reductions associated with the TDM Program are applied:

- Resort Village Raw VMT = 212,097 VMT
- Resort Village RAW VMT without Commercial VMT and Resort associated VMT: 162,179 (based on trips generation ratio of Commercial and Resort daily trips vs. total trips generated). Assuming a conservative analysis, where TDM measures are only applied to non-commercial and non-resort trips.
- Resort Village VMT Reduction = 162,179 * 4.97% = 8,056

Total project VMT = 212,097 – 8,056 = 204,041

ATTACHMENT 1

Select Zone Results & Home-School trips calculation



SUMMARY OF TRIPS BY							
	HOME	HOME	HOME	HOME	NON	SERVE	
MODE	WORK	COLL	SCHL	OTHER	HOME	PASS	TOTAL
Off-Peak Period							
Total Auto	752305	139377	283331	3703203	5926573	771992	11576780
>Drive Alone	659969	102206	71674	1916961	3367673	229203	6347687
>>Non-Toll	653820	102009	71674	1915561	3366866	229203	6339132
>>Toll	6149	197	0	1401	807	1	8555
>Carpool-2 Person	73826	31292	75086	1179550	1525046	276455	3161255
>>Non-Toll/Non-HOV	65062	30239	75038	1157817	1507530	272644	3108330
>>Non-Toll/HOV	7978	1028	43	20895	17389	3810	51143
>>Toll/HOV	786	25	0	839	122	1	1773
>Carpool-3+ Person	18510	5879	136575	606690	1033858	266334	2067847
>>Non-Toll/Non-HOV	16395	5656	136504	595068	1021832	262706	2038160
>>Non-Toll/HOV	1947	217	71	11132	11937	3627	28931
>>Toll/HOV	168	6	0	490	90	1	755
Total Transit	41486	8948	4612	55449	16675	0	127171
>Commuter Rail	287	86	19	130	12	0	534
>Light Rail	18521	3809	650	18797	5885	0	47662
>BRT	0	0	0	0	0	0	0
>Express Bus	2414	267	36	1104	275	0	4096
>Local Bus	20264	4786	3907	35419	10503	0	74879
>Walk	35428	8363	4496	51863	16675	0	116825
>Drive	4567	316	13	2339	0	0	7235
>Driven	1491	269	103	1248	0	0	3110
School Bus	0	0	54525	3813	5763	0	64100
Walk	15692	1247	90205	126780	70710	0	304634
Bicycle	9187	2196	5471	16585	3128	0	36567
Total	818671	151768	438143	3905830	6022849	771992	12109253
Peak Period							
Total Auto	993039	55493	257732	1003295	1720841	851511	4881912
>Drive Alone	870298	40736	65206	519042	975746	252318	2723346
>>Non-Toll	848659	40350	65206	517990	974551	252317	2699073
>>Toll	21639	386	0	1052	1195	1	24273
>Carpool-2 Person	98227	12419	68281	319798	443908	305175	1247808
>>Non-Toll/Non-HOV	82385	11924	68206	312473	431205	298956	1205149
>>Non-Toll/HOV	14303	486	71	7047	12624	6217	40747
>>Toll/HOV	1539	9	0	279	78	2	1907
>Carpool-3+ Person	24515	2338	124249	164455	301189	294018	910763
>>Non-Toll/Non-HOV	20724	2231	124133	160516	292425	288113	888143
>>Non-Toll/HOV	3462	104	115	3775	8706	5904	22067
>>Toll/HOV	328	2	0	163	57	2	553
Total Transit	63274	3909	4518	16232	4619	0	92552
>Commuter Rail	2987	148	144	240	150	0	3670
>Light Rail	32149	1878	719	5977	1859	0	42583
>BRT	0	0	0	0	0	0	0
>Express Bus	5476	113	64	399	150	0	6203
>Local Bus	22662	1770	3591	9615	2460	0	40097
>Walk	51821	3643	4391	15060	4619	0	79534
>Drive	9776	165	18	871	0	0	10831
>Driven	1677	101	109	300	0	0	2188
School Bus	0	0	49766	957	2338	0	53061
Walk	16156	211	82778	34169	11766	0	145080
Bicycle	10534	893	4906	4622	726	0	21680
Total	1083004	60506	399700	1059275	1740291	851511	5194286

SUMMARY OF TRIPS BY							
	HOME	HOME	HOME	HOME	NON	SERVE	
MODE	WORK	COLL	SCHL	OTHER	HOME	PASS	TOTAL
Daily Summary							
Total Auto	1745344	194870	**541063**	4706498	7647414	1623503	**16458692**
>Drive Alone	1530267	142942	136881	2436003	4343418	481521	9071033
>>Non-Toll	1502479	142359	136881	2433550	4341417	481519	9038205
>>Toll	27788	583	0	2453	2002	2	32828
>Carpool-2 Person	172053	43712	143367	1499349	1968953	581630	4409063
>>Non-Toll/Non-HOV	147447	42163	143245	1470290	1938735	571600	4313480
>>Non-Toll/HOV	22281	1514	115	27941	30013	10027	91891
>>Toll/HOV	2324	34	0	1118	200	3	3680
>Carpool-3+ Person	43025	8217	260823	771145	1335047	560352	2978609
>>Non-Toll/Non-HOV	37119	7887	260637	755584	1314257	550818	2926303
>>Non-Toll/HOV	5410	321	186	14907	20643	9531	50998
>>Toll/HOV	496	9	0	654	147	3	1308
Total Transit	104760	12858	9130	71681	21295	0	219723
>Commuter Rail	3274	235	163	370	162	0	4204
>Light Rail	50671	5687	1369	24774	7745	0	90245
>BRT	0	0	0	0	0	0	0
>Express Bus	7890	380	100	1503	425	0	10298
>Local Bus	42925	6556	7498	45034	12963	0	114976
>Walk	87249	12006	8886	66923	21295	0	196359
>Drive	14342	482	32	3210	0	0	18066
>Driven	3169	370	212	1548	0	0	5299
School Bus	0	0	104291	4770	8101	0	117161
Walk	31849	1457	172983	160949	82477	0	449715
Bicycle	19722	3088	10377	21207	3854	0	58248
Total	1901674	212273	837844	4965105	7763140	1623503	17303539
Total	1901674	212273	837844	4965105	7763140	1623503	17303539
Home school trips percentage = School trips / total Trips (bold text above)						3.3%	

ATTACHMENT 2

CAPCOA Fact Sheets

3.1.8 Locate Project near Bike Path/Bike Lane

Range of Effectiveness: Grouped strategy. [See LUT-4]

Measure Description:

A Project that is designed around an existing or planned bicycle facility encourages alternative mode use. The project will be located within 1/2 mile of an existing Class I path or Class II bike lane. The project design should include a comparable network that connects the project uses to the existing offsite facilities.

This measure is most effective when applied in combination of multiple design elements that encourage this use. Refer to Increase Destination Accessibility (LUT-4) strategy. The benefits of Proximity to Bike Path/Bike Lane are small as a standalone strategy. The strategy should be grouped with the Increase Destination Accessibility strategy to increase the opportunities for multi-modal travel.

Measure Applicability:

- Urban or suburban context; may be applicable in a rural master planned community
- Appropriate for residential, retail, office, industrial, and mixed-use projects

Alternative Literature:

Alternate:

- 0.625% reduction in vehicle miles traveled (VMT)

As a rule of thumb, the *Center for Clean Air Policy (CCAP) Guidebook* [1] attributes a 1% to 5% reduction associated with comprehensive bicycle programs. Based on the CCAP guidebook, the TIAX report allots 2.5% reduction for all bicycle-related measures and a 1/4 of that for this measure alone. (This information is based on a TIAX review for SMAQMD).

Alternative Literature References:

[1] Center for Clean Air Policy (CCAP). *Transportation Emission Guidebook*. http://www.ccap.org/safe/guidebook/guide_complete.html; TIAX Results of 2005 Literature Search Conducted by TIAX on behalf of SMAQMD.

Other Literature Reviewed:

None

3.1.9 Improve Design of Development

Range of Effectiveness: 3.0 – 21.3% vehicle miles traveled (VMT) reduction and therefore 3.0-21.3% reduction in GHG emissions.

Measure Description:

The project will include improved design elements to enhance walkability and connectivity. Improved street network characteristics within a neighborhood include street accessibility, usually measured in terms of average block size, proportion of four-way intersections, or number of intersections per square mile. Design is also measured in terms of sidewalk coverage, building setbacks, street widths, pedestrian crossings, presence of street trees, and a host of other physical variables that differentiate pedestrian-oriented environments from auto-oriented environments.

Measure Applicability:

- Urban and suburban context
- Negligible impact 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:

- Number of intersections per square mile

Mitigation Method:

$$\% \text{ VMT Reduction} = \text{Intersections} * B$$

Where

Intersections = Percentage increase in intersections versus a typical ITE suburban development

$$= \frac{\text{Intersections per square mile of project} - \text{Intersections per square mile of typical ITE suburban development}}{\text{Intersections per square mile of typical ITE suburban development}}$$

$$= \frac{\text{Intersections per square mile of project} - 36}{36}$$

See Appendix C for detail [not to exceed 500% increase]

B = Elasticity of VMT with respect to percentage of intersections (0.12 from [1])

Assumptions:

Data based upon the following references:

[1] Ewing, R., and Cervero, R., "Travel and the Built Environment - A Meta-Analysis." *Journal of the American Planning Association*, <to be published> (2010). Table 4.

Emission Reduction Ranges and Variables:

Pollutant	Category Emissions Reductions[43]
CO_2e	3.0 – 21.3% of running
PM	3.0 – 21.3% of running
CO	3.0 – 21.3% of running
NOx	3.0 – 21.3% of running
SO_2	3.0 – 21.3% of running
ROG	1.8 – 12.8% of total

Discussion:

The VMT reductions for this strategy are based on changes in intersection density versus the standard suburban intersection density in North America. This standard density is used as a baseline to mirror the density reflected in the *ITE Trip Generation Manual*, which is the baseline method for determining VMT.

The calculations in the Example section look at a low and high range of intersection densities. The low range is simply a slightly higher density than the typical ITE

[43] 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.

development. The high range uses an average intersection density of mixed use/transit-oriented development sites (TOD Site surveys in the Bay Area for *Candlestick-Hunters Point Phase II TIA,* Fehr & Peers, 2009).

There are two separate maxima noted in the fact sheet: a cap of 500% on the allowable percentage increase of intersections per square mile (variable A) and a cap of 30% on % VMT reduction. The rationale for the 500% cap is that there are diminishing returns to any change in environment. For example, it is reasonably doubtful that increasing intersection density by a factor of six instead of five would produce any additional change in travel behavior. The purpose for the 30% cap is to limit the influence of any single environmental factor (such as design). This emphasizes that community designs that implement multiple land use strategies (such as density, design, diversity, etc.) will show more of a reduction than relying on improvements from a single land use factor.

Example:

Sample calculations are provided below:

- Low Range % VMT Reduction (45 intersections per square mile) = (45 – 36) / 36 * 0.12 = 3.0%
- High Range % VMT Reduction (100 intersections per square mile) = (100 – 36) / 36 * 0.12 = 21.3%

Preferred Literature:

- -0.12 = elasticity of VMT with respect to design (intersection/street density)
- -0.12 = elasticity of VMT with respect to design (% of 4-way intersections)

Ewing and Cervero's [1] synthesis showed a strong relationship of VMT to design elements, second only to destination accessibility. The weighted average elasticity of VMT to intersection/street density was -0.12 (looking at six studies). The weighted average elasticity of VMT to percentage of 4-way intersections was -0.12 (looking at four studies, of which one controlled for self-selection[44]).

Alternative Literature:

Alternate:

- 2-19% reduction in VMT

[44] Self selection occurs when residents or employers that favor travel by non-auto modes choose locations where this type of travel is possible. They are therefore more inclined to take advantage of the available options than a typical resident or employee might otherwise be.

Growing Cooler [2] looked at various reports which studied the effect of site design on VMT, showing a range of 2-19% reduction in VMT. In each case, alternative development plans for the same site were compared to a baseline or trend plan. Results suggest that VMT and CO_2 per capita decline as site density increases as well as the mix of jobs, housing, and retail uses become more balanced. *Growing Cooler* notes that the limited number of studies, differences in assumptions and methodologies, and variability of results make it difficult to generalize.

Alternate:

- 3 – 17% shift in mode share from auto to non-auto

The Marshall and Garrick paper [3] analyzes the differences in mode shares for grid and non-grid ("tree") neighborhoods. For a city with a tributary tree street network, a neighborhood with a tree network had auto mode share of 92% while a neighborhood with a grid network had auto mode share of 89% (3% difference). For a city with a tributary radial street network, a tree neighborhood had auto mode share of 97% while a grid neighborhood had auto mode share of 84% (13% difference). For a city with a grid network, a tree neighborhood had auto mode share of 95% while a grid neighborhood had auto mode share of 78% (17% difference). The research is based on 24 California cities with populations between 30,000 and 100,000.

Alternative Literature References:

[2] Ewing, et al, 2008. Growing Cooler – The Evidence on Urban Development and Climate Change. Urban Land Institute.

[3] Marshall and Garrick, 2009. "The Effect of Street Network Design on Walking and Biking." Submitted to the 89th Annual Meeting of Transportation Research Board, January 2010. (Table 3)

Other Literature Reviewed:

None

3.2 Neighborhood/Site Enhancements

3.2.1 Provide Pedestrian Network Improvements

Range of Effectiveness: 0 - 2% vehicle miles traveled (VMT) reduction and therefore 0 - 2% reduction in GHG emissions.

Measure Description:

Providing a pedestrian access network to link areas of the Project site encourages people to walk instead of drive. This mode shift results in people driving less and thus a reduction in VMT. The project will provide a pedestrian access network that internally links all uses and connects to all existing or planned external streets and pedestrian facilities contiguous with the project site. The project will minimize barriers to pedestrian access and interconnectivity. Physical barriers such as walls, landscaping, and slopes that impede pedestrian circulation will be eliminated.

Measure Applicability:

- Urban, suburban, and rural context
- Appropriate for residential, retail, office, industrial and mixed-use projects
- Reduction benefit only occurs if the project has both pedestrian network improvements on site and connections to the larger off-site network.

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 project applicant must provide information regarding pedestrian access and connectivity within the project and to/from off-site destinations.

Mitigation Method:

Estimated VMT Reduction	Extent of Pedestrian Accommodations	Context
2%	Within Project Site and Connecting Off-Site	Urban/Suburban
1%	Within Project Site	Urban/Suburban
< 1%	Within Project Site and Connecting Off-Site	Rural

Assumptions:

Data based upon the following references:

- Center for Clean Air Policy (CCAP) Transportation Emission Guidebook. http://www.ccap.org/safe/guidebook/guide_complete.html (accessed March 2010)
- 1000 Friends of Oregon (1997) "Making the Connections: A Summary of the LUTRAQ Project" (p. 16): http://www.onethousandfriendsoforegon.org/resources/lut_vol7.html

Emission Reduction Ranges and Variables:

Pollutant	Category Emissions Reductions[45]
CO_2e	0 - 2% of running
PM	0 - 2% of running
CO	0 - 2% of running
NOx	0 - 2% of running
SO_2	0 - 2% of running
ROG	0 – 1.2% of total

Discussion:

As detailed in the preferred literature section below, the lower range of 1 – 2% VMT reduction was pulled from the literature to provide a conservative estimate of reduction potential. The literature does not speak directly to a rural context, but an assumption was made that the benefits will likely be lower than a suburban/urban context.

Example:

N/A – calculations are not needed.

Preferred Literature:

[45] 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.

- 1 - 2% reduction in VMT

The Center for Clean Air Policy (CCAP) attributes a 1% reduction in VMT from pedestrian-oriented design assuming this creates a 5% decrease in automobile mode share (e.g. auto split shifts from 95% to 90%). This mode split is based on the Portland Regional Land Use Transportation and Air Quality (LUTRAQ) project. The LUTRAQ analysis also provides the high end of 10% reduction in VMT. This 10% assumes the following features:

– Compact, mixed-use communities
– Interconnected street network
– Narrower roadways and shorter block lengths
– Sidewalks
– Accessibility to transit and transit shelters
– Traffic calming measures and street trees
– Parks and public spaces

Other strategies (development density, diversity, design, transit accessibility, traffic calming) are intended to account for the effects of many of the measures in the above list. Therefore, the assumed effectiveness of the Pedestrian Network measure should utilize the lower end of the 1 - 10% reduction range. If the pedestrian improvements are being combined with a significant number of the companion strategies, trip reductions for those strategies should be applied as well, based on the values given specifically for those strategies in other sections of this report. Based upon these findings, and drawing upon recommendations presented in the alternate literature below, the recommended VMT reduction attributable to pedestrian network improvements, above and beyond the benefits of other measures in the above bullet list, should be 1% for comprehensive pedestrian accommodations within the development plan or project itself, or 2% for comprehensive internal accommodations and external accommodations connecting to off-site destinations.

Alternative Literature:

Alternate:

- Walking is three times more common with enhanced pedestrian infrastructure
- 58% increase in non-auto mode share for work trips

The Nelson\Nygaard [1] report for the City of Santa Monica Land Use and Circulation Element EIR summarized studies looking at pedestrian environments. These studies have found a direct connection between non-auto forms of travel and a high quality pedestrian environment. Walking is three times more common with communities that have pedestrian friendly streets compared to less pedestrian friendly communities. Non-auto mode share for work trips is 49% in a pedestrian friendly community, compared to 31% in an auto-oriented community. Non-auto mode share for non-work trips is 15%, compared to 4% in an auto-oriented community. However, these effects also depend upon other aspects of the pedestrian friendliness being present, which are accounted for separately in this report through land use strategy mitigation measures such as density and urban design.

Alternate:

- 0.5% - 2.0% reduction in VMT

The Sacramento Metropolitan Air Quality Management District (SMAQMD) Recommended Guidance for Land Use Emission Reductions [2] attributes 1% reduction for a project connecting to *existing* external streets and pedestrian facilities. A 0.5% reduction is attributed to connecting to *planned* external streets and pedestrian facilities (which must be included in a pedestrian master plan or equivalent). Minimizing pedestrian barriers attribute an additional 1% reduction in VMT. These recommendations are generally in line with the recommended discounts derived from the preferred literature above.

Preferred and Alternative Literature Notes:

[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). http://www.shapethefuture2025.net/

Nelson\Nygaard looked at the following studies: Anne Vernez Moudon, Paul Hess, Mary Catherine Snyder and Kiril Stanilov (2003), Effects of Site Design on Pedestrian Travel in Mixed Use, Medium-Density Environments, http://www.wsdot.wa.gov/research/reports/fullreports/432.1.pdf; Robert Cervero and Carolyn Radisch (1995), Travel Choices in Pedestrian Versus Automobile Oriented Neighborhoods, http://www.uctc.net/papers/281.pdf;

[2] Sacramento Metropolitan Air Quality Management District (SMAQMD) Recommended Guidance for Land Use Emission Reductions. (p. 11) http://www.airquality.org/ceqa/GuidanceLUEmissionReductions.pdf

Other Literature Reviewed:

None

3.2.2 Provide Traffic Calming Measures

Range of Effectiveness: 0.25 – 1.00% vehicle miles traveled (VMT) reduction and therefore 0.25 – 1.00% reduction in GHG emissions.

Measure Description:

Providing traffic calming measures encourages people to walk or bike instead of using a vehicle. This mode shift will result in a decrease in VMT. Project design will include pedestrian/bicycle safety and traffic calming measures in excess of jurisdiction requirements. Roadways will be designed to reduce motor vehicle speeds and encourage pedestrian and bicycle trips with traffic calming features. Traffic calming features may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.

Measure Applicability:

- Urban, suburban, and 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 streets within project with traffic calming improvements
- Percentage of intersections within project with traffic calming improvements

Mitigation Method:

		% of streets with improvements			
		25%	*50%*	*75%*	*100%*
		% VMT Reduction			
% of intersections with improvements	*25%*	**0.25%**	**0.25%**	**0.5%**	**0.5%**
	50%	**0.25%**	**0.5%**	**0.5%**	**0.75%**
	75%	**0.5%**	**0.5%**	**0.75%**	**0.75%**
	100%	**0.5%**	**0.75%**	**0.75%**	**1%**

Assumptions:

Data based upon the following references:

[1] Cambridge Systematics. *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions.*(p. B-25) http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendices_Complete_102209.pdf

[2] Sacramento Metropolitan Air Quality Management District (SMAQMD) *Recommended Guidance for Land Use Emission Reductions.* (p.13) http://www.airquality.org/ceqa/GuidanceLUEmissionReductions.pdf

Emission Reduction Ranges and Variables:

Pollutant	Category Emissions Reductions[46]
CO_2e	0.25 – 1.00% of running
PM	0.25 – 1.00% of running
CO	0.25 – 1.00% of running
NOx	0.25 – 1.00% of running
SO_2	0.25 – 1.00% of running
ROG	0.15 – 0.6% of total

Discussion:

The table above allows the Project Applicant to choose a range of street and intersection improvements to determine an appropriate VMT reduction estimate. The Applicant will look at the rows on the left and choose the percent of intersections within

[46] 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.

the project which will have traffic calming improvements. Then, the Applicant will look at the columns along the top and choose the percent of streets within the project which will have traffic calming improvements. The intersection cell of the row and column selected in the matrix is the VMT reduction estimate.

Though the literature provides some difference between a suburban and urban context, the difference is small and thus a conservative estimate was used to be applied to all contexts. Rural context is not specifically discussed in the literature but is assumed to have similar impacts.

For a low range, a project is assumed to have 25% of its streets with traffic calming improvements and 25% of its intersections with traffic calming improvements. For a high range, 100% of streets and intersections are assumed to have traffic calming improvements

Example:

N/A - No calculations needed.

Preferred Literature:

- -0.03 = elasticity of VMT with respect to a pedestrian environment factor (PEF)
- 1.5% - 2.0% reduction in suburban VMT
- 0.5% - 0.6% reduction in urban VMT

Moving Cooler [1] looked at Ewing's synthesis elasticity from the Smart Growth INDEX model (-0.03) to estimate VMT reduction for a suburban and urban location. The estimated reduction in VMT came from looking at the difference between the VMT results for Moving Cooler's strategy of pedestrian accessibility only compared to an aggressive strategy of pedestrian accessibility and traffic calming.

The Sacramento Metropolitan Air Quality Management District (SMAQMD) *Recommended Guidance for Land Use Emission Reductions* [2] attributes 0.25 – 1% of VMT reductions to traffic calming measures. The table above illustrates the range of VMT reductions based on the percent of streets and intersections with traffic calming measures implemented. This range of reductions is recommended because it is generally consistent with the effectiveness ranges presented in the other preferred literature for situations in which the effects of traffic calming are distinguished from the other measures often found to co-exist with calming, and because it provides graduated effectiveness estimates depending on the degree to which calming is implemented.

Alternative Literature:

None

Alternative Literature References:

None

Other Literature Reviewed:

None

3.2.9 Dedicate Land for Bike Trails

Range of Effectiveness: Grouped strategy. [See LUT-9]

Measure Description:

Larger projects may be required to provide for, contribute to, or dedicate land for the provision of off-site bicycle trails linking the project to designated bicycle commuting routes in accordance with an adopted citywide or countywide bikeway plan.

Refer to Improve Design of Development (LUT-9**)** strategy for ranges of effectiveness in this category. The benefits of Land Dedication for Bike Trails have not been quantified and should be grouped with the Improve Design of Development strategy to strengthen street network characteristics and improve connectivity to off-site bicycle networks.

Measure Applicability:

- Urban, suburban, or rural contexts
- Appropriate for large residential, retail, office, mixed use, and industrial projects

Alternative Literature:

No literature was identified that specifically looks at the quantitative impact of implementing land dedication for bike trails.

Alternative Literature References:

None

Other Literature Reviewed:

None

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

3.4.7 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

3.4.10 Implement a School Pool Program

Range of Effectiveness: 7.2 – 15.8% school vehicle miles traveled (VMT) Reduction and therefore 7.2 – 15.8% reduction in school trip GHG emissions.

Measure Description:

This project will create a ridesharing program for school children. Most school districts provide bussing services to public schools only. SchoolPool helps match parents to transport students to private schools, or to schools where students cannot walk or bike but do not meet the requirements for bussing.

Measure Applicability:

- Urban, suburban, and rural context
- Appropriate for residential 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:

- Degree of implementation of SchoolPool Program(moderate to aggressive)

Mitigation Method:

$$\% \text{ VMT Reduction} = \text{Families} * B$$

Where

Families = % families that participate (from [1] and [2])

B = adjustments to convert from participation to daily VMT to annual school VMT

Detail:

- Families: 16% (moderate implementation), 35% (aggressive implementation), (from [1] and [2])
- B: 45% (see Appendix C for detail)

Assumptions:

Data based upon the following references:

[1] Transportation Demand Management Institute of the Association for Commuter Transportation. *TDM Case Studies and Commuter Testimonials*. Prepared for the US EPA. 1997. (p. 10, 36-38) http://www.epa.gov/OMS/stateresources/rellinks/docs/tdmcases.pdf

[2] Denver Regional Council of Governments (DRCOG). *Survey of Schoolpool Participants, April 2008.* http://www.drcog.org/index.cfm?page=SchoolPool. Obtained from Schoolpool Coordinator, Mia Bemelen.

Emission Reduction Ranges and Variables:

Pollutant	Category Emissions Reductions[64]
CO_2e	7.2 – 15.8% of running
PM	7.2 – 15.8% of running
CO	7.2 – 15.8% of running
NOx	7.2 – 15.8% of running
SO_2	7.2 – 15.8% of running
ROG	4.3 – 9.5% of total

Discussion:

This strategy reflects the findings from only one case study.

Example:

Sample calculations are provided below:

- Low Range % School VMT Reduction (moderate implementation) = 16% * 45% = 7.2%
- High Range % School VMT Reduction (aggressive implementation) = 35% * 45% = 15.8%

[64] 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.

Preferred Literature:

- 7,711 – 18,659 daily VMT reduction

As presented in the TDM Case Studies [1] compilation, the SchoolPool program in Denver saved 18,659 VMT per day in 1995, compared with 7,711 daily in 1994 – a 142% increase. The Denver Regional Council of Governments (DRCOG) [2] enrolled approximately 7,000 families and 32 private schools in the program. The DRCOG staff surveyed a school or interested families to collect home location and schedules of the students. The survey also identified prospective drivers. DRCOG then used carpool-matching software and GIS to match families. These match lists were sent to the parents for them to form their own school pools. 16% of families in the database formed carpools. The average carpool carried 3.1 students.

The SchoolPool program is still in effect and surveys are conducted every few years to monitor the effectiveness of the program. The latest survey report received was in 2008. The report showed that the participant database had increased to over 10,000 families, an 18% increase from 2005. 29% of participants used the list to form a school carpool. This percentage was lower than 35% in 2005 but higher than prior to 2005, at 24%. The average number of families in each carpool ranged from 2.1 prior to 2005 to 2.8 in 2008. The average number of carpool days per week was roughly 4.7. The number of school weeks per year was 39. Per discussions with the Schoolpool Coordinator, a main factor of success was establishing a large database. This was achieved by having parents opt-out of the database versus opting-in.

Alternative Literature:

None

Alternative Literature References:

None

Other Literature Reviewed:

None

ATTACHMENT C

Otay Ranch GDP VMT per Capita output

Vehicle Miles of Travel Report

Scenario ID **805** **Otay V13V14 - 2050 Otay Ranch V13V14 - Otay Ranch**

VMT per Resident							
			Residents	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Resident
Regionwide			3,865,014	13,827,767	84,171,267	59,929,608	15.5
Jurisdiction	Chula Vista		326,623	1,141,957	6,152,451	4,229,546	12.9
CPA		0	-	-	-	-	0.0
Otay Ranch			112,487	398,864	2,476,903	1,762,701	**15.7**

VMT per Employee							
			Employees	Total Trips	Person Miles of Travel	Vehicle Miles of Travel	VMT per Employee
Regionwide			1,621,201	5,507,196	43,357,745	37,461,242	23.1
Jurisdiction	Chula Vista		101,442	341,829	2,203,081	1,862,359	18.4
CPA		0	-	-	-	-	0.0
Otay Ranch			25,603	90,359	601,185	502,488	**19.6**

Report Generated: 01/10/19

SANDAG

ATTACHMENT D

Street Light Data – Average Speed along Otay Lakes Road

Basic Project Metrics

Personal

Average Weekday (M-Th)

All Day (12am-12am)

Select Zone(s)

Average Segment Speed (MPH)

View as #

Average Segment Speed (MPH)

51 - <51

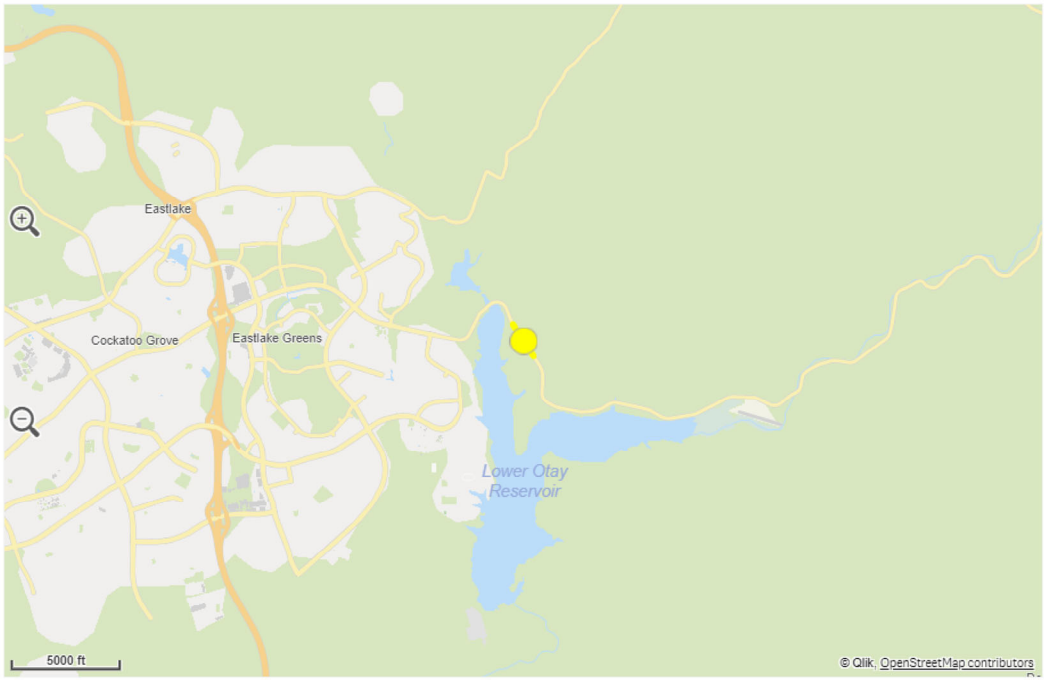
51 - <51

51 - <51

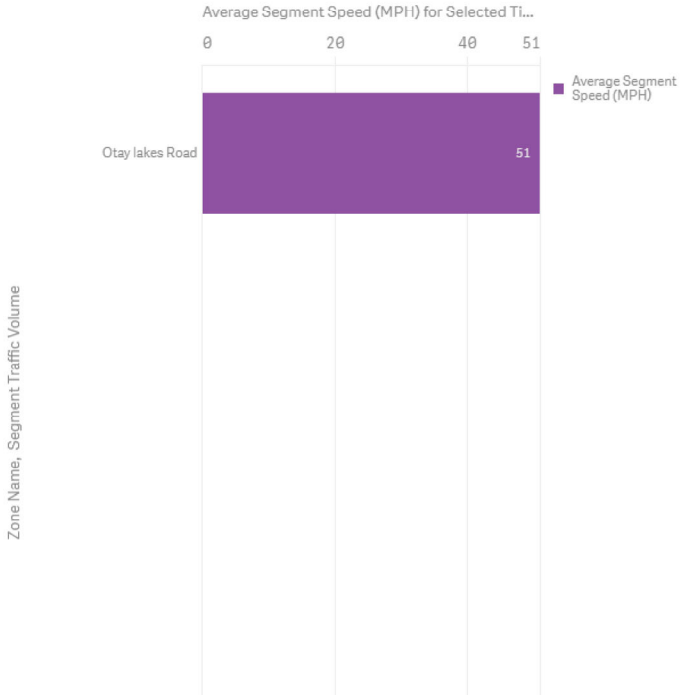
51 - <51

Heatmap of Average Segment Speed (MPH)

Colors indicate the on each Segment during the selected time period.



Average Segment Speed (MPH)



ATTACHMENT E

SimTraffic Average Speed Ouptut

1: Otay Lakes Road & Strada Piazza (N) Performance by approach

Approach	WB	NB	SB	All
Avg Speed (mph)	24	13	10	13

2: Otay Lakes Road & Piazza Urbino Performance by approach

Approach	WB	NB	SB	All
Avg Speed (mph)	24	30	28	28

3: Otay Lakes Road & Strada Piazza (S) Performance by approach

Approach	EB	WB	SB	All
Avg Speed (mph)	35	32	22	33

4: Otay Lakes Road & Resort Driveway Performance by approach

Approach	EB	WB	SB	All
Avg Speed (mph)	31	33	22	32

Total Network Performance

Avg Speed (mph)	26