



Memorandum



Date: June 29, 2022

To: Ms. Natalie Noyes, David J. Powers & Associates, Inc.

From: Ollie Zhou

Subject: Danville Housing Element Update Transportation Study

Hexagon Transportation Consultants, Inc. has completed a transportation study for the proposed Danville Housing Element Update (HEU) project. The purpose of this study is to conduct a vehicle-miles travelled (VMT) analysis consistent with CEQA guidelines to determine whether the proposed HEU project would generate a VMT impact.

Background

SB 743, which was signed into law in 2013, initiated a change how public agencies evaluate transportation impacts under the California Environmental Quality Act (CEQA). Traditionally, transportation impacts have been evaluated by examining whether the project is likely to cause automobile delay at intersections and congestion on nearby individual highway segments, and whether this delay will exceed local or regionally-defined thresholds of significance (this is known as Level of Service or LOS analysis).

Starting on July 1, 2020, agencies must analyze transportation impacts using a new metric known as vehicle miles traveled (VMT) instead of LOS. VMT is a metric that captures how much auto travel (additional miles driven) a proposed project would create on California roads. If the project adds excessive car travel onto our roads, the project may cause a significant transportation impact.

Opportunity Subareas

The HEU has identified 8 "HEU subareas" (see Figure 1) with a total capacity for 4,620 units¹, as illustrated in Table 1.





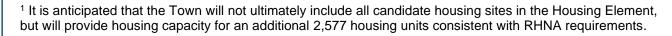




Table 1
Potential Unit Increase by HEU Subarea

HEU Subareas	Potential New Units
Subarea #1	1,137
Subarea #2 - Downtown	1,523
Subarea #3	575
Subarea #4	108
Subarea #5	151
Subarea #6	412
Subarea #7	514
Subarea #8	200
Subareas 1-8 (Total)	4,620

VMT Thresholds of Significance

Given that the Town of Danville has not formally adopted a local VMT policy, this study utilizes the Contra Costa Transportation Authority (CCTA)'s Growth Management Program Implementation Guide (the CCTA "Guide"). The Guide directs residential projects (such as the HEU) to use the home-based VMT per capita metric to evaluate their project generated VMT.

The project is considered to generate a **significant impact** if its project-generated home-based VMT per capita is *higher than 85%* (or *15% below*) the existing town-wide baseline for residential home-based VMT per capita average.

Therefore, for this study, a HEU Subarea is considered to generate a significant impact if - under HEU buildout conditions (cumulative year 2031 + HEU) - the Subarea's residential home-based VMT per capita exceeds 85% of existing baseline conditions (year 2020).

VMT Threshold Analysis

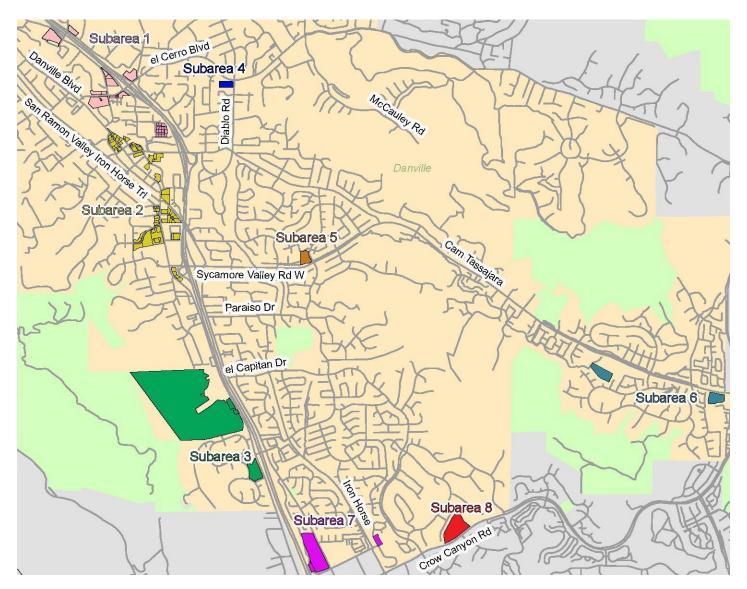
VMT is defined as the total distance traveled by vehicles traveling to and from a land use over a typical day. The Contra Costa Transportation Authority (CCTA) travel demand forecast model was used to estimate the town-wide VMT threshold and the HEU's VMT. The CCTA model is a mathematical representation of travel within the nine Bay Area counties. The base model structure was developed by the Metropolitan Transportation Commission (MTC) and further refined by the CCTA for use within Contra Costa County. It is the best available model to represent travel within the Town of Danville and serves as the primary forecasting tool for the County and the Town.

There are four main components of the CCTA model: 1) trip generation, 2) trip distribution, 3) mode choice, and 4) trip assignment. The model uses socioeconomic inputs (i.e., population, income, employment) aggregated into geographic areas, called transportation analysis zones (TAZ) to estimate travel within the model area. There are 64 TAZs within the model to represent the Town of Danville.

For residential land uses, the VMT threshold is expressed in terms of home-based vehicle-miles travelled per capita. As estimated by the CCTA model (see land use summary below in Table 2), the Year 2020 town-wide average residential VMT is estimated at 22.3 daily VMT per capita. Therefore, the VMT threshold for this project, measured at 85% of the Town's baseline average, is **19.0 daily VMT per capita** (see Table 3).



Figure 1 HEU Subareas





VMT Evaluation

The HEU has a buildout year of 2031. Therefore, VMT for the HEU Subareas are analyzed under year 2031 conditions. As discussed, the Cumulative Year 2031+HEU scenario is studying a capacity of 4,620 units (see Table 2) above existing conditions, spread across 8 HEU Subareas.

It is anticipated that the Town will not ultimately include all candidate housing sites within each of the HEU Subareas in the Housing Element. Rather, a more likely scenario is an adopted Housing Element that would provide sufficient housing capacity for additional housing units, plus a buffer, that is consistent with Danville's RHNA assignment. Therefore, the residential land use assumptions studied in the model is a conservative overestimate of potential impacts.

Under the Cumulative Year 2031+HEU scenario, the HEU population is estimated using a persons per household ratio of 2.8 as published in the Department of Finance data for the Town for Year 2021. The Cumulative Year 2031 scenario represents the anticipated land use in Danville without the HEU, as projected by ABAG. Its land use projections are included for information only.

Table 2
Model Land Use Inputs Summary

		Tov	vn of Danville	
Scenario	Households	Population	Employed Residents	Jobs
Year 2020 ¹	15,677	44,330	25,701	19,399
Cumulative Year 2031 1	16,470	46,750	26,520	19,319
Cumulative Year 2031 + HEU ²	20,297	57,266	33,140	19,319

Notes:

Subarea-Level VMT Analysis

The CCTA model was run under the Cumulative Year 2031+HEU scenario. Table 3 shows that Subareas #2, #3, #7, and #8 would generate VMT per capita *below* the Town residential VMT threshold. This is primarily attributable to the fact that these Subareas are located in areas with complementary land uses that could shorten vehicle trip lengths or reduce the need to drive (hence reducing VMT per capita). Therefore, Subarea #2, #3, #7, and #8 VMT impacts would be considered **less than significant**.

Subarea #1 would generate VMT at 4% *above* the Town residential VMT threshold. The remaining Subareas #4, #5 and #6 would generate the most VMT at 13% to 18% *above* the Town residential VMT threshold. This is primarily attributable to the fact that these Subareas are not located in areas with a great mix of complementary land uses and residents need to drive more or travel further (hence increasing VMT per capita). These four subareas would generate a **significant impact** as defined by the Town's per capita VMT threshold of significance described earlier. Potential VMT mitigation measures are discussed in the section below.



^{1.} Land use data sourced from the CCTA model.

^{2.} Cumulative + HEU residential land use derived by adding HEU (4,620 units) onto existing land use. Jobs data assumed the same as Cumulative Year 2031 scenario. Population for HEU units assumed at 2.8 persons per household. Employed residents per HEU units assumed at 1.61, same as Cumulative Year 2031 scenario.

Table 3 Subarea-Specific VMT

		Residenti	al VMT Analysis
HEU Subareas	Proposed Households	VMT per resident	Reduction Needed to Eliminate VMT Impact
Town of Danville existing V	MT	22.3	-
VMT Threshold (@ 85% of	Town average)	19.0	
<u>Cumulative Year 2031 + H</u> Subarea #1	<u>IEU Scenario</u> 1,137	19.8	4%
Subarea #2 - Downtown	1,523	18.8	No Impact
Subarea #3	575	16.7	No Impact
Subarea #4	108	21.8	13%
Subarea #5	151	22.3	15%
Subarea #6	412	23.2	18%
Subarea #7	514	16.7	No Impact
Subarea #8	200	18.6	No Impact
Subareas 1-8 Total	4,620	19.1	1%

VMT Mitigation Discussion

The Contra Costa Transportation Authority (CCTA)'s Growth Management Program Implementation Guide (CCTA's Guide) outlined various VMT mitigation measures as well as their potential effectiveness.

Table 4 presents potential mitigation measures per CCTA's Guide that could be applied towards the four HEU Subareas with VMT impacts. The potential mitigation measures are separated into project-scale strategies and community-wide strategies. Project-scale strategies would benefit only residents at the project sites, while community-wide strategies would also benefit the neighboring communities. Implementing community-wide strategies would require coordination with the Town and local transit agencies and/or via a Transportation Management Association. It should be noted that the range of effectiveness for these mitigation strategies depends not only on the intensity of the implementation, but also on the location context (high mixed-use areas, high transit-connected areas would likely result in more effective VMT reductions for the same strategy implemented).

The potential range of effectiveness of VMT reduction strategies by Subarea is summarized in Table 5. The project-scale mitigation reductions are calculated per the latest CAPCOA Handbook for Analyzing Greenhouse Gas Emissions, 2021 (see Appendix for detailed calculations). The community-scale mitigation reductions assumed the low end of the effective ranges provided by CCTA's Guide. Danville presents a more suburban context with limited transit coverage or connectivity that is wholly provided through separate public agencies. Therefore, it should be expected that implementation of the strategies would result in VMT reduction on the lower end of the range of effectiveness.



Table 4
Potential Mitigation Strategies

		Types of Trips	Range of Potential VMT
Stra	itegy	Affected	Reduction for Affected Trips
<u>Pro</u>	iect-Scale Strategies		
1	Increase land use diversity through greater mix of uses on site	All	0% - 12%
2	Implement ride-sharing program	Primarily commute trips	2.5% - 8.3%
3	Subsidize or discount transit passes	Primarily commute trips	0.1% - 16%
4	Incentivize telework and alternative schedules	Commute trips	0.2% - 4.5%
5	Price and manage parking	All	2% - 30%
Con	nmunity-Scale Strategies		
6	Improve the pedestrian network	All	0.5% - 5.7%
7	Implement traffic calming and low- stress bicycle faciliies	All	0% - 1.7%
8	Increase transit service frequency	All	0.3% - 6.3%
9	Implement neighborhood or community- wide car-sharing programs	All	0.3% - 1.5%
10	Coordinate school pools	School	7% - 15%
Note Sou	es: rce: CCTA's <i>Growth M</i> anagement Program	n Implementation Guide	

Table 5
Potential VMT Mitigation Strategies – Effectiveness by Subarea

		Project-Sca	le Mitigation	Community-So	Total		
HEU Subareas	Resident VMT	Applicable Strategies ¹	Potential Reduction ²	Applicable Strategies ¹	Potential Reduction ³	Potential Reduction	
Subarea #1	19.8	#2, #3, #5	-3.9%	#6, #8, #9	-1.3%	-5.2%	
Subarea #2 - Downtown	18.8	#2, #3, #5	-3.9%	#6, #8, #9	-1.3%	-5.2%	
Subarea #3	16.7	#2, #5	-3.4%	#6, #8, #9	-1.3%	-4.7%	
Subarea #4	21.8	#2, #3, #5	-3.9%	#6, #8, #9	-1.3%	-5.2%	
Subarea #5	22.3	#2, #3, #5	-3.6%	#6, #8, #9	-1.3%	-4.9%	
Subarea #6	23.2	#2, #3, #5	-3.8%	#6, #8, #9	-1.3%	-5.1%	
Subarea #7	16.7	#2, #3, #5	-3.5%	#6, #8, #9	-1.3%	-4.8%	
Subarea #8	18.6	#2, #3, #5	-3.5%	#6, #8, #9	-1.3%	-4.8%	

Notes

- 1. Mitigation strategies referenced the CCTA's Growth Management Program (GMP) Implementation Guide
- 2. Project-scale mitigation reductions calculated per CAPCOA Handbook for Analyzing Greenhouse Gas Emission Reductions, 2021.
- 3. Potential reduction assumed the lower end of the reduction range provided by the CCTA's GMP Implementation Guide.



Table 6 provides a cumulative summary of potential effectiveness of VMT reduction strategies across all Subareas:

- Subarea #1could feasibly fully mitigate their VMT impacts by implementing a combination of the applicable strategies through TDM Plans, achieving 5.2% VMT reductions, respectively. With such a TDM Plan, the VMT impact for Subarea #1 would be *less than significant with mitigation*.
- For remaining Subareas #4, #5 and #6, it would be unlikely that implementation of TDM Plans achieving high VMT reductions of 13%, 15%, and 18%, respectively, would be feasible given the suburban context of Danville. Therefore, the VMT impacts for Subareas #4, #5 and #6 would remain *significant and unavoidable*.

Table 6
Potential VMT Mitigation Strategies – Summary of Effectiveness

HEU Subareas	Resident VMT	%Reduction Needed to Mitigate Impact	Total Potential Mitigation Reduction	Potential Net VMT	Result with Mitigation
Subarea #1	19.8	4%	5.2%	18.8	Less than Significant
Subarea #2 - Downtown	18.8	No Impact	5.2%	17.8	Less than Significant
Subarea #3	16.7	No Impact	4.7%	15.9	Less than Significant
Subarea #4	21.8	13%	5.2%	20.7	Significant and Unavoidable
Subarea #5	22.3	15%	4.9%	21.2	Significant and Unavoidable
Subarea #6	23.2	18%	5.1%	22.0	Significant and Unavoidable
Subarea #7	16.7	No Impact	4.8%	15.9	Less than Significant
Subarea #8	18.6	No Impact	4.8%	17.7	Less than Significant
Total (Subareas #1 - #8)	19.1	1%	5.0%	18.2	Less than Significant

Plan-Level VMT Analysis

As shown on Table 3, the Housing Element Update (HEU Plan) – assuming an approval of all 4,620 units in the 8 subareas - would generate residential VMT at 19.1 VMT per capita under the Cumulative Year 2031+HEU scenario. Therefore, the HEU Plan would require a total VMT reduction of 1% to meet the Town's threshold of 19.0 residential home-based VMT per capita.

As shown on Table 6, it would be feasible for units within the HEU Plan to achieve a *combined* 5% VMT reduction by implementing a combination of the project-scale and community-scale strategies. With such a Plan-level requirement, the VMT impact for the HEU Plan would be *less than significant with mitigation*. It should be noted that this analysis is specific to the specific mix of units and locations analyzed in this report.



Effect of HEU on Town-Wide VMT

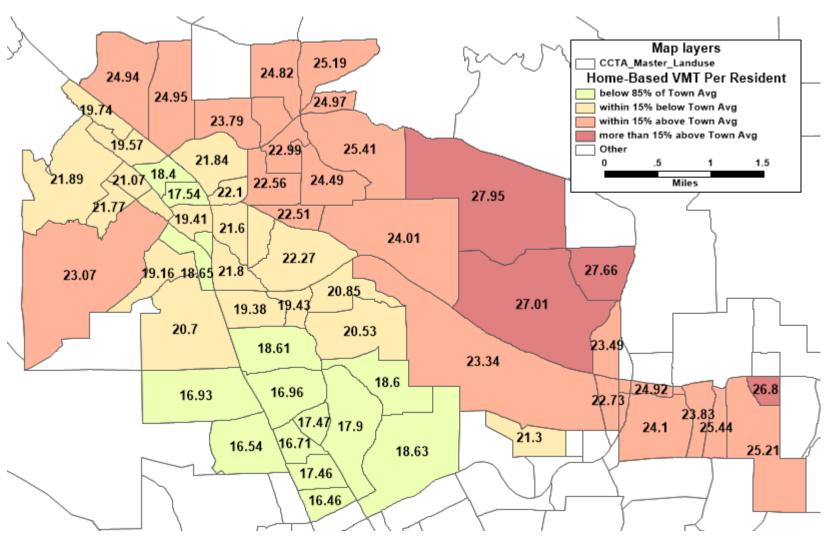
Town-wide residential VMT per capita for the Cumulative Year 2031+HEU scenario was compared to the Cumulative Year 2031 without HEU for information only. As shown on Table 7, the proposed HEU update would reduce town-wide residential VMT per capita by approximately 1%, from 21.4 under Cumulative Year 2031 conditions to 21.1. Compared to existing conditions, the proposed HEU update would reduce town-wide residential VMT per capita by approximately 5%, from 22.3 under Existing Year 2020 conditions to 21.1. This is because most of the potential housing development are located in areas where the residential VMT is lower than the town-wide average (see Figure 2).

Table 7
Effect of HEU on Town-Wide Residential VMT

		Town of Danville	
Scenario	Home-Based VMT	Population	Residential VMT per capita
Existing Year 2020	988,559	44330	22.3
Cumulative Year 2031	1,000,450	46,750	21.4
Cumulative Year 2031 + HEU	1,208,313	57,266	21.1



Figure 2 Year 2031 + HEU Conditions Residential VMT by TAZ





Appendix A Danville Land Use Inputs – Cumulative Year 2031	

CCTAZ	TOTHH_30	TOTPOP_3	30 EMPRES_30	SFDU_30	MFDU_30	TOTEMP_30) RETEMP	30 SE	EREMP_30	OTHEMP_30	AGREMP_3(M	FGEMP 30 T	RDEMP 30	HSENROLL 4	COLL FTE 4	COLL PTE 4	GMSENROLL4
		138	391	221	129	8	94	_ 	_ 	_ 20	_ 1	_ 2	- 3	_ 0			0
		179	508	288	168		104	10	57	31	0	4	0	0	0	0	0
		176	504	283	165	11	27	4	12	7	0	2	0	0	0	0	0
		353	1028	593	349	4	93	30	18	41	0	1	2	0	0	0	0
	0005	67	194	112	66	•	156	13	79	58	0	1	3	0	0	0	0
		100	260	156	81	18	10	1	3	4	0	0	0	0	0	0	0
		179	469	281	146		504	94	160	228	3	9	7	0	_	0	0
		254	665	398	207		319	68	100	130	0	10	,	0		0	638
		123	322	193	100		292	72	95		0	5	9	2280	0	0	030
										114	_	_	4			•	0
		517	1356	809	422	95	54	26	12	14	0	0	0	0	_	0	0
		113	297	177	92	20	20	20	0	0	0	0	0	0	0	0	0
		392	1036	612	319		171	31	51	79	0	4	4	0	0	0	538
		112	295	176	91		254	50	79	110	1	6	5	0	•	0	0
		216	563	337	176		1313	274	418	567	1	27	23	0	•	0	0
		144	378	226	118		586	129	181	244	2	15	13	0	0	0	0
		298	776	465	242		1833	387	608	773	2	34	28	0	0	0	0
	0017	26	71	42	21		1158	237	390	478	4	26	22	0	•	0	0
4	0018	169	474	266	138	32	762	157	238	330	1	18	15	27	0	0	378
4	0019	98	287	166	97	1	12	1	5	3	0	0	0	0	0	0	0
4	0020	163	477	275	161	1	27	27	0	0	0	0	0	0	0	0	0
4	0021	119	355	201	118	1	32	32	0	0	0	0	0	0	0	0	0
4	0022	629	1833	1058	621	7	240	30	114	88	1	1	3	0	0	0	0
4	0023	293	827	469	214	79	342	57	131	130	0	7	15	0	0	0	506
4	0024	120	338	192	88	31	29	29	0	0	0	0	0	0	0	0	0
4	0025	346	1010	556	253	93	132	24	47	50	0	2	5	0	0	0	987
4	0026	495	1397	792	362	133	23	23	0	0	0	0	0	0	0	0	0
4	0027	140	396	225	103	37	77	14	27	32	0	0	1	0	0	0	631
4	0028	301	855	483	220	81	13	4	6	1	0	0	0	0	0	0	0
4	0029	331	826	467	205	125	212	212	0	0	0	0	0	0	0	0	0
4	.0030	53	133	75	33	20	9	9	0	0	0	0	0	0	0	0	0
4	0031	461	1191	704	355	105 2	2743	476	1302	867	7	43	45	0	0	0	0
		121	344	195	113		375	6	233	97	1	12	23	2334	. 0	0	639
		152	431	244	142	9	180	5	108	50	1	6	6	0		0	0
		471	1332	755	439	30	71	71	0	0	0	0	0	0	0	0	0
		119	339	192	111	7	45	1	26	14	0	2	1	0	0	0	0
		196	572	329	193	2	27	4	9	11	0	0	0	0	0	0	0
		111	325	187	110	1	68	10	31	19	0	5	2	0	0	0	0
		122	356	205	120	1	384	34	191	141	1	4	9	0	0	0	628
		135	394	227	133		388	39	196	140	1	3	7	0	_	0	662
		168	491	283	166		134	21	60	45	2	1	2	0	•	0	0
		473	1380	797	468		111	8	62	39	0	0	0	0	_	0	0
		473 424	1235	714	419		543	55	263	205	2	4	10	0	•	0	701
		339	988	570	335		100	19	39	40	0	0	10	0	_	0	0
	.0043	91	268	154	90	ე 1	27	4	12	40 7	0	2	0	0	_	0	0
		357		600	352	4	360		163	102	_	2 27		0	•	_	
			1039 536					54 16			1 0		11	0	•		0
		195		304	192	2	16	16	0	0	_	0	0	_	_	_	0
		060			1045	14	67	18	31	15	0	1	1	0	_	0	0
4	0048	365	1007	567	360	5	19	19	0	0	0	0	0	0	0	0	0

40049	177	486	276	174	2	15	2	6	4	0	1	0	0	0	0	0
40050	838	2304	1305	826	11	307	41	142	106	0	6	8	0	0	0	0
40051	911	2500	1418	898	12	526	53	247	199	0	12	14	0	0	0	0
40052	243	692	390	177	65	9	9	0	0	0	0	0	0	0	0	0
40053	450	1273	720	329	121	1223	193	460	498	2	23	45	0	0	0	0
40054	65	177	88	36	28	0	0	0	0	0	0	0	0	0	0	0
40056	194	533	302	191	2	757	757	0	0	0	0	0	0	0	0	0
40057	14	40	20	8	6	121	14	60	40	0	3	2	0	0	0	0
40058	101	304	168	99	2	74	74	0	0	0	0	0	0	0	0	0
40059	19	63	34	19	0	1038	218	435	328	1	41	11	0	0	0	0
40060	10	33	18	10	0	18	2	8	5	0	1	0	0	0	0	0
40061	584	1897	1035	568	16	362	112	130	101	0	13	3	0	0	0	0
40062	134	451	238	130	3	43	43	0	0	0	0	0	0	0	0	0
40063	100	372	180	97	2	42	6	19	12	0	3	1	0	0	0	0
40064	491	1740	821	477	13	132	25	61	43	0	1	0	0	0	0	0
40600	131	427	233	128	3	100	17	45	31	0	3	0	0	0	0	846

Appendix B Danville Land Use Inputs – Cumulative Year 2031 + HEU											

GMSENROLL4 0 0 0	0	0	_ 0	_ 7	EMP_31 TRDE 2	_ 1							RES_31 SFDU_3:			
0		U	U	,	_		20	60	3	94	74	127	324	563	201	40001
0	0	0	0	1	4	0	31	57	10	104	140	166	491	853	306	40002
0	0	0	0	2	2	0	7	12	4	27	12	163	282	494	175	40003
U	0	0	0	4	1	0	41	18	30	93	111	347	764	1311	458	40004
0	0	0	0	5	1	0	58	79	13	156	1	65	111	189	66	40005
0	0	0	0	2	0	0	4	3	1	10	207	77	458	781	284	40006
0	0	0	0	11	9	3	228	160	94	504	241	151	633	1068	392	40007
638	0	0	0	11	10	0	130	100	68	319	395	186	937	1590	581	40008
030	0	0	2280	6	5	0	114	95	72	292	18	103	197	320	121	40009
0	0	0	0	2	0	0	14	12	26	54	76	437	835	1358	513	40010
0	0	0	0	0	0	0	0	0	20	20	18	94	180	294	112	40010
538	0	0	0	6	4	0	79	51	31	171		330	631	1035	388	40011
238	-		0	0 7	4	1					58 545					
0	0	0	0	,	6	1	110	79	50	254	545	93	1031	1772	638	40013
0	0	0	0	26	27	1	567	418	274	1313	372	162	858	1457	534	40014
0	0	0	Ü	15	15	2	244	181	129	586	148	121	435	730	269	40015
0	0	0	0	30	34	2	773	608	387	1833	204	123	528	891	327	40016
0	0	0	0	24	26	4	478	390	237	1158	4	20	40	64	24	40017
378	0	0	27	18	18	1	330	238	157	762	474	139	995	1720	613	40018
0	0	0	0	3	0	0	3	5	1	12	0	97	164	280	97	40019
0	0	0	0	0	0	0	0	0	27	27	2	160	273	466	162	40020
0	0	0	0	0	0	0	0	0	32	32	1	117	199	347	118	40021
0	0	0	0	6	1	1	88	114	30	240	157	618	1292	2214	775	40022
506	0	0	0	17	7	0	130	131	57	342	60	230	479	818	290	40023
0	0	0	0	0	0	0	0	0	29	29	25	94	195	334	119	40024
987	0	0	0	8	2	0	50	47	24	132	71	272	568	997	343	40025
0	0	0	0	0	0	0	0	0	23	23	101	390	808	1381	491	40026
631	0	0	0	3	0	0	32	27	14	77	29	110	230	394	139	40027
0	0	0	0	2	0	0	1	6	4	13	63	237	494	848	300	40028
0	0	0	0	0	0	0	0	0	212	212	380	201	890	1525	581	40029
0	0	0	0	0	0	0	0	0	9	9	344	32	599	1037	376	40030
0	0	0	0	48	43	7	867	1302	476	2743	159	353	816	1347	512	40031
639	0	0	2334	26	12	1	97	233	6	375	8	112	194	337	120	40032
0	0	0	0	9	6	1	50	108	5	180	10	141	243	423	151	40033
0	0	0	0	0	0	0	0	0	71	71	30	432	745	1295	462	40034
0	0	0	0	2	2	0	14	26	1	45	7	111	191	332	118	40035
0	0	0	n	3	0	0	11	9	4	27	2	190	324	553	192	40036
0	0	0	n	3	5	0	19	31	10	68	1	109	186	318	110	40037
628	0	0	0	13	<i>J</i>	1	141	191	34	384	1	120	205	351	121	40037
662	0	0	0	10	3	1	140	196	39	388	1	130	222	379	131	40038
002	0	0	0	5	3 1	2	45	60	21	134	2	166	282	483	168	40049
•	0	•	0	2	0	Δ					Z 1	467	794			
0 701	-	0	0			υ n	39 205	62 363	8	111	4			1356	471 421	40041
701	0	0	Ü	13	4	2	205	263	55 10	543	4	417	706	1207	421	40042
0	0	0	Ü	2	0	0	40	39	19	100	3	319	541	924	322	40043
Ü	0	0	Ü	2	2	0	7	12	4	27	1	90	154	263	91	40044
0	0	0	0	14	27	1	102	163	54	360	3	296	504	862	299	40045
0	0	0	0	0	0	0	0	0	16	16	2	192	310	538	194	40046
0	0	0	0	2	1	0	15	31	18	67	330	882	1893	3281	1212	40047
0	0	0	0	0	0	0	0	0	19	19	4	349	564	981	353	40048

40049	161	445	257	159	2	15	2	6	4	0	1	2	0	0	0	0
40050	902	2503	1444	822	80	307	41	142	106	0	6	11	0	0	0	0
40051	1104	3049	1760	894	210	526	53	247	199	0	12	15	0	0	0	0
40052	242	687	400	192	50	9	9	0	0	0	0	0	0	0	0	0
40053	743	2083	1205	237	506	1223	193	460	498	2	23	47	0	0	0	0
40054	65	177	92	38	27	0	0	0	0	0	0	0	0	0	0	0
40056	285	792	457	191	94	757	757	0	0	0	0	0	0	0	0	0
40057	14	40	20	8	6	121	14	60	40	0	3	4	0	0	0	0
40058	101	299	169	99	2	74	74	0	0	0	0	0	0	0	0	0
40059	19	63	34	19	0	1038	218	435	328	1	41	14	0	0	0	0
40060	10	32	18	10	0	18	2	8	5	0	1	2	0	0	0	0
40061	578	1865	1032	563	15	362	112	130	101	0	13	5	0	0	0	0
40062	133	443	239	130	3	43	43	0	0	0	0	0	0	0	0	0
40063	99	361	180	97	2	42	6	19	12	0	3	2	0	0	0	0
40064	469	1646	805	457	12	132	25	61	43	0	1	2	0	0	0	0
40600	131	421	233	127	4	100	17	45	31	0	3	3	0	0	0	846

Appendix C

Danville TAZ Level VMT Results

	Residential VMT per Capita								
TAZ	Year 2020 Year 2031 Year 2031 + HEI								
40064	24.0	24.4	25.2						
40063	23.9	24.3	25.4						
40062	25.3	23.4	23.8						
40600	25.5	26.3	26.8						
40012	22.7	22.5	23.1						
40051	20.8	18.5	18.6						
40050	19.9	17.7	17.9						
40049	20.4	18.4	18.6						
40047	24.2	23.0	23.3						
40053	19.4	16.8	16.5						
40052	19.4	16.9	17.5						
40028	18.5	16.1	16.7						
40026	18.8	16.4	17.0						
40025	19.2	18.0	18.6						
40041	23.7	23.6	24.0						
40042	27.2	26.6	27.0						
40043	26.4	23.1	23.5						
40030	19.2	17.2	16.9						
40031	21.0	20.4	20.7						
40048	20.7	20.1	20.5						
40046	21.1	20.5	20.9						
40024	20.2	19.0	19.4						
40022	22.3	22.0	22.3						
40023	20.1	18.9	19.4						
40021	21.9	21.4	21.8						
40037	24.1	24.0	24.5						
40036	25.1	24.9	25.4						
40045	27.9	27.6	27.9						
40044	27.8	27.0	27.7						
40013	21.3	21.0	19.2						
40014	20.7	20.5	18.6						
40038	22.8	22.6	23.0						
40032	24.0	24.1	24.8						
40035	24.1	24.5	25.0						
40034	24.4	24.8	25.2						
40029	18.4	16.6	16.5						

40027 19.6 17.1 17.5 40015 19.9 19.6 18.4 40016 20.8 20.3 19.4 40019 21.4 21.4 21.6 40020 22.2 22.0 22.3 40018 19.7 19.3 17.5 40017 20.8 20.5 21.5 40005 22.0 21.4 22.1 40004 21.8 21.7 21.8 40008 20.3 20.2 18.4 40008 20.3 20.2 18.4 40002 24.4 24.8 24.9 40003 22.9 23.3 23.8 40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40040 22.1 22.1 19.7 40040 22.1 22.1 22.5 40033 24.0 24.3 24.8 40054				Ţ
40016 20.8 20.3 19.4 40019 21.4 21.4 21.6 40020 22.2 22.0 22.3 40018 19.7 19.3 17.5 40017 20.8 20.5 21.5 40005 22.0 21.4 22.1 40004 21.8 21.7 21.8 40008 20.3 20.2 18.4 40002 24.4 24.8 24.9 40003 22.9 23.3 23.8 40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40040 22.1 22.1 19.7 40040 22.1 22.1 22.5 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40054 22.0 20.5 21.3 40057	40027	19.6	17.1	17.5
40019 21.4 21.4 21.6 40020 22.2 22.0 22.3 40018 19.7 19.3 17.5 40017 20.8 20.5 21.5 40005 22.0 21.4 22.1 40004 21.8 21.7 21.8 40008 20.3 20.2 18.4 40002 24.4 24.8 24.9 40003 22.9 23.3 23.8 40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40040 22.1 22.1 19.7 40040 22.1 22.1 22.5 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40057 26.3 23.7 23.7 40059	40015	19.9	19.6	18.4
40020 22.2 22.0 22.3 40018 19.7 19.3 17.5 40017 20.8 20.5 21.5 40005 22.0 21.4 22.1 40004 21.8 21.7 21.8 40008 20.3 20.2 18.4 40002 24.4 24.8 24.9 40003 22.9 23.3 23.8 40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40040 22.1 22.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059	40016	20.8	20.3	19.4
40018 19.7 19.3 17.5 40017 20.8 20.5 21.5 40005 22.0 21.4 22.1 40004 21.8 21.7 21.8 40008 20.3 20.2 18.4 40002 24.4 24.8 24.9 40003 22.9 23.3 23.8 40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40040 22.1 22.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060	40019	21.4	21.4	21.6
40017 20.8 20.5 21.5 40005 22.0 21.4 22.1 40004 21.8 21.7 21.8 40008 20.3 20.2 18.4 40002 24.4 24.8 24.9 40003 22.9 23.3 23.8 40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40040 22.1 22.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40020	22.2	22.0	22.3
40005 22.0 21.4 22.1 40004 21.8 21.7 21.8 40008 20.3 20.2 18.4 40002 24.4 24.8 24.9 40003 22.9 23.3 23.8 40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40040 22.1 22.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40018	19.7	19.3	17.5
40004 21.8 21.7 21.8 40008 20.3 20.2 18.4 40002 24.4 24.8 24.9 40003 22.9 23.3 23.8 40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40040 21.2 21.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40017	20.8	20.5	21.5
40008 20.3 20.2 18.4 40002 24.4 24.8 24.9 40003 22.9 23.3 23.8 40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40040 22.1 22.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40005	22.0	21.4	22.1
40002 24.4 24.8 24.9 40003 22.9 23.3 23.8 40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40006 21.2 21.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40004	21.8	21.7	21.8
40003 22.9 23.3 23.8 40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40040 22.1 22.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40008	20.3	20.2	18.4
40009 20.7 20.7 21.1 40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40006 21.2 21.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40002	24.4	24.8	24.9
40001 24.2 24.6 24.9 40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40006 21.2 21.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40003	22.9	23.3	23.8
40011 21.8 21.6 21.8 40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40006 21.2 21.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40009	20.7	20.7	21.1
40007 20.9 20.6 19.6 40010 21.7 21.6 21.9 40006 21.2 21.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40001	24.2	24.6	24.9
40010 21.7 21.6 21.9 40006 21.2 21.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40011	21.8	21.6	21.8
40006 21.2 21.1 19.7 40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40007	20.9	20.6	19.6
40040 22.1 22.1 22.5 40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40010	21.7	21.6	21.9
40039 22.3 22.2 22.6 40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40006	21.2	21.1	19.7
40033 24.0 24.3 24.8 40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40040	22.1	22.1	22.5
40061 25.0 23.7 24.1 40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40039	22.3	22.2	22.6
40056 26.4 22.9 22.7 40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40033	24.0	24.3	24.8
40054 22.0 20.5 21.3 40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40061	25.0	23.7	24.1
40057 26.3 23.7 23.7 40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40056	26.4	22.9	22.7
40059 26.1 24.8 24.9 40060 25.1 22.3 23.1	40054	22.0	20.5	21.3
40060 25.1 22.3 23.1	40057	26.3	23.7	23.7
	40059	26.1	24.8	24.9
40058 25.0 23.6 24.2	40060	25.1	22.3	23.1
	40058	25.0	23.6	24.2

Appendix D

Project-Scale VMT Mitigation Calculations

	Subareas									
	1	2	3	4	5	6	7	8		
VMT Reduction	-1.48%	-1.48%	-1.48%	-1.48%	-1.48%	-1.48%	-1.48%	-1.48%		
<u>Variables</u>										
HBW VMT as a percentage of										
HB VMT ¹	37%	37%	37%	37%	37%	37%	37%	37%		
% of residents eligible 2	100%	100%	100%	100%	100%	100%	100%	100%		
Percent reduction in employee										
commute VMT 3	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%		

Notes

Referenced formula for T-8 in CAPCOA's Handbook for Analyzing GHG Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity, December 2021.

- 1. Assumption per CAPCOA
- 2. Assumption that program will be available to all residents
- 3. Table T-8.1 for Suburban area

	Implement Subsidized or Discounted Transit Program										
-	1	2	3	Suba 4	reas 5	6	7	8			
VMT Reduction	-0.51%	-0.51%	0.00%	-0.49%	-0.19%	-0.46%	-0.16%	-0.12%			
Implementation Requirement (Y/N)											
Project within 1 mile of high-quality (headway<15 min) transit, or	N	N	N	N	N	N	N	N			
Project within 0.5 mile oof local/less frequent transit, <u>or</u>	Υ	Υ	N	Y	Υ	Y	Y	Y			
Project along a designated shuttle route providing last-mile connections to rail service, or	N	N	N	N	N	N	N	N			
If well-established bikeshare service available, project within 2 miles of high-quality transit Meet requirement? (at least one Y)	N Y	N Y	N N	N Y	N Y	N Y	N Y	N Y			
<u>Variables</u>											
Average transit fare without subsidy 1	\$2	\$2	-	\$2	\$2	\$2	\$2	\$2			
Subsidy amount ¹	\$2	\$2	-	\$2	\$2	\$2	\$2	\$2			
% of residents eligible for subsidy ² % of project-generated VMT from residents ³	100%	100%	-	100%	100%	100%	100%	100%			
Transit mode share of all trips or work trips ⁴	2.4%	2.4%	-	2.3%	0.9%	2.2%	0.7%	0.6%			
<u>Constants</u>											
Elasticity of transit boardings with respect to transit fare price	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43			
% of transit trips that would otherwise be made in a vehicle	50%	50%	50%	50%	50%	50%	50%	50%			
Conversion factor of vehicle trips to VMT	1	1	1	1	1	1	1	1			

Notes:

Referenced formula for T-9 in CAPCOA's Handbook for Analyzing GHG Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity, December 2021.

- 1. Assume that transit fare will be fully subsidized. \$2 is an arbitrary value and since the subsidy amount equals the average fare, the numeric value is inconsequential.
- 2. Assumption that program will be available to all residents
- 3. Projects are assumed to be fully residential
- 4. From the CCTA model

	Unbundle Residential Parking Costs from Subareas								
	1	2	3	4	5	6	7	8	
VMT Reduction	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	-1.9%	
<u>Variables</u>									
Annual parking cost per space 1	\$432	\$432	\$432	\$432	\$432	\$432	\$432	\$432	
Constants									
Average annual vehicle cost Elasticity of vehicle ownership with	\$9,282	\$9,282	\$9,282	\$9,282	\$9,282	\$9,282	\$9,282	\$9,282	
respect to total vehicle cost Adjustment factor from vehicle	-0.40	-0.40	-0.40	-0.40	-0.40	-0.40	-0.40	-0.40	
ownership to VMT	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	

Referenced formula for T-16 in CAPCOA's Handbook for Analyzing GHG Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity, December 2021.

1. Assuming \$36 per space per month, per T16.1