



Memorandum

Date: December 7, 2010

To: Paul Hom, El Dorado County Department of Transportation
From: Dowling Associates, Inc.
Reference #: P08044.009
Subject: 2030 No Build Intersection and Ramp Analysis

As a part of the Silva Valley Interchange Traffic Operations Study (Dowling Associates, August 2010), No-Build conditions (i.e., without Silva Valley Interchange) were analyzed under 2010 and 2020 future conditions only. To better gauge the long-term cumulative plus project traffic impacts and to support the environmental document for the proposed project, a 2030 No-Build traffic operations analysis for intersections; basic freeway segments and freeway-ramp merge/diverge was performed. This memorandum presents the results for the 2030 No-Build analysis.

1. 2030 NO-BUILD ANALYSIS

Project Description

The Silva Valley Parkway to US-50 interchange project consists of a new interchange along a new alignment for Silva Valley Parkway to the east of the current Silva Valley Parkway/White Rock Road alignment. It includes constructing the over-crossing and ramps, and the signalization of the eastbound and westbound on-/off-ramps. The No-Build scenario for this analysis assumes the above mentioned improvements will not be constructed.

2030 No-Build Volumes

To forecast intersections turning movement volumes assuming no Silva Valley Interchange, an additional model run using the El Dorado County DOT travel model was performed. The following steps describe in general the methodology adopted to forecast future No-Build turning movement volumes.

1. The out-year forecast of the El Dorado County DOT travel model is 2025. In order to generate 2030 No-Build turning movement volumes, the AM/PM peak hour "raw" 2025 "with Silva Valley Interchange" volumes were compared to the like "raw" 2025 "without Silva Valley Interchange" model volumes.
2. The relative difference in "raw" ramp volumes at the El Dorado Hills Blvd and Bass Lake Road interchanges were computed to provide the trip diversion splits from the Silva Valley Interchange to the adjacent interchanges at Bass Lake and El Dorado Hills.
3. These were used as control points to help balance the study area network and estimate turning movement volumes at the study intersections as described in the subsequent steps.
4. Comparison of intersection turning movement volumes between the No-Build and Build scenario in 2020 was used to estimate delta (percentage difference) for study intersections.

2030 No-Build Intersection and Ramp Analysis

5. This delta was applied to the 2030 build volumes to provide a starting point for developing 2030 No-Build volumes.
6. Assuming a closed system, turning movement volumes were adjusted manually with ramp volumes as control points. These adjustments were performed on a movement by movement basis to account for different distribution patterns between 2020 and 2030 as well as between the No-Build and Build scenarios. Engineering judgment was applied to reconcile differences between two analysis scenarios and achieve reasonable balancing between study intersections.

Figure 1 presents the 2030 No Project Volumes at all study intersections. **Figure 2** provides freeway and ramp volumes for US-50.

2030 No-Build Operational Analysis

Intersection Analysis

Based on El Dorado County requirements, the methodology utilized to evaluate the level of service for the signalized intersections is the Highway Capacity Manual, Special Report No. 209, Transportation Research Board, Third Edition, updated 2000. The average delay criteria were used to determine the LOS at signalized intersections.

El Dorado County's desired level of service (LOS) is LOS 'D', although the General Plan allows LOS E with the "community areas" like El Dorado Hills. The County's LOS threshold is based on the average of each all movements within the intersection. The Caltrans LOS standard assumed for this study is LOS D

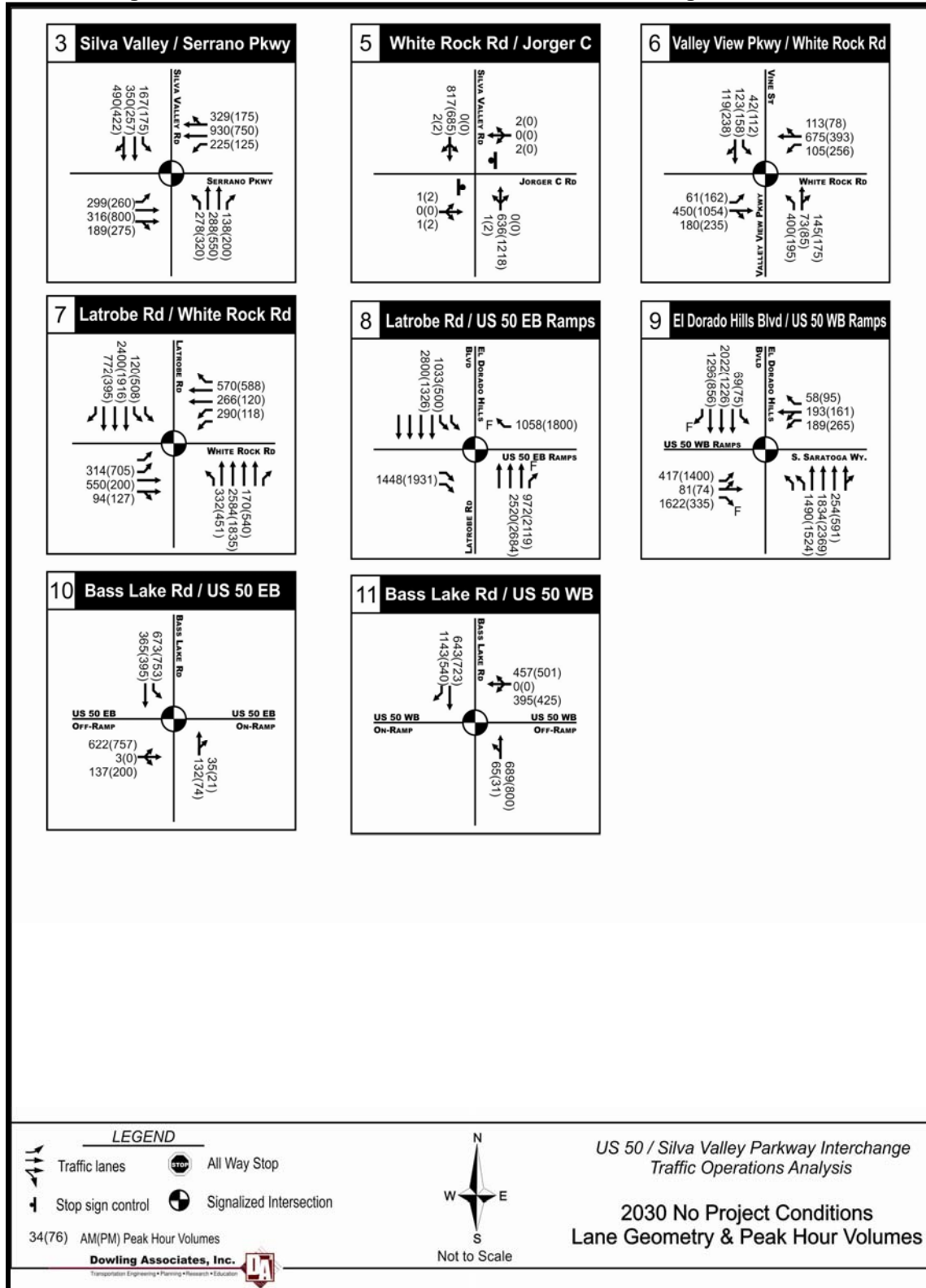
Table 1 presents the intersection level of service summary for the 2030 No-Build scenario. As presented in the table, all study intersections except White Rock Road & Jorger Cutoff Road are forecast to operate at unacceptable LOS E or worse.

Table 1 2030 No-Build - Intersection Level of Service Summary

#	Synch	Intersection	Control	AM Peak Hour			PM Peak Hour		
				V/c	Delay (secs)	LOS	v/c	Delay (secs)	LOS
1	111	Silva Valley Pkwy & US-50 EB	Future*	---	---	---	---	---	---
2	112	Silva Valley Pkwy & US-50 WB	Future*	---	---	---	---	---	---
3	113	Silva Valley Pkwy & Serrano Pkwy	Signal	1.13	88.4	F	0.89	50.7	D
4	114	Silva Valley Pkwy & Country Club	Future	---	---	---	---	---	---
5	115	White Rock Rd & Jorger Cutoff	2-Way Stop	0.53	0.1	A	0.76	0.2	D
6	116	Valley View & White Rock Road	Signal	1.04	73.7	E	1.43	189	F
7	117	Latrobe Road & White Rock Road	Signal	1.35	127.1	F	1.47	156.7	F
8	118	El Dorado Hills/Latrobe & US-50 EB	Signal	1.17	68.1	E	1.68	124.8	F
9	119	El Dorado Hills & US-50 WB	Signal	1.3	130.2	F	1.52	191.4	F
10	120	Bass Lake Rd & US-50 EB	Signal	1.24	103.9	F	1.3	151.8	F
11	121	Bass Lake Rd & US-50 WB	Signal	1.33	93.9	F	1.4	136.6	F

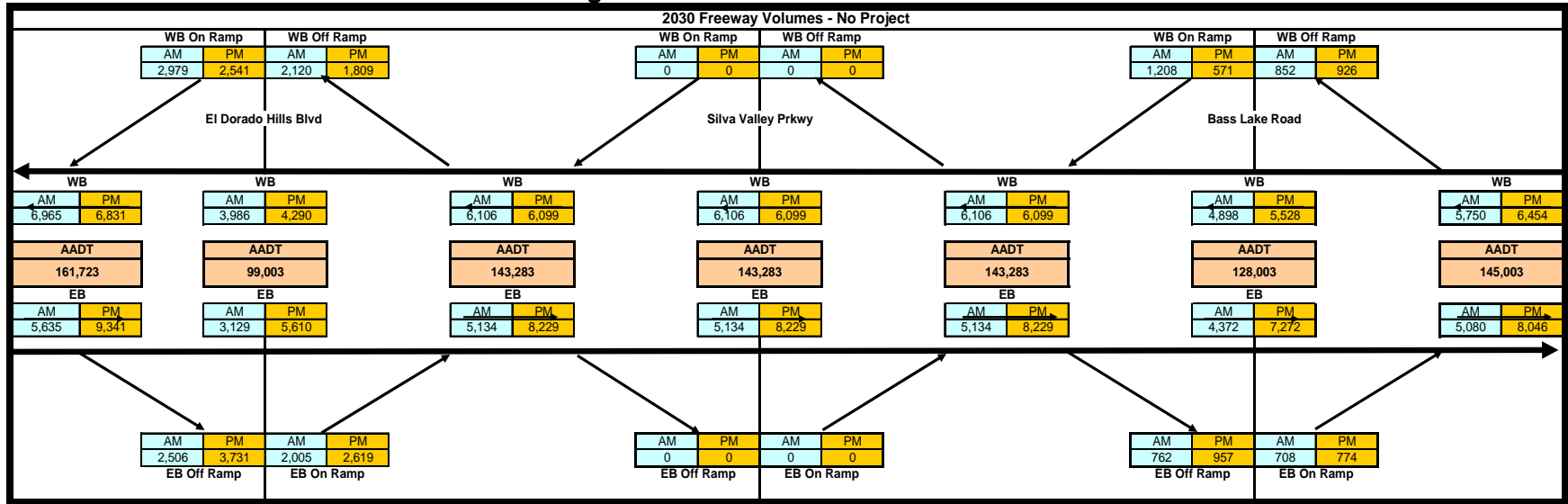
* Future intersections not assumed under no-build scenario.
 Highlighted cell indicate unacceptable LOS conditions.

Figure 1: 2030 No-Build – Peak Hour Intersection Turning Movement Volumes



2030 No-Build Intersection and Ramp Analysis

Figure 2: 2030 No-Build US-50 Volumes



2030 No-Build Intersection and Ramp Analysis

2020 Queue Storage Requirements

The required queue storage lengths for 2030 no-project conditions are presented in **Table 2**

Table 2 Required Left Turn Storage – 2030 No Build

Left Turn Pocket Queue Storage Requirements			2030 No Project	
Intersection	Control	Dir	Max AM/PM	Required
			(vph)	Storage (ft)
3 Silva Valley & Serrano	Signal	NB	320	275
		SB	175	150
		EB	299	250
		WB	225	200
4 Silva Valley & Cntry Clb	Signal	NB	N/A	N/A
		SB	NA	NA
		EB	N/A	N/A
		WB	340	300
5 White Rock & Jorger C	2-Way Stop	NB	NA	NA
		SB	NA	NA
		EB	NA	NA
		WB	NA	NA
6 Valley Vw & White Rock	Signal	NB	400	350
		SB	112	100
		EB	162	150
		WB	256	225
7 Latrobe & White Rock	Signal	NB	451	400
		SB	508	425
		EB	705	600
		WB	290	250
8 El Dorado & US 50 EB	Signal	NB	NA	NA
		SB	1033	875
		EB	NA	NA
		WB	NA	NA
9 El Dorado & US 50 WB	Signal	NB	1524	1275
		SB	75	75
		EB	1400	1175
		WB	265	225
10 Bass Lake & US 50 EB	2-Way Stop	NB	N/A	N/A
		SB	753	650
		EB	757	650
		WB	N/A	N/A
11 Bass Lake & US 50 WB	2-Way Stop	NB	NA	NA
		SB	N/A	N/A
		EB	N/A	N/A
		WB	425	375

Available Storage is equal to the number of lanes in the left turn pocket multiplied by their average length in feet.

Required storage is given in total number of lanes and feet required. For multiple lane turn pockets, the length per lane is derived by dividing the total required storage by the number of lanes.

Basic Freeway Segment LOS Analysis

The HCM/HCS analysis method was used to evaluate US-50 mainline (basic freeway segment) from Bass Lake Road to Empire Ranch Road. Basic freeway segment LOS criterion is based on vehicle density expressed in passenger cars per mile per lane (pc/mi/ln) per hour. Consistent with the Silva Valley Interchange Traffic Operations Study (June, 2009), the US-50 freeway volumes reflect passenger car equivalents based on the Caltrans truck classification data. Ideal hourly lane capacities were based on the HCM 2000 maximum flow rates for basic freeway segments with design speeds of 70 mph. A peak hour factor of .92 was applied as part of the base year analysis.

The AM/PM US-50 mainline direction peak hour volumes presented in **Figure 2** were input to Highway Capacity Manual operational spreadsheets to compute LOS. **Table 3** presents the 2030 No Project HCM LOS results for basic freeway segments for the AM and PM peak hours respectively. Appendix A provides the detailed HCM LOS worksheets.

Results indicate that during the AM peak hour, US-50 mainline operations on the mixed flow lanes will operate at LOS D or better in the eastbound direction. In the westbound direction, US-50 mixed flow lanes will operate at LOS E for the mainline segment from Bass Lake Road to west of El Dorado Hills.

During the PM peak hour, eastbound US-50 mainline operations from east of Bass Lake Road to west of El Dorado Hills Blvd will operate at unacceptable LOS E or worse. In the westbound direction, mainline operation between Bass Lake Road and El Dorado Hills Blvd will operate at unacceptable LOS E.

2030 No-Build Intersection and Ramp Analysis

Table 3: 2030 US-50 Basic Freeway Segment LOS

US 50	AM Peak		PM Peak	
	Density ¹ pc/mi/ln	LOS ²	Density ¹ pc/mi/ln	LOS ²
2030 No Project Scenario				
<u>Eastbound</u>				
West of El Dorado Hills	19.75	C	36.17	E
El Dorado Hills to Bass Lake	28.81	D	164.49	F
East of Bass Lake	23.77	C	50.50	F
<u>Westbound</u>				
East of Bass Lake	27.18	D	31.59	D
Bass Lake to El Dorado Hills	37.86	E	37.75	E
West of El Dorado Hills	35.77	E	34.56	D
<small>¹ Density expressed in pc/mi/ln, passenger cars per mile per lane</small>				
<small>² Level of service is based on density as described in Basic Freeway Segment, Chapter 23, HCM 2000</small>				
<small>³ Denotes a weave section. Level of Service is based on density as described in Freeway Weave, Chapter 24, HCM 2000</small>				

Ramp Merge-Diverge Analysis

The HCM/HCS analysis method consistent with the methodology used in the Silva Valley Interchange PSR (Dowling, 2010) was used to evaluate US-50 ramp operations (merge-diverge) from Bass Lake Road to west of El Dorado Hills Blvd. Ramp merge-diverge LOS criteria are based on vehicle density expressed in passenger cars per mile per lane (pc/mi/ln) per hour. Per HCM, average on- and off-ramp speeds of 30 mph and 35 mph respectively were assumed. A peak hour factor of .92 was applied for this analysis.

For merge diverge areas, HCM LOS criteria for LOS A through LOS E reflects vehicle densities operating at stable flow, with no breakdowns within the merge influence area (defined as 1,500 ft downstream from ramp juncture) or diverge influence area (1,500 ft upstream from ramp juncture). LOS F conditions reflect unstable flow – turbulence that causes freeway speeds to drop below 35 mph within the merge-diverge influence area.

Using the methodology described above, a merge-diverge analysis was performed for the No-Build scenario. The results of this analysis are presented in **Table 4** and **Table 5**.

In 2030 AM peak hour, all ramp merge-diverge influence areas are projected to operate at level of service “D” or better with the exception of two merge areas in the westbound direction, such as Bass Lake Road to US 50 WB On-ramp and El Dorado Hills Blvd to US 50 WB On-ramp. These two merge sections will operate with unstable flow conditions, i.e. LOS F. All diverge-influence area are forecast to operate at LOS “D” or better

In the PM peak hour, merge sections in both directions are characterized by unstable flow conditions with LOS F conditions. The eastbound and westbound US-50 diverge sections are anticipated to be operating with stable flows (LOS D or better) with the exception of Bass Lake Rd EB off-ramp, which will function at LOS F

2030 No-Build Intersection and Ramp Analysis

Table 4: 2030 No-Build – Merge Analysis

Freeway-Ramp Components and Characteristics																							
				Freeway Data			On-Ramp Data			Terrain	Volume Composition			Results of Merge Area									
ID	Interchange	Direction (NB or SB)	Ramp Type (On or Off)	Number of Lanes on Freeway (Each Direction), N	S _{FF} (mph)	Volume (vph)	Side of Ramp (Left or Right)	S _{FR} (mph)	Volume, V _R (vph)	Lanes on Ramp, N	Type (Level, Rolling, Mountainous, Grade, Composite)	Percent Trucks and Buses on Freeway (%)	Percent Trucks and Buses on Ramp (%)	Percent Trucks and Buses on Adjacent Ramp (%)	Max. Downstream Freeway Flow, v (pc/h)	Max Desirable Flow Entering Influence Area, V _{R12} (pc/h)	Capacity Check: V _{F0} > Max.	Capacity Check: V _{R12} > Max.	Compute D _R (pc/mi/h)	M _s	Compute S _R (mph)	LOS	
AM Peak Hour																							
Non-Mitigated Conditions	Latrobe to US 50 EB ON	EB	On	3	70	2,769	Right	35	2005	1	Rolling	6%	6%	6%	7200	4600	No	No	26.7	0.4	58	C	
	EDH to US 50 WB ON	WB	On	3	70	3,528	Right	35	2979	1	Rolling	6%	6%	6%	7200	4600	No	Yes	43.9	1.3	35	F	
	Bass Lake to US 50 EB ON	EB	On	3	70	3,867	Right	35	708	1	Rolling	6%	6%	6%	7200	4600	No	No	27.5	0.4	59	C	
	Bass Lake to US 50 WB ON	WB	On	2	70	4,335	Right	35	1208	1	Level	6%	2%	6%	4800	4600	Yes	Yes	39.9	1.4	32	F	
PM Peak Hour																							
Non-Mitigated Conditions	Latrobe to US 50 EB ON	EB	On	3	70	4,965	Right	35	2619	1	Rolling	6%	6%	6%	7200	4600	Yes	Yes	43.7	2.3	6	F	
	EDH to US 50 WB ON	WB	On	3	70	3,797	Right	35	2541	1	Rolling	6%	6%	6%	7200	4600	No	Yes	41.8	1.0	42	F	
	Bass Lake to US 50 EB ON	EB	On	3	70	6,436	Right	35	774	1	Rolling	6%	6%	6%	7200	4600	Yes	Yes	40.9	0.9	46	F	
	Bass Lake to US 50 WB ON	WB	On	2	70	4,892	Right	35	571	1	level	6%	2%	6%	4800	4600	Yes	Yes	39.6	1.3	34	F	
Mitigated Conditions treats HOV, truck and auxiliary lanes as mixed flow lanes																							

Table 5: 2030 No-Build – Diverge Analysis

Freeway-Ramp Components and Characteristics																							
				Freeway Data			On-Ramp Data			Terrain	Volume Composition			Results of Merge Area									
ID	Interchange	Direction (NB or SB)	Ramp Type (On or Off)	Number of Lanes on Freeway (Each Direction), N	S _{FF} (mph)	Volume (vph)	Side of Ramp (Left or Right)	S _{FR} (mph)	Volume, V _R (vph)	Lanes on Ramp, N	Type (Level, Rolling, Mountainous, Grade, Composite)	Percent Trucks and Buses on Freeway (%)	Percent Trucks and Buses on Ramp (%)	Percent Trucks and Buses on Adjacent Ramp (%)	Max. Upstream, V _{F1} , or Downstream Freeway Flow, V _{F0} (pc/h)	Max Desirable Flow Entering Influence Area, V ₁₂ (pc/h)	Capacity Check: V _F > Max.	Capacity Check: V ₁₂ > Max.	Capacity Check: V _{F0} > Max.	Compute D _R (pc/mi/h)	D _s	Compute S _R (mph)	LOS
AM Peak Hour																							
Non-Mitigated Conditions	US 50 EB OFF to Latrobe/EDH	EB	Off	4	70	4,987	Right	35	2506	2	Rolling	6%	6%	6%	9600	4400	No	No	No	5.9	0.7	51.1	A
	US 50 WB OFF to EDH-Latrobe	WB	Off	4	70	5,404	Right	35	2120	1	Rolling	6%	6%	6%	9600	4400	No	No	No	24.0	0.6	52.2	C
	US 50 EB Off to Bass Lake	EB	Off	3	70	4,544	Right	35	765	1	Rolling	6%	6%	6%	7200	4400	No	No	No	28.1	0.5	55.9	D
	US 50 WB Off to Bass Lake	WB	Off	3	70	5,089	Right	35	852	1	level	6%	2%	6%	7200	4400	No	No	No	20.4	0.5	55.8	C
PM Peak Hour																							
Non-Mitigated Conditions	US 50 EB OFF to Latrobe/EDH	EB	Off	4	70	8,267	Right	35	3731	2	Rolling	6%	6%	6%	9600	4400	No	Yes	No	22.4	0.8	47.8	C
	US 50 WB OFF to EDH-Latrobe	WB	Off	4	70	5,398	Right	35	1809	1	Rolling	6%	6%	6%	9600	4400	No	No	No	22.4	0.6	53.0	C
	US 50 EB Off to Bass Lake	EB	Off	3	70	7,283	Right	35	957	1	Rolling	6%	6%	6%	7200	4400	Yes	Yes	No	39.2	0.5	55.4	F
	US 50 WB Off to Bass Lake	WB	Off	3	70	5,712	Right	35	926	1	level	6%	2%	6%	7200	4400	No	No	No	23.0	0.5	55.7	C
Mitigated Conditions treats HOV, truck and auxiliary lanes as mixed flow lanes																							