



APPENDIX B

TECHNICAL ANALYSIS SUMMARY

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PURPOSE OF THIS MEMORANDUM

This memorandum describes the process of evaluating the Placer-Sacramento Gateway Plan (Gateway Plan) project scenarios based on the performance measures selected in collaboration with the Project Development Team (PDT). The associated analysis results are incorporated in the Gateway Plan to illustrate the effectiveness of the plan with respect to the desired performance outcomes.

Organization of this Memorandum

The Gateway Plan includes a variety of corridor transportation improvement projects including roadway projects, transportation systems management (TSM) projects, transit projects, and bicycle and pedestrian projects. The corridor goals were created by balancing the California Transportation Commission (CTC) performance criteria for Solutions for Congested Corridors Program (SCCP) project selection with previous decisions by the agencies in the corridor (as expressed through the goals and policies contained in their adopted plans such as local general plans and previous corridor plans) and with community values expressed by the public, stakeholders, and corridor users. The main goals of the plan are as follows:

- Reduce total delay
- Increase travel time reliability
- Increase use of transit modes
- Increase efficiency of the transportation network
- Minimize regional cut-through traffic on local roadways
- Increase transit travel choices for commute and long-distance trips

The following specific performance measures were developed based on CTC requirements and refined based on PDT input:

- How does the plan change person hours of delay (PHD) per capita in the corridor during peak periods?
- How does the plan change vehicle speeds at screenline analysis locations?
- How does the plan change travel time index (i.e., reliability) in the corridor during peak periods?
- How does the plan change person throughput by mode at study screenlines during peak periods?
- How does the plan change seat utilization at screenline analysis locations?
- How does the plan reduce vehicle travel demand?
- How does the plan change traffic in local neighborhoods?

The following pages of this document describe the analysis of each transportation metric, addressing the following topics:

- Definition
- Data Sources
- Methodology
- Evaluation

Analysis Methodology

SACOG's Sacramento Activity-Based Travel Simulation Model (SACSIM19) MTP/SCS 2020 update was used for evaluating most metrics described in this memorandum. Four scenarios were analyzed using SACSIM19 in order to understand the effects of the Gateway Plan. The four scenarios are as follows:

1. **Scenario 1 – Existing Conditions.** This scenario utilizes 2016 land use and transportation network inputs (i.e., existing conditions) from the 2020 MTP/SCS.
2. **Scenario 2 – Existing Plus Gateway Plan Conditions.** This scenario utilizes 2016 land use inputs but updates the transportation network inputs to reflect the Gateway Plan projects.
3. **Scenario 3 – 2040 Preferred Scenario Conditions.** This scenario utilizes 2040 land use and transportation network inputs in accordance with the preferred scenario from the 2020 MTP/SCS.
4. **Scenario 4 – 2040 Plus Gateway Plan Conditions.** This scenario utilizes 2040 land use inputs but updates the transportation network to reflect the Gateway Plan projects. No other 2020 MTP/SCS preferred scenario transportation network projects are included in this scenario.

For the purposes of the Gateway Plan, a comparison of Scenario 1 to Scenario 4 was utilized to report the effectiveness of the Gateway Plan with respect to the various performance measures.

Some of the performance measures consider corridor performance at select locations, also referred to as screenlines. Screenlines are imaginary lines drawn across the corridor that represent the primary corridor transportation facilities at a given location, including freeways, bus routes, rail lines, and major parallel arterial roads. The use of screenline analysis enables the Gateway Plan to express transportation system performance in a manner that reflects the variation in transportation facilities/services and travel markets along the extent of the study corridor. The Gateway Plan includes the following 10 screenline locations:

1. Business 80 at Q Street
2. Business 80 at the American River
3. Business 80 at Howe Avenue
4. I-80 at Madison Avenue
5. I-80 at Antelope Road
6. I-80 at Douglas Boulevard
7. I-80 at Sierra College Boulevard
8. I-80 at Newcastle Road
9. Highway 65 at Galleria Boulevard
10. Highway 65 at Twelve Bridges Drive

How does the plan change person hours of delay (PHD) per capita in the corridor during peak periods?

Delay is defined by the additional time required to travel through a roadway segment during congested conditions compared to the free-flow conditions. Person hours of delay (PHD) is defined as hours of delay experienced by each person travelling on a specific segment of a roadway throughout the day. The plan is expected to decrease delay by introducing express lanes and more travel choices on the Gateway Corridor.

Data Sources

PHD was analyzed using SACSIM19. Free-flow speed was assumed to be the posted speed limit. This analysis utilizes peak hour vehicle occupancy observed by Fehr & Peers at I-80 near Madison Avenue on July 31, 2019.

Methodology

Each link on the corridor was given an identifier for the screenline that they fall within. The vehicle hours of delay (VHD) was calculated by multiplying volume by delay. VHD was then converted to PHD by multiplying it by the average vehicle occupancy data collected on the corridor.

$$VHD = \text{Volume on a link} * (\text{Length of the Link}/\text{Congested Speed} - \text{Length of the Link}/\text{Free-flow Speed})$$

$$PHD = VHD \text{ of each lane type} * \text{Average occupancy of that lane type}$$

Evaluation

Changes to PHD per capita associated with each analysis scenario are presented below.

Table 1.1: PHD per Capita – Daily

Analysis Location	Scenario 1	Scenario 2		Scenario 3		Scenario 4	
	PHD/Capita	PHD/Capita	Change	PHD/Capita	Change	PHD/Capita	Change
Region	0.093	0.090	-3.5%	0.093	0.2%	0.079	-14.4%
Gateway Corridor	0.149	0.140	-5.8%	0.143	-3.8%	0.123	-17.4%
1. Business 80 at Q St.	0.215	0.205	-4.8%	0.181	-15.6%	0.166	-22.9%
2. Business 80 at the American River	0.618	0.523	-15.3%	0.476	-22.9%	0.462	-25.1%
3. Business 80 at Howe Ave.	0.208	0.182	-12.1%	0.232	11.7%	0.188	-9.4%
4. I-80 at Madison Ave.	0.222	0.224	0.6%	0.260	17.0%	0.208	-6.2%
5. I-80 at Antelope Rd.	0.178	0.197	10.7%	0.210	18.4%	0.197	10.9%
6. I-80 at Douglas Blvd.	0.259	0.239	-7.7%	0.276	6.6%	0.250	-3.3%
7. I-80 at Sierra College Blvd.	0.136	0.095	-30.2%	0.104	-23.7%	0.064	-53.2%
8. I-80 at Newcastle Rd.	0.223	0.153	-31.6%	0.252	12.8%	0.136	-39.3%
9. Highway 65 at Galleria Blvd.	0.162	0.114	-29.8%	0.172	6.1%	0.133	-17.7%
10. Highway 65 at Twelve Bridges Dr.	0.058	0.036	-38.5%	0.055	-4.3%	0.032	-44.2%

Source: Fehr & Peers, 2019

Table 1.2: PHD per Capita – AM Peak Hour

Analysis Location	Scenario 1	Scenario 2		Scenario 3		Scenario 4	
	PHD/Capita	PHD/Capita	Change	PHD/Capita	Change	PHD/Capita	Change
Region	0.013	0.013	-3.9%	0.012	-9.3%	0.011	-14.8%
Gateway Corridor	0.020	0.019	-7.2%	0.018	-11.3%	0.017	-18.0%
1. Business 80 at Q St.	0.026	0.024	-10.1%	0.020	-23.0%	0.019	-26.1%
2. Business 80 at the American River	0.082	0.067	-17.6%	0.058	-29.0%	0.061	-25.8%
3. Business 80 at Howe Ave.	0.028	0.024	-14.8%	0.030	6.9%	0.024	-12.3%
4. I-80 at Madison Ave.	0.034	0.034	-0.7%	0.037	7.7%	0.031	-7.4%
5. I-80 at Antelope Rd.	0.025	0.029	16.1%	0.029	15.0%	0.029	16.3%
6. I-80 at Douglas Blvd.	0.032	0.029	-9.2%	0.032	-1.7%	0.031	-2.7%
7. I-80 at Sierra College Blvd.	0.018	0.012	-30.5%	0.014	-22.9%	0.008	-52.7%
8. I-80 at Newcastle Rd.	0.026	0.016	-36.8%	0.028	7.4%	0.015	-42.4%
9. Highway 65 at Galleria Blvd.	0.020	0.013	-35.3%	0.020	-1.0%	0.015	-23.1%
10. Highway 65 at Twelve Bridges Dr.	0.008	0.004	-49.4%	0.007	-16.1%	0.004	-53.7%

Source: Fehr & Peers, 2019

Table 1.3: PHD per Capita – PM Peak Hour

Analysis Location	Scenario 1	Scenario 2		Scenario 3		Scenario 4	
	PHD/Capita	PHD/Capita	Change	PHD/Capita	Change	PHD/Capita	Change
Region	0.009	0.009	-1.7%	0.009	-2.2%	0.008	-15.3%
Gateway Corridor	0.015	0.015	-1.2%	0.014	-7.3%	0.012	-16.8%
1. Business 80 at Q St.	0.021	0.021	-1.8%	0.018	-18.1%	0.016	-24.3%
2. Business 80 at the American River	0.060	0.054	-9.9%	0.045	-24.5%	0.045	-24.7%
3. Business 80 at Howe Ave.	0.021	0.019	-7.9%	0.022	4.2%	0.018	-11.8%
4. I-80 at Madison Ave.	0.021	0.024	13.0%	0.024	13.4%	0.021	1.1%
5. I-80 at Antelope Rd.	0.018	0.022	24.4%	0.020	14.3%	0.021	18.0%
6. I-80 at Douglas Blvd.	0.026	0.025	-4.9%	0.026	-1.3%	0.026	-1.4%
7. I-80 at Sierra College Blvd.	0.014	0.009	-31.7%	0.010	-27.7%	0.006	-55.4%
8. I-80 at Newcastle Rd.	0.022	0.014	-33.9%	0.024	11.4%	0.013	-42.0%
9. Highway 65 at Galleria Blvd.	0.017	0.011	-31.4%	0.016	-1.5%	0.013	-21.9%
10. Highway 65 at Twelve Bridges Dr.	0.005	0.003	-40.8%	0.005	-9.0%	0.003	-48.3%

Source: Fehr & Peers, 2019

How does the plan change vehicle speeds at screenline analysis locations?

Vehicle speed is an indicator of how fast or slow a motorist can travel along the corridor. Speed is associated with other corridor performance measures, including travel time, delay, and reliability. The Gateway Plan aims to increase peak hour vehicle speeds on the Gateway Corridor.

Data Sources

Data sources used for this analysis include the following:

1. Screenline traffic volume and speed data - Caltrans Performance Measurement System (PeMS) data for April 2018, August 2018, and October 2018
2. Additional speed, delay, and reliability data - INRIX

Methodology

The existing conditions analysis utilizes speed data collected from big data vendor INRIX. For all other scenarios, volume-to-capacity (V/C) outputs from SACSIM19 were adjusted by correlating PeMS V/C and speed data using the process described below.

Screenline average hourly volumes were calculated by averaging all flow rates in each given hour across all weekdays during one month in 2018 where data were available from PeMS. The capacity for each PeMS location was estimated based on the freeway lane capacity from the travel model multiplied by the number of lanes at the PeMS location. This process was repeated separately for general purpose lanes and for HOV lanes. The following figures shows the relationship between speed and V/C ratio from the PeMS data.

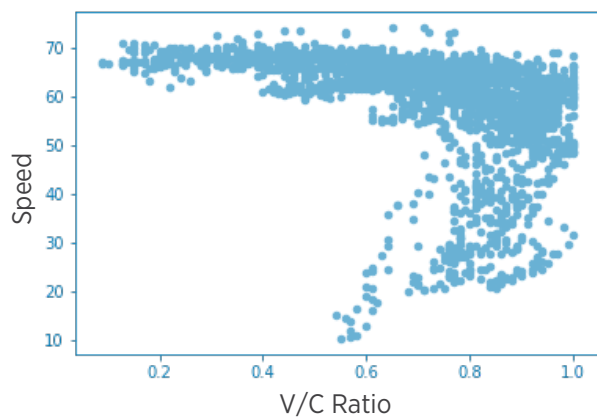


Figure 2.1: Relationship between Speed and V/C ratio for GP lanes

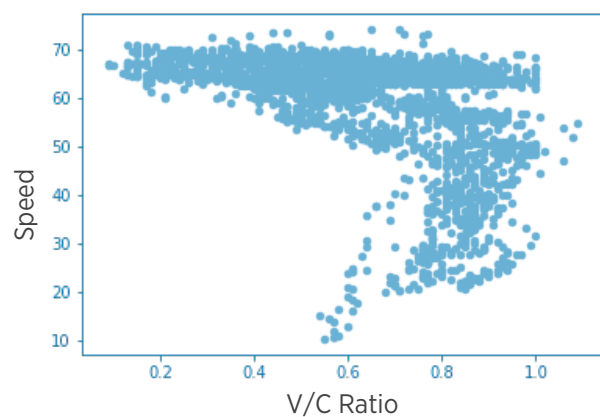


Figure 1.2: Relationship between Speed and V/C ratio for HOV lanes

The data was first divided into two segments for speed greater than or equal to 45 mph and another for speed less than 45 mph. Four separate Poisson regression models were estimated for each speed bin for each lane types. The PeMS data was used as the “Train Data” and the SACSIM19 travel demand model V/C ratio was used as the “Test Data”. The regression model uses the train data to come up with predictions for the speed of the travel demand model data that is more representative of actual conditions.

Regression Model

- Train data: X = PeMS V/C ratio
Y = PeMS Speed
- Test data: X = SACSIM19 V/C ratio
Y = SACSIM19 Speed
- Output: Speed predictions for SACSIM19 V/C ratio from regression model

The results of the model estimations are shown below:

Model estimation for General Purpose Lanes where speed >= 45 mph

```

training data set length=2612
testing data set length=54
Generalized Linear Model Regression Results
=====
Dep. Variable:          S      No. Observations:      2612
Model:                 GLM    Df Residuals:          2610
Model Family:          Poisson Df Model:              1
Link Function:         log     Scale:                 1.0000
Method:                IRLS    Log-Likelihood:        -8170.3
Date:                  Wed, 26 Feb 2020 Deviance:              723.33
Time:                  10:20:39 Pearson chi2:          706.
No. Iterations:       4      Covariance Type:      nonrobust
=====
              coef    std err          z      P>|z|     [0.025    0.975]
-----+-----
Intercept    4.3079     0.009    461.561    0.000     4.290     4.326
R            -0.2366     0.013   -18.337    0.000    -0.262    -0.211
=====

```

Model estimation for General Purpose Lanes where speed < 45 mph

```

training data set length=288
testing data set length=8
Generalized Linear Model Regression Results
=====
Dep. Variable:          S      No. Observations:      288
Model:                 GLM    Df Residuals:          286
Model Family:          Poisson Df Model:              1
Link Function:         log     Scale:                 1.0000
Method:                IRLS    Log-Likelihood:        -972.08
Date:                  Wed, 26 Feb 2020 Deviance:              434.63
Time:                  10:20:41 Pearson chi2:          433.
No. Iterations:       4      Covariance Type:      nonrobust
=====
              coef    std err          z      P>|z|     [0.025    0.975]
-----+-----
Intercept    2.3328     0.101    23.118    0.000     2.135     2.531
R            1.3479     0.122    11.022    0.000     1.108     1.588
=====

```

Model estimation for HOV Lanes where speed >= 45 mph

```

training data set length=2556
testing data set length=36
Generalized Linear Model Regression Results
=====
Dep. Variable:          S      No. Observations:      2556
Model:                 GLM    Df Residuals:          2554
Model Family:         Poisson Df Model:                1
Link Function:         log    Scale:                 1.0000
Method:               IRLS   Log-Likelihood:       -8160.7
Date:                 Fri, 22 Nov 2019 Deviance:              1038.0
Time:                 17:23:44 Pearson chi2:          1.00e+03
No. Iterations:       4     Covariance Type:      nonrobust
=====
              coef      std err          z      P>|z|      [0.025      0.975]
-----+-----
Intercept    4.2532      0.008     503.232    0.000      4.237      4.270
R            -0.1726     0.013    -13.585    0.000     -0.198     -0.148
=====

```

Model estimation for HOV Lanes where speed < 45 mph

```

training data set length=344
testing data set length=0
Generalized Linear Model Regression Results
=====
Dep. Variable:          S      No. Observations:      344
Model:                 GLM    Df Residuals:          342
Model Family:         Poisson Df Model:                1
Link Function:         log    Scale:                 1.0000
Method:               IRLS   Log-Likelihood:       -1157.0
Date:                 Fri, 22 Nov 2019 Deviance:              496.21
Time:                 17:23:52 Pearson chi2:           487.
No. Iterations:       4     Covariance Type:      nonrobust
=====
              coef      std err          z      P>|z|      [0.025      0.975]
-----+-----
Intercept    2.2433      0.096     23.270    0.000      2.054      2.432
R            1.4923      0.116     12.909    0.000      1.266      1.719
=====

```

The speeds compared are:

Speed_Scenario1 = Scenario 1 Freeway Speed from INRIX for Peak Hours

Speed_Scenario2,3,4 = Speed estimated using V/C ratio of the Scenario 2,3,4 and Regression Model

Evaluation

The model freeway V/C ratios were used to estimate model speed for each scenario that includes the addition of the Gateway Plan. The model speeds were compared to existing INRIX average speed data at screenline locations during AM and PM peak hours. The results are summarized in Table 2.

Table 2.1: Speed Comparison – AM Peak Hour

Analysis Location		Scenario 1	Scenario 2		Scenario 3		Scenario 4	
		Speed	Speed	Change	Speed	Change	Speed	Change
1. Business 80 at Q St.	WB	47.0	63.5	35%	58.5	24%	59.5	27%
	EB	58.5	62.5	7%	62.5	7%	60.0	3%
2. Business 80 at the American River	WB	58.0	59.5	3%	56.5	-3%	56.0	-3%
	EB	54.5	62.5	15%	56.0	3%	59.5	9%
3. Business 80 at Howe Ave.	WB	43.0	49.0	14%	44.0	2%	40.5	-6%
	EB	63.0	64.0	2%	63.5	1%	63.5	1%
4. I-80 at Madison Ave.	WB	54.0	53.0	-2%	61.0	13%	44.5	-18%
	EB	66.5	65.0	-2%	64.0	-4%	58.5	-12%
5. I-80 at Antelope Rd.	WB	59.0	61.5	4%	60.5	3%	61.5	4%
	EB	61.5	60.5	-2%	64.0	4%	63.0	2%
6. I-80 at Douglas Blvd.	WB	54.5	51.5	-6%	49.5	-9%	39.5	-28%
	EB	67.5	64.0	-5%	62.0	-8%	57.5	-15%
7. I-80 at Sierra College Blvd.	WB	69.0	64.5	-7%	62.0	-10%	64.5	-7%
	EB	64.5	67.0	4%	64.0	-1%	66.0	2%
8. I-80 at Newcastle Rd.	WB	67.0	64.0	-4%	62.0	-7%	64.0	-4%
	EB	66.0	66.5	1%	64.5	-2%	66.5	1%
9. Highway 65 at Galleria Blvd.	NB	59.5	66.0	11%	64.0	8%	62.0	4%
	SB	46.0	64.5	40%	57.5	25%	62.0	35%
10. Highway 65 south of Twelve Bridges Dr.	NB	68.0	70.0	3%	66.0	-3%	64.5	-5%
	SB	63.5	64.5	2%	62.0	-2%	61.0	-4%

Source: Fehr & Peers, 2019

Table 2.2: Speed Comparison – PM Peak Hour

Analysis Location		Scenario 1	Scenario 2		Scenario 3		Scenario 4	
		Speed	Speed	Change	Speed	Change	Speed	Change
1. Business 80 at Q St.	WB	31.5	60.5	92%	56.0	78%	51.5	63%
	EB	31.0	61.0	97%	55.5	79%	57.5	85%
2. Business 80 at the American River	WB	30.0	58.5	95%	54.5	82%	53.5	78%
	EB	29.0	60.0	107%	54.0	86%	51.5	78%
3. Business 80 at Howe Ave.	WB	59.0	64.0	8%	63.5	8%	63.0	7%
	EB	27.5	48.0	75%	36.5	33%	42.0	53%
4. I-80 at Madison Ave.	WB	64.5	63.5	-2%	63.0	-2%	60.0	-7%
	EB	43.5	50.0	15%	61.0	40%	42.0	-3%
5. I-80 at Antelope Rd.	WB	68.0	63.5	-7%	62.0	-9%	62.5	-8%
	EB	61.0	61.0	0%	62.0	2%	61.0	0%
6. I-80 at Douglas Blvd.	WB	44.5	63.0	42%	54.0	21%	63.0	42%
	EB	62.5	61.5	-2%	62.0	-1%	42.5	-32%
7. I-80 at Sierra College Blvd.	WB	65.0	65.5	1%	63.0	-3%	66.0	2%
	EB	64.5	63.5	-2%	64.0	-1%	64.0	-1%
8. I-80 at Newcastle Rd.	WB	68.5	66.5	-3%	63.0	-8%	65.5	-4%
	EB	63.0	63.5	1%	62.0	-2%	64.5	2%
9. Highway 65 at Galleria Blvd.	NB	40.0	64.0	60%	59.0	48%	59.5	49%
	SB	48.0	66.5	39%	58.5	22%	61.5	28%
10. Highway 65 south of Twelve Bridges Dr.	NB	68.0	66.0	-3%	63.5	-7%	61.0	-10%
	SB	67.0	68.0	1%	66.5	-1%	64.0	-4%

Source: Fehr & Peers, 2019

How does the plan change travel time index (i.e., reliability) in the corridor during peak periods?

Travel time reliability refers to the variation in travel time that drivers experience due to hourly or daily changes to delay. Reliable travel times make it easier for drivers to plan for travel around their schedules and make better use of their own time. Reliability is evaluated using the travel time index (TTI) metric. TTI is defined as the ratio between posted speed and congested speed. A TTI greater than 1.0 indicates lower speed and reliability.

Data Sources

Data sources used for this analysis include the following:

3. Screenline traffic volume and speed data - Caltrans Performance Measurement System (PeMS) data for April 2018, August 2018, and October 2018
4. Additional speed, delay, and reliability data - INRIX

Methodology

Speed was estimated utilizing the methodology described for the previous performance measure. TTI was calculated using the following formulas:

$$TTI_Scenario1 = \text{Posted Speed} / \text{Congested Speed during Peak Period from INRIX Speed data}$$

$$TTI_Scenario2 = \text{Posted Speed} / \text{Congested Speed during Peak Period estimated using V/C ratio of the Scenario 2 and Regression Model}$$

$$TTI_Scenario3 = \text{Posted Speed} / \text{Congested Speed during Peak Period estimated using V/C ratio of the Scenario 3 and Regression Model}$$

Evaluation

The estimated SACSIM19 model freeway peak hour TTI was compared with the peak hour TTI calculated for existing conditions using INRIX speed data. The results are summarized in Table 3.

Table 3.1: Travel Time Index – AM Peak Hour

Analysis Location		Scenario 1	Scenario 2		Scenario 3		Scenario 4	
		TTI	TTI	Change	TTI	Change	TTI	Change
1. Business 80 at Q St.	WB	1.38	1.02	-26%	1.11	-20%	1.09	-21%
	EB	1.11	1.04	-6%	1.04	-6%	1.08	-3%
2. Business 80 at the American River	WB	1.12	1.09	-3%	1.15	3%	1.16	4%
	EB	1.19	1.04	-13%	1.16	-3%	1.09	-8%
3. Business 80 at Howe Ave.	WB	1.51	1.33	-12%	1.48	-2%	1.60	6%
	EB	1.03	1.02	-2%	1.02	-1%	1.02	-1%
4. I-80 at Madison Ave.	WB	1.20	1.23	2%	1.07	-11%	1.46	21%
	EB	0.98	1.00	2%	1.02	4%	1.11	14%
5. I-80 at Antelope Rd.	WB	1.10	1.06	-4%	1.07	-2%	1.06	-4%
	EB	1.06	1.07	2%	1.02	-4%	1.03	-2%
6. I-80 at Douglas Blvd.	WB	1.19	1.26	6%	1.31	10%	1.65	38%
	EB	0.96	1.02	5%	1.05	9%	1.13	17%
7. I-80 at Sierra College Blvd.	WB	0.94	1.01	7%	1.05	11%	1.01	7%
	EB	1.01	0.97	-4%	1.02	1%	0.98	-2%
8. I-80 at Newcastle Rd.	WB	0.97	1.02	5%	1.05	8%	1.02	5%
	EB	0.98	0.98	-1%	1.01	2%	0.98	-1%
9. Highway 65 at Galleria Blvd.	NB	1.09	0.98	-10%	1.02	-7%	1.05	-4%
	SB	1.41	1.01	-29%	1.13	-20%	1.05	-26%
10. Highway 65 south of Twelve Bridges Dr.	NB	0.96	0.93	-3%	0.98	3%	1.01	5%
	SB	63.5	64.5	2%	62.0	-2%	61.0	-4%

Source: Fehr & Peers, 2019

Table 3.2: Travel Time Index – PM Peak Hour

Analysis Location		Scenario 1	Scenario 2		Scenario 3		Scenario 4	
		TTI	TTI	Change	TTI	Change	TTI	Change
1. Business 80 at Q St.	WB	2.06	1.07	-48%	1.11	-20%	1.26	-39%
	EB	2.10	1.07	-49%	1.04	-6%	1.13	-46%
2. Business 80 at the American River	WB	2.17	1.11	-49%	1.15	3%	1.21	-44%
	EB	2.24	1.08	-52%	1.16	-3%	1.26	-44%
3. Business 80 at Howe Ave.	WB	1.10	1.02	-8%	1.48	-2%	1.03	-6%
	EB	2.36	1.35	-43%	1.02	-1%	1.55	-35%
4. I-80 at Madison Ave.	WB	1.01	1.02	2%	1.07	-11%	1.08	7%
	EB	1.49	1.30	-13%	1.02	4%	1.55	4%
5. I-80 at Antelope Rd.	WB	0.96	1.02	7%	1.07	-2%	1.04	9%
	EB	1.07	1.07	0%	1.02	-4%	1.07	0%
6. I-80 at Douglas Blvd.	WB	1.46	1.03	-29%	1.31	10%	1.03	-29%
	EB	1.04	1.06	2%	1.05	9%	1.53	47%
7. I-80 at Sierra College Blvd.	WB	1.00	0.99	-1%	1.05	11%	0.98	-2%
	EB	1.01	1.02	2%	1.02	1%	1.02	1%
8. I-80 at Newcastle Rd.	WB	0.95	0.98	3%	1.05	8%	0.99	5%
	EB	1.03	1.02	-1%	1.01	2%	1.01	-2%
9. Highway 65 at Galleria Blvd.	NB	1.63	1.02	-38%	1.02	-7%	1.09	-33%
	SB	1.35	0.98	-28%	1.13	-20%	1.06	-22%
10. Highway 65 south of Twelve Bridges Dr.	NB	0.96	0.98	3%	0.98	3%	1.07	11%
	SB	0.97	0.96	-1%	1.05	2%	1.02	5%

Source: Fehr & Peers, 2019

How does the plan change person throughput by mode at study screenlines during peak periods?

Person throughput represents the number of people utilizing each mode of transportation on the Gateway Corridor.

Data Sources

Data sources used for this analysis include the following:

1. Screenline traffic volume and speed data - PeMS data for April 2018, August 2018, and October 2018
2. Vehicle occupancy data- Data collected by Fehr & Peers at I-80 near Madison Avenue on July 31, 2019
3. Transit occupancy data – Trip- and stop-level ridership, load, and vehicle capacity data provided by the following transit operators:
 - a. Capitol Corridor Joint Powers Authority (CCJPA)
 - b. Placer County Transit (PCT)
 - c. Roseville Transit

d. Sacramento Regional Transit District (SacRT)

Methodology

The existing person throughput for private vehicles was estimated using PeMS volume data and observed vehicle occupancy data. Person throughput for transit services was calculated from data provided by corridor transit operators. For scenarios with the Gateway Plan, person throughput for private vehicles was estimated by multiplying SAMSIM19 travel demand model volume on the freeway by vehicle occupancy for different lane types. Person throughput for transit was estimated by calculating the expected load per trip associated with new transit services, transit service enhancements, or other changes to transit capacity associated with the Gateway Plan.

Evaluation

Table 4 shows the changes to peak hour person throughput for each of the analysis scenarios.

Table 4.1 : Person Throughput - AM Peak

Screenline Location	Mode	Westbound/Southbound AM Peak Hour								Eastbound/Northbound AM Peak Hour							
		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 1		Scenario 2		Scenario 3		Scenario 4	
		Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change
Cap City Freeway at Q St	Freeway Vehicles	4,150	7,190	73.3%	7,530	81.4%	7,170	72.8%	3,480	5,940	70.7%	5,930	70.4%	5,910	69.8%		
	Capitol Corridor Rail	-	-	-	-	-	-	-	95	125	31.6%	125	31.6%	125	31.6%		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	36	36	0.0%	36	0.0%	36	0.0%	38	78	104.7%	78	104.7%	78	104.7%		
	Total	4,186	7,226	72.6%	7,566	80.7%	7,206	72.1%	3,613	6,143	70.0%	6,133	69.7%	6,113	69.2%		
Cap City Freeway at American River	Freeway Vehicles	5,820	8,300	42.6%	8,790	51.0%	8,310	42.8%	5,220	7,320	40.2%	7,100	36.0%	7,260	39.1%		
	Capitol Corridor Rail	-	100	-	100	-	100	-	95	125	31.6%	125	31.6%	125	31.6%		
	SacRT Blue Line LRT	200	200	0.0%	200	0.0%	200	0.0%	666	666	0.0%	666	0.0%	666	0.0%		
	Bus	35	35	0.0%	35	0.0%	35	0.0%	151	231	52.6%	231	52.6%	231	52.6%		
	Total	6,055	8,635	42.6%	9,125	50.7%	8,645	42.8%	6,132	8,342	36.0%	8,122	32.4%	8,282	35.1%		
Cap City Freeway North of Howe Ave	Freeway Vehicles	4,660	6,360	36.5%	5,390	15.7%	6,400	37.3%	5,090	7,260	42.6%	6,020	18.3%	7,250	42.4%		
	Capitol Corridor Rail	-	100	-	100	-	100	-	95	125	31.6%	125	31.6%	125	31.6%		
	SacRT Blue Line LRT	165	165	0.0%	165	0.0%	165	0.0%	378	378	0.0%	378	0.0%	378	0.0%		
	Bus	3	3	0.0%	3	0.0%	3	0.0%	259	339	30.7%	339	30.7%	339	30.7%		
	Total	6,521	6,628	1.6%	5,658	-13.2%	6,668	2.3%	5,822	8,102	39.2%	6,862	17.9%	8,092	39.0%		
I-80 South of Madison Ave	Freeway Vehicles	9,490	11,300	19.1%	9,660	1.8%	11,310	19.2%	10,980	10,940	-0.4%	11,040	0.5%	10,920	-0.5%		
	Capitol Corridor Rail	-	100	-	100	-	100	-	95	125	31.6%	125	31.6%	125	31.6%		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	57	263	361.4%	363	536.8%	363	536.8%	320	691	115.7%	691	115.7%	691	115.7%		
	Total	9,547	11,663	22.2%	10,123	6.0%	11,773	23.3%	11,395	11,756	3.2%	11,856	4.0%	11,736	3.0%		
I-80 South of West of Antelope Rd	Freeway Vehicles	9,510	9,260	-2.6%	10,440	9.8%	9,240	-2.8%	9,210	8,920	-3.1%	9,680	5.1%	8,900	-3.4%		
	Capitol Corridor Rail	-	100	-	100	-	100	-	95	125	31.6%	125	31.6%	125	31.6%		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	11	159	1345.5%	159	1345.5%	159	1345.5%	270	563	108.2%	563	108.2%	563	108.2%		
	Total	9,547	9,519	-0.3%	10,699	12.1%	9,499	-0.5%	9,575	9,608	0.3%	10,368	8.3%	9,588	0.1%		
I-80 South of Douglas Blvd	Freeway Vehicles	6,780	6,560	-3.2%	8,220	21.2%	6,580	-2.9%	8,220	7,400	-10.0%	8,480	3.2%	7,410	-9.9%		
	Capitol Corridor Rail	-	100	-	100	-	100	-	95	125	31.6%	125	31.6%	125	31.6%		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	13	13	0.0%	13	0.0%	13	0.0%	270	483	78.6%	483	78.6%	483	78.6%		
	Total	6,793	6,673	-1.8%	8,333	22.7%	6,693	-1.5%	8,585	8,008	-6.7%	9,088	5.9%	8,018	-6.6%		
I-80 South of Sierra College Blvd	Freeway Vehicles	4,030	4,450	10.4%	4,370	8.4%	4,530	12.4%	4,500	5,070	12.7%	4,790	6.4%	5,190	15.3%		
	Capitol Corridor Rail	-	-	-	-	-	-	-	21	21	0.0%	21	0.0%	21	0.0%		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	13	19	46.2%	19	46.2%	19	46.2%	151	160	6.0%	160	6.0%	160	6.0%		
	Total	4,043	4,469	10.5%	4,389	8.6%	4,549	12.5%	4,672	5,251	12.4%	4,971	6.4%	5,371	15.0%		

I-80 South of Newcastle Rd	Freeway Vehicles	3,280	3,750	14.3%	3,570	8.8%	3,810	16.2%	3,910	4,590	17.4%	3,960	1.3%	4,620	18.2%
	Capitol Corridor Rail	-	-	-	-	-	-	-	21	21	0.0%	21	0.0%	21	0.0%
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	5	10	100.0%	10	100.0%	10	100.0%	144	148	2.8%	148	2.8%	148	2.8%
	Total	3,285	3,760	14.5%	3,580	9.0%	3,820	16.3%	4,075	4,759	16.8%	4,129	1.3%	4,789	17.5%
SR 65 north of Galleria Blvd	Freeway Vehicles	4,510	4,960	10.0%	6,920	53.4%	5,180	14.9%	3,190	3,410	6.9%	4,840	51.7%	3,480	9.1%
	Capitol Corridor Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	-	80	-	80	-	80	-	-	162	-	162	-	162	-
	Total	4,510	5,040	11.8%	7,000	55.2%	5,260	16.6%	3,190	3,572	12.0%	5,002	56.8%	3,642	14.2%
SR 65 south of Twelve Bridges	Freeway Vehicles	2,430	2,190	-9.9%	2,580	6.2%	2,230	-8.2%	3,480	3,210	-7.8%	3,360	-3.4%	3,230	-7.2%
	Capitol Corridor Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	2	22	1000.0%	22	1000.0%	22	1000.0%	1	63	6180.0%	63	6180.0%	63	6180.0%
	Total	2,432	2,212	-9.0%	2,602	7.0%	2,252	-7.4%	3,481	3,273	-6.0%	3,423	-1.7%	3,293	-5.4%
	Vehicle	54,660	64,320	17.7%	67,470	23.4%	64,760	18.5%	57,280	64,060	11.8%	65,200	13.8%	64,170	12.0%
	Transit	540	1,505	178.7%	1,605	197.2%	1,605	197.2%	3,262	4,753	45.7%	4,753	45.7%	4,753	45.7%
		55,200	65,825	19.2%	69,075	25.1%	66,365	20.2%	60,542	68,813	13.7%	69,953	15.5%	68,923	13.8%

Source: Fehr & Peers, 2019

Table 4.2 : Person Throughput – PM Peak

Screenline Location	Mode	Westbound/Southbound AM Peak Hour								Eastbound/Northbound AM Peak Hour							
		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 1		Scenario 2		Scenario 3		Scenario 4	
		Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change
Cap City Freeway at Q St	Freeway Vehicles	4,620	6,430	39.2%	6,580	42.4%	6,520	41.1%	4,600	6,760	47.0%	7,300	58.7%	6,820	48.3%		
	Capitol Corridor Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	24	63	162.5%	63	162.5%	63	162.5%	26	26	0.0%	26	0.0%	26	0.0%		
	Total	4,644	6,493	39.8%	6,643	43.0%	6,583	41.8%	4,626	6,786	46.7%	7,326	58.4%	6,846	48.0%		
Cap City Freeway at American River	Freeway Vehicles	6,450	9,490	47.1%	9,200	42.6%	9,630	49.3%	6,200	8,200	32.3%	8,620	39.0%	8,270	33.4%		
	Capitol Corridor Rail	107	125	16.8%	125	16.8%	125	16.8%	-	125	-	125	-	125	-		
	SacRT Blue Line LRT	599	599	0.0%	599	0.0%	599	0.0%	134	134	0.0%	134	0.0%	134	0.0%		
	Bus	137	215	56.9%	215	56.9%	215	56.9%	26	26	0.0%	26	0.0%	26	0.0%		
	Total	7,293	10,429	43.0%	10,139	39.0%	10,569	44.9%	6,360	8,485	33.4%	8,905	40.0%	8,555	34.5%		
Cap City Freeway North of Howe Ave	Freeway Vehicles	5,320	7,210	35.5%	5,970	12.2%	7,280	36.8%	4,210	5,210	23.8%	4,970	18.1%	5,310	26.1%		
	Capitol Corridor Rail	107	125	16.8%	125	16.8%	125	16.8%	-	125	-	125	-	125	-		
	SacRT Blue Line LRT	380	380	0.0%	380	0.0%	380	0.0%	98	98	0.0%	98	0.0%	98	0.0%		
	Bus	265	343	29.4%	343	29.4%	343	29.4%	8	8	0.0%	8	0.0%	8	0.0%		
	Total	6,072	8,058	32.7%	6,818	12.3%	8,128	33.9%	4,316	5,441	26.1%	5,201	20.5%	5,541	28.4%		
I-80 South of Madison Ave	Freeway Vehicles	11,350	13,070	15.2%	11,750	3.5%	13,170	16.0%	9,180	8,900	-3.1%	9,550	4.0%	9,000	-2.0%		
	Capitol Corridor Rail	107	125	16.8%	125	16.8%	125	16.8%	-	125	-	125	-	125	-		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	330	735	122.7%	735	122.7%	735	122.7%	56	262	367.9%	262	367.9%	262	367.9%		
	Total	11,787	13,930	18.2%	12,610	7.0%	14,030	19.0%	9,236	9,287	0.6%	9,937	7.6%	9,387	1.6%		
I-80 South of West of Antelope Rd	Freeway Vehicles	8,400	7,630	-9.2%	9,220	9.8%	7,780	-7.4%	7,980	7,270	-8.9%	8,980	12.5%	7,450	-6.6%		
	Capitol Corridor Rail	107	125	16.8%	125	16.8%	125	16.8%	-	125	-	125	-	125	-		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	288	615	113.5%	615	113.5%	615	113.5%	17	164	864.7%	164	864.7%	164	864.7%		
	Total	8,795	8,370	-4.8%	9,960	13.2%	8,520	-3.1%	7,997	7,559	-5.5%	9,269	15.9%	7,739	-3.2%		
I-80 South of Douglas Blvd	Freeway Vehicles	5,910	5,380	-9.0%	7,210	22.0%	5,510	-6.8%	9,060	7,740	-14.6%	9,220	1.8%	7,850	-13.4%		
	Capitol Corridor Rail	107	125	16.8%	125	16.8%	125	16.8%	-	125	-	125	-	125	-		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	288	535	85.8%	535	85.8%	535	85.8%	17	104	511.8%	104	511.8%	104	511.8%		
	Total	6,305	6,040	-4.2%	7,870	24.8%	6,170	-2.1%	9,077	7,969	-12.2%	9,449	4.1%	8,079	-11.0%		
I-80 South of Sierra College Blvd	Freeway Vehicles	4,270	4,800	12.4%	4,660	9.1%	4,880	14.3%	3,500	3,820	9.1%	3,840	9.7%	4,020	14.9%		
	Capitol Corridor Rail	26	26	0.0%	26	0.0%	26	0.0%	-	-	-	-	-	-	-		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	162	174	7.4%	174	7.4%	174	7.4%	7	13	85.7%	13	85.7%	13	85.7%		
	Total	4,458	5,000	12.2%	4,860	9.0%	5,080	14.0%	3,507	3,833	9.3%	3,853	9.9%	4,033	15.0%		

I-80 South of Newcastle Rd	Freeway Vehicles	3,870	4,510	16.5%	3,790	-2.1%	4,480	15.8%	2,980	3,390	13.8%	3,530	18.5%	3,500	17.4%
	Capitol Corridor Rail	26	26	0.0%	26	0.0%	26	0.0%	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	159	170	6.9%	170	6.9%	170	6.9%	2	4	100.0%	4	100.0%	4	100.0%
	Total	4,055	4,706	16.1%	3,986	-1.7%	4,676	15.3%	2,982	3,394	13.8%	3,534	18.5%	3,504	17.5%
SR 65 north of Galleria Blvd	Freeway Vehicles	4,740	5,700	20.3%	6,950	46.6%	6,010	26.8%	3,730	3,670	-1.6%	5,210	39.7%	3,760	0.8%
	Capitol Corridor Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	-	185	-	185	-	185	-	-	78	-	78	-	78	-
Total	4,740	5,885	24.2%	7,135	50.5%	6,195	30.7%	3,730	3,748	0.5%	5,288	41.8%	3,838	2.9%	
SR 65 south of Twelve Bridges	Freeway Vehicles	3,580	2,900	-19.0%	3,190	-10.9%	2,990	-16.5%	2,000	2,090	4.5%	2,470	23.5%	2,220	11.0%
	Capitol Corridor Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	3	88	2833.3%	88	2833.3%	88	2833.3%	3	21	600.0%	21	600.0%	21	600.0%
Total	3,583	2,988	-16.6%	3,278	-8.5%	3,078	-14.1%	2,003	2,111	5.4%	2,491	24.4%	2,241	11.9%	
Vehicle	58,510	67,120	14.7%	68,520	17.1%	68,250	16.6%	53,440	57,050	6.8%	63,690	19.2%	58,200	8.9%	
Transit	3,222	4,779	48.3%	4,779	48.3%	4,779	48.3%	394	1,563	296.7%	1,563	296.7%	1,563	296.7%	
	61,732	71,899	16.5%	73,299	18.7%	73,029	18.3%	53,834	58,613	8.9%	65,253	21.2%	59,763	11.0%	

Source: Fehr & Peers, 2019

How does the plan change seat utilization at screenline analysis locations?

Seat utilization is defined as the ratio of occupied seats to total seats for a given mode of transportation. Seat utilization is an efficiency metric that is indicative of how well available seat supply is utilized.

Data Sources

Data sources used for this analysis include the following:

1. Screenline traffic volume and speed data - PeMS data for April 2018, August 2018, and October 2018
2. Vehicle occupancy/seat utilization data- Data collected by Fehr & Peers at I-80 near Madison Avenue on July 31, 2019
3. Transit occupancy data – Trip- and stop-level ridership, load, and vehicle capacity data provided by the following transit operators:
 - a. Capitol Corridor Joint Powers Authority (CCJPA)
 - b. Placer County Transit (PCT)
 - c. Roseville Transit
 - d. Sacramento Regional Transit District (SacRT)

Methodology

The existing person throughput for private vehicles was estimated using PeMS volume data and observed vehicle occupancy data. Person throughput for transit services was calculated from data provided by corridor transit operators. For scenarios with the Gateway Plan, person throughput for private vehicles was estimated by multiplying SAMSIM19 travel demand model volume on the freeway by vehicle occupancy for different lane types. Person throughput for transit was estimated by calculating the expected load per trip associated with new transit services, transit service enhancements, or other changes to transit capacity associated with the Gateway Plan.

Seat utilization was then calculated using the following formulas:

$$\text{Scenario1_Seat_utilization_Vehicles} = (\text{Occupancy in GP lane} * \text{PEMS Volume on GP Lane} + \text{Occupancy in HOV Lane} * \text{PEMS Volume on HOV lane}) / \text{PEMS Total Volume}$$

$$\text{Scenario1_Seat_Utilization_Transit} = \text{Occupied seats} / (\text{Available seats})$$

$$\text{Scenario2_Seat_utilization_Vehicles} = (\text{Occupancy in GP lane} * \text{Scenario2 Model Volume on GP Lane} + \text{Occupancy in HOV Lane} * \text{Scenario2 Model Volume on HOV lane}) / \text{Scenario2 Model Total Volume}$$

$$\text{Scenario2_Seat_Utilization_Transit} = \text{Projected Occupied seats} / (\text{Projected available seats})$$

$$\text{Scenario3_Seat_utilization_Vehicles} = (\text{Occupancy in GP lane} * \text{Scenario3 Model Volume on GP Lane} + \text{Occupancy in HOV Lane} * \text{Scenario3 Model Volume on HOV lane}) / \text{Scenario3 Model Total Volume}$$

$$\text{Scenario3_Seat_Utilization_Transit} = \text{Projected Occupied seats} / (\text{Projected available seats})$$

Evaluation

Table 5 shows the changes to peak hour seat utilization for each of the analysis scenarios.

Table 5.1 : Seat Utilization – AM Peak

Screenline Location	Mode	Westbound/Southbound AM Peak Hour								Eastbound/Northbound AM Peak Hour					
		Scenario 2		Scenario 3		Scenario 4		Scenario 1		Scenario 2		Scenario 3		Scenario 4	
		Scenario 1	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change	Scenario 1	Seat Utilization	Change	Seat Utilization	Change	Seat Utilization	Change
Cap City Freeway at Q St	Freeway Vehicles	22%	22%	-1%	22%	0%	22%	0%	22%	22%	-1%	22%	-1%	22%	-1%
	Capitol Corridor Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	17%	27%	10%	27%	10%	27%	10%	19%	19%	-	19%	-	19%	-
	Total	22%	22%	0%	22%	0%	22%	0%	22%	22%	-1%	22%	-1%	22%	-1%
Cap City Freeway at American River	Freeway Vehicles	22%	22%	-1%	22%	-1%	22%	-1%	22%	22%	-1%	22%	-1%	22%	-1%
	Capitol Corridor Rail	30%	35%	5%	35%	5%	35%	5%	-	35%	35%	35%	35%	35%	35%
	SacRT Blue Line LRT	58%	58%	-	58%	-	58%	-	13%	13%	-	13%	-	13%	-
	Bus	33%	36%	3%	36%	3%	36%	3%	11%	11%	-	11%	-	11%	-
	Total	24%	23%	-1%	23%	-1%	23%	-1%	22%	22%	0%	22%	0%	21%	0%
Cap City Freeway North of Howe Ave	Freeway Vehicles	22%	22%	-1%	22%	0%	22%	-1%	22%	22%	-1%	22%	0%	22%	-1%
	Capitol Corridor Rail	30%	35%	5%	35%	5%	35%	5%	-	35%	35%	35%	35%	35%	35%
	SacRT Blue Line LRT	37%	37%	-	37%	-	37%	-	9%	9%	-	9%	-	9%	-
	Bus	53%	51%	-3%	51%	-3%	51%	-3%	9%	9%	-	9%	-	9%	-
	Total	24%	23%	-1%	24%	0%	23%	-1%	22%	21%	0%	22%	0%	21%	0%
I-80 South of Madison Ave	Freeway Vehicles	22%	21%	0%	22%	0%	21%	0%	22%	22%	0%	22%	0%	22%	0%
	Capitol Corridor Rail	30%	35%	5%	35%	5%	35%	5%	-	35%	35%	35%	35%	35%	35%
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	48%	48%	-1%	48%	-1%	48%	-1%	20%	28%	7%	28%	7%	28%	7%
	Total	22%	22%	0%	23%	0%	22%	0%	22%	22%	0%	22%	0%	22%	0%
I-80 South of West of Antelope Rd	Freeway Vehicles	22%	22%	0%	22%	0%	22%	0%	22%	22%	0%	21%	0%	22%	0%
	Capitol Corridor Rail	30%	35%	5%	35%	5%	35%	5%	-	35%	35%	35%	35%	35%	35%
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	53%	50%	-3%	50%	-3%	50%	-3%	13%	26%	13%	26%	13%	26%	13%
	Total	22%	23%	0%	23%	0%	23%	0%	22%	22%	0%	22%	0%	22%	0%
I-80 South of Douglas Blvd	Freeway Vehicles	22%	21%	0%	22%	0%	21%	0%	22%	22%	0%	22%	0%	22%	0%
	Capitol Corridor Rail	30%	35%	5%	35%	5%	35%	5%	-	35%	35%	35%	35%	35%	35%
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	53%	52%	-1%	52%	-1%	52%	-1%	13%	23%	11%	23%	11%	23%	11%
	Total	22%	23%	0%	23%	0%	23%	0%	22%	22%	0%	22%	0%	22%	0%
I-80 South of Sierra College Blvd	Freeway Vehicles	22%	22%	-1%	22%	0%	22%	0%	22%	22%	0%	22%	0%	22%	0%
	Capitol Corridor Rail	7%	7%	-	7%	-	7%	-	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	53%	49%	-3%	49%	-3%	49%	-3%	9%	10%	2%	10%	2%	10%	2%
	Total	23%	22%	-1%	23%	0%	22%	0%	22%	22%	-1%	22%	0%	22%	0%

I-80 South of Newcastle Rd	Freeway Vehicles	22%	22%	-1%	22%	0%	22%	-1%	22%	22%	-1%	22%	0%	22%	-1%
	Capitol Corridor Rail	7%	7%	-	7%	-	7%	-	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	58%	53%	-5%	53%	-5%	53%	-5%	4%	4%	-	4%	-	4%	-
	Total	23%	22%	-1%	23%	0%	22%	-1%	22%	22%	-1%	22%	0%	22%	-1%
SR 65 north of Galleria Blvd	Freeway Vehicles	22%	22%	-1%	22%	-1%	22%	-1%	22%	22%	-1%	22%	0%	22%	-1%
	Capitol Corridor Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	-	51%	51%	51%	51%	51%	51%	-	29%	29%	29%	29%	29%	29%
	Total	22%	22%	0%	22%	0%	22%	0%	22%	22%	0%	22%	0%	22%	0%
SR 65 south of Twelve Bridges	Freeway Vehicles	22%	22%	0%	22%	0%	22%	0%	22%	22%	0%	22%	0%	22%	0%
	Capitol Corridor Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	9%	41%	32%	41%	32%	41%	32%	9%	17%	8%	17%	8%	17%	8%
	Total	22%	23%	0%	23%	0%	23%	0%	22%	22%	0%	22%	0%	22%	0%
	Vehicle	22%	22%	0%	22%	0%	22%	0%	22%	22%	0%	22%	0%	22%	0%
	Transit	40%	43%	3%	43%	3%	43%	3%	12%	22%	10%	22%	10%	22%	10%
		23%	22%	0%	23%	0%	22%	0%	22%	22%	0%	22%	0%	22%	0%

Source: Fehr & Peers, 2019

Table 5.2 : Seat Utilization – PM Peak

Screenline Location	Mode	Westbound/Southbound AM Peak Hour								Eastbound/Northbound AM Peak Hour							
		Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 1		Scenario 2		Scenario 3		Scenario 4	
		Utilization	Change	Utilization	Change	Utilization	Change	Utilization	Change	Utilization	Change	Utilization	Change	Utilization	Change	Utilization	Change
Cap City Freeway at Q St	Freeway Vehicles	22%	22%	-1%	22%	-1%	22%	-1%	22%	22%	-1%	22%	-1%	22%	-1%		
	Capitol Corridor Rail	-	-	-	-	-	-	-	26%	35%	8%	35%	8%	35%	8%		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	20%	20%	-	20%	-	20%	-	27%	34%	7%	34%	7%	34%	7%		
	Total	22%	22%	-1%	22%	-1%	22%	-1%	22%	22%	-1%	22%	-1%	22%	-1%		
Cap City Freeway at American River	Freeway Vehicles	22%	22%	-1%	22%	-1%	22%	-1%	22%	21%	-1%	22%	-1%	21%	-1%		
	Capitol Corridor Rail	-	28%	28%	28%	28%	28%	28%	26%	35%	8%	35%	8%	35%	8%		
	SacRT Blue Line LRT	19%	19%	-	19%	-	19%	-	64%	64%	-	64%	-	64%	-		
	Bus	19%	19%	-	19%	-	19%	-	34%	37%	3%	37%	3%	37%	3%		
	Total	22%	22%	-1%	22%	-1%	22%	-1%	24%	23%	-1%	23%	-1%	23%	-1%		
Cap City Freeway North of Howe Ave	Freeway Vehicles	22%	21%	-1%	22%	0%	21%	-1%	22%	21%	-1%	22%	0%	21%	-1%		
	Capitol Corridor Rail	-	28%	28%	28%	28%	28%	28%	26%	35%	8%	35%	8%	35%	8%		
	SacRT Blue Line LRT	16%	16%	-	16%	-	16%	-	36%	36%	-	36%	-	36%	-		
	Bus	7%	7%	-	7%	-	7%	-	52%	50%	-2%	50%	-2%	50%	-2%		
	Total	24%	21%	-3%	22%	-2%	21%	-3%	24%	23%	-1%	24%	0%	23%	-1%		
I-80 South of Madison Ave	Freeway Vehicles	22%	22%	0%	22%	0%	22%	0%	22%	21%	-1%	22%	0%	21%	-1%		
	Capitol Corridor Rail	-	28%	28%	28%	28%	28%	28%	26%	35%	8%	35%	8%	35%	8%		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	25%	29%	4%	33%	8%	33%	8%	47%	45%	-2%	45%	-2%	45%	-2%		
	Total	22%	22%	0%	22%	0%	22%	0%	22%	22%	0%	23%	0%	22%	0%		
I-80 South of West of Antelope Rd	Freeway Vehicles	22%	22%	0%	22%	0%	22%	0%	22%	21%	0%	22%	0%	22%	0%		
	Capitol Corridor Rail	-	28%	28%	28%	28%	28%	28%	26%	35%	8%	35%	8%	35%	8%		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	12%	27%	15%	27%	15%	27%	15%	50%	46%	-4%	46%	-4%	46%	-4%		
	Total	22%	22%	0%	22%	0%	22%	0%	22%	22%	0%	22%	0%	22%	0%		
I-80 South of Douglas Blvd	Freeway Vehicles	22%	22%	0%	22%	0%	22%	0%	22%	21%	0%	22%	0%	21%	0%		
	Capitol Corridor Rail	-	28%	28%	28%	28%	28%	28%	26%	35%	8%	35%	8%	35%	8%		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	14%	4%	-10%	4%	-10%	4%	-10%	50%	47%	-3%	47%	-3%	47%	-3%		
	Total	22%	21%	0%	22%	0%	21%	0%	22%	22%	0%	22%	0%	22%	0%		
I-80 South of Sierra College Blvd	Freeway Vehicles	22%	22%	-1%	22%	0%	22%	-1%	22%	22%	-1%	22%	0%	22%	-1%		
	Capitol Corridor Rail	-	-	-	-	-	-	-	6%	6%	-	6%	-	6%	-		
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Bus	16%	15%	-1%	15%	-1%	15%	-1%	49%	45%	-4%	45%	-4%	45%	-4%		
	Total	22%	22%	-1%	22%	0%	22%	-1%	22%	22%	-1%	22%	0%	22%	-1%		

I-80 South of Newcastle Rd	Freeway Vehicles	22%	21%	-1%	22%	0%	21%	-1%	22%	21%	-1%	22%	0%	21%	-1%
	Capitol Corridor Rail	-	-	-	-	-	-	-	6%	6%	-	6%	-	6%	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	11%	11%	-	11%	-	11%	-	53%	47%	-6%	47%	-6%	47%	-6%
	Total	22%	21%	-1%	22%	0%	21%	-1%	22%	22%	-1%	22%	0%	22%	-1%
SR 65 north of Galleria Blvd	Freeway Vehicles	22%	22%	-1%	22%	-1%	22%	-1%	22%	21%	-1%	22%	-1%	21%	-1%
	Capitol Corridor Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	-	30%	30%	30%	30%	30%	30%	-	45%	45%	45%	45%	45%	45%
	Total	22%	22%	0%	22%	0%	22%	0%	22%	22%	0%	22%	0%	22%	0%
SR 65 south of Twelve Bridges	Freeway Vehicles	22%	22%	0%	22%	0%	22%	0%	22%	22%	0%	22%	0%	22%	0%
	Capitol Corridor Rail	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	SacRT Blue Line LRT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bus	6%	15%	9%	15%	9%	15%	9%	3%	29%	26%	29%	26%	29%	26%
	Total	22%	22%	0%	22%	0%	22%	0%	22%	22%	0%	22%	0%	22%	0%
Vehicle	22%	22%	0%	22%	0%	22%	0%	22%	21%	-1%	22%	0%	21%	-1%	
Transit	18%	22%	5%	23%	6%	23%	6%	39%	41%	3%	41%	3%	41%	3%	
Overall	22%	22%	0%	22%	0%	22%	0%	23%	22%	0%	23%	0%	22%	0%	

Source: Fehr & Peers, 2019

How does the plan reduce vehicle travel demand?

For the purposes of the Gateway Plan, vehicle travel demand is estimated in terms of vehicle miles traveled (VMT) per capita. One VMT represents one vehicle traveling one mile. Generally, VMT is a land use efficiency metric that can be used to express the relationship between land use and transportation systems.

Data Sources

The SACSIM19 travel demand model was used to estimate VMT per capita for all analysis scenarios.

Methodology

VMT and population outputs were extracted from the SACSIM19 travel demand model to estimate VMT per capita. For the Gateway Corridor and the screenline locations, VMT and population data was extracted for all roadway links and TAZs within two miles of each analysis location, respectively.

$$VMT \text{ per Capita} = \text{Total Link-Level VMT} / \text{Total Population}$$

Evaluation

Table 6 shows the changes to VMT per capita for each of the analysis scenarios.

Table 6.1: VMT per Capita – Daily

Analysis Location	Scenario 1	Scenario 2		Scenario 3		Scenario 4	
	VMT/Capita	VMT/Capita	Change	VMT/Capita	Change	VMT/Capita	Change
Region	24.95	25.03	0.4%	23.64	-5.2%	21.38	-14.3%
Gateway Corridor	31.84	32.43	1.9%	29.39	-7.7%	26.52	-16.7%
1. Business 80 at Q St.	40.52	42.46	4.8%	35.31	-12.9%	32.75	-19.2%
2. Business 80 at the American River	106.10	113.41	6.9%	95.45	-10.0%	91.41	-13.9%
3. Business 80 at Howe Ave.	43.13	45.12	4.6%	43.24	0.3%	41.49	-3.8%
4. I-80 at Madison Ave.	38.35	39.36	2.6%	37.86	-1.3%	35.61	-7.1%
5. I-80 at Antelope Rd.	30.61	30.90	0.9%	31.70	3.6%	29.98	-2.1%
6. I-80 at Douglas Blvd.	46.99	47.53	1.2%	46.87	-0.3%	42.91	-8.7%
7. I-80 at Sierra College Blvd.	50.67	51.71	2.1%	37.48	-26.0%	33.39	-34.1%
8. I-80 at Newcastle Rd.	138.36	140.58	1.6%	137.90	-0.3%	129.39	-6.5%
9. Highway 65 at Galleria Blvd.	40.49	41.39	2.2%	48.38	19.5%	41.67	2.9%
10. Highway 65 at Twelve Bridges Dr.	26.94	28.56	6.0%	26.38	-2.1%	19.62	-27.2%

Source: Fehr & Peers, 2019

Table 6.2: VMT per Capita – AM Peak Hour

Analysis Location	Scenario 1	Scenario 2		Scenario 3		Scenario 4	
	VMT/Capita	VMT/Capita	Change	VMT/Capita	Change	VMT/Capita	Change
Region	1.99	1.99	0.3%	1.83	-7.8%	1.68	-15.3%
Gateway Corridor	2.39	2.41	0.9%	2.17	-9.1%	1.96	-17.9%
1. Business 80 at Q St.	2.98	3.12	4.7%	2.59	-13.2%	2.40	-19.4%
2. Business 80 at the American River	7.87	8.38	6.6%	7.08	-10.0%	6.78	-13.9%
3. Business 80 at Howe Ave.	3.23	3.31	2.6%	3.17	-1.9%	3.05	-5.7%
4. I-80 at Madison Ave.	2.86	2.85	-0.1%	2.77	-3.2%	2.57	-10.0%
5. I-80 at Antelope Rd.	2.29	2.22	-3.1%	2.38	3.8%	2.14	-6.5%
6. I-80 at Douglas Blvd.	3.48	3.45	-0.9%	3.46	-0.7%	3.09	-11.2%
7. I-80 at Sierra College Blvd.	3.79	3.85	1.5%	2.78	-26.6%	2.47	-34.8%
8. I-80 at Newcastle Rd.	10.14	10.31	1.7%	10.00	-1.4%	9.37	-7.6%
9. Highway 65 at Galleria Blvd.	3.04	3.09	1.9%	3.59	18.3%	3.08	1.4%
10. Highway 65 at Twelve Bridges Dr.	2.05	2.24	9.1%	2.04	-0.8%	1.53	-25.6%

Source: Fehr & Peers, 2019

Table 6.3: VMT per Capita – PM Peak Hour

Analysis Location	Scenario 1	Scenario 2		Scenario 3		Scenario 4	
	VMT/Capita	VMT/Capita	Change	VMT/Capita	Change	VMT/Capita	Change
Region	2.07	2.08	0.3%	1.91	-7.7%	1.74	-15.9%
Gateway Corridor	2.48	2.52	1.5%	2.24	-9.5%	2.00	-19.2%
1. Business 80 at Q St.	3.10	3.25	4.9%	2.65	-14.3%	2.45	-20.8%
2. Business 80 at the American River	8.23	8.79	6.7%	7.31	-11.2%	6.95	-15.6%
3. Business 80 at Howe Ave.	3.32	3.44	3.7%	3.25	-2.1%	3.10	-6.6%
4. I-80 at Madison Ave.	2.95	2.98	1.2%	2.84	-3.8%	2.63	-10.6%
5. I-80 at Antelope Rd.	2.38	2.35	-1.2%	2.44	2.4%	2.23	-6.5%
6. I-80 at Douglas Blvd.	3.65	3.65	0.1%	3.59	-1.7%	3.21	-12.1%
7. I-80 at Sierra College Blvd.	3.99	4.04	1.2%	2.89	-27.6%	2.56	-35.9%
8. I-80 at Newcastle Rd.	10.86	10.96	1.0%	10.51	-3.2%	9.90	-8.8%
9. Highway 65 at Galleria Blvd.	3.15	3.24	2.8%	3.78	19.7%	3.14	-0.6%
10. Highway 65 at Twelve Bridges Dr.	2.08	2.24	8.0%	2.04	-1.8%	1.44	-30.6%

Source: Fehr & Peers, 2019

How does the plan change traffic in local neighborhoods?

Changes to neighborhood traffic are estimated by calculating VMT per capita on local roadways within the vicinity of the Gateway Corridor.

Data Sources

The SACSIM19 travel demand model was used to estimate VMT per capita in local neighborhoods. Relevant model outputs include VMT and TAZ-level population quantities.

Methodology

VMT and population outputs were extracted from the SACSIM19 travel demand model to estimate VMT per capita. For the Gateway Corridor and the screenline locations, VMT and population data was extracted for non-highway roadway links and TAZs within two miles of each analysis location, respectively.

$$VMT \text{ per Capita} = \text{Total Non-Highway Link-Level VMT} / \text{Total Population}$$

Evaluation

Table 7 shows the changes to VMT per capita on local roadways for each of the analysis scenarios.

Table 7.1: VMT per Capita on Local Roadways – Daily

Analysis Location	Scenario 1	Scenario 2		Scenario 3		Scenario 4	
	VMT/Capita	VMT/Capita	Change	VMT/Capita	Change	VMT/Capita	Change
Region	13.09	13.04	-0.3%	12.61	-3.7%	11.10	-15.2%
Gateway Corridor	15.76	15.67	-0.6%	14.97	-5.0%	12.96	-17.7%
1. Business 80 at Q St.	17.21	17.46	1.5%	14.99	-12.9%	13.57	-21.1%
2. Business 80 at the American River	49.65	50.06	0.8%	42.69	-14.0%	40.80	-17.8%
3. Business 80 at Howe Ave.	18.43	18.45	0.1%	19.08	3.6%	17.24	-6.4%
4. I-80 at Madison Ave.	18.94	19.00	0.3%	19.81	4.6%	17.35	-8.4%
5. I-80 at Antelope Rd.	15.66	15.59	-0.4%	16.50	5.4%	15.17	-3.1%
6. I-80 at Douglas Blvd.	27.81	28.11	1.1%	28.21	1.4%	25.71	-7.6%
7. I-80 at Sierra College Blvd.	19.54	19.05	-2.5%	15.66	-19.8%	12.48	-36.1%
8. I-80 at Newcastle Rd.	23.57	22.49	-4.6%	27.02	14.7%	21.57	-8.5%
9. Highway 65 at Galleria Blvd.	23.32	22.78	-2.3%	27.95	19.8%	23.21	-0.5%
10. Highway 65 at Twelve Bridges Dr.	11.76	11.23	-4.5%	13.16	12.0%	8.09	-31.2%

Source: Fehr & Peers, 2019

Table 7.2: VMT per Capita on Local Roadways – AM Peak Hour

Analysis Location	Scenario 1	Scenario 2		Scenario 3		Scenario 4	
	VMT/Capita	VMT/Capita	Change	VMT/Capita	Change	VMT/Capita	Change
Region	1.048	1.050	0.1%	0.989	-5.7%	0.888	-15.3%
Gateway Corridor	1.225	1.221	-0.4%	1.133	-7.5%	1.015	-17.2%
1. Business 80 at Q St.	1.336	1.353	1.3%	1.140	-14.7%	1.056	-20.9%
2. Business 80 at the American River	3.767	3.802	0.9%	3.194	-15.2%	3.126	-17.0%
3. Business 80 at Howe Ave.	1.436	1.441	0.4%	1.426	-0.7%	1.350	-6.0%
4. I-80 at Madison Ave.	1.472	1.499	1.8%	1.467	-0.3%	1.368	-7.1%
5. I-80 at Antelope Rd.	1.197	1.206	0.7%	1.247	4.2%	1.183	-1.1%
6. I-80 at Douglas Blvd.	2.065	2.092	1.3%	2.064	0.0%	1.936	-6.2%
7. I-80 at Sierra College Blvd.	1.580	1.527	-3.4%	1.262	-20.1%	0.998	-36.8%
8. I-80 at Newcastle Rd.	1.934	1.828	-5.5%	2.157	11.6%	1.717	-11.2%
9. Highway 65 at Galleria Blvd.	1.794	1.757	-2.0%	2.073	15.5%	1.803	0.5%
10. Highway 65 at Twelve Bridges Dr.	0.974	0.908	-6.8%	1.036	6.4%	0.650	-33.3%

Source: Fehr & Peers, 2019

Table 7.3: VMT per Capita on Local Roadways - PM Peak Hour

Analysis Location	Scenario 1	Scenario 2		Scenario 3		Scenario 4	
	VMT/Capita	VMT/Capita	Change	VMT/Capita	Change	VMT/Capita	Change
Region	1.071	1.070	-0.1%	1.015	-5.2%	0.891	-16.8%
Gateway Corridor	1.261	1.258	-0.3%	1.169	-7.3%	1.019	-19.2%
1. Business 80 at Q St.	1.376	1.395	1.4%	1.157	-16.0%	1.066	-22.5%
2. Business 80 at the American River	4.002	4.033	0.8%	3.359	-16.1%	3.236	-19.1%
3. Business 80 at Howe Ave.	1.472	1.477	0.3%	1.479	0.5%	1.355	-8.0%
4. I-80 at Madison Ave.	1.506	1.537	2.0%	1.530	1.6%	1.371	-9.0%
5. I-80 at Antelope Rd.	1.231	1.241	0.8%	1.283	4.2%	1.192	-3.1%
6. I-80 at Douglas Blvd.	2.205	2.228	1.1%	2.183	-1.0%	2.010	-8.8%
7. I-80 at Sierra College Blvd.	1.571	1.532	-2.5%	1.260	-19.8%	0.983	-37.4%
8. I-80 at Newcastle Rd.	1.883	1.777	-5.6%	2.105	11.8%	1.648	-12.4%
9. Highway 65 at Galleria Blvd.	1.872	1.854	-1.0%	2.214	18.3%	1.850	-1.1%
10. Highway 65 at Twelve Bridges Dr.	0.943	0.878	-6.9%	1.034	9.7%	0.597	-36.6%

Source: Fehr & Peers, 2019