

OLYMPIA HILLS

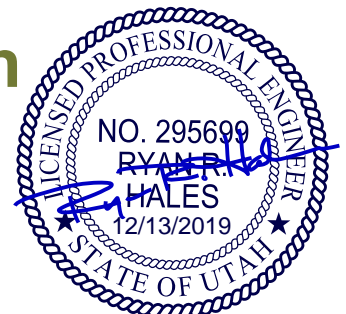
Traffic Impact Study



Salt Lake County, Utah

December 13, 2019

UT19-1472



EXECUTIVE SUMMARY

This study addresses the traffic impacts associated with the proposed Olympia Hills development located in Salt Lake County, Utah. The proposed project is located generally between 6400 West and Bacchus Highway on the east and west, and 12600 South and Herriman Highway on the north and south.

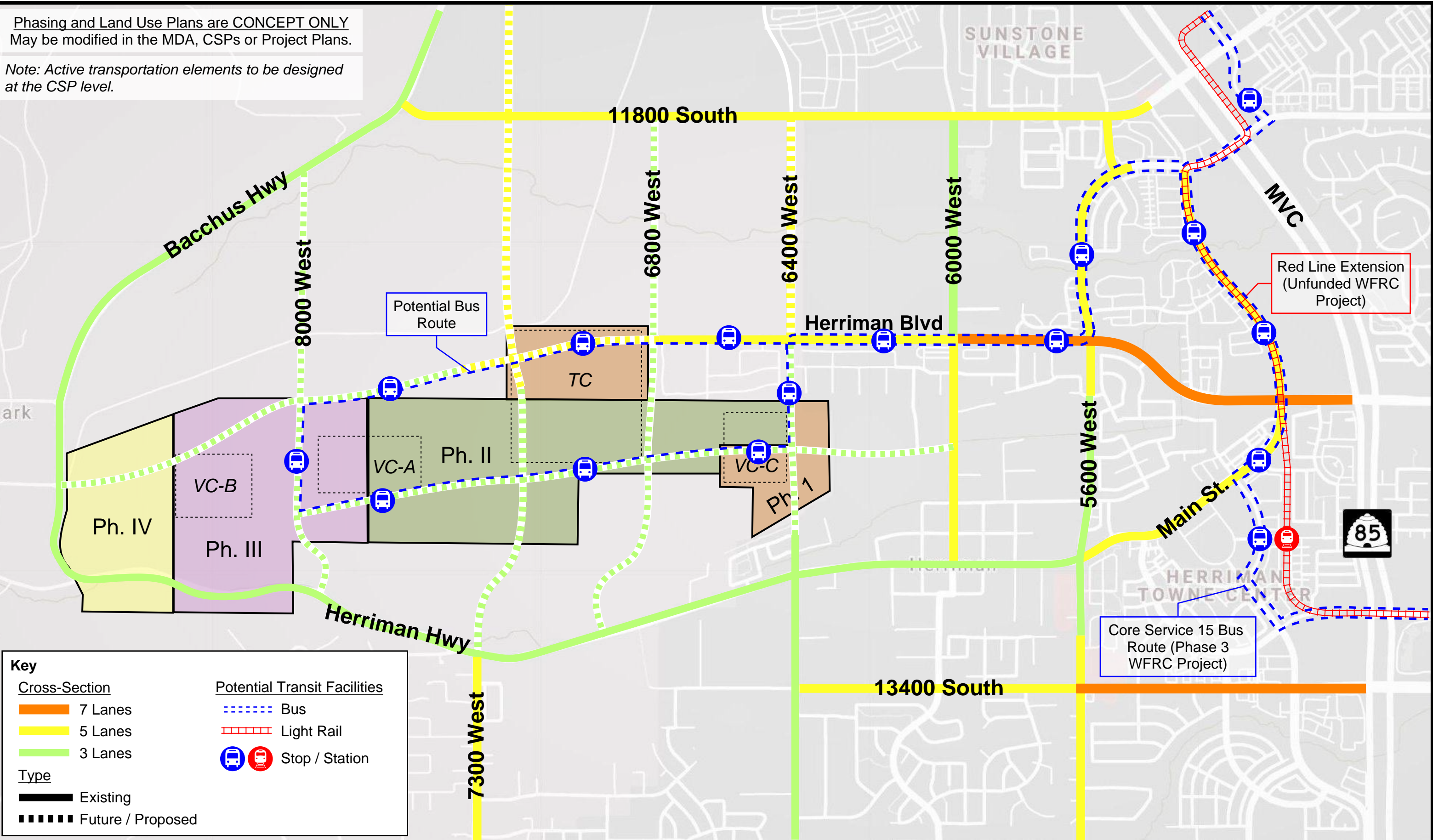
Included within the analyses for this study are the traffic operations and recommended mitigation measures for existing (2019) conditions at key intersections and roadways near the project site, and future background conditions starting in 2022 and in five-year increments thereafter. Plus project conditions (conditions after development of the proposed project) were analyzed starting in 2027 and in five-year increments thereafter.

The morning and evening peak hour levels of service (LOS) were computed for each study intersection. LOS A, B, C, and D were considered to be acceptable according to standard practice. When an intersection was anticipated to operate at LOS E or F or when there was excessive queueing, Hales Engineering made recommendations to improve the intersection. In each background and plus project scenario, Hales Engineering was able to mitigate all poor levels of service except for poor LOS at the Mountain View Corridor and Bangerter Highway intersections, which are under UDOT jurisdiction.

A map showing the proposed roadway and transit network is shown in Figure ES-1. A summary of the original and mitigated LOS results for each scenario is shown in Table ES-1. The recommended improvements by scenario are shown in Table ES-2. Additional improvement details are found in Appendix F.

Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.

Note: Active transportation elements to be designed
at the CSP level.



Intersection		Level of Service Results - Salt Lake County Olympia Hills TIS																																	Intersection #									
		Existing (2019)				Future (2022)				Future (2027)								Future (2032)								Future (2037)								Future (2042)										
		Background				Background				Background				Plus Project				Background				Plus Project				Background				Plus Project				Background				Plus Project						
		AM		PM		AM		PM		AM		PM		AM		PM		AM		PM		AM		PM		AM		PM		AM		PM		AM		PM								
		O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O		M	O	M						
1	Bacchus Hwy / 11800 S	a	-	a	-	a	-	c	-	f	D	f	D	D	-	D	-	D	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	1				
2	7300 W / 11800 S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	b	-	c	-	f	B	f	B	e	B	f	C	C	-	F	C	B	-	D	-	C	-	E	D	2		
3	6400 W / 11800 S	-	-	-	-	-	-	-	-	-	-	-	-	b	-	b	-	f	B	f	C	C	-	D	-	B	-	D	-	C	-	E	D	C	-	E	D	C	-	F	D	3		
4	6000 W / 11800 S	B	-	B	-	B	-	B	-	E	C	E	C	C	-	D	-	B	-	A	-	B	-	B	-	B	-	B	-	B	-	B	-	B	-	B	-	B	-	B	-	4		
5	Freedom Park Dr / 11800 S	B	-	B	-	B	-	C	-	D	-	D	-	C	-	D	-	B	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	5		
6	8000 W / Bacchus Hwy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	-	a	-	-	-	-	-	a	-	b	-	-	-	-	-	c	-	f	C	6		
7	Bingham Canyon / Bacchus Hwy	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	b	-	a	-	b	-	a	-	a	-	a	-	a	-	7		
8	6400 W / Herriman Blvd	-	-	-	-	-	-	-	-	-	-	-	-	a	-	b	-	d	-	c	-	C	-	D	-	f	B	f	B	C	-	D	-	B	-	B	-	C	-	D	-	8		
9	6000 W / Herriman Blvd	B	-	A	-	A	-	A	-	A	-	A	-	B	-	B	-	B	-	A	-	B	-	B	-	B	-	B	-	C	-	B	-	B	-	B	-	B	-	D	-	C	-	9
10	Anthem Park Blvd / Herriman Blvd	C	-	B	-	B	-	B	-	C	-	B	-	E	D	C	-	D	-	B	-	E	D	D	-	E	D	C	-	D	-	D	-	E	D	C	-	F	D	E	D	10		
11	Main St / Herriman Blvd	C	-	A	-	E	C	D	-	E	C	D	-	D	-	D	-	D	-	C	-	F	D	E	C	C	-	D	-	D	-	C	-	E	C	E	C	E	D	D	-	11		
12	SB MVC / 12600 S	C	-	C	-	E	D	E	C	E	D	E	D	E	D	E	C	E	-	F	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	12
13	NB MVC / 12600 S	C	-	C	-	C	-	C	-	D	-	D	-	D	-	F	C	D	-	F	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	13
14	Bangerter Hwy / 12600 S	D	-	F	C	C	-	E	D	C	-	D	-	C	-	F	D	C	-	C	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	14
15	Silver Sky Dr / 6000 W	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	15
16	Butterfield Cnyn / Herriman Hwy	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	a	-	16
17	8000 W / Herriman Hwy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	-	a	-	-	-	-	-	a	-	b	-	-	-	-	-	c	-	f	C	17		
18	7300 W / Herriman Hwy	a	-	a	-	a	-	a	-	a	-	a	-	a	-	b	-	b	-	b	-	c	-	d	-	f	B	f	C	D	-	E	D	C	-	C	-	F	C	F	C	18		
19	6800 W / Herriman Hwy	-	-	-	-	-	-	-	-	-	-	-	-	a	-	b	-	-	-	-	-	b	-	f	B	-	-	-	-	C	-	D	-	-	-	-	-	C	-	C	-	19		
20	6400 W / Main St	b	-	c	-	c	-	c	-	d	-	f	B	C	-	F	C	C	-	C	-	C	-	F	D	C	-	C	-	C	-	F	D	C	-	F	C	D	-	E	D	20		
21	5600 W / Main St	B	-	C	-	B	-	B	-	B	-	C	-	B	-	C	-	B	-	B	-	B	-	D	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	C	-	21
22	6400 W / 13400 S	B	-	B	-	B	-	D	-	B	-	F	B	B	-	B	-	B	-	C	-	E	D	D	-	C	-	C	-	C	-	E	C	C	-	F	C	C	-	D	-	22		
23	5600 W / 13400 S	C	-	D	-	C	-	D	-	C	-	F	D	C	-	E	D	D	-	D	-	D	-	F	D	D	-	F	D	C	-	D	-	C	-	D	-	C	-	E	D	23		
24	5000 W / 13400 S	C	-	C	-	C	-	B	-	D	-	C	-	C	-	C	-	F	C	C	-	D	-	E	C	D	-	D	-	C	-	C	-	D	-	D	-	C	-	D	-	24		
25	SB MVC / 13400 S	E	D	D	-	D	-	D	-	E	C	D	-	C	-	C	-	F	-	D	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	25
26	NB MVC / 13400 S	E	C	D	-	D	-	E	D	E	B	E	-	B	-	D	-	F	-	F	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	n/a	-	26
27	8000 W / Herriman Blvd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	-	a	-	-	-	-	-	a	-	b	-	-	-	-	-	c	-	f	C	27		
28	7300 W / Herriman Blvd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	a	-	c	-	f	B	f	D	b	-	f	D	C	-	F	D	C	-	f	C	C	-	F	C	28		
29	6800 W / Herriman Blvd	-	-	-	-	-	-	-	-	-	-	-	-	a	-	a	-	-	-	-	-	f	B	f	C	-	-	-	-	C	-	D	-	-	-	-	-	D	-	D	-	29		
30	Silver Sky Dr / 6400 W	-	-	-	-	-	-	-	-	-	-	-	-	a	-	a	-	-	-	-	-	d	-	c	-	-	-	-	-	c	-	c	-	-	-	-	-	d	-	d	-	30		

Lowercase LOS = Unsignalized Intersection
Uppercase LOS = Signalized Intersection

O = Original Analysis
M = Mitigated Analysis

Notes:
- LOS A, B, C, and D are acceptable levels of service
- LOS E and F are unacceptable levels of service

Intersection		Recommended Improvements									
		2019	2022	2027		2032		2037		2042	
		BG	BG	BG	PP	BG	PP	BG	PP	BG	PP
1	Bacchus Hwy / 11800 S			1.1		1.2					
2	7300 W / 11800 S						2.1	2.2	2.3		2.4
3	6400 W / 11800 S					3.1	3.2	3.3	3.4	3.5	3.6
4	6000 W / 11800 S			4.1							
5	Freedom Park Dr / 11800 S				5.1						
6	8000 W / Bacchus Hwy										6.1
8	6400 W / Herriman Blvd						8.1	8.2	8.3		
10	Anthem Park Blvd / Herriman Blvd				10.1		10.2	10.3		10.4	10.5
11	Main St / Herriman Blvd		11.1	11.2	11.3		11.4			11.5	11.6
12	SB MVC / 12600 S		S.4	12.1	12.2	12.3					
13	NB MVC / 12600 S				13.1	13.2					
14	Bangerter Hwy / 12600 S	14.1	14.2		13.1						
17	8000 W / Herriman Hwy										17.1
18	7300 W / Herriman Hwy						18.1	18.2	20.4		18.3
19	6800 W / Herriman Hwy						19.1				
20	6400 W / Main St			20.1	20.2		20.3		20.4	20.5	20.6
22	6400 W / 13400 S			22.1			22.2		22.3	22.4	
23	5600 W / 13400 S			23.1	23.2		23.3	23.4			23.5
24	5000 W / 13400 S					25.2	24.1				
25	SB MVC / 13400 S	S.6		25.1		25.2					
26	NB MVC / 13400 S	S.6	S.7	26.1		S.18					
27	8000 W / Herriman Blvd										27.1
28	7300 W / Herriman Blvd						28.1	28.2	28.3	28.4	28.5
29	6800 W / Herriman Blvd						29.1				
-	11800 South					S.1					
-	Herriman Boulevard					S.2					S.3
-	12600 South		S.4								
-	Herriman Highway					S.5					
-	13400 South	S.6	S.7				S.8	S.9			
-	7300 West					S.10		S.11	S.12	S.13	
-	6400 West					S.14					S.15
-	6000 West					S.16					
-	MVC			S.17	S.18	S.18					

Key: BG=Background, PP=Plus Project

Improvement List			
#	Description	#	Description
1.1	Signal, Turn Pockets on All Approaches, Dual SB LT Lanes	20.3	Add RT Pockets on All Approaches, NB & SB PM/PT LT Phasing, EB RT Overlap Phase
1.2	NB RT Lane	20.4	PM/PT LT Phasing on All Approaches
2.1	Signal, Turn Pockets on All Approaches	20.5	EB & WB RT Lanes
2.2	Signal, Turn Pockets on All Approaches	20.6	NB Dual LT Lanes, EB Channelized RT Lane
2.3	PM/PT LT Phasing on All Approaches	22.1	SB & EB LT/T/RT Lanes
2.4	NB & WB Dual Left Turn Lanes	22.2	SB & WB Dual LT Lanes, WB RT Overlap Phase
3.1	Signal, Turn Pockets on All Approaches, EB & WB PM/PT LT Phasing	22.3	WB Dual LT Lanes
3.2	EB & WB RT Lanes, NB PM/PT LT Phasing	22.4	Extend SB LT Lane, WB Dual LT Lanes
3.3	EB Dual LT Lanes, NB & SB PM/PT LT Phasing	23.1	SB & WB Dual LT Lanes, Add SB Thru Lane
3.4	PM/PT LT Phasing on All Approaches, NB Dual LT Lanes	23.2	Extend Turn Lanes on All Approaches, Add WB RT Overlap Phase, Convert NB RT Lane to Shared T/RT Lane
3.5	EB & WB RT Lanes	23.3	Add RT Lanes on All Approaches
3.6	Add SB Thru Lane, Convert NB RT Lane to Shared T/RT Lane, SB RT Overlap Phase	23.4	Extend All Turn Lanes, SB & EB RT Lanes, 2 Thru Lanes on All Approaches
4.1	WB PM/PT LT Phasing, Extend WB LT Storage	23.5	EB Dual LT Lanes, Convert EB RT Lane to Shared T/RT Lane
5.1	WB Dual LT Lanes	24.1	Add WB RT Lane
6.1	Signal, Turn Pockets on All Approaches	25.1	Freeway Grade- Separated Interchange
8.1	Signal, Turn Pockets on All Approaches, EB & WB PM/PT LT Phasing	25.2	Channelized EB/WB RT Lanes, Extend 3 EB Lanes to 5000 W
8.2	Signal, Turn Pockets on All Approaches	26.1	Freeway Grade- Separated Interchange, Northbound Free RT Lane
8.3	PM/PT LT Phasing on All Approaches	27.1	Signal, Turn Pockets on All Approaches
10.1	WB RT Pocket, Extend LT Lanes on All Approaches	28.1	Signal, Turn Pockets on All Approaches
10.2	Convert NB RT to Shared T/RT	28.2	Signal, Turn Pockets on All Approaches
10.3	EB Dual LT Lanes	28.3	PM/PT LT Phasing on All Approaches
10.4	EB & WB RT Lanes	28.4	RT Lanes on All Approaches, PM/PT LT Phasing on All Approaches
10.5	NB & WB Dual LT Lanes, Extend NB LT Lane, Convert NB & SB RT Lanes to Shared T/RT Lanes	28.5	SB EB & WB Dual LT Lanes, WB Channelized RT Lane, Add NB/SB Thru Lanes, Convert EB RT Lane to Share Thru/RT Lane
11.1	NB Channelized RT Lane	29.1	Signal, Turn Pockets on All Approaches, EB PM/PT LT Phasing
11.2	SB Dual LT Lanes	S.1	11800 South: 5-Lane Cross Section Bacchus to 6000 West
11.3	WB Dual LT Lanes	S.2	Herriman Boulevard: 5-Lane Cross Section 6000 West to 6800 West, New 3-Lane Cross Section 6800 West to Bacchus
11.4	Additional NB Thru lane, Convert EB RT to Shared T/RT	S.3	Herriman Boulevard: 7-Lane Cross Section Main to 6000 West, 5-Lane Cross Section 6800 West to 7300 West
11.5	2 NB Thru Lanes, WB Dual LT Lanes, Lengthen SB LT Lanes	S.4	12600 South: Additional Lane Each Direction Main to BH, Three EB Lanes through BH Interchange, WB Lane Trap Right at BH Interchange
11.6	EB RT Lane, Add WB Thru Lane	S.5	Herriman Highway: 3-Lane Cross Section 6200 West to 7300 West
12.1	SB & WB Dual LT Lanes	S.6	13400 South: Extend Three EB Thru Lanes West Through MVC
12.2	Freeway Grade- Separated Interchange	S.7	13400 South: Additional Westbound Lane MVC to 5000 West
12.3	Channelized EB & WB RT Lanes	S.8	13400 South: 7-Lane Cross Section 5000 West to 5600 West, 5-Lane Cross Section 5600 West to 6400 West
13.1	Freeway Grade- Separated Interchange, Additional WB Thru Lane, Channelized EB/WB RT Lanes	S.9	13400 South: 5-Lane Cross Section 5600 West to 6000 West
13.2	Channelized EB & WB RT Lanes, Convert NB Thru lane to be Shared T/LT Lane	S.10	7300 West: New 3-Lane Cross Section Herriman Hwy to Herriman Blvd, New 3-Lane Cross Section Herriman Blvd to 10400 S
14.1	SPUI	S.11	7300 West: 3-Lane Cross Section South of Herriman Highway
14.2	Additional LT Lane on NB Off Ramp	S.12	7300 West: 5-Lane Cross Section North of Herriman Boulevard
17.1	Signal, Turn Pockets on All Approaches	S.13	7300 West: 5-Lane Cross Section South of Herriman Highway
18.1	Add WB RT Lane	S.14	6400 West: New 3-Lane Cross Section 10400 South to Main
18.2	Signal, Turn Pockets on All Approaches	S.15	6400 West: 5-Lane Cross Section 11800 S to Herriman Blvd
18.3	SB RT Lane, SB Dual LT Lanes, PM/PT LT Phasing on All Approaches	S.16	6000 West: 5-Lane Cross Section Herriman Blvd to Main
19.1	Signal, Turn Pockets on All Approaches	S.17	MVC: Add Frontage Road Lane NB & SB South of 13400 South
20.1	Signal, Turn Pockets on All Approaches	S.18	MVC Freeway Needed
20.2	WB PM/PT LT Phasing, Add EB RT Pocket		

Sources: Hales Engineering, WFRC RTP, MVC Interactive Map

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
TABLE OF CONTENTS.....	v
LIST OF TABLES	vii
LIST OF FIGURES.....	viii
I. INTRODUCTION	1
A. Purpose	1
B. Scope	2
C. Analysis Methodology.....	2
II. EXISTING (2019) BACKGROUND CONDITIONS	6
A. Purpose	6
B. Roadway System.....	6
C. Traffic Volumes.....	7
D. Level of Service Analysis.....	8
E. Queuing Analysis.....	12
F. Mitigation Measures	13
III. FUTURE (2022) BACKGROUND CONDITIONS	15
A. Purpose	15
B. Roadway Network	15
C. Traffic Volumes.....	15
D. Level of Service Analysis.....	18
E. Queuing Analysis.....	18
F. Mitigation Measures	21
IV. FUTURE (2027) BACKGROUND CONDITIONS	23
A. Purpose	23
B. Roadway Network	23
C. Traffic Volumes.....	23
D. Level of Service Analysis.....	26
E. Queuing Analysis.....	26
F. Mitigation Measures	29
V. PROJECT CONDITIONS.....	33
A. Purpose	33
B. Project Description	33
C. Trip Generation.....	34
D. Trip Distribution and Assignment.....	35
VI. FUTURE (2027) PLUS PROJECT CONDITIONS	45
A. Purpose	45
B. Traffic Volumes.....	45
C. Level of Service Analysis.....	45
D. Queuing Analysis.....	50
E. Mitigation Measures	51
VII. FUTURE (2032) BACKGROUND CONDITIONS	53
A. Purpose	53

B.	Roadway Network	53
C.	Traffic Volumes.....	53
D.	Level of Service Analysis.....	54
E.	Queuing Analysis.....	54
F.	Mitigation Measures	60
VIII.	FUTURE (2032) PLUS PROJECT CONDITIONS	61
A.	Purpose	61
B.	Traffic Volumes.....	61
C.	Level of Service Analysis.....	61
D.	Queuing Analysis.....	66
E.	Mitigation Measures	67
	FUTURE (2037) BACKGROUND CONDITIONS	69
A.	Purpose	69
B.	Roadway Network	69
C.	Traffic Volumes.....	69
D.	Level of Service Analysis.....	69
E.	Queuing Analysis.....	70
F.	Mitigation Measures	76
IX.	FUTURE (2037) PLUS PROJECT CONDITIONS	77
A.	Purpose	77
B.	Traffic Volumes.....	77
C.	Level of Service Analysis.....	77
D.	Queuing Analysis.....	82
E.	Mitigation Measures	83
X.	FUTURE (2042) BACKGROUND CONDITIONS	85
A.	Purpose	85
B.	Roadway Network	85
C.	Traffic Volumes.....	85
D.	Level of Service Analysis.....	85
E.	Queuing Analysis.....	86
F.	Mitigation Measures	92
XI.	FUTURE (2042) PLUS PROJECT CONDITIONS	93
A.	Purpose	93
B.	Traffic Volumes.....	93
C.	Level of Service Analysis.....	93
D.	Queuing Analysis.....	98
E.	Mitigation Measures	100

Appendix A: Turning Movement Counts

Appendix B: Project Phasing Plan

Appendix C: Trip Generation

Appendix D: LOS Results

Appendix E: Queuing Results

Appendix F: Recommended Improvements

LIST OF TABLES

Table 1: Level of Service Description	4
Table 2: Existing (2019) Background Morning Peak Hour Level of Service	11
Table 3: Existing (2019) Background Evening Peak Hour Level of Service	12
Table 4: Future (2022) Background Morning Peak Hour Level of Service	20
Table 5: Future (2022) Background Evening Peak Hour Level of Service	21
Table 6: Future (2027) Background Morning Peak Hour Level of Service	28
Table 7: Future (2027) Background Evening Peak Hour Level of Service	29
Table 8: Trip Generation Summary	35
Table 9: Future (2027) Plus Project Morning Peak Hour Level of Service	48
Table 10: Future (2027) Plus Project Evening Peak Hour Level of Service	49
Table 11: Future (2032) Background Morning Peak Hour Level of Service	58
Table 12: Future (2032) Background Evening Peak Hour Level of Service	59
Table 13: Future (2032) Plus Project Morning Peak Hour Level of Service	64
Table 14: Future (2032) Plus Project Evening Peak Hour Level of Service	65
Table 15: Future (2037) Background Morning Peak Hour Level of Service	74
Table 16: Future (2037) Background Evening Peak Hour Level of Service	75
Table 17: Future (2037) Plus Project Morning Peak Hour Level of Service	80
Table 18: Future (2037) Plus Project Evening Peak Hour Level of Service	81
Table 19: Future (2042) Background Morning Peak Hour Level of Service	90
Table 20: Future (2042) Background Evening Peak Hour Level of Service	91
Table 21: Future (2042) Plus Project Morning Peak Hour Level of Service	96
Table 22: Future (2042) Plus Project Evening Peak Hour Level of Service	97

LIST OF FIGURES

Figure 1: Vicinity map showing the project location in Salt Lake County, Utah	1
Figure 2: Visual representation of the LOS letter designations	5
Figure 3: Existing (2019) background morning peak hour traffic volumes.....	9
Figure 4: Existing (2019) background evening peak hour traffic volumes	10
Figure 5: Future (2022) background morning peak hour volumes.....	16
Figure 6: Future (2022) background evening peak hour volumes	17
Figure 7: Future (2027) background morning peak hour volumes.....	24
Figure 8: Future (2027) background evening peak hour volumes	25
Figure 9: Trip distribution summary	36
Figure 10: Phase I (2027) trip assignment for the morning peak hour	37
Figure 11: Phase I (2027) trip assignment for the evening peak hour.....	38
Figure 12: Phase II (2032) trip assignment for the morning peak hour	39
Figure 13: Phase II (2032) trip assignment for the evening peak hour.....	40
Figure 14: Phase III (2037) trip assignment for the morning peak hour	41
Figure 15: Phase III (2037) trip assignment for the evening peak hour.....	42
Figure 16: Phase IV (2042) trip assignment for the morning peak hour	43
Figure 17: Phase IV (2042) trip assignment for the evening peak hour	44
Figure 18: Future (2027) plus project morning peak hour volumes	46
Figure 19: Future (2027) plus project evening peak hour volumes	47
Figure 20: Future (2032) background morning peak hour volumes.....	56
Figure 21: Future (2032) background evening peak hour volumes	57
Figure 22: Future (2032) plus project morning peak hour volumes.....	62
Figure 23: Future (2032) plus project evening peak hour volumes	63
Figure 24: Future (2037) background morning peak hour volumes.....	72
Figure 25: Future (2037) background evening peak hour volumes	73
Figure 26: Future (2037) plus project morning peak hour volumes.....	78
Figure 27: Future (2037) plus project evening peak hour volumes	79
Figure 28: Future (2042) background morning peak hour volumes.....	88
Figure 29: Future (2042) background evening peak hour volumes.....	89
Figure 30: Future (2042) plus project morning peak hour volumes.....	94
Figure 31: Future (2042) plus project evening peak hour volumes	95

I. INTRODUCTION

A. Purpose

This study addresses the traffic impacts associated with the proposed Olympia Hills development located in Salt Lake County, Utah. The proposed project is located generally between 6400 West and Bacchus Highway on the east and west, and 12600 South and Herriman Highway on the north and south. Figure 1 shows a vicinity map of the proposed development.

Included within the analyses for this study are the traffic operations and recommended mitigation measures for existing (2019) conditions at key intersections and roadways near the project site, and future background conditions starting in 2022 and in five-year increments thereafter. Plus project conditions (conditions after development of the proposed project) were analyzed starting in 2027 and in five-year increments thereafter.



Figure 1: Vicinity map showing the project location in Salt Lake County, Utah

B. Scope

The study area was defined based on conversations with Salt Lake County staff. This study was scoped to evaluate the traffic operational performance impacts of the project on the following intersections:

- Bacchus Highway / 11800 South
- 6000 West / 11800 South
- Freedom Park Drive / 11800 South
- Bingham Canyon Mine / Bacchus Highway
- 6000 West / Herriman Boulevard
- Anthem Park Boulevard / Herriman Boulevard
- Main Street / Herriman Boulevard / 12600 South
- Mountain View Corridor (SR-85) / 12600 South
- Bangerter Highway (SR-154) / 12600 South
- Silver Sky Drive / 6000 West
- Butterfield Canyon Road / Herriman Highway / Bacchus Highway
- 7300 West / Herriman Highway
- 6400 West / Main Street
- 5600 West / Main Street
- 6400 West / 13400 South
- 5600 West / 13400 South
- 5000 West / 13400 South
- Mountain View Corridor (SR-85) / 13400 South

C. Analysis Methodology

Level of service (LOS) is a term that describes the operating performance of an intersection or roadway. LOS is measured quantitatively and reported on a scale from A to F, with A representing the best performance and F the worst. Table 1 provides a brief description of each LOS letter designation and an accompanying average delay per vehicle for both signalized and unsignalized intersections. Figure 2 provides a visual representation of each LOS letter designation.

The *Highway Capacity Manual* (HCM), 6th Edition, 2016 methodology was used in this study to remain consistent with “state-of-the-practice” professional standards. This methodology has different quantitative evaluations for signalized and unsignalized intersections. For signalized and all-way stop intersections, the LOS is provided for the overall intersection (weighted average of all approach delays). For all other unsignalized intersections, LOS is reported based on the worst approach.



Using Synchro/SimTraffic software, which follow the HCM methodology, the peak hour LOS was computed for each study intersection. Multiple runs of SimTraffic were used to provide a statistical evaluation of the interaction between the intersections. The detailed LOS reports are provided in Appendix D. Hales Engineering also calculated the 95th percentile queue lengths for each of the study intersections using SimTraffic. The detailed queue length reports are provided in Appendix E.

Table 1: Level of Service Description

Level of Service	Description of Traffic Conditions	Average Delay (seconds/vehicle)
Signalized Intersections		Overall Intersection
A	Extremely favorable progression and a very low level of control delay. Individual users are virtually unaffected by others in the traffic stream.	$0 \leq 10.0$
B	Good progression and a low level of control delay. The presence of other users in the traffic stream becomes noticeable.	$> 10.0 \text{ and } \leq 20.0$
C	Fair progression and a moderate level of control delay. The operation of individual users becomes somewhat affected by interactions with others in the traffic stream.	$>20.0 \text{ and } \leq 35.0$
D	Marginal progression with relatively elevated levels of control delay. Operating conditions are noticeably more constrained.	$> 35.0 \text{ and } \leq 55.0$
E	Poor progression with unacceptably elevated levels of control delay. Operating conditions are at or near capacity.	$> 55.0 \text{ and } \leq 80.0$
F	Unacceptable progression with forced or breakdown operating conditions.	> 80.0
Unsignalized Intersections		Worst Approach
A	Free Flow / Insignificant Delay	$0 \leq 10.0$
B	Stable Operations / Minimum Delays	$>10.0 \text{ and } \leq 15.0$
C	Stable Operations / Acceptable Delays	$>15.0 \text{ and } \leq 25.0$
D	Approaching Unstable Flows / Tolerable Delays	$>25.0 \text{ and } \leq 35.0$
E	Unstable Operations / Significant Delays Can Occur	$>35.0 \text{ and } \leq 50.0$
F	Forced Flows / Unpredictable Flows / Excessive Delays Occur	> 50.0

Source: Hales Engineering Descriptions, based on the *Highway Capacity Manual* (HCM), 6th Edition, 2016 Methodology (Transportation Research Board)

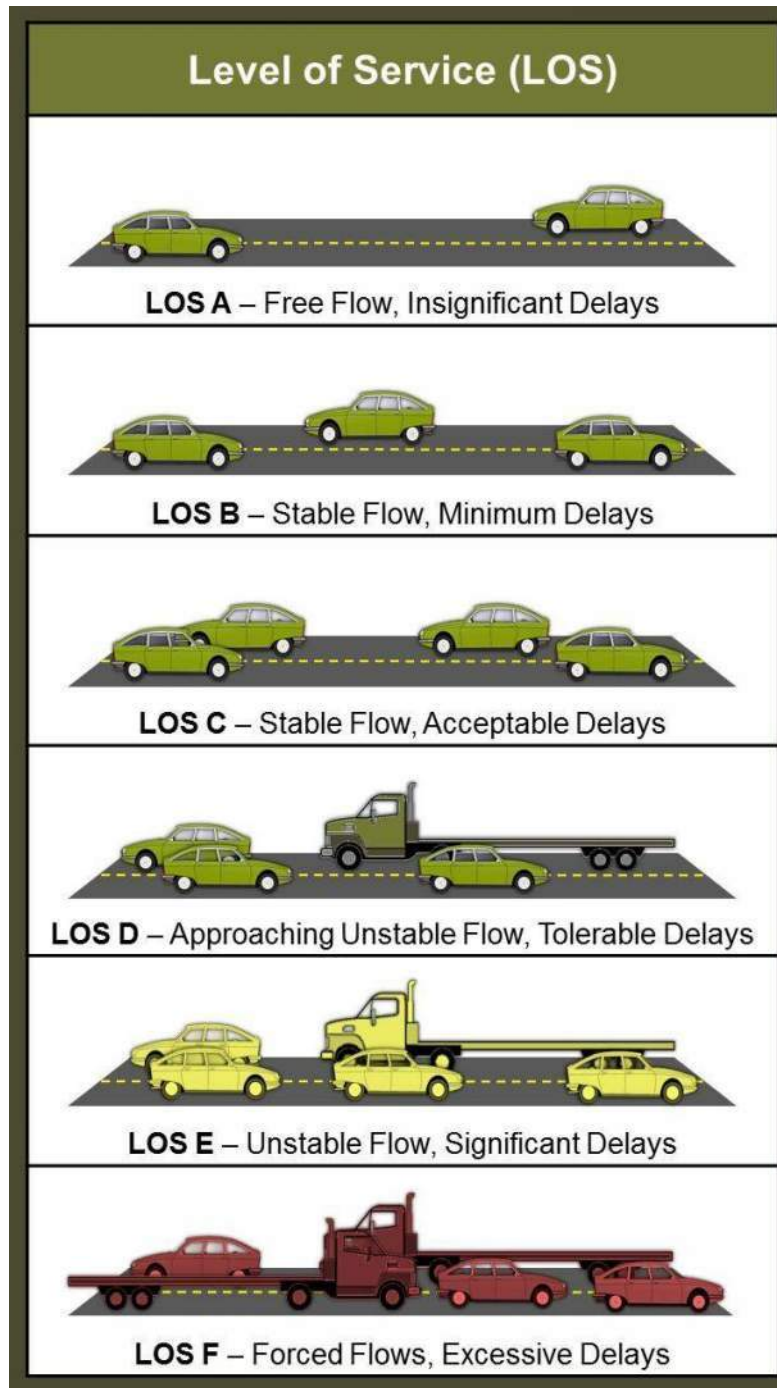


Figure 2: Visual representation of the LOS letter designations

II. EXISTING (2019) BACKGROUND CONDITIONS

A. Purpose

The purpose of the background analysis is to study the intersections and roadways during the peak travel periods of the day with background traffic and geometric conditions. Through this analysis, background traffic operational deficiencies can be identified, and potential mitigation measures recommended. This analysis provides a baseline condition that may be compared to the build conditions to identify the impacts of the development.

B. Roadway System

The primary roadways that will provide access to the project site are described below:

11800 South – is a city-maintained (South Jordan/Herriman) roadway that runs east/west between Bacchus Highway and Mountain View Corridor (SR-85). 11800 South currently consists of a five-lane cross section east of 6000 West, and a two-lane cross section west of 6000 West. The posted speed limit is 35 mph in the study area.

According to Wasatch Choice 2050, the regional transportation plan (RTP) published in 2019 by the Wasatch Front Regional Council (WFRC), 11800 South between 6000 West and Bacchus Highway is planned to be widened to five lanes. This is planned as a Phase 1 (2019-2030) project.

Herriman Boulevard – is a city-maintained (Herriman) roadway that currently extends west from Mountain View Corridor (SR-85) at 12600 South and currently terminates at approximately 6800 West. Herriman Boulevard consists of a five-lane cross section east of 6000 West, and a three-lane cross section west of 6000 West. The posted speed limit is 40 mph in the study area.

According to the WFRC RTP, Herriman Boulevard is planned to be extended west to connect to Bacchus Highway. This is planned as a Phase 1 (2019-2030) project.

Herriman Highway/Main Street – is a county/city-maintained (Salt Lake County/Herriman) roadway that runs east/west between Bacchus Highway and Herriman Boulevard (12600 South near Mountain View Corridor (SR-85)). The roadway consists of a two-lane cross section between Bacchus Highway and approximately 6200 West, a three-lane cross section between 6200 West and 5600 West, and a five-lane cross section between 5600 West and Herriman Boulevard (12600 South). The posted speed limit is 35 mph east of 5600 West and 30 mph west of 5600 West.

The segment of Main street between Herriman Boulevard (12600 South) and Anthem Park Boulevard is planned to be completed by the end of 2019.

Bacchus Highway – is a north/south route that spans the entire west bench of the Salt Lake Valley, connecting to SR-201 on the north and Herriman Highway on the south. Bacchus Highway is a county-maintained (Salt Lake County) roadway within the study area. The roadway consists of a two-lane cross section and the posted speed limit is 50 mph within the study area.

Although no formal plan has been adopted, there are talks at the County level about realigning Bacchus Highway south of Old Bingham Highway through the study area. For this study it was assumed that the New Bacchus Highway would deviate from the current alignment near the Trans Jordan Landfill, follow a generally north/south route, and connect to Herriman Highway at 7300 West. It was also assumed that the existing Bacchus Highway would remain and will be referred to in this study as the Old Bacchus Highway once the new alignment is completed.

Other roadways included in this study are described below:

Mountain View Corridor (SR-85) – is a state-maintained roadway (classified by UDOT access management standards as a “Freeway – One-Way Frontage Road” facility, or access category 10 roadway). Mountain View Corridor (SR-85) has two travel lanes in each direction with left- and right-turn lanes at intersections. The north- and southbound lanes are currently separated by a wide median. In the future, a freeway facility will be constructed in this median resulting in a freeway/frontage road system. As identified and controlled by UDOT, a “Freeway – One-Way Frontage Road” access classification identifies minimum signalized intersection spacing of one-quarter mile (1,320 feet), minimum unsignalized street spacing of 660 feet. The posted speed limit on Mountain View Corridor (SR-85) is 55 mph in the study area.

Bangerter Highway (SR-154) – is a state-maintained roadway (classified by UDOT access management standards as a “Freeway/Interstate System” facility, or access category 1 roadway). Bangerter Highway (SR-154) has three travel lanes in each direction with left- and right-turn lanes at intersections and the posted speed limit is 60 mph in the study area. North- and southbound traffic are separated by a raised center median and access is currently limited to signalized intersections or interchanges at major cross streets. According to the WFRC RTP, five at-grade intersections on Bangerter Highway (SR-154) are planned to be converted to grade-separated interchanges as Phase 1 (2019-2030) projects, including at 12600 South.

C. Traffic Volumes

Weekday morning (7:00 to 9:00 a.m.) and evening (4:00 to 6:00 p.m.) peak period traffic counts were performed at the following intersections:

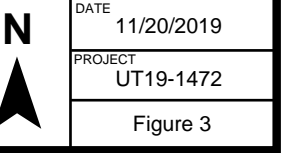
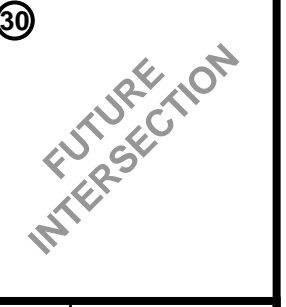
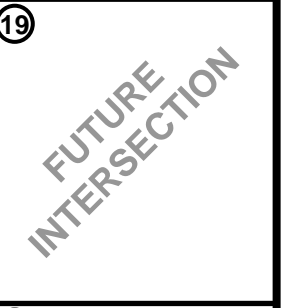
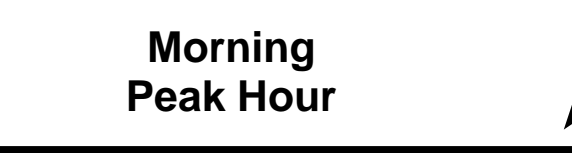
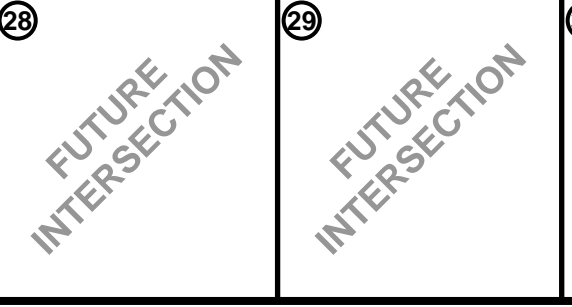
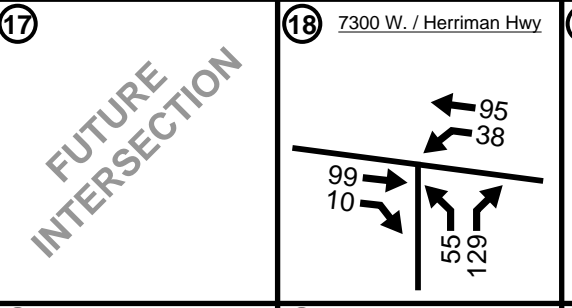
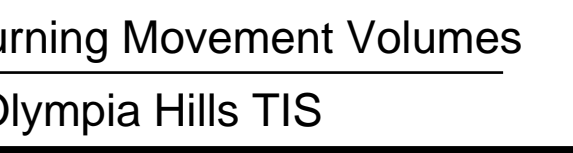
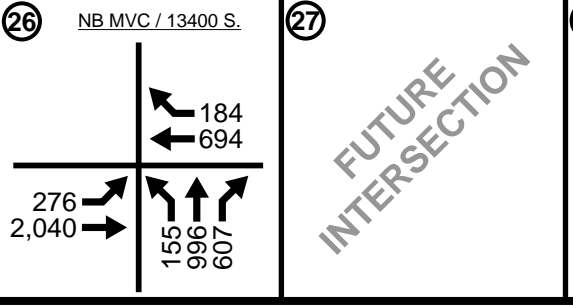
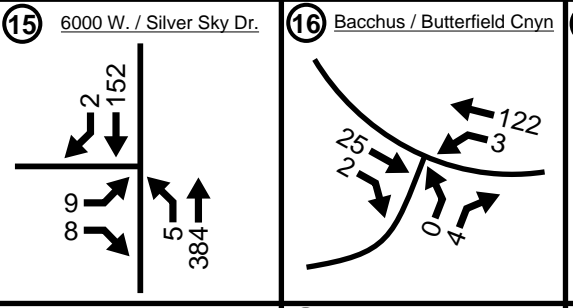
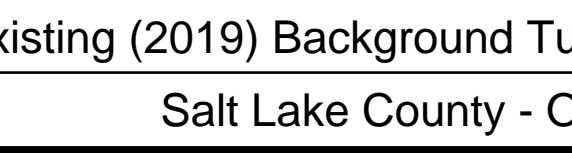
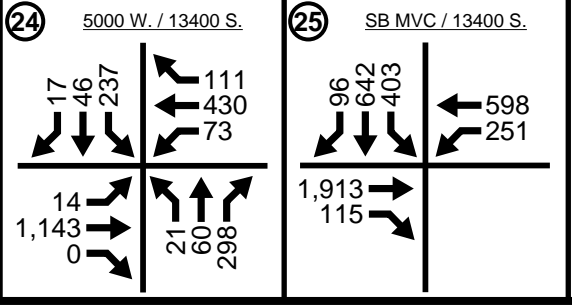
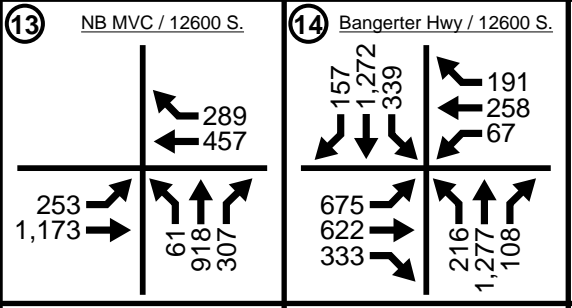
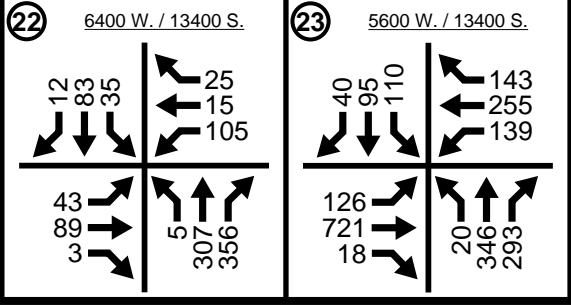
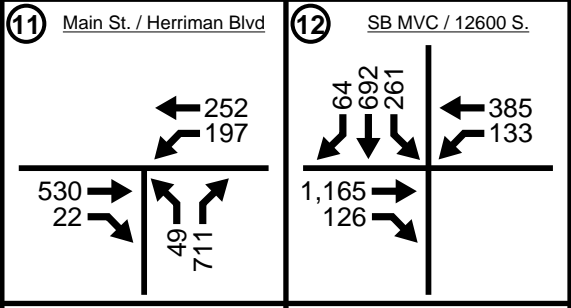
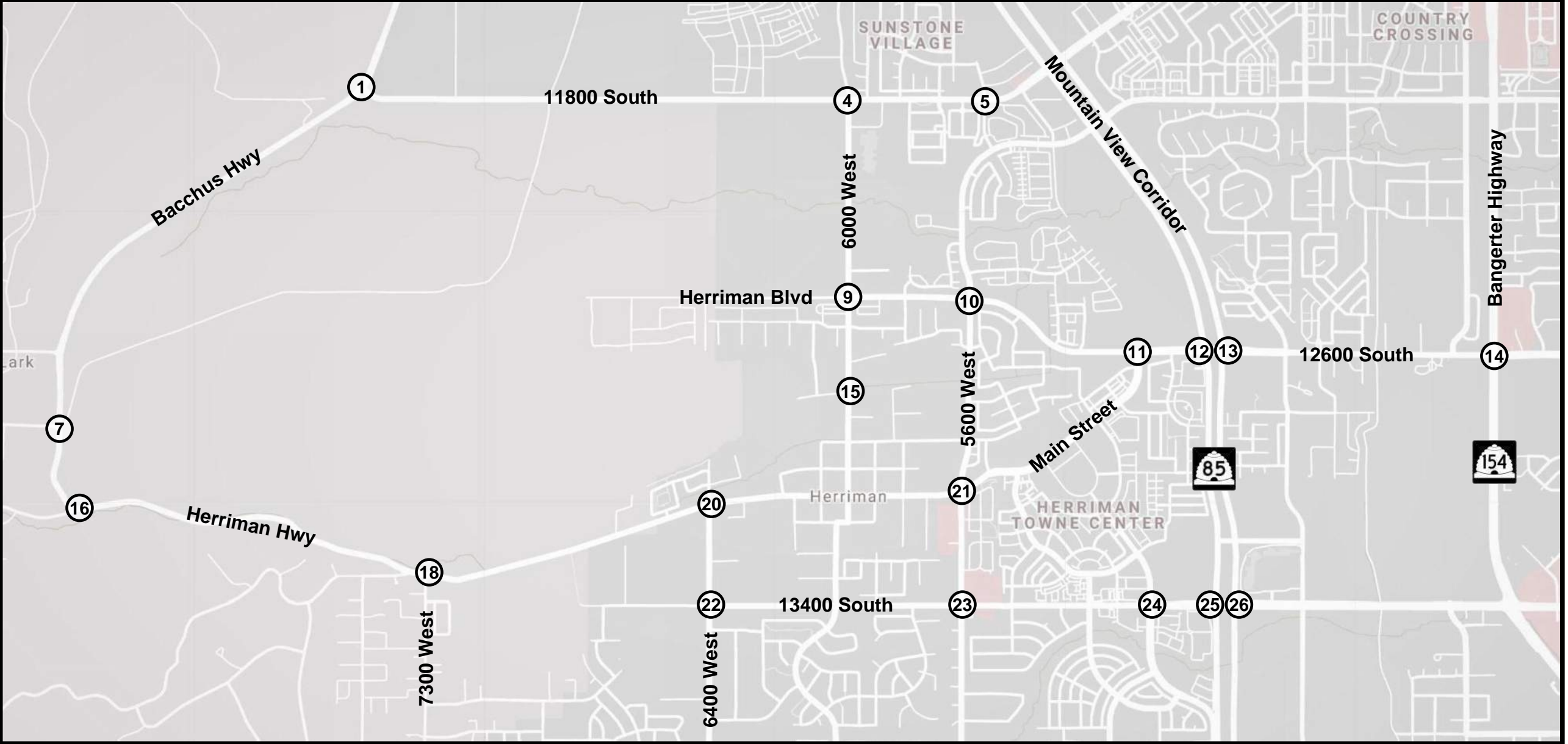
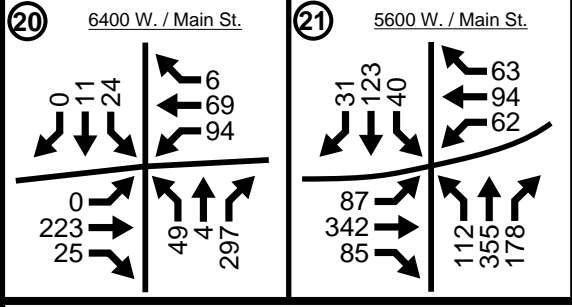
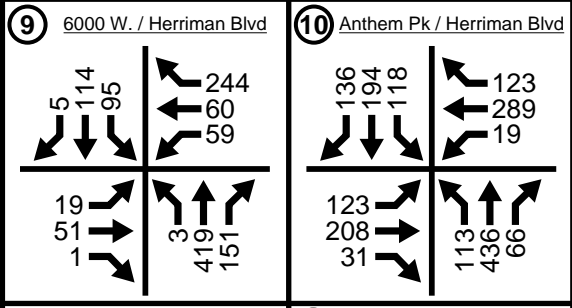
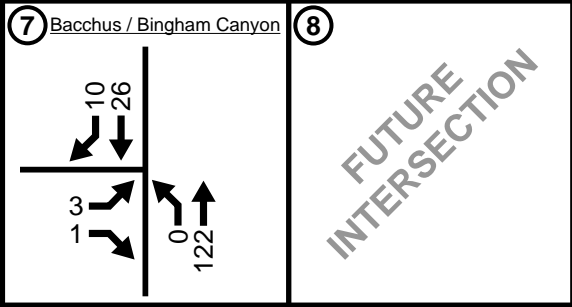
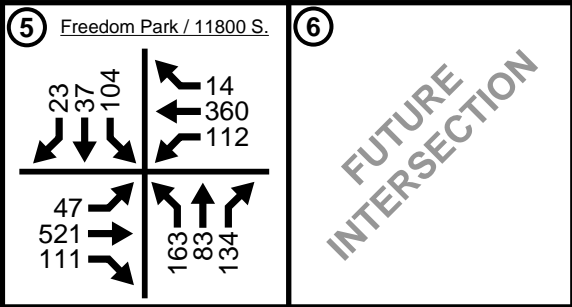
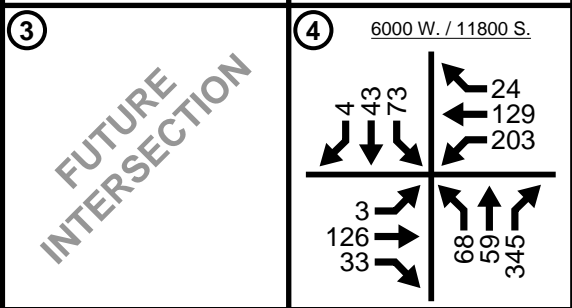
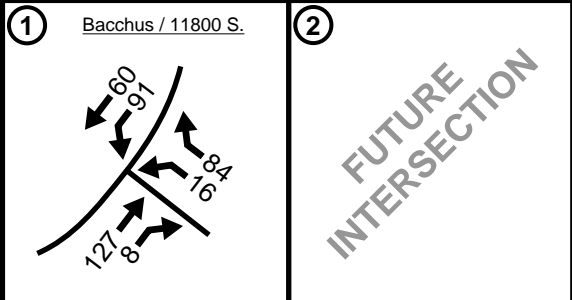
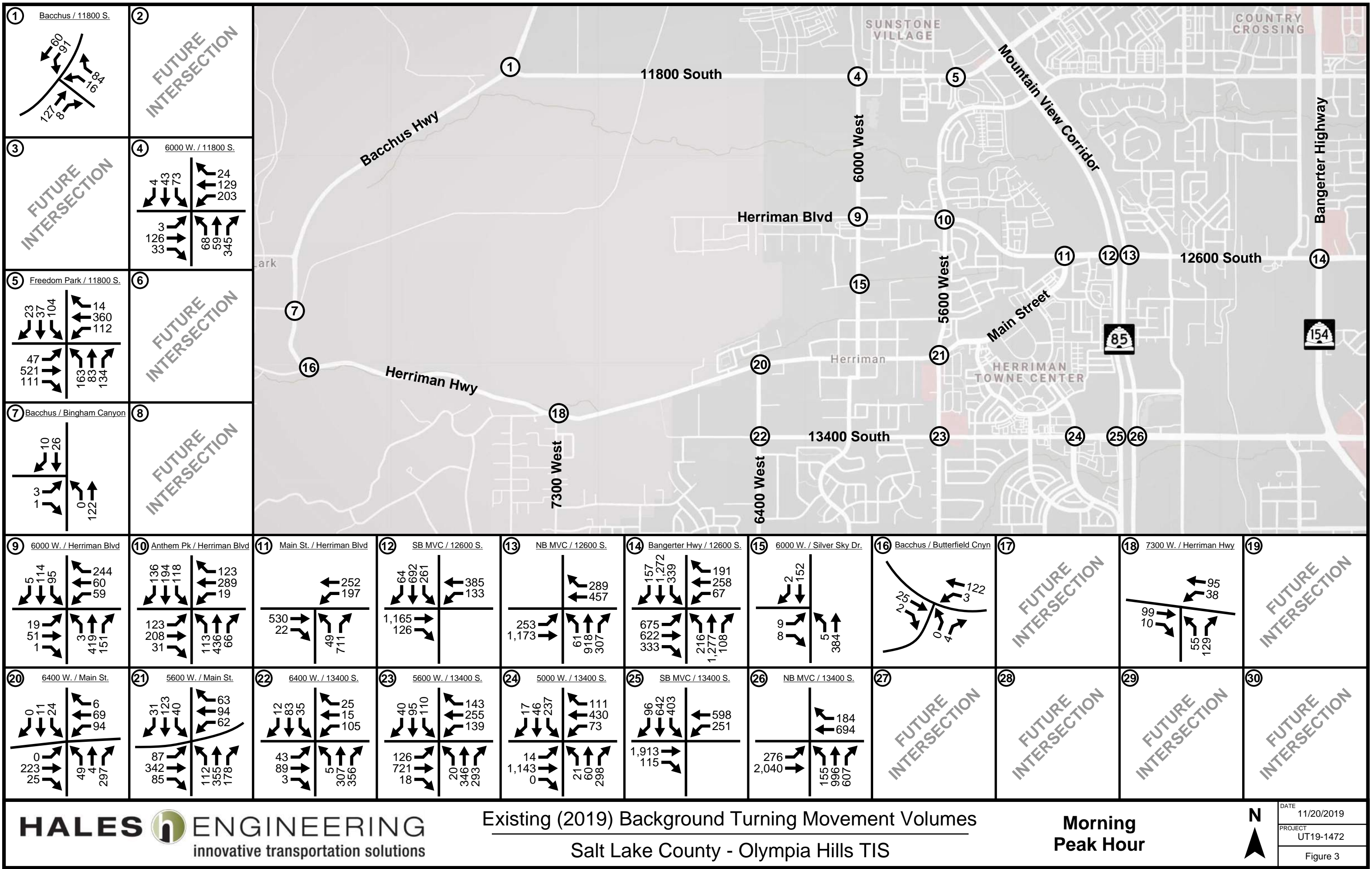
- Bacchus Highway / 11800 South

- 6000 West / 11800 South
- Freedom Park Drive / 11800 South
- Bingham Canyon Mine / Bacchus Highway
- 6000 West / Herriman Boulevard
- Anthem Park Boulevard / Herriman Boulevard
- Main Street / Herriman Boulevard / 12600 South
- Mountain View Corridor (SR-85) / 12600 South
- Bangerter Highway (SR-154) / 12600 South
- Silver Sky Drive / 6000 West
- Butterfield Canyon Road / Herriman Highway / Bacchus Highway
- 7300 West / Herriman Highway
- 6400 West / Main Street
- 5600 West / Main Street
- 6400 West / 13400 South
- 5600 West / 13400 South
- 5000 West / 13400 South
- Mountain View Corridor (SR-85) / 13400 South

The counts were performed on typical weekdays (Tuesday, Wednesday, or Thursday) throughout 2019. The morning peak hour was determined to be between 7:00 and 8:00 a.m., and the evening peak hour was determined to be between 5:00 and 6:00 p.m. The evening peak hour volumes were approximately 30% higher than the morning peak hour volumes. However, at the request of Salt Lake County Staff, both morning and evening peak hours were analyzed in this study. Detailed count data are included in Appendix A. Figure 3 and Figure 4 show the existing morning and evening peak hour volumes at the study intersections.

D. Level of Service Analysis

Hales Engineering determined that the north- and southbound Mountain View Corridor / 13400 South intersections are currently operating at LOS E during the morning peak hour as shown in Table 2, and the Bangerter Highway / 12600 South intersection is operating at LOS F during the evening peak hour as shown in Table 3. All other study intersections are currently operating at acceptable levels of service. These results serve as a baseline condition for the impact analysis of the proposed development during existing (2019) conditions.



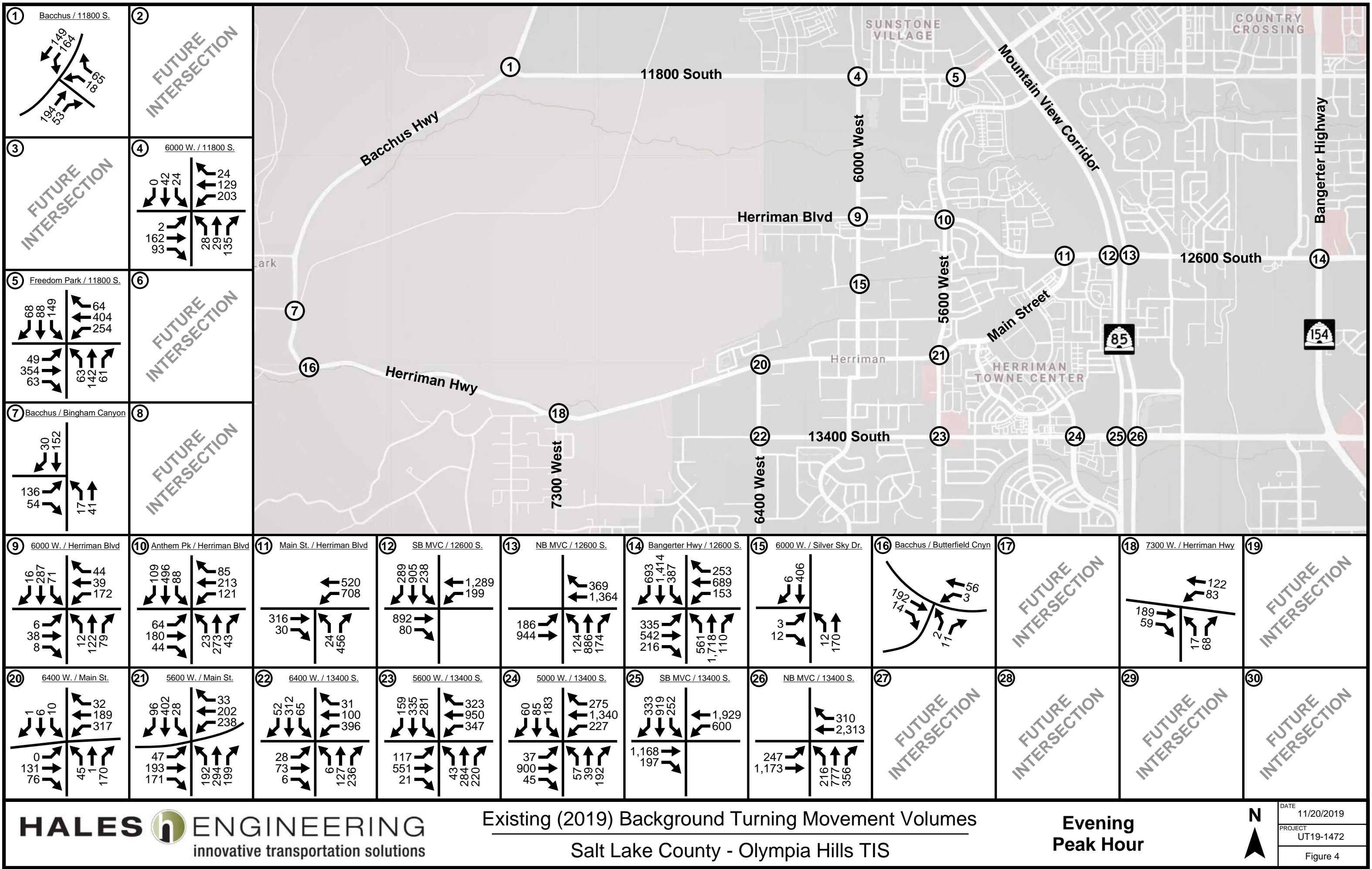


Table 2: Existing (2019) Background Morning Peak Hour Level of Service

Intersection		Worst Approach			Overall Intersection		Mitigated
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	LOS (Delay)
Bacchus Highway / 11800 South	WB Stop	WB	2.6	A	-	-	-
6000 West / 11800 South	Signal	-	-	-	11.3	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	11.3	B	-
Bingham Canyon Mine / Bacchus Highway	EB Stop	EB	2.6	A	-	-	-
6000 West / Herriman Boulevard	Signal	-	-	-	10.6	B	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	15.4	B	-
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	11.2	B	-
SB MVC / 12600 South	Signal	-	-	-	22.2	C	-
NB MVC / 12600 South	Signal	-	-	-	24.2	C	-
Bangerter Highway / 12600 South	Signal	-	-	-	47.0	D	-
Silver Sky Drive / 6000 West	EB Stop	EB	4.6	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	2.1	A	-	-	-
7300 West / Herriman Highway	NB Stop	NB	5.6	A	-	-	-
6400 West / Main Street	NB/SB Stop	NB	13.0	B	-	-	-
5600 West / Main Street	Signal	-	-	-	20.0	B	-
6400 West / 13400 South	Signal	-	-	-	11.3	B	-
5600 West / 13400 South	Signal	-	-	-	23.2	C	-
5000 West / 13400 South	Signal	-	-	-	34.4	C	-
SB MVC / 13400 South	Signal	-	-	-	59.0	E	D (43.5)
NB MVC / 13400 South	Signal	-	-	-	56.7	E	C (30.1)

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, October 2019

Table 3: Existing (2019) Background Evening Peak Hour Level of Service

Intersection	Worst Approach			Overall Intersection		Mitigated	
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	LOS (Delay)
Bacchus Highway / 11800 South	WB Stop	NB	5.0	A	-	-	-
6000 West / 11800 South	Signal	-	-	-	11.4	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	13.5	B	-
Bingham Canyon Mine / Bacchus Highway	EB Stop	EB	5.3	A	-	-	-
6000 West / Herriman Boulevard	Signal	-	-	-	10.0	A	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	11.5	B	-
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	7.7	A	-
SB MVC / 12600 South	Signal	-	-	-	22.8	C	-
NB MVC / 12600 South	Signal	-	-	-	29.5	C	-
Bangerter Highway / 12600 South	Signal	-	-	-	83.3	F	C (34.7)
Silver Sky Drive / 6000 West	EB Stop	EB	4.7	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	3.1	A	-	-	-
7300 West / Herriman Highway	NB Stop	NB	6.1	A	-	-	-
6400 West / Main Street	NB/SB Stop	NB	17.1	C	-	-	-
5600 West / Main Street	Signal	-	-	-	28.0	C	-
6400 West / 13400 South	Signal	-	-	-	15.9	B	-
5600 West / 13400 South	Signal	-	-	-	52.0	D	-
5000 West / 13400 South	Signal	-	-	-	20.3	C	-
SB MVC / 13400 South	Signal	-	-	-	41.2	D	-
NB MVC / 13400 South	Signal	-	-	-	48.4	D	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, October 2019

E. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- Mountain View Corridor / 12600 South
 - Westbound Approach – 410 feet (a.m. peak)
- Bangerter Highway / 12600 South
 - Significant queueing (approximately 610 feet) on the eastbound approach during the morning peak hour.
 - Significant queueing (>1,000 feet) on the south- and westbound approaches during the evening peak hour.
- 5600 West / Main Street
 - Northbound Approach – 365 feet (a.m. peak)
 - Southbound Approach – 730 feet (p.m. peak)
- 6400 West / 13400 South
 - Southbound Approach – 335 feet (p.m. peak)
- 5600 West / 13400 South
 - Northbound Approach – 365 feet (a.m. peak)
 - Southbound Approach – >1,000 feet (p.m. peak)
- 5000 West / 13400 South
 - Eastbound Approach – 520 feet (a.m. peak)
 - Westbound Approach – 340 feet (p.m. peak)
- Mountain View Corridor / 13400 South
 - Northbound Approach – >1,000 feet (a.m. peak)
 - Southbound Approach – 590 feet (p.m. peak)
 - Eastbound Approach – 525 feet (p.m. peak)

Detailed queueing reports are included in Appendix E.

F. Mitigation Measures

Additional capacity is needed at the Bangerter Highway / 12600 South intersection and the Mountain View Corridor / 13400 South intersection.

As discussed previously, the Bangerter Highway / 12600 South intersection is slated to become a grade-separated interchange before 2030 (Phase 1 Project). According to the State Environmental Study (SES) completed in 2018 by UDOT for this project, construction is anticipated to begin in 2020.

According to the WFRC RTP, Mountain View Corridor south of 13400 South is planned to be widened to three lanes in each direction prior to 2030. (No information could be found regarding a specific construction timeline.



Hales Engineering analyzed a mitigated scenario assuming that both of these improvements had been implemented. By converting the Bangerter Highway / 12600 South intersection to a grade-separated single point urban interchange (SPUI), the intersection is anticipated to operate at an acceptable level of service in both the morning and evening peak hours.

Adding additional lanes to Mountain View Corridor south of 13400 South is not anticipated to improve the level of service at the Mountain View Corridor / 13400 South intersection. It is recommended that an additional eastbound lane be added to 13400 South through the Mountain View Corridor intersection to match the number of eastbound lanes on 13400 South on the east side of Mountain View Corridor. This would provide the needed capacity to accommodate the eastbound demand during the morning peak hour. With this improvement it is anticipated that the Mountain View Corridor / 13400 South intersection will operate at an acceptable level of service during the morning and evening peak hours.

No additional mitigation measures are recommended.

III. FUTURE (2022) BACKGROUND CONDITIONS

A. Purpose

The purpose of the future (2022) background analysis is to study the intersections and roadways during the peak travel periods of the day for future background traffic and geometric conditions. Through this analysis, future background traffic operational deficiencies can be identified, and potential mitigation measures recommended.

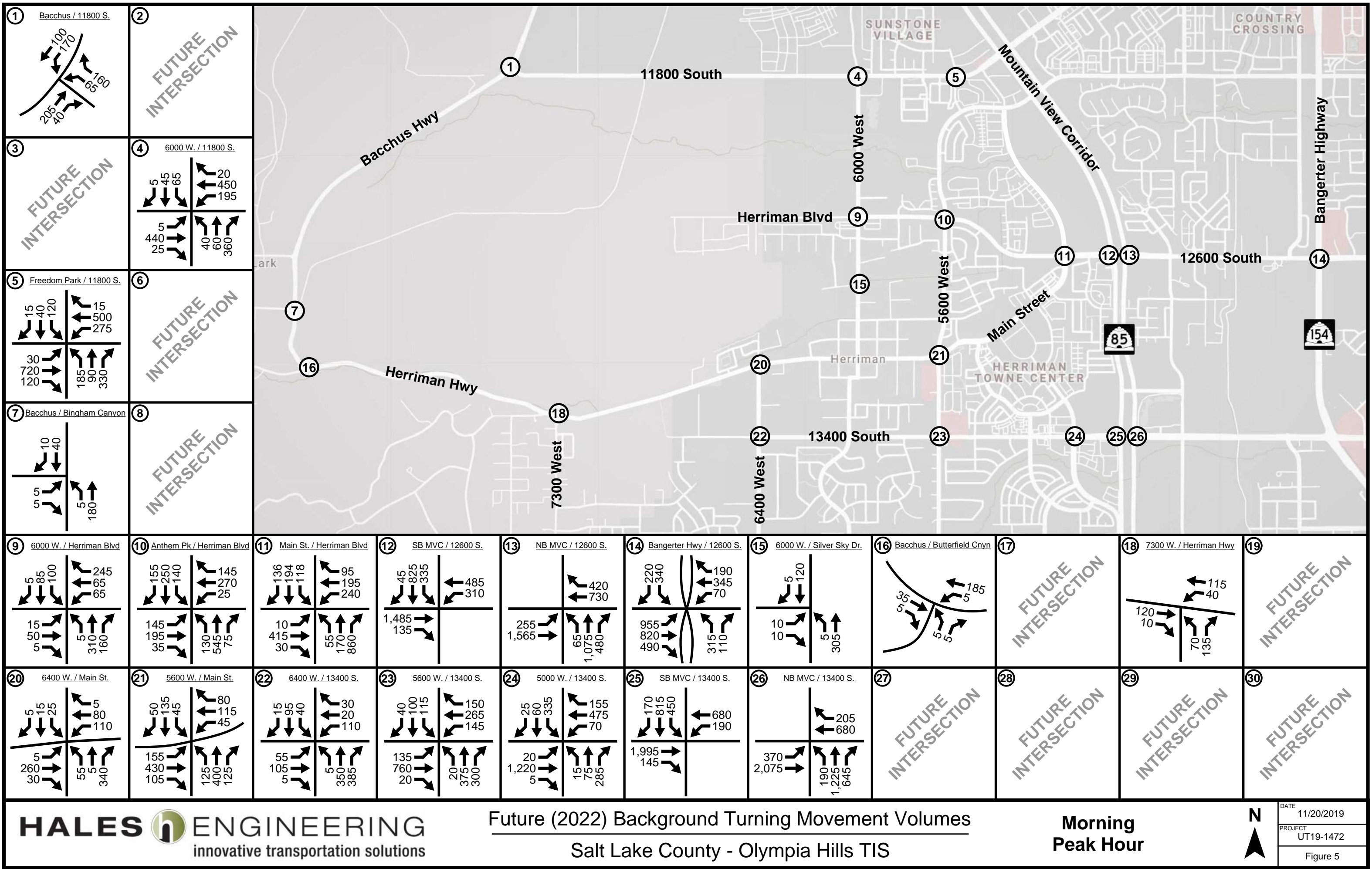
B. Roadway Network

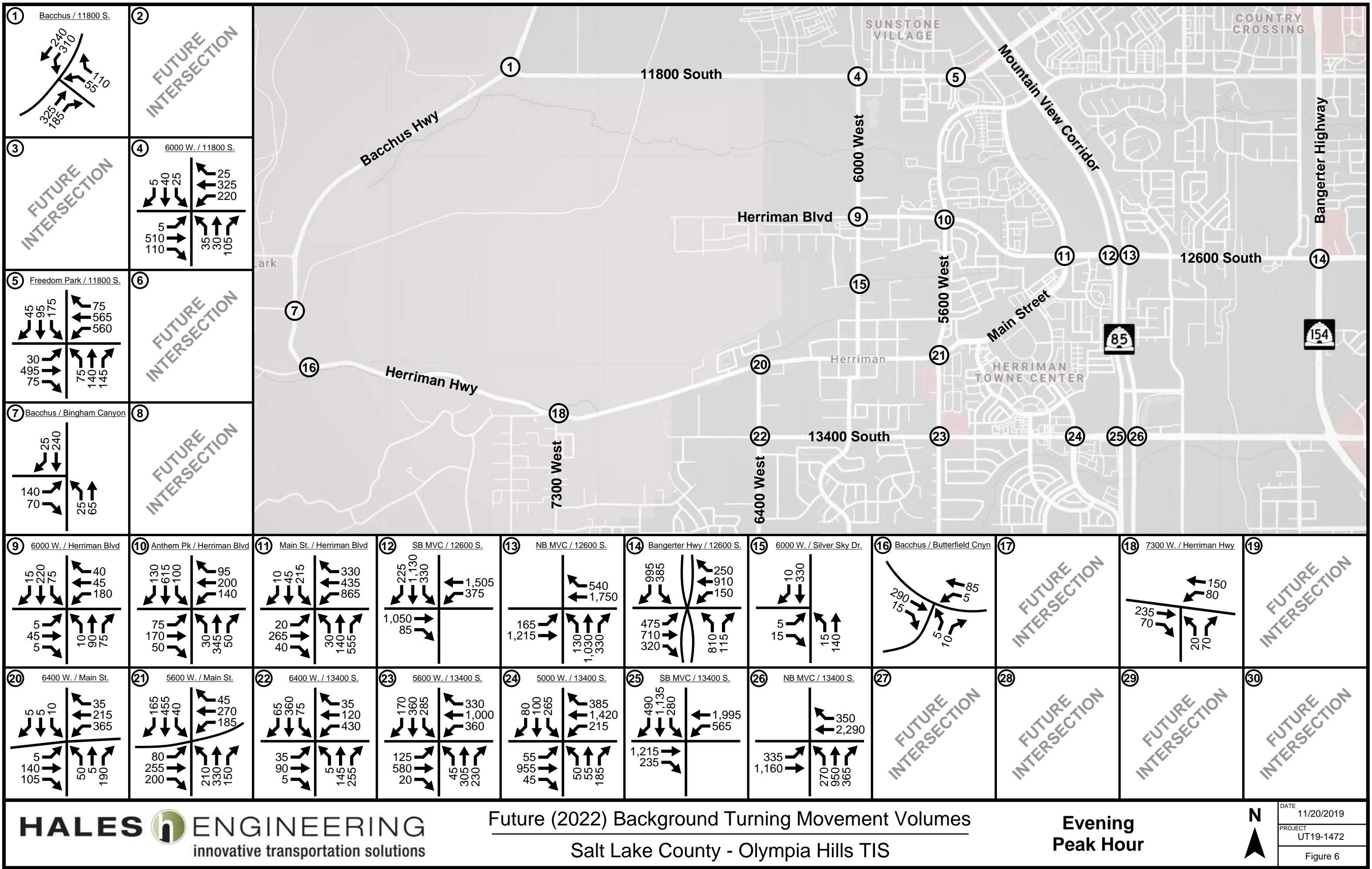
The segment of Herriman Main Street between Herriman Boulevard (12600 South) and Anthem Park Boulevard is currently under construction and is planned to be completed by the end of 2019. It was assumed that this project was completed prior to 2022. It was also assumed that the previously recommended improvements (grade separated interchange at the Bangerter Highway / 12600 South intersection and additional east/west lanes on 13400 South at Mountain View Corridor) had been implemented prior to 2022.

According to the WFRC Regional Transportation Plan, there are several improvement projects in the study area that are planned as Phase 1 (2019-2030) projects. However, none of these improvements were assumed to be completed prior to 2022.

C. Traffic Volumes

Hales Engineering obtained future (2022) forecasted volumes from a modified version of the WFRC / Mountainland Association of Governments (MAG) travel demand model (TDM). This version of the WFRC/MAG TDM was tailored specifically for this project by Horrocks Engineers (and reviewed by Salt Lake County) to forecast future average weekday daily traffic (AWDT) volumes within the study area. Peak period turning movement counts were estimated using National Cooperative Highway Research Program (NCHRP) 255 methodologies which utilize existing peak period turn volumes and future AWDT volumes to project the future turn volumes at the major intersections. Future (2022) morning and evening peak hour turning movement volumes are shown in Figure 5 and Figure 6.





D. Level of Service Analysis

Hales Engineering determined that the Main Street / Herriman Boulevard / 12600 South and southbound Mountain View Corridor / 12600 South intersections are anticipated to operate at LOS E during the morning peak hour in future (2022) background conditions, as shown in Table 4. The southbound Mountain View Corridor / 12600 South intersection is also anticipated to operate at LOS E during the evening peak hour, along with the northbound Mountain View Corridor / 13400 South intersection, as shown in Table 5. These results serve as a baseline condition for the impact analysis of the proposed development for future (2022) conditions.

E. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- Freedom Park Drive / 11800 South
 - Westbound Approach – >500 feet (p.m. peak)
- Anthem Park Boulevard / Herriman Boulevard
 - Northbound Approach – 395 feet (a.m. peak)
- Main Street / Herriman Boulevard / 12600 South
 - Northbound Approach – 815 feet (a.m. peak)
 - Southbound Approach – 445 feet (a.m. peak)
 - Westbound Approach – 555 feet (p.m. peak)
- Mountain View Corridor / 12600 South
 - Northbound Approach – 500 feet (a.m. peak)
 - Southbound Approach – 480 feet (p.m. peak)
 - Eastbound Approach – 665 feet (a.m. peak), 710 feet (p.m. peak)
 - Westbound Approach – 695 feet (p.m. peak)
- Bangerter Highway / 12600 South
 - Northbound Offramp – >1,000 feet (p.m. peak)
- 6400 West / 13400 South
 - Southbound Approach – >1,000 feet (p.m. peak)
- 5600 West / 13400 South
 - Northbound Approach – 440 feet (p.m. peak)
 - Southbound Approach – >1,000 feet (p.m. peak)
 - Eastbound Approach – 390 feet (p.m. peak)
 - Westbound Approach – 575 feet (p.m. peak)
- 5000 West / 13400 South
 - Eastbound Approach – 400 feet (a.m. peak)
- Mountain View Corridor / 13400 South
 - Northbound Approach – >1,000 feet (a.m. peak), 580 feet (p.m. peak)

- Southbound Approach – 965 feet (p.m. peak)
- Eastbound Approach – 465 feet (a.m. peak)
- Westbound Approach – 810 feet (p.m. peak)

Detailed queueing reports are included in Appendix E.

Table 4: Future (2022) Background Morning Peak Hour Level of Service

Intersection Description	Control	Worst Approach			Overall Intersection		Mitigated LOS (Delay)
		Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	
Bacchus Highway / 11800 South	WB Stop	WB	5.7	A	-	-	-
6000 West / 11800 South	Signal	-	-	-	14.2	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	16.0	B	-
Bingham Canyon Mine / Bacchus Highway	EB Stop	EB	2.8	A	-	-	-
6000 West / Herriman Boulevard	Signal	-	-	-	9.3	A	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	18.4	B	-
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	57.5	E	C (26.1)
SB MVC / 12600 South	Signal	-	-	-	60.7	E	D (48.0)
NB MVC / 12600 South	Signal	-	-	-	31.4	C	-
Bangerter Highway / 12600 South	Signal	-	-	-	28.1	C	-
Silver Sky Drive / 6000 West	EB Stop	EB	4.1	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	4.4	A	-	-	-
7300 West / Herriman Highway	NB Stop	NB	6.4	A	-	-	-
6400 West / Main Street	NB/SB Stop	NB	20.4	C	-	-	-
5600 West / Main Street	Signal	-	-	-	15.4	B	-
6400 West / 13400 South	Signal	-	-	-	13.4	B	-
5600 West / 13400 South	Signal	-	-	-	26.8	C	-
5000 West / 13400 South	Signal	-	-	-	24.8	C	-
SB MVC / 13400 South	Signal	-	-	-	37.1	D	-
NB MVC / 13400 South	Signal	-	-	-	41.1	D	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, October 2019

Table 5: Future (2022) Background Evening Peak Hour Level of Service

Intersection Description	Control	Worst Approach		Overall Intersection		Mitigated	
		Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	LOS (Delay)
Bacchus Highway / 11800 South	WB Stop	WB	19.6	C	-	-	-
6000 West / 11800 South	Signal	-	-	-	14.4	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	27.4	C	-
Bingham Canyon Mine / Bacchus Highway	EB Stop	EB	5.8	A	-	-	-
6000 West / Herriman Boulevard	Signal	-	-	-	9.2	A	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	14.1	B	-
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	35.3	D	-
SB MVC / 12600 South	Signal	-	-	-	65.8	E	C (33.9)
NB MVC / 12600 South	Signal	-	-	-	34.4	C	-
Bangerter Highway / 12600 South	Signal	-	-	-	72.9	E	D (49.0)
Silver Sky Drive / 6000 West	EB Stop	EB	4.4	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	4.8	A	-	-	-
7300 West / Herriman Highway	NB Stop	NB	7.1	A	-	-	-
6400 West / Main Street	NB/SB Stop	NB	17.6	C	-	-	-
5600 West / Main Street	Signal	-	-	-	19.0	B	-
6400 West / 13400 South	Signal	-	-	-	46.4	D	-
5600 West / 13400 South	Signal	-	-	-	53.0	D	-
5000 West / 13400 South	Signal	-	-	-	19.1	B	-
SB MVC / 13400 South	Signal	-	-	-	39.4	D	-
NB MVC / 13400 South	Signal	-	-	-	58.3	E	D (52.0)

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, October 2019

F. Mitigation Measures

The poor level of service during the morning peak hour at the Main Street / Herriman Boulevard / 12600 South intersection can be attributed to high number of right-turning vehicles on the

northbound approach, as well as left-turning vehicles on the southbound approach. It is recommended that a channelized right-turn lane be considered for the northbound right-turn movement.

The poor levels of service during the morning and evening peak hours at the southbound Mountain View Corridor / 12600 South intersection can be attributed to the need for additional eastbound capacity at the intersection. According to the WFRCTP, an additional lane in each direction is planned to be added to 12600 South between Mountain View Corridor and Bangerter Highway as a Phase 1 project. It is recommended that this seven-lane cross section be extended west to Main Street to provide the needed east/west capacity on 12600 South through Mountain View Corridor.

The poor level of service during the evening peak hour at the Bangerter Highway / 12600 South intersection can be attributed to the need for additional eastbound capacity on the northbound offramp, particularly for the northbound left-turn movement. It is recommended that additional capacity be added for the northbound left-turn movement, as well as for the westbound through movement. It is recommended that an additional westbound lane through the interchange be added along with the planned improvements to 12600 South.

The poor level of service during the evening peak hour at the northbound Mountain View Corridor / 13400 South intersection can be attributed to the need for additional westbound capacity at the intersection. It is recommended that an additional westbound through lane be added to 13400 South between Mountain View Corridor and 5000 West. This would match the existing cross section that currently exists on 13400 South east of Mountain View Corridor.

Hales Engineering analyzed a mitigated scenario assuming that these recommended improvements had been implemented. It is anticipated that with these recommended improvements the Main Street / Herriman Boulevard / 12600 South, Mountain View Corridor / 12600 South, Bangerter Highway / 12600 South, and Mountain View Corridor / 13400 South intersections will operate at acceptable levels of service during the morning and evening peak hours.

No additional mitigation measures are recommended.

IV. FUTURE (2027) BACKGROUND CONDITIONS

A. Purpose

The purpose of the future (2027) background analysis is to study the intersections and roadways during the peak travel periods of the day for future background traffic and geometric conditions. Through this analysis, future background traffic operational deficiencies can be identified, and potential mitigation measures recommended.

B. Roadway Network

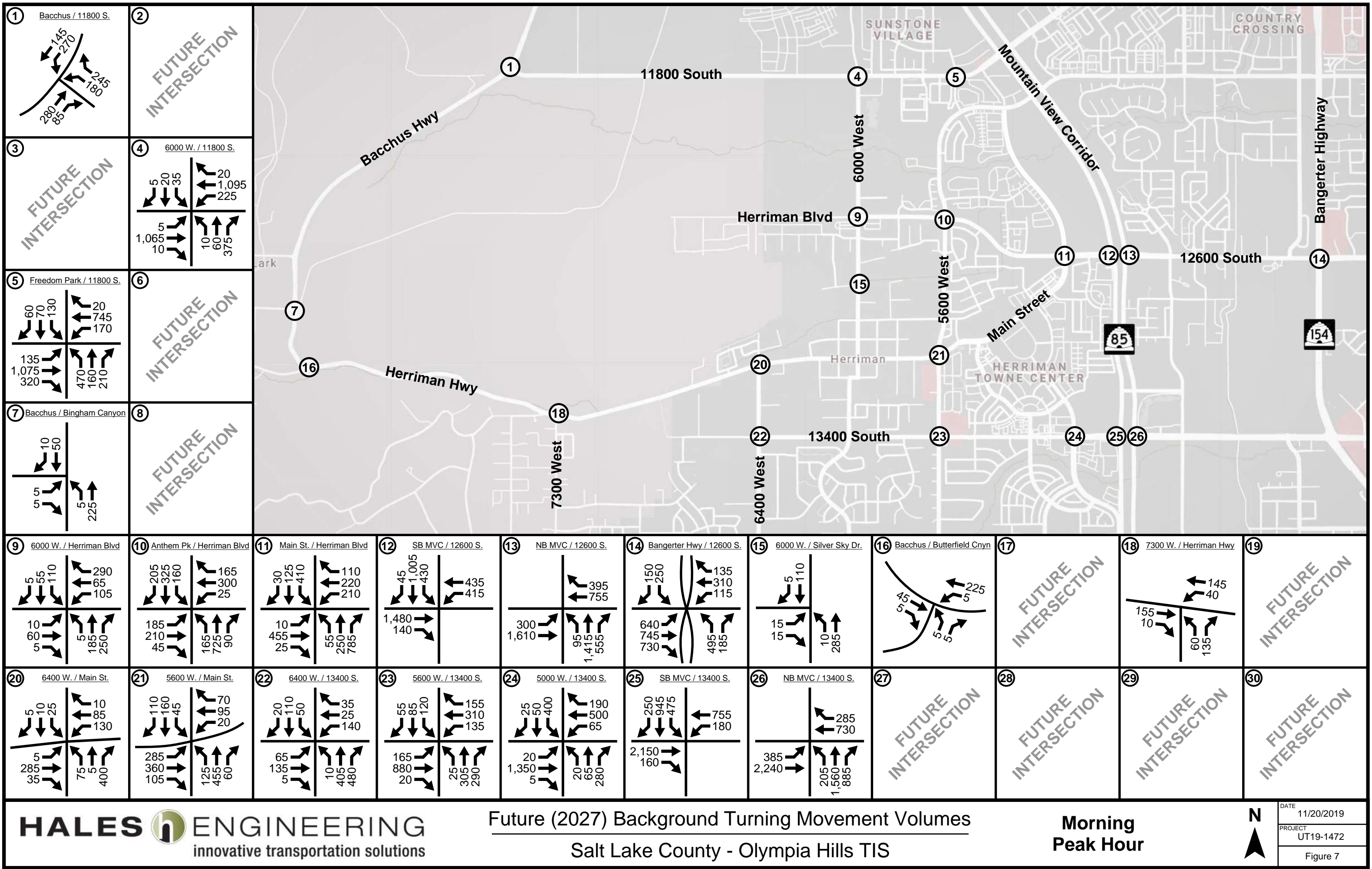
It was assumed that all previously recommended mitigation measures had been implemented prior to 2027. These mitigation measures include:

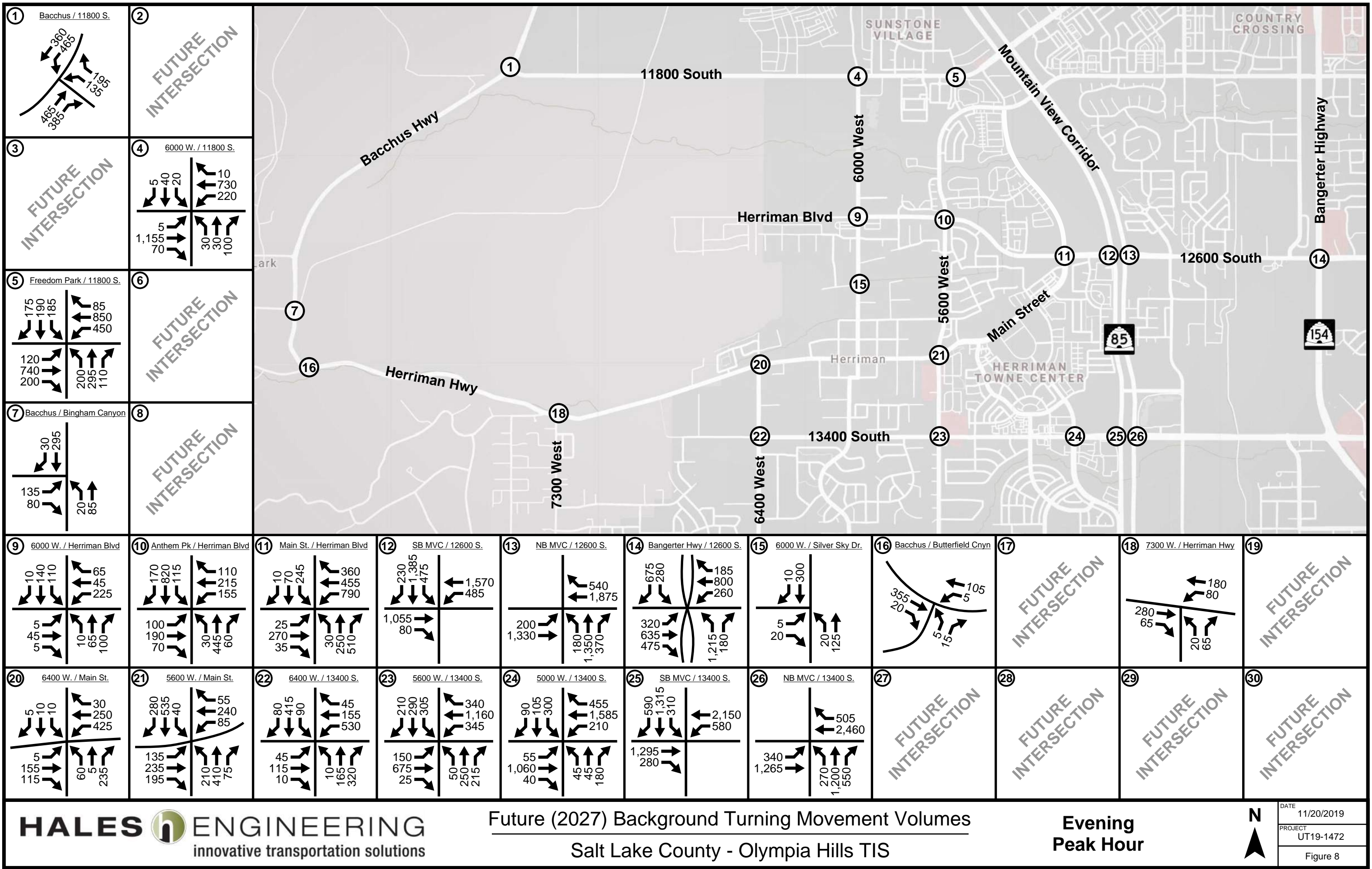
- Additional east/west travel lanes on 12600 South
- Additional east west travel lanes on 13400 South
- A channelized right-turn lane on the northbound approach to the Main Street / Herriman Boulevard / 12600 South intersection.
- Capacity improvements for the northbound left-turn movement at the Bangerter Highway / 12600 South interchange.

According to the WFRC Regional Transportation Plan, there are several additional improvement projects in the study area that are planned as Phase 1 (2019-2030) projects. However, none of these improvements were assumed to be completed prior to 2027.

C. Traffic Volumes

Hales Engineering obtained future (2027) forecasted volumes from a modified version of the WFRC / MAG travel demand model (TDM). This version of the WFRC/MAG TDM was tailored specifically for this project by Horrocks Engineers (and reviewed by Salt Lake County) to forecast future average weekday daily traffic (AWDT) volumes within the study area. Peak period turning movement counts were estimated using National Cooperative Highway Research Program (NCHRP) 255 methodologies which utilize existing peak period turn volumes and future AWDT volumes to project the future turn volumes at the major intersections. Future (2027) morning and evening peak hour turning movement volumes are shown in Figure 7 and Figure 8.





D. Level of Service Analysis

Hales Engineering determined that the following intersections are anticipated to operate at LOS E or LOS F in future (2027) background conditions as shown in Table 6 and Table 7:

- Bacchus Highway / 11800 South (Morning and Evening Peak)
- 6000 West / 11800 South (Morning and Evening Peak)
- Main Street / Herriman Boulevard / 12600 South (Morning Peak)
- SB Mountain View Corridor / 12600 South (Morning and Evening Peak)
- SB Mountain View Corridor / 13400 South (Morning Peak)
- 6400 West / Main Street (Evening Peak)
- 6400 West / 13400 South (Evening Peak)
- 5600 West / 13400 South (Evening Peak)
- NB Mountain View Corridor / 13400 South (Morning and Evening Peak)

These results serve as a baseline condition for the impact analysis of the proposed development for future (2027) conditions.

E. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- Bacchus Highway / 11800 South
 - Southbound Approach – 425 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (a.m. and p.m. peak)
- 6000 West / 11800 South
 - Westbound Approach – >1,000 feet (a.m. and p.m. peak)
- Freedom Park Drive / 11800 South
 - Northbound Approach – 640 feet (a.m. peak)
 - Southbound Approach – 640 feet (p.m. peak)
 - Eastbound Approach – 435 feet (a.m. peak)
 - Westbound Approach – 670 feet (p.m. peak)
- Anthem Park Boulevard / Herriman Boulevard
 - Northbound Approach – 815 feet (a.m. peak)
 - Southbound Approach – 540 feet (p.m. peak)
- Main Street / Herriman Boulevard / 12600 South
 - Northbound Approach – 665 feet (a.m. peak)
 - Southbound Approach – >1,000 feet (a.m. peak)
 - Westbound Approach – 655 feet (p.m. peak)
- Mountain View Corridor / 12600 South

- Northbound Approach – 485 feet (a.m. peak), 500 feet (p.m. peak)
 - Southbound Approach – 975 feet (p.m. peak)
 - Eastbound Approach – 680 feet (a.m. peak), 400 feet (p.m. peak)
 - Westbound Approach – 610 feet (a.m. peak), 960 feet (p.m. peak)
- Bangerter Highway / 12600 South
 - Northbound Offramp – 690 feet (p.m. peak)
 - Southbound Offramp – 405 feet (p.m. peak)
- 6400 West / Main Street
 - Northbound Approach – 865 feet (p.m. peak)
 - Eastbound Approach – 995 feet (p.m. peak)
 - Westbound Approach – 945 feet (p.m. peak)
- 5600 West / Main Street
 - Southbound Approach – 635 feet (p.m. peak)
- 6400 West / 13400 South
 - Southbound Approach – >1,000 feet (p.m. peak)
- 5600 West / 13400 South
 - Northbound Approach – 370 feet (a.m. peak), 360 feet (p.m. peak)
 - Southbound Approach – >1,000 feet (p.m. peak)
 - Eastbound Approach – 470 feet (a.m. peak), 520 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (p.m. peak)
- 5000 West / 13400 South
 - Southbound Approach – 630 feet (a.m. peak)
 - Eastbound Approach – 870 feet (a.m. peak)
- Mountain View Corridor / 13400 South
 - Northbound Approach – >1,000 feet (a.m. and p.m. peak)
 - Southbound Approach – 805 feet (p.m. peak)
 - Eastbound Approach – 875 feet (a.m. peak)
 - Westbound Approach – 610 feet (a.m. peak), 760 feet (p.m. peak)

Detailed queueing reports are included in Appendix E.

Table 6: Future (2027) Background Morning Peak Hour Level of Service

Intersection Description	Control	Worst Approach		Overall Intersection	Mitigated
		Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	Aver. Delay (Sec/Veh) ²	LOS (Delay)
Bacchus Highway / 11800 South	WB Stop	WB	>75.0	F	D (40.6)
6000 West / 11800 South	Signal	-	-	66.6	E
Freedom Park Drive / 11800 South	Signal	-	-	35.5	D
Bingham Canyon Mine / Bacchus Highway	EB Stop	EB	3.2	A	-
6000 West / Herriman Boulevard	Signal	-	-	8.3	A
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	30.3	C
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	64.5	E
SB MVC / 12600 South	Signal	-	-	70.4	E
NB MVC / 12600 South	Signal	-	-	36.4	D
Bangerter Highway / 12600 South	Signal	-	-	28.0	C
Silver Sky Drive / 6000 West	EB Stop	EB	4.3	A	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	3.7	A	-
7300 West / Herriman Highway	NB Stop	NB	7.0	A	-
6400 West / Main Street	NB/SB Stop	NB	29.1	D	-
5600 West / Main Street	Signal	-	-	16.8	B
6400 West / 13400 South	Signal	-	-	16.2	B
5600 West / 13400 South	Signal	-	-	25.7	C
5000 West / 13400 South	Signal	-	-	44.7	D
SB MVC / 13400 South	Signal	-	-	63.1	E
NB MVC / 13400 South	Signal	-	-	62.6	E

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, October 2019

Table 7: Future (2027) Background Evening Peak Hour Level of Service

Intersection		Worst Approach		Overall Intersection		Mitigated
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ² LOS (Delay)
Bacchus Highway / 11800 South	WB Stop	WB	>75.0	F	-	- D (45.7)
6000 West / 11800 South	Signal	-	-	-	73.1	E C (21.3)
Freedom Park Drive / 11800 South	Signal	-	-	-	46.7	D -
Bingham Canyon Mine / Bacchus Highway	EB Stop	EB	5.5	A	-	- -
6000 West / Herriman Boulevard	Signal	-	-	-	9.3	A -
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	19.6	B -
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	36.3	D -
SB MVC / 12600 South	Signal	-	-	-	56.0	E D (43.4)
NB MVC / 12600 South	Signal	-	-	-	46.0	D -
Bangerter Highway / 12600 South	Signal	-	-	-	42.9	D -
Silver Sky Drive / 6000 West	EB Stop	EB	3.8	A	-	- -
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	4.3	A	-	- -
7300 West / Herriman Highway	NB Stop	NB	8.3	A	-	- -
6400 West / Main Street	NB/SB Stop	NB	>120.0	F	-	- B (17.8)
5600 West / Main Street	Signal	-	-	-	22.1	C -
6400 West / 13400 South	Signal	-	-	-	98.8	F B (17.1)
5600 West / 13400 South	Signal	-	-	-	89.9	F D (54.9)
5000 West / 13400 South	Signal	-	-	-	20.4	C -
SB MVC / 13400 South	Signal	-	-	-	37.4	D -
NB MVC / 13400 South	Signal	-	-	-	70.7	E D (38.0)

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, October 2019

F. Mitigation Measures

It is anticipated that by 2027 traffic volumes at the Bacchus Highway / 11800 South intersection will warrant the installation of a traffic signal (based on Utah MUTCD 2009 Chapter 4C Warrant

3). It is also anticipated that dual left-turn lanes will be warranted on the southbound approach based on the projected evening peak hour volumes. It is recommended that this intersection be monitored and that the improvements be implemented when warrants are met.

The poor level of service at the 6000 West / 11800 South intersection can be attributed to large delays experienced by westbound left-turning vehicles. It is recommended that the signal cycle length at this intersection be increased to 120 seconds, that permitted/protected left-turn phasing be added for the westbound approach, and that the westbound left-turn storage lane length be increased.

It is anticipated that dual left-turn lanes will be warranted on the southbound approach to the Main Street / Herriman Boulevard / 12600 South intersection based on projected morning peak hour volumes. It is recommended that this improvement be completed prior to 2027 and that the signal cycle length at this intersection be increased to 120 seconds during the morning peak hour (the evening peak hour cycle length is already set to 120 seconds).

It is anticipated that additional capacity will be needed at the Mountain View Corridor / 12600 South intersection. It is recommended that dual left-turn lanes be installed for the south- and westbound movements, and that the signal cycle length at this intersection be increased to 120 seconds during the morning peak hour (the evening peak hour cycle length is already set to 120 seconds).

It is anticipated that additional capacity will be needed at the 6400 West / Main Street intersection to accommodate the projected 2027 traffic volumes, particularly during the evening peak hour. It is recommended that a separate right-turn lane be added to the northbound approach and that separate left-turn lanes be added to the east- and westbound approaches. This would allow left-turning vehicles to queue and wait for gaps without blocking other movements.

The south- and eastbound approaches to the 6400 West / 13400 South intersection currently consist of a single lane. It is recommended that these approaches be expanded to match the north- and westbound approaches which consist of a through lane with separate left- and right-turn lanes.

It is anticipated that dual left-turn lanes will be warranted on the south- and westbound approaches to the 5600 West / 13400 South intersection based on projected 2027 evening peak hour traffic projections.

It is recommended that the signal cycle length at the 5000 West / 13400 south intersection be increased to 120 seconds during the morning peak hour (the evening peak hour cycle length is already set to 120 seconds), and that the signal be coordinated with other signals on the 13400 South corridor

It is anticipated that additional capacity will be needed at the Mountain View Corridor (SR-85) / 13400 South intersection to accommodate the projected 2027 traffic volumes. According to the WFRM RTP, Mountain View Corridor south of 13400 South is planned to be widened to three lanes in each direction prior to 2030.

Hales Engineering analyzed a mitigated scenario assuming that these recommended improvements had been implemented. It is anticipated that with these recommended improvements the Bacchus Highway / 11800 South intersection will improve to LOS D during the morning and evening peak hours and the 6000 West / 11800 South intersection will improve to LOS C during the morning and evening peak hours. It is anticipated that the Main Street / Herriman Boulevard / 12600 South intersection will improve to LOS C during the morning peak hour. It is also anticipated that with the recommended improvements the southbound Mountain View Corridor / 12600 South intersection will improve to LOS D during the morning and evening peak hours.

With the previously recommended mitigation measures the poor levels of service at the 6400 West / Main Street and 5600 West / 13400 South intersections are anticipated to persist during the evening peak hour, and the poor levels of service at the Mountain View Corridor / 13400 South intersections are anticipated to persist in the morning and evening peak hours.

The projected evening peak hour traffic volumes at the 6400 West / Main Street intersection will warrant the installation of a traffic signal (based on Utah MUTCD 2009 Chapter 4C Warrant 3). Therefore, a traffic signal is recommended at this intersection.

Despite the addition of dual left-turn lanes to the 5600 West / 13400 South intersection, it is anticipated that additional capacity will still be needed at the intersection during the evening peak hour. It is recommended that an additional southbound through lane be added to the intersection to increase capacity.

As previously discussed, the Mountain View Corridor is planned to have a freeway facility constructed in the median area to create a freeway/frontage road system with segments planned to be constructed in either Phase 2 (2031-2040) or Phase 3 (2041-2050). It is also recommended that the northbound right-turn movement be a channelized free right-turn movement.

An additional mitigated scenario was analyzed assuming that freeway lanes had been constructed on Mountain View Corridor creating a grade separated intersection at 13400 South. It was assumed that 75% of north- and southbound through traffic would be carried by the freeway lanes with 25% remaining on the frontage roads. (This assumption is based on the projected ratio of ADTs on the freeway and frontage roads segments in the 2042 travel demand model runs that were developed for this study.) This scenario also assumed that an additional southbound through lane had been added to the 5600 West / 13400 South intersection, and a channelized free right-



turn lane had been added to northbound Mountain View Corridor at 13400 South. With these additional mitigation measures, all study intersections are anticipated to operate at acceptable levels of service.

No additional mitigation measures are recommended.

V. PROJECT CONDITIONS

A. Purpose

The project conditions discussion explains the type and intensity of development. This provides the basis for trip generation, distribution, and assignment of project trips to the surrounding study intersections defined in Chapter I.

B. Project Description

The proposed Olympia Hills development located generally between 6400 West and Bacchus Highway on the east and west, and 12600 South and Herriman Highway on the north and south. The development will consist of several land uses in a mixed-use setting. Metrostudy completed an analysis of the project area to determine appropriate land use types, absorption rates, and build timelines for Olympia Hills.

Based on the Metrostudy analysis, IBI Group developed a land use plan with unit counts and building sizes by area. The project will consist of four town / village centers with higher density and other areas with lower density. The project is being proposed to be built in four five-year phases with the first phase being completed in 2027. A concept and phasing plan for the proposed development is provided in Appendix B.

The proposed land use for Phase I (2027) has been identified as follows:

- | | |
|----------------------------------|-----------------|
| • Single-family detached housing | 219 Units |
| • Multi-family housing | 1,223 Units |
| • Commercial/Retail | 150,000 sq. ft. |
| • Office Buildings | 638,500 sq. ft. |

Note: Phase 1 includes half of Village Center C and half of the Town Center.

The additional proposed land use for Phase II (2032) has been identified as follows:

- | | |
|----------------------------------|-----------------|
| • Single-family detached housing | 516 Units |
| • Multi-family housing | 1,379 Units |
| • Commercial/Retail | 172,000 sq. ft. |
| • Office Buildings | 698,200 sq. ft. |

Note: Phase 2 includes half of Village Center C, half of the Town Center, and half of Village Center A.

The additional proposed land use for Phase III (2037) has been identified as follows:

- Single-family detached housing 125 Units
- Multi-family housing 1,669 Units
- Commercial/Retail 59,000 sq. ft.
- Office Buildings 57,300 sq. ft.

Note: Phase 3 includes half of Village Center A and all of Village Center B.

The additional proposed land use for Phase IV (2042) has been identified as follows:

- Single-family detached housing 90 Units
- Multi-family housing 1,109 Units

In summary, the proposed land use for all of Olympia Hills has been identified as follows:

- Single-family detached housing 950 Units
- Multi-family housing 5,380 Units
- Commercial/Retail 381,000 sq. ft.
- Office Buildings 1,394,000 sq. ft.

C. Trip Generation

Trip generation for the development was calculated using trip generation rates published in the Institute of Transportation Engineers (ITE) *Trip Generation*, 10th Edition, 2017. Based on discussions with Salt Lake County and the development team, Hales Engineering also took trip reductions due to internal capture and transit use. Detailed trip generation tables are provided in Appendix C.

Internal capture rates were calculated for the Town Center and the Village Centers using standard ITE methodologies discussed in the ITE *Trip Generation Handbook*, 3rd Edition, 2017 and NCHRP Report 684. Hales Engineering used the NCHRP 684 Internal Trip Capture Estimation Tool, which follows these methodologies. Detailed internal capture calculations are shown in Appendix C.

Trip reductions due to transit use were determined based on transit ridership in neighboring communities and the anticipated transit types that may be available in the Olympia Hills development. The following transit data were pulled from the 2017 American Community Survey (formerly known as Journey to Work):

- Riverton: 2.5%
- South Jordan: 3.2%
- West Jordan: 2.3%
- Herriman: 1.1%

It is anticipated that Olympia Hills will be more conducive to transit ridership than the surrounding communities due to the concentrated densities of the town and village centers. It is also anticipated that the types of transit that will be available will be similar to that of Riverton. Therefore, a 2.5% transit reduction, which is equal to the Riverton transit ridership, was assumed. It was assumed that Olympia Hills would have access to transit by Phase II (2032).

A summary of the trip generation after reductions for Olympia Hills is included in Table 8.

Table 8: Trip Generation Summary

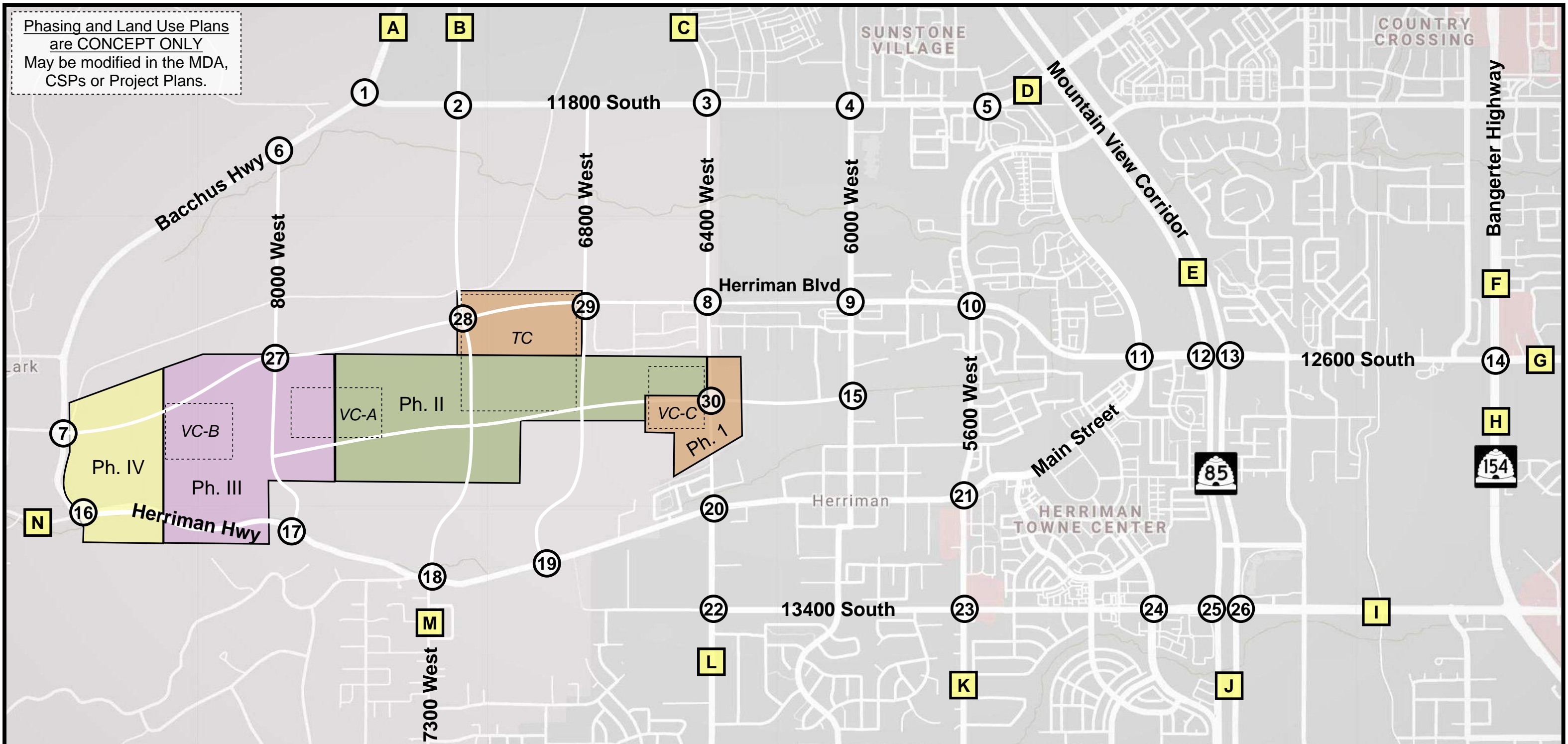
Phase	Time	Reduced Trips		
		In	Out	Total
Phase I (2027)	Daily	11,772	11,772	23,544
	AM	755	663	1,418
	PM	844	1,060	1,904
Phase II (2032)	Daily	25,414	25,414	50,828
	AM	1,574	1,488	3,062
	PM	1,855	2,222	4,077
Phase III (2037)	Daily	33,563	33,563	67,126
	AM	1,830	2,114	3,944
	PM	2,502	2,692	5,194
Phase IV (2042)	Daily	38,091	38,091	76,182
	AM	1,953	2,519	4,472
	PM	2,869	2,906	5,775

D. Trip Distribution and Assignment

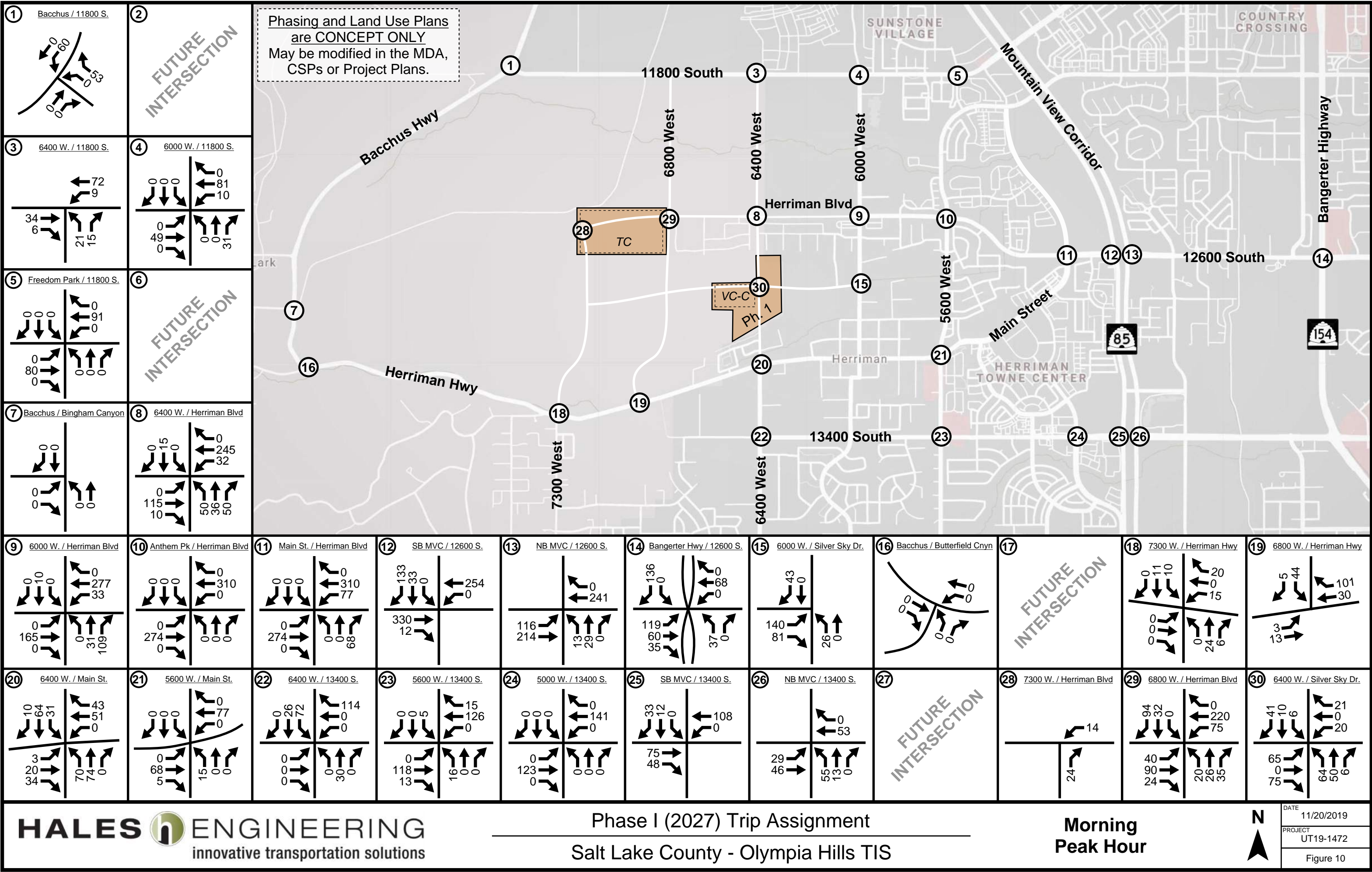
Trip distribution for the Olympia Hills project was developed based on a select link analysis in the build travel demand models of the project. Horrocks Engineers ran the analysis, which provided the distribution of project trips in the study network. The distribution percentages of project trips entering and exiting 14 separate external nodes were calculated based on the select link analysis results. A summary of the assumed trip distribution based on the select link analysis is shown in Figure 9.

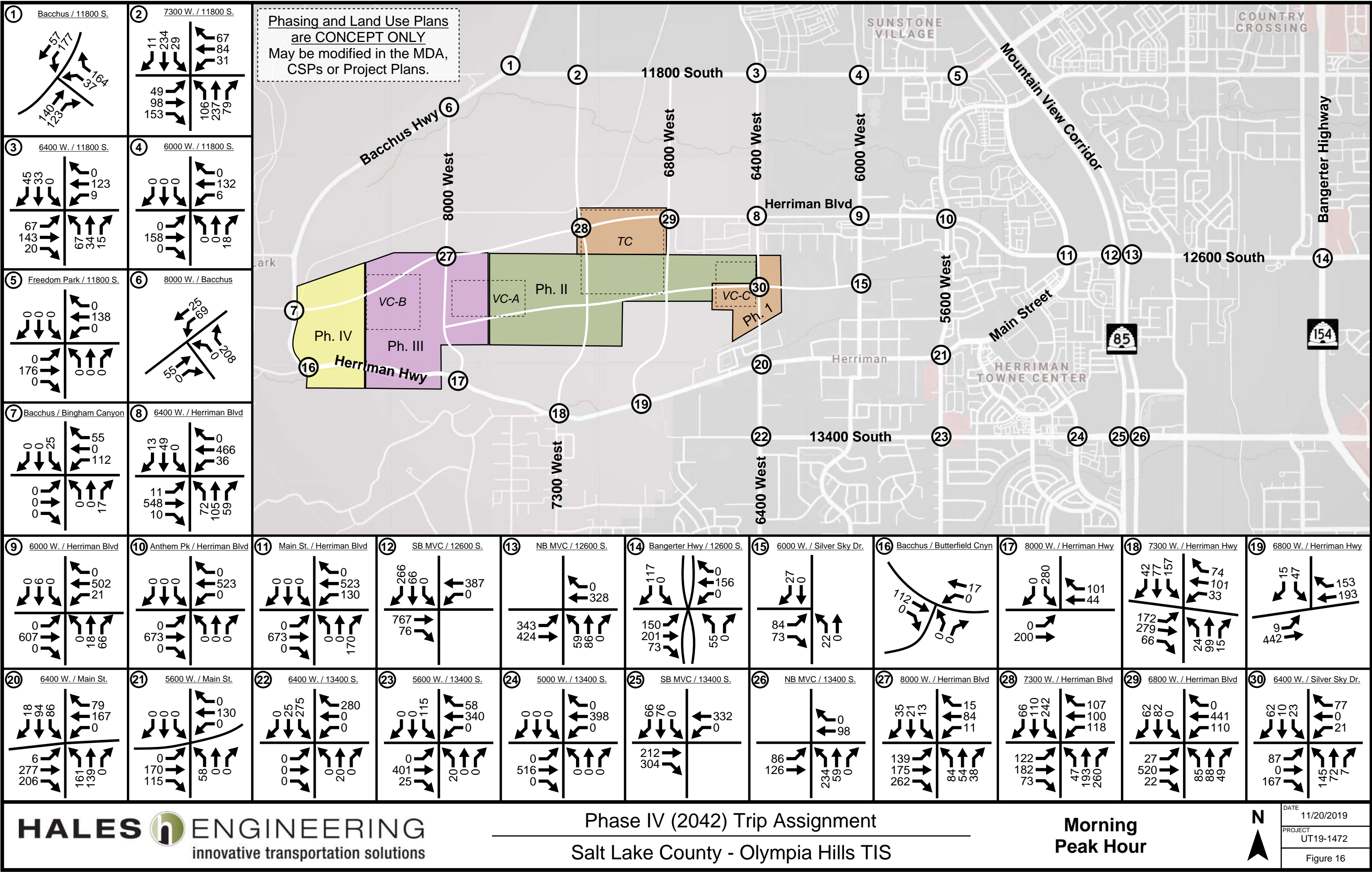
These trip distribution assumptions were used to assign the morning and evening peak hour trip generation at the study intersections to create trip assignment for the proposed development. The detailed select link results along each route were used as a guide to assign trips to the appropriate routes. Trip assignment volumes for the development for each phase and peak hour are shown in Figures 10 through 17.

Phasing and Land Use Plans
are CONCEPT ONLY
May be modified in the MDA,
CSPs or Project Plans.



A	B	C	D	E	F	G	H	I	J	K	L	M	N
Bacchus Hwy	North 7300 West	North 6400 West	11800 South	North MVC	North Bangerter	12600 South	South Bangerter	13400 South	South MVC	South 5600 West	South 6400 West	South 7300 West	Butterfield Canyon Rd.
2027: 8%	2027: 0%	2027: 0%	2027: 12%	2027: 22%	2027: 18%	2027: 9%	2027: 5%	2027: 7%	2027: 9%	2027: 2%	2027: 4%	2027: 4%	2027: 0%
2032: 4%	2032: 14%	2032: 10%	2032: 5%	2032: 18%	2032: 10%	2032: 9%	2032: 2%	2032: 5%	2032: 15%	2032: 1%	2032: 3%	2032: 4%	2032: 0%
2037: 9%	2037: 15%	2037: 6%	2037: 7%	2037: 19%	2037: 5%	2037: 8%	2037: 2%	2037: 5%	2037: 15%	2037: 1%	2037: 1%	2037: 7%	2037: 0%
2042: 12%	2042: 14%	2042: 4%	2042: 7%	2042: 17%	2042: 6%	2042: 8%	2042: 3%	2042: 5%	2042: 15%	2042: 1%	2042: 1%	2042: 7%	2042: 0%





VI. FUTURE (2027) PLUS PROJECT CONDITIONS

A. Purpose

The purpose of the future (2027) plus project analysis is to study the intersections and roadways during the peak travel periods of the day for future background traffic and geometric conditions plus the net trips generated by the proposed development. This scenario provides valuable insight into the potential impacts of the proposed project on future background traffic conditions.

B. Traffic Volumes

Hales Engineering added the Phase I project trips discussed in Chapter V to the future (2027) background traffic volumes to predict turning movement volumes for future (2027) plus project conditions. Future (2027) plus project evening peak hour turning movement volumes are shown in Figure 18 and Figure 19.

C. Level of Service Analysis

Hales Engineering determined that the following intersections are anticipated to operate at LOS E or LOS F in future (2027) plus project conditions as shown in Table 9 and Table 10:

- Anthem Park Boulevard / Herriman Boulevard (Morning Peak)
- SB Mountain View Corridor / 12600 South (Morning and Evening Peak)
- NB Mountain View Corridor / 12600 South (Evening Peak)
- Bangerter Highway / 12600 South (Evening Peak)
- 6400 West / Main Street (Evening Peak)
- 5600 West / 13400 South (Evening Peak)

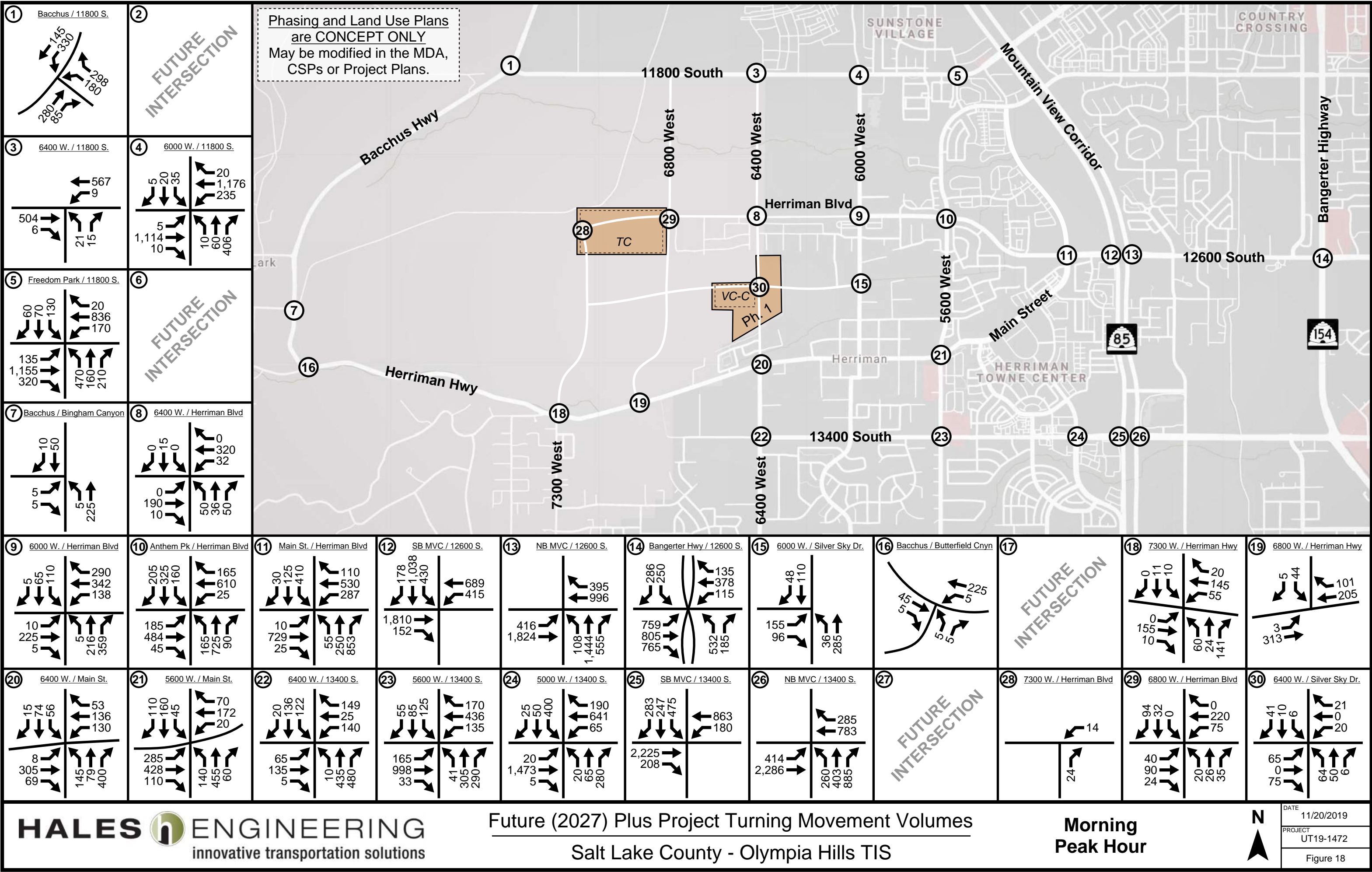


Table 9: Future (2027) Plus Project Morning Peak Hour Level of Service

Intersection Description	Control	Worst Approach		LOS ¹	Overall Intersection		Mitigated
		Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹		Aver. Delay (Sec/Veh) ²	LOS ²	
Bacchus Highway / 11800 South	Signal	-	-	-	41.6	D	-
6400 West / 11800 South	NB Stop	NB	14.5	B	-	-	-
6000 West / 11800 South	Signal	-	-	-	32.8	C	-
Freedom Park Drive / 11800 South	Signal	-	-	-	33.6	C	-
Bingham Canyon Mine / Bacchus Highway	EB Stop	EB	3.1	A	-	-	-
6400 West / Herriman Boulevard	SB Stop	SB	8.2	A	-	-	-
6000 West / Herriman Boulevard	Signal	-	-	-	12.9	B	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	63.8	E	D (44.6)
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	43.5	D	-
SB MVC / 12600 South	Signal	-	-	-	60.6	E	D (38.6)
NB MVC / 12600 South	Signal	-	-	-	35.9	D	-
Bangerter Highway / 12600 South	Signal	-	-	-	29.2	C	-
Silver Sky Drive / 6000 West	EB Stop	EB	8.5	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	4.0	A	-	-	-
7300 West / Herriman Highway	NB/SB Stop	SB	8.2	A	-	-	-
6800 West / Herriman Highway	SB Stop	SB	7.5	A	-	-	-
6400 West / Main Street	Signal	-	-	-	27.1	C	-
5600 West / Main Street	Signal	-	-	-	18.4	B	-
6400 West / 13400 South	Signal	-	-	-	16.7	B	-
5600 West / 13400 South	Signal	-	-	-	34.2	C	-
5000 West / 13400 South	Signal	-	-	-	33.0	C	-
SB MVC / 13400 South	Signal	-	-	-	26.7	C	-
NB MVC / 13400 South	Signal	-	-	-	19.6	B	-
6800 West / Herriman Boulevard	NB/SB Stop	SB	6.2	A	-	-	-
Silver Sky Drive / 6400 West	EB/WB Stop	EB	4.3	A	-	-	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

Table 10: Future (2027) Plus Project Evening Peak Hour Level of Service

Intersection Description	Control	Worst Approach			Overall Intersection		Mitigated
		Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	
Bacchus Highway / 11800 South	Signal	-	-	-	46.3	D	-
6400 West / 11800 South	NB Stop	NB	13.4	B	-	-	-
6000 West / 11800 South	Signal	-	-	-	36.7	D	-
Freedom Park Drive / 11800 South	Signal	-	-	-	50.6	D	-
Bingham Canyon Mine / Bacchus Highway	EB Stop	EB	5.9	A	-	-	-
6400 West / Herriman Boulevard	SB Stop	SB	10.9	B	-	-	-
6000 West / Herriman Boulevard	Signal	-	-	-	16.3	B	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	26.7	C	-
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	36.0	D	-
SB MVC / 12600 South	Signal	-	-	-	71.1	E	C (26.7)
NB MVC / 12600 South	Signal	-	-	-	108.1	F	C (23.7)
Bangerter Highway / 12600 South	Signal	-	-	-	96.2	F	D (41.9)
Silver Sky Drive / 6000 West	EB Stop	EB	8.9	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	5.4	A	-	-	-
7300 West / Herriman Highway	NB/SB Stop	SB	14.5	B	-	-	-
6800 West / Herriman Highway	SB Stop	SB	13.2	B	-	-	-
6400 West / Main Street	Signal	-	-	-	80.4	F	C (30.2)
5600 West / Main Street	Signal	-	-	-	22.0	C	-
6400 West / 13400 South	Signal	-	-	-	19.3	B	-
5600 West / 13400 South	Signal	-	-	-	70.7	E	D (52.5)
5000 West / 13400 South	Signal	-	-	-	23.0	C	-
SB MVC / 13400 South	Signal	-	-	-	23.3	C	-
NB MVC / 13400 South	Signal	-	-	-	49.5	D	-
6800 West / Herriman Boulevard	NB/SB Stop	NB	8.2	A	-	-	-
Silver Sky Drive / 6400 West	EB/WB Stop	EB	4.2	A	-	-	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

D. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- Bacchus Highway / 11800 South
 - Northbound Approach – 615 feet (a.m. peak), 595 feet (p.m. peak)
- 6000 West / 11800 South
 - Northbound Approach – 400 feet (a.m. peak)
 - Eastbound Approach - >1,000 feet (a.m. and p.m. peak)
- Freedom Park Drive / 11800 South
 - Northbound Approach – 610 feet (a.m. peak), 510 feet (p.m. peak)
 - Southbound Approach – 650 feet (p.m. peak)
 - Eastbound Approach – 450 feet (a.m. peak)
 - Westbound Approach – 820 feet (p.m. peak)
- Anthem Park Boulevard / Herriman Boulevard
 - Northbound Approach – >1,000 feet (a.m. peak)
 - Southbound Approach – 615 feet (p.m. peak)
 - Eastbound Approach – 560 feet (a.m. peak)
 - Westbound Approach – 710 feet (a.m. peak)
- Main Street / Herriman Boulevard / 12600 South
 - Northbound Approach – 530 feet (a.m. peak)
 - Southbound Approach – 905 feet (a.m. peak)
 - Eastbound Approach – 400 feet (p.m. peak)
 - Westbound Approach – 400 feet (p.m. peak)
- Mountain View Corridor / 12600 South
 - Northbound Approach – 630 feet (a.m. peak), 540 feet (p.m. peak)
 - Southbound Approach – >1,000 feet (p.m. peak)
 - Westbound Approach – 475 feet (a.m. peak), >1,000 feet (p.m. peak)
- Bangerter Highway / 12600 South
 - Northbound Offramp – >1,000 feet (p.m. peak)
 - Southbound Offramp – 790 feet (p.m. peak)
 - Westbound Approach – 875 feet (p.m. peak)
- 6400 West / Main Street
 - Westbound Approach – 950 feet (p.m. peak)
- 5600 West / Main Street
 - Southbound Approach – 450 feet (p.m. peak)
- 5600 West / 13400 South
 - Northbound Approach – 425 feet (a.m. peak)
 - Southbound Approach – 690 feet (p.m. peak)

- Eastbound Approach – 590 feet (a.m. peak), 670 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (p.m. peak)
- 5000 West / 13400 South
 - Northbound Approach – 475 feet (a.m. peak)
 - Eastbound Approach – 475 feet (a.m. peak), 350 feet (p.m. peak)
- Mountain View Corridor / 13400 South
 - Southbound Approach – 450 feet (p.m. peak)
 - Westbound Approach – 780 feet (p.m. peak)

Detailed queueing reports are included in Appendix E.

E. Mitigation Measures

It is recommended that a dedicated right-turn pocket be added to the westbound approach of the Anthem Park Boulevard / Herriman Boulevard intersection to increase the westbound capacity at the intersection. It is also recommended that the storage length of all left-turn lanes be increased at the intersection.

It is anticipated that dual left-turn lanes will be warranted at the Freedom Park Drive / 11800 South intersection on the westbound approach. It is recommended that westbound dual left-turn lanes be installed when warranted. It is also recommended that the cycle length of the signal be increased to 120 seconds.

It is anticipated that left-turn permissive-protected phasing will be warranted at the 6400 West / Main Street intersection on the westbound approach. It is recommended that this phasing be implemented when warranted. It is also recommended that a separate right-turn lane be installed on the eastbound approach of the intersection.

The delays at the 5600 West / 13400 South intersection can be attributed to lack of capacity at the intersection due to high westbound volumes during the evening peak hour. It is recommended that the storage length of all left- and right-turn lanes be increased, that a right-turn overlap phase be implemented on the westbound approach, and that the northbound right-turn lane be converted into a shared through-right lane.

Significant delays are anticipated at the Mountain View Corridor / 12600 South intersections in future (2027) plus project conditions. Ultimately, this section of Mountain View Corridor will include a grade-separated freeway corridor that will pull northbound and southbound through traffic off the frontage roads. This project is planned by WFRC to be completed by 2040. It is recommended that this freeway project be expedited to be built as soon as possible. In the meantime, the following mitigation measures can be implemented at the Mountain View Corridor / 12600 South intersection to reduce delays: an additional westbound through lane at the NB MVC / 12600 South



intersection and channelizing eastbound and westbound right-turns. It is anticipated that these improvements will also improve the performance at the Bangerter Highway / 12600 South intersection, as westbound queues from Mountain View Corridor were reaching Bangerter Highway previously.

With added capacity and throughput at the Mountain View Corridor / 12600 South intersections, it is anticipated that the westbound left-turn queue at the Main Street / Herriman Boulevard intersection will increase to where it interferes with Mountain View Corridor. It is recommended that westbound dual left turns be installed at the Main Street / Herriman Boulevard intersection when warranted.

Hales Engineering completed a mitigated scenario with the proposed improvements, including the Mountain View Corridor freeway. As done previously, it was assumed that approximately 25% of the northbound and southbound traffic will remain on the frontage roads when the freeway is built. Based on the mitigated scenario, it is anticipated that the proposed improvements will improve the LOS at all study intersections to an acceptable level of service.

VII. FUTURE (2032) BACKGROUND CONDITIONS

A. Purpose

The purpose of the future (2032) background analysis is to study the intersections and roadways during the peak travel periods of the day for future background traffic and geometric conditions. Through this analysis, future background traffic operational deficiencies can be identified, and potential mitigation measures recommended.

B. Roadway Network

It was assumed that all previously recommended background mitigation measures had been implemented prior to 2032. It was also assumed that all Phase 1 (2019-2030) improvements outlined in the WFRC RTP had been implemented. These improvements include:

- 11800 South widened to a five-lane cross section between Bacchus Highway and 6000 West.
- Herriman Boulevard extended west to Bacchus Highway as a three-lane cross section.
- Herriman Highway/Main Street widened to a three-lane cross section between 7300 West and 6200 West.
- 7300 West extended north from Herriman Highway to Herriman Boulevard as a three-lane cross section.
- 6400 West extended north from Main Street to 10400 South as a three-lane cross section.
- 6000 West widened to a five-lane cross section between Main Street and Herriman Boulevard.

In addition to these improvements listed in the WFRC RTP, the 2030 WFRC/MAG TDM assumes that 7300 West had been extended farther north than Herriman Boulevard connecting to Bacchus Highway at a point north of 11000 South as a three-lane cross section. It was assumed that this improvement had been completed prior to 2032.

Also, it was assumed that Herriman Boulevard would be striped and widened to a five-lane cross-section between 6000 West and 6800 West by 2032, as the current pavement along much of this section is already 80 feet wide.

C. Traffic Volumes

Hales Engineering obtained future (2032) forecasted volumes from a modified version of the WFRC / MAG TDM. This version of the WFRC/MAG TDM was tailored specifically for this project

by Horrocks Engineers (and reviewed by Salt Lake County) to forecast future average weekday daily traffic (AWDT) volumes within the study area. Peak period turning movement counts were estimated using National Cooperative Highway Research Program (NCHRP) 255 methodologies which utilize existing peak period turn volumes and future AWDT volumes to project the future turn volumes at the major intersections. Future (2032) morning and evening peak hour turning movement volumes are shown in Figure 20 and Figure 21.

D. Level of Service Analysis

Hales Engineering determined that the following intersections are anticipated to operate at LOS E or LOS F in future (2032) background conditions as shown in Table 11 and Table 12:

- 6400 West / 11800 South (Morning and Evening Peak)
- SB Mountain View Corridor / 12600 South (Morning and Evening Peak)
- NB Mountain View Corridor / 12600 South (Evening Peak)
- SB Mountain View Corridor / 13400 South (Morning Peak)
- 5000 West / 13400 South (Morning Peak)
- SB Mountain View Corridor / 13400 South (Evening Peak)
- NB Mountain View Corridor / 13400 South (Morning and Evening Peak)

These results serve as a baseline condition for the impact analysis of the proposed development for future (2032) conditions.

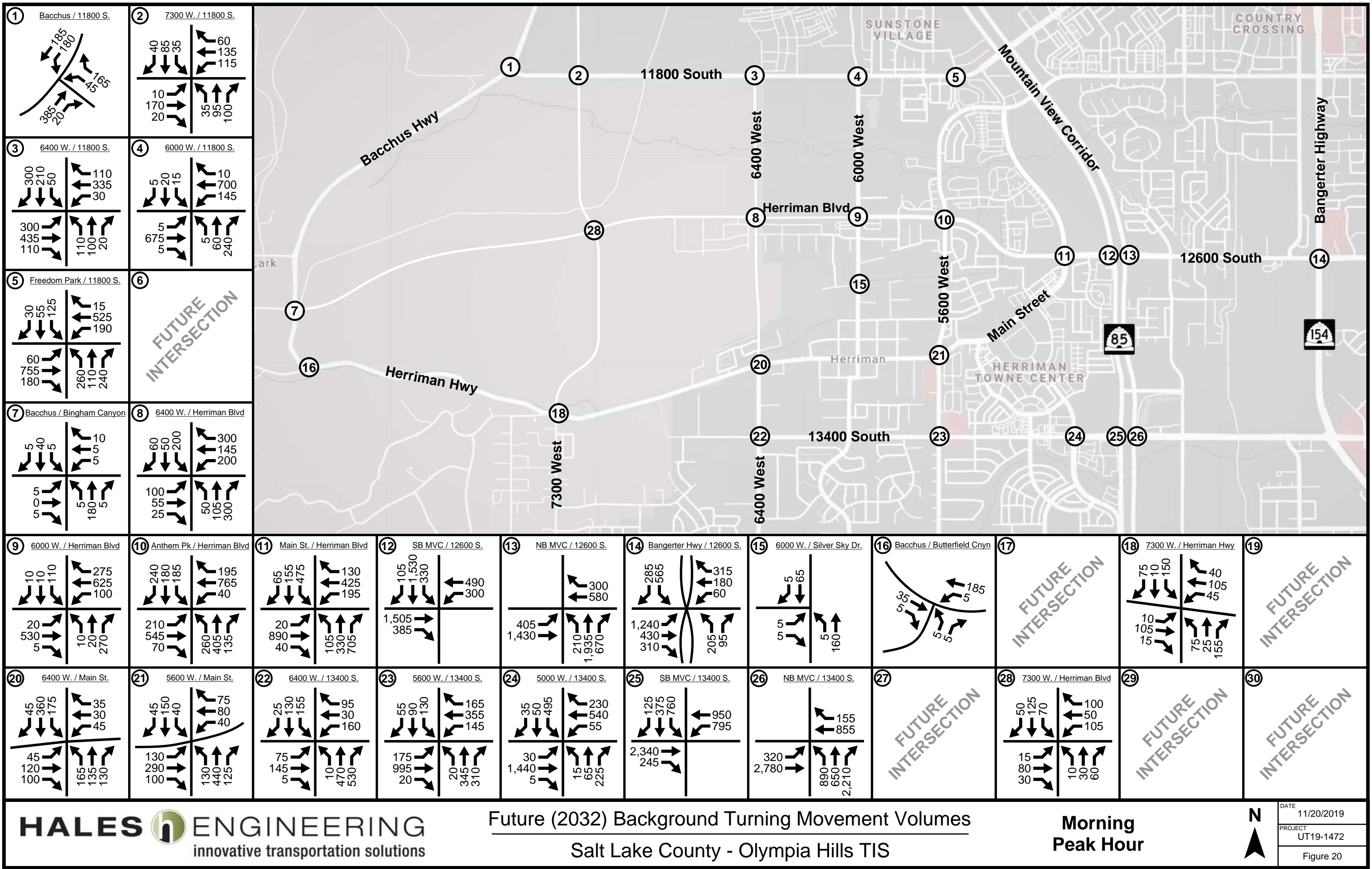
E. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- Bacchus Highway / 11800 South
 - Northbound Approach – 515 feet (a.m. peak), 535 feet (p.m. peak)
- 6400 West / 11800 South
 - Northbound Approach – 425 feet (a.m. peak), >1,000 feet (p.m. peak)
 - Southbound Approach – 780 feet (a.m. peak), >1,000 feet (p.m. peak)
- Freedom Park Drive / 11800 South
 - Southbound Approach – 530 feet (p.m. peak)
- Anthem Park Boulevard / Herriman Boulevard
 - Northbound Approach – 500 feet (a.m. peak)
 - Westbound Approach – 620 feet (a.m. peak)
- Main Street / Herriman Boulevard / 12600 South
 - Northbound Approach – 745 feet (a.m. peak)
 - Southbound Approach – >1,000 feet (a.m. peak)
- Mountain View Corridor / 12600 South

- Northbound Approach – 465 feet (a.m. peak), 430 feet (p.m. peak)
 - Southbound Approach – 560 feet (a.m. peak), >1,000 feet (p.m. peak)
 - Eastbound Approach – 630 feet (a.m. peak)
 - Westbound Approach – 405 feet (a.m. peak), >1,000 feet (p.m. peak)
- Bangerter Highway / 12600 South
 - Southbound Offramp – 375 feet (a.m. peak)
 - Eastbound Approach – 410 feet (a.m. peak)
- 6400 West / 13400 South
 - Northbound Approach – 420 feet (p.m. peak)
 - Southbound Approach – 375 feet (a.m. peak), 570 feet (p.m. peak)
 - Eastbound Approach – 410 feet (a.m. peak)
- 5600 West / 13400 South
 - Northbound Approach – 635 feet (a.m. peak), 400 feet (p.m. peak)
 - Eastbound Approach – 995 feet (a.m. peak), 420 feet (p.m. peak)
- 5000 West / 13400 South
 - Southbound Approach – >1,000 feet (a.m. peak)
 - Eastbound Approach – >1,000 feet (a.m. peak)
- Mountain View Corridor / 13400 South
 - Northbound Approach – >1,000 feet (a.m. and p.m. peak)
 - Southbound Approach – 480 feet (a.m. peak)
 - Eastbound Approach – 835 feet (a.m. peak), 445 feet (p.m. peak)
 - Westbound Approach – 645 feet (a.m. peak), 595 feet (p.m. peak)

Detailed queueing reports are included in Appendix E.



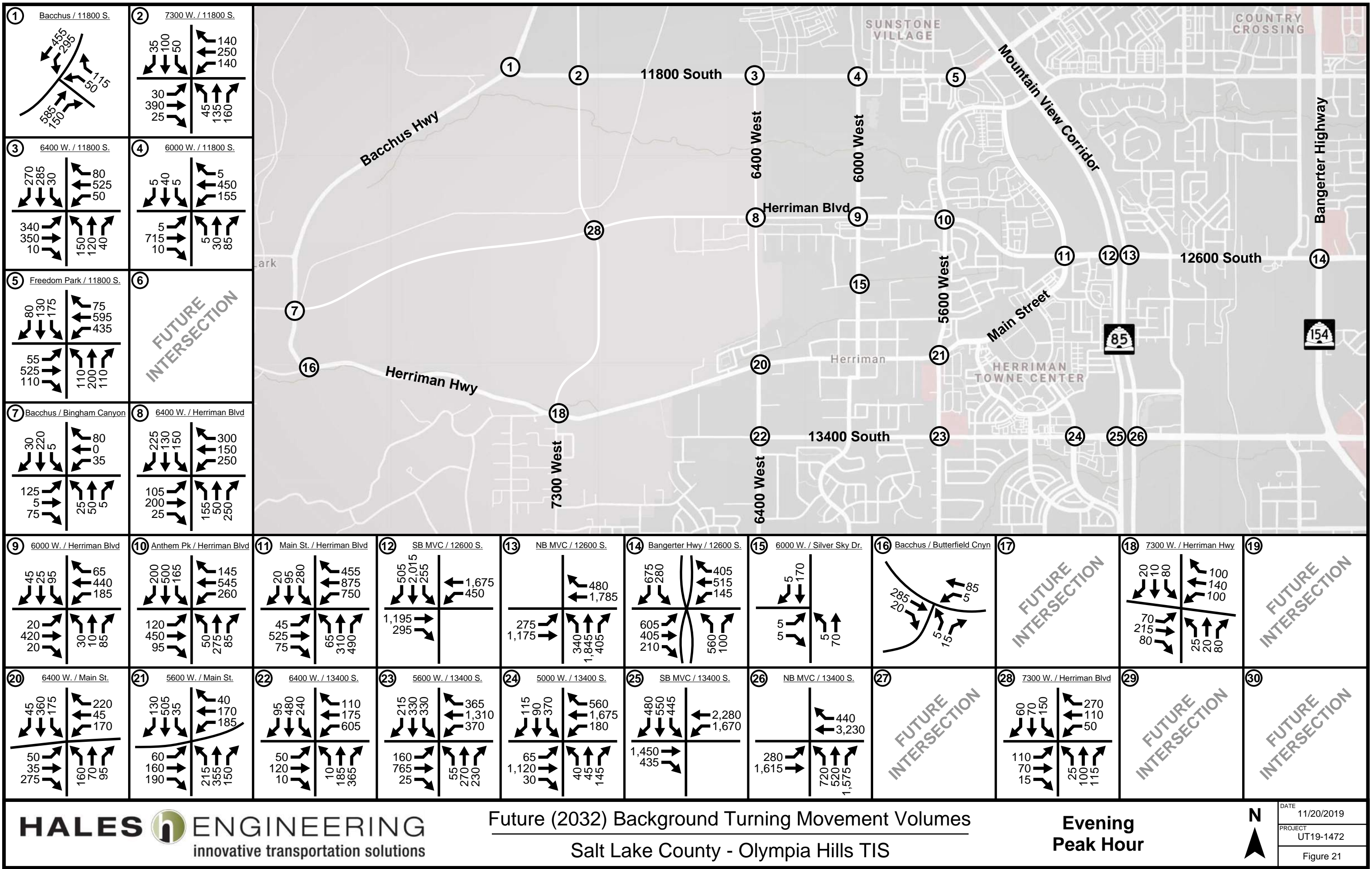


Table 11: Future (2032) Background Morning Peak Hour Level of Service

Intersection Description	Control	Worst Approach			Overall Intersection		Mitigated LOS (Delay)
		Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	
Bacchus Highway / 11800 South	Signal	-	-	-	35.5	D	-
7300 West / 11800 South	NB/SB Stop	NB	10.7	B	-	-	-
6400 West / 11800 South	NB/SB Stop	SB	>75.0	F	-	-	B (15.7)
6000 West / 11800 South	Signal	-	-	-	12.2	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	16.4	B	-
Bingham Canyon Mine / Bacchus Highway	EB/WB Stop	EB	2.9	A	-	-	-
7300 West / Herriman Boulevard	NB/SB Stop	SB	8.0	A	-	-	-
6400 West / Herriman Boulevard	NB/SB Stop	NB	27.7	D	-	-	-
6000 West / Herriman Boulevard	Signal	-	-	-	10.9	B	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	39.1	D	-
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	53.5	D	-
SB MVC / 12600 South	Signal	-	-	-	64.2	E	N/A
NB MVC / 12600 South	Signal	-	-	-	35.3	D	N/A
Bangerter Highway / 12600 South	Signal	-	-	-	34.6	C	-
Silver Sky Drive / 6000 West	EB Stop	EB	3.4	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	4.1	A	-	-	-
7300 West / Herriman Highway	NB/SB Stop	SB	10.7	B	-	-	-
6400 West / Main Street	Signal	-	-	-	26.1	C	-
5600 West / Main Street	Signal	-	-	-	13.7	B	-
6400 West / 13400 South	Signal	-	-	-	18.6	B	-
5600 West / 13400 South	Signal	-	-	-	53.9	D	-
5000 West / 13400 South	Signal	-	-	-	>120.0	F	C (29.4)
SB MVC / 13400 South	Signal	-	-	-	107.1	F	N/A
NB MVC / 13400 South	Signal	-	-	-	111.9	F	N/A

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

Table 12: Future (2032) Background Evening Peak Hour Level of Service

Intersection		Worst Approach		Overall Intersection		Mitigated
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ² LOS (Delay)
Bacchus Highway / 11800 South	Signal	-	-	-	30.9	C -
7300 West / 11800 South	NB/SB Stop	NB	18.8	C	-	- -
6400 West / 11800 South	NB/SB Stop	SB	>75.0	F	-	- C (25.9)
6000 West / 11800 South	Signal	-	-	-	9.9	A -
Freedom Park Drive / 11800 South	Signal	-	-	-	28.2	C -
Bingham Canyon Mine / Bacchus Highway	EB/WB Stop	EB	6.0	A	-	- -
7300 West / Herriman Boulevard	NB/SB Stop	NB	16.4	C	-	- -
6400 West / Herriman Boulevard	NB/SB Stop	NB	21.7	C	-	- -
6000 West / Herriman Boulevard	Signal	-	-	-	9.0	A -
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	19.0	B -
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	25.0	C -
SB MVC / 12600 South	Signal	-	-	-	99.9	F N/A
NB MVC / 12600 South	Signal	-	-	-	112.8	F N/A
Bangerter Highway / 12600 South	Signal	-	-	-	26.8	C -
Silver Sky Drive / 6000 West	EB Stop	EB	3.4	A	-	- -
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	4.2	A	-	- -
7300 West / Herriman Highway	NB/SB Stop	SB	13.7	B	-	- -
6400 West / Main Street	Signal	-	-	-	28.0	C -
5600 West / Main Street	Signal	-	-	-	15.1	B -
6400 West / 13400 South	Signal	-	-	-	23.7	C -
5600 West / 13400 South	Signal	-	-	-	39.0	D -
5000 West / 13400 South	Signal	-	-	-	23.8	C -
SB MVC / 13400 South	Signal	-	-	-	36.4	D -
NB MVC / 13400 South	Signal	-	-	-	84.1	F N/A

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

F. Mitigation Measures

A northbound right-turn pocket is recommended on the northbound approach to the Bacchus Highway / 11800 South intersection is recommended to mitigate the queues that are anticipated on that approach.

It is anticipated that both morning and evening peak hour traffic volumes in 2032 at the 6400 West / 11800 South intersection will warrant the installation of a traffic signal (based on Utah MUTCD 2009 Chapter 4C Warrant 3). Therefore, a traffic signal is recommended at this intersection. It is also recommended that permissive/protected left-turn phasing be installed on the east- and westbound approaches, and that right-turn pockets be constructed on the north- and southbound approaches.

Hales Engineering analyzed a mitigated scenario which assumed that these recommended mitigation measures had been implemented. The mitigated scenario also assumed that additional improvements had been made at the Mountain View Corridor / 12600 South and Mountain View Corridor / 13400 South intersections. These improvements include channelized east- and westbound right-turn lanes at both intersections, the conversion of a northbound through lane at 12600 South to a shared through/left-turn lane and extending the three eastbound lanes on 13400 south to 5000 West.

With the recommended mitigation measures, the 6400 West / 1800 South intersection is anticipated to improve to an acceptable level of service in both the morning and evening peak hours. The poor levels of service and excessive queuing at the Mountain View Corridor / 12600 South and Mountain View Corridor / 13400 South intersections is anticipated to persist. Along with the poor levels of service, the excessive queueing at the Mountain View Corridor / 13400 South intersection is adversely impacting other intersections on 13400 South.

Projected traffic conditions at the Mountain View Corridor / 12600 South and Mountain View Corridor / 13400 South intersections are anticipated to be such that the mitigation measures required to attain acceptable levels of service exceed that of this traffic impact study. Hales Engineering acknowledges that capacity enhancements will be needed at these locations, but those enhancements will need to be developed at a system level by UDOT or other entities. Therefore, the Mountain View Corridor / 12600 South, Bangerter Highway / 12600 South, and Mountain View Corridor / 13400 South intersections will be omitted from further analyses.

An additional mitigated scenario was analyzed which assumed that the queueing at the Mountain View Corridor intersections had been mitigated. With this assumption the poor level of service during the morning peak hour at the 5000 West / 13400 South intersection is anticipated to improve to LOS C.

VIII. FUTURE (2032) PLUS PROJECT CONDITIONS

A. Purpose

The purpose of the future (2032) plus project analysis is to study the intersections and roadways during the peak travel periods of the day for future background traffic and geometric conditions plus the net trips generated by the proposed development. This scenario provides valuable insight into the potential impacts of the proposed project on future background traffic conditions.

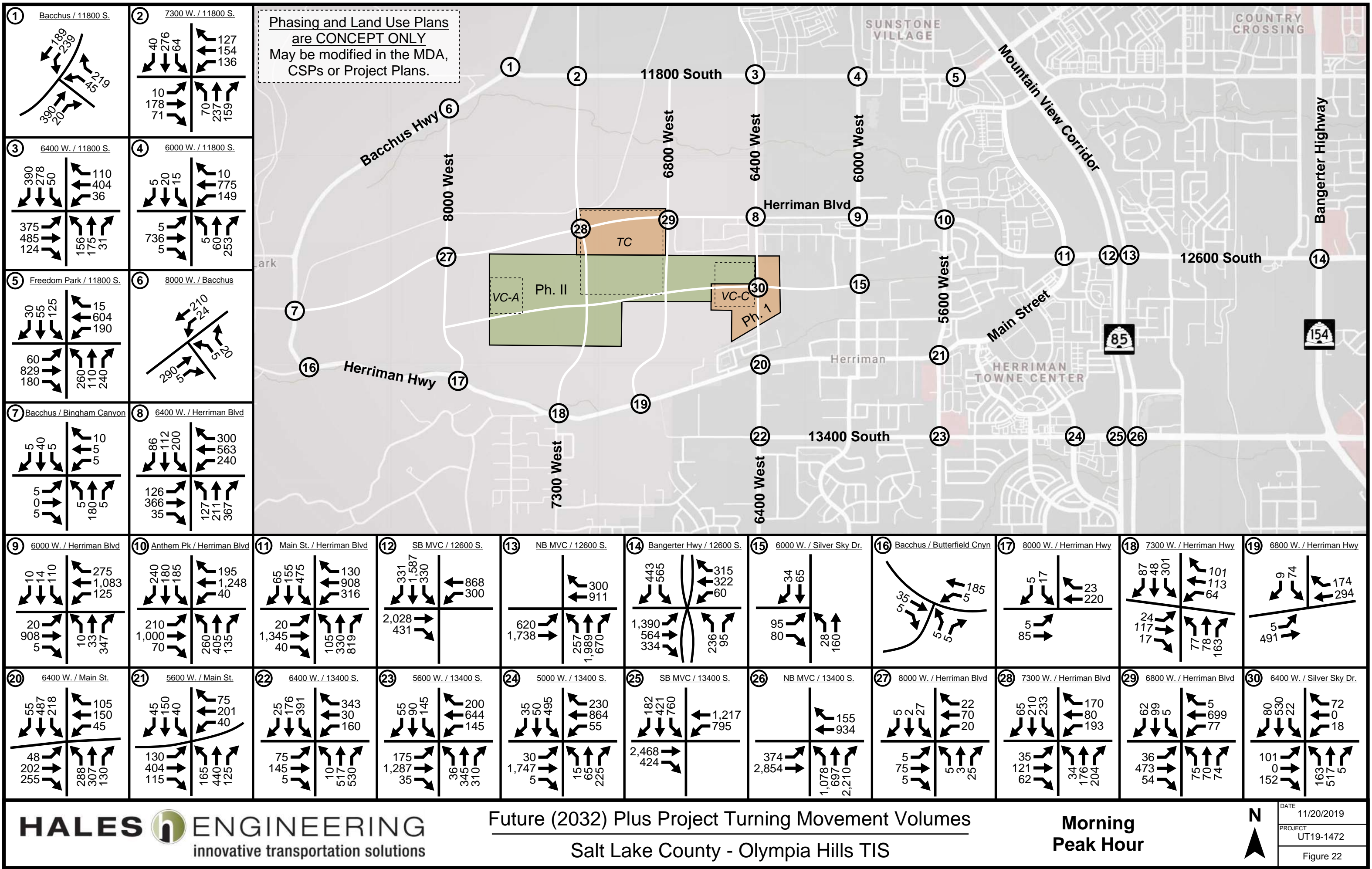
B. Traffic Volumes

Hales Engineering added the Phase II project trips discussed in Chapter V to the future (2032) background traffic volumes to predict turning movement volumes for future (2032) plus project conditions. Additional turning movement volumes were added manually to new project roadways as well to match better with the volumes provided by Horrocks in the build travel demand models. Future (2032) plus project evening peak hour turning movement volumes are shown in Figure 22 and Figure 23.

C. Level of Service Analysis

Hales Engineering determined that the following intersections are anticipated to operate at LOS E or LOS F in future (2032) plus project conditions as shown in Table 13 and Table 14:

- 7300 West / 11800 South (Morning and Evening Peak)
- Anthem Park Boulevard / Herriman Boulevard (Morning Peak)
- Main Street / Herriman Boulevard (Morning and Evening Peak)
- 6800 West / Herriman Highway (Evening Peak)
- 6400 West / Main Street (Evening Peak)
- 6400 West / 13400 South (Morning Peak)
- 5600 West / 13400 South (Evening Peak)
- 5000 West / 13400 South (Evening Peak)
- 7300 West / Herriman Boulevard (Morning and Evening Peak)
- 6800 West / Herriman Boulevard (Morning and Evening Peak)



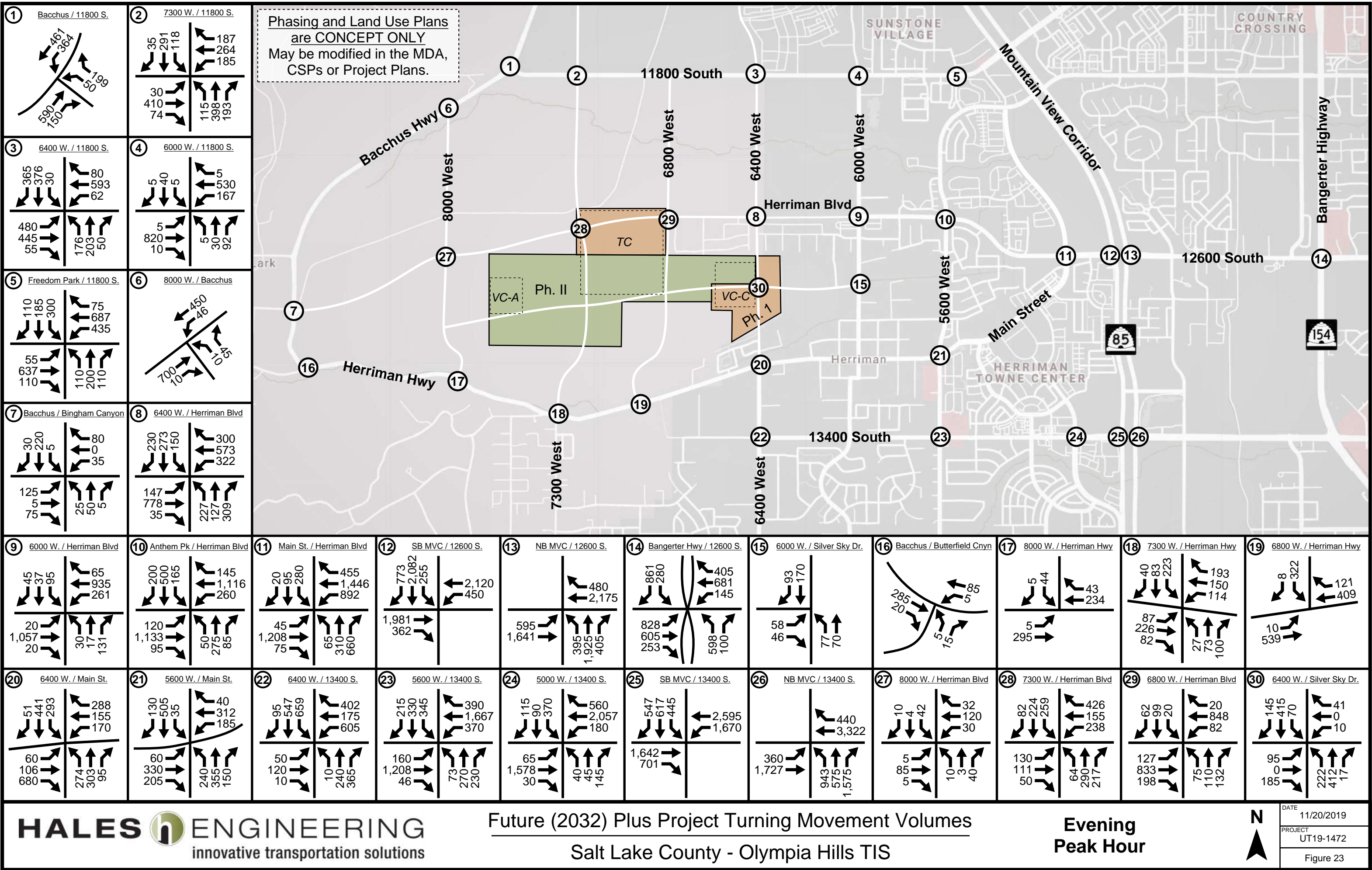


Table 13: Future (2032) Plus Project Morning Peak Hour Level of Service

Intersection		Worst Approach			Overall Intersection		Mitigated
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	LOS (Delay)
Bacchus Highway / 11800 South	Signal	-	-	-	34.5	C	-
7300 West / 11800 South	NB Stop	NB	60.6	F	-	-	B (11.3)
6400 West / 11800 South	Signal	-	-	-	22.4	C	-
6000 West / 11800 South	Signal	-	-	-	13.0	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	22.7	C	-
8000 West / Bacchus Highway	NB Stop	NB	4.0	A	-	-	-
Bingham Canyon Mine / Bacchus Highway	EB Stop	EB	3.4	A	-	-	-
6400 West / Herriman Boulevard	Signal	-	-	-	29.5	C	-
6000 West / Herriman Boulevard	Signal	-	-	-	16.3	B	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	65.1	E	D (43.9)
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	102.3	F	D (53.5)
Silver Sky Drive / 6000 West	EB Stop	EB	5.4	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	3.7	A	-	-	-
8000 West / Herriman Highway	SB Stop	SB	5.1	A	-	-	-
7300 West / Herriman Highway	NB/SB Stop	NB	23.4	C	-	-	-
6800 West / Herriman Highway	SB Stop	SB	11.9	B	-	-	-
6400 West / Main Street	Signal	-	-	-	35.0	C	-
5600 West / Main Street	Signal	-	-	-	16.6	B	-
6400 West / 13400 South	Signal	-	-	-	62.9	E	D (36.5)
5600 West / 13400 South	Signal	-	-	-	38.1	D	-
5000 West / 13400 South	Signal	-	-	-	45.4	D	-
8000 West / Herriman Boulevard	NB/SB Stop	SB	5.5	A	-	-	-
7300 West / Herriman Boulevard	NB/SB Stop	NB	72.7	F	-	-	B (15.2)
6800 West / Herriman Boulevard	NB/SB Stop	SB	>75.0	F	-	-	B (14.5)
Silver Sky Drive / 6400 West	EB/WB Stop	EB	33.2	D	-	-	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

Table 14: Future (2032) Plus Project Evening Peak Hour Level of Service

Intersection	Worst Approach			Overall Intersection		Mitigated	
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	LOS (Delay)
Bacchus Highway / 11800 South	Signal	-	-	-	29.4	C	-
7300 West / 11800 South	NB Stop	NB	>75.0	F			B (17.0)
6400 West / 11800 South	Signal	-	-	-	48.1	D	-
6000 West / 11800 South	Signal	-	-	-	11.7	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	30.3	C	-
8000 West / Bacchus Highway	NB Stop	NB	8.5	A	-	-	-
Bingham Canyon Mine / Bacchus Highway	EB Stop	EB	5.5	A	-	-	-
6400 West / Herriman Boulevard	Signal	-	-	-	41.5	D	-
6000 West / Herriman Boulevard	Signal	-	-	-	15.3	B	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	40.0	D	-
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	56.7	E	C (34.1)
Silver Sky Drive / 6000 West	EB Stop	EB	6.1	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	4.1	A	-	-	-
8000 West / Herriman Highway	SB Stop	SB	6.5	A	-	-	-
7300 West / Herriman Highway	NB/SB Stop	SB	30.2	D	-	-	-
6800 West / Herriman Highway	SB Stop	SB	51.2	F	-	-	B (14.7)
6400 West / Main Street	Signal	-	-	-	>120.0	F	D (54.4)
5600 West / Main Street	Signal	-	-	-	43.8	D	-
6400 West / 13400 South	Signal	-	-	-	49.8	D	-
5600 West / 13400 South	Signal	-	-	-	>120.0	F	D (53.4)
5000 West / 13400 South	Signal	-	-	-	60.7	E	C (24.0)
8000 West / Herriman Boulevard	NB/SB Stop	SB	6.1	A	-	-	-
7300 West / Herriman Boulevard	NB/SB Stop	SB	>75.0	F	-	-	C (28.7)
6800 West / Herriman Boulevard	NB/SB Stop	SB	>75.0	F	-	-	B (18.4)
Silver Sky Drive / 6400 West	EB/WB Stop	EB	18.1	C	-	-	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

D. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- Bacchus Highway / 11800 South
 - Northbound Approach – 490 feet (p.m. peak)
- 7300 West / 11800 South
 - Northbound Approach – 635 feet (a.m. peak), >1,000 feet (p.m. peak)
 - Southbound Approach – 415 feet (a.m. peak), >1,000 feet (p.m. peak)
- 6400 West / 11800 South
 - Northbound Approach – 760 feet (p.m. peak)
 - Southbound Approach – 400 feet (p.m. peak)
 - Eastbound Approach – 625 feet (p.m. peak)
 - Westbound Approach – 365 feet (p.m. peak)
- Freedom Park Drive / 11800 South
 - Southbound Approach – 400 feet (p.m. peak)
- 6400 West / Herriman Boulevard
 - Northbound Approach – 435 feet (a.m. peak), 635 feet (p.m. peak)
 - Southbound Approach – 505 feet (p.m. peak)
 - Westbound Approach – 400 feet (p.m. peak)
- Anthem Park Boulevard / Herriman Boulevard
 - Northbound Approach – 430 feet (a.m. peak)
 - Southbound Approach – 400 feet (p.m. peak)
 - Eastbound Approach – 680 feet (a.m. peak), 570 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (a.m. peak), 470 feet (p.m. peak)
- Main Street / Herriman Boulevard / 12600 South
 - Northbound Approach – 875 feet (a.m. peak), 460 feet (p.m. peak)
 - Southbound Approach – >1,000 feet (a.m. peak), 575 feet (p.m. peak)
 - Eastbound Approach – >1,000 feet (a.m. peak), 605 feet (p.m. peak)
 - Westbound Approach – 470 feet (p.m. peak)
- 6400 West / Main Street
 - Northbound Approach – 820 feet (a.m. peak), >1,000 feet (p.m. peak)
 - Southbound Approach – 430 feet (a.m. peak), 730 feet (p.m. peak)
 - Eastbound Approach – >1,000 feet (p.m. peak)
 - Westbound Approach – 757 feet (p.m. peak)
- 5600 West / Main Street
 - Southbound Approach – >1,000 feet (p.m. peak)
 - Westbound Approach – 720 feet (p.m. peak)

- 6400 West / 13400 South
 - Northbound Approach – >1,000 feet (a.m. peak)
 - Southbound Approach – 955 feet (a.m. peak), >1,000 feet (p.m. peak)
- 5600 West / 13400 South
 - Northbound Approach – 425 feet (a.m. peak)
 - Southbound Approach – >1,000 feet (p.m. peak)
 - Eastbound Approach – 490 feet (a.m. peak), 595 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (p.m. peak)
- 5000 West / 13400 South
 - Southbound Approach – >1,000 feet (a.m. and p.m. peak)
 - Eastbound Approach – 465 feet (a.m. peak), 390 feet (p.m. peak)
 - Westbound Approach – 930 feet (p.m. peak)

Detailed queueing reports are included in Appendix E.

E. Mitigation Measures

It is anticipated that a traffic signal will be warranted at the 6400 West / Herriman Boulevard intersection. It is recommended that a traffic signal be installed when warranted. In order to mitigate the anticipated queueing at the intersection, it is recommended that right-turn lanes be added on all approaches and that permissive-protected phasing be implemented on the eastbound and westbound approaches.

It is anticipated that a traffic signal will be warranted at the 7300 West / 11800 South intersection. It is recommended that a traffic signal be installed with turn pockets when warranted.

At the Anthem Park Boulevard / Herriman Boulevard intersection, it is recommended that the cycle length be increased to 150 seconds and that the northbound right-turn lane be converted to a shared through-right lane.

At the Main Street / Herriman Boulevard intersection, it is recommended that the cycle length be increased to 150 seconds, that a second northbound through lane be added, and that the eastbound right-turn lane be converted to a shared through-right lane.

It is anticipated that a traffic signal will be warranted at the 6800 West / Herriman Highway intersection. It is recommended that a traffic signal be installed with turn pockets when warranted.

At the 6400 West / Main Street intersection, it is recommended that right-turn lanes be added on all approaches, that permissive-protected phasing be implemented on the north- and southbound approaches, and that a right-turn overlap phase be implemented on the eastbound approach.



At the 6400 West / 13400 South intersection, it is recommended that the cycle length be increased to 120 seconds, that dual left-turns be installed on the south- and westbound approaches, and that a right-turn overlap phase be implemented on the westbound approach.

It is recommended that 13400 South be widened to seven lanes between 5000 West and 5600 West and to five lanes between 5600 West and 6400 West to provide needed capacity at the study intersections.

At the 5600 West / 13400 South intersection, it is recommended that right-turn lanes be added on all approaches.

At the 5000 West / 13400 South intersection, it is recommended that a right-turn lane be added on the westbound approach.

It is anticipated that a traffic signal will be warranted at the 7300 West / Herriman Boulevard intersection. It is recommended that a traffic signal be installed with turn pockets when warranted.

It is anticipated that a traffic signal will be warranted at the 6800 West / Herriman Boulevard intersection. It is recommended that a traffic signal be installed with turn pockets when warranted and that permissive-protected phasing be implemented on the eastbound approach.

In order to mitigate queueing at the 6400 West / 11800 South intersection, it is recommended that right-turn lanes be added on the eastbound and westbound approaches and that permissive-protected phasing be implemented on the northbound approach.

In order to mitigate queueing at the 7300 West / Herriman Highway intersection, it is recommended that a right-turn lane be added on the westbound approach.

Hales Engineering completed a mitigated scenario with the proposed improvements. Based on the mitigated scenario, it is anticipated that the proposed improvements will improve the LOS at all study intersections to an acceptable level of service.

FUTURE (2037) BACKGROUND CONDITIONS

A. Purpose

The purpose of the future (2037) background analysis is to study the intersections and roadways during the peak travel periods of the day for future background traffic and geometric conditions. Through this analysis, future background traffic operational deficiencies can be identified, and potential mitigation measures recommended.

B. Roadway Network

It was assumed that all previously recommended background mitigation measures had been implemented prior to 2037. It was also assumed that all traffic signals had been coordinated to optimize traffic flow along the 11800 South, Herriman Boulevard, and 13400 South corridors.

C. Traffic Volumes

Hales Engineering obtained future (2037) forecasted volumes from a modified version of the WFRC / MAG TDM. This version of the WFRC/MAG TDM was tailored specifically for this project by Horrocks Engineers (and reviewed by Salt Lake County) to forecast future average weekday daily traffic (AWDT) volumes within the study area. Peak period turning movement counts were estimated using National Cooperative Highway Research Program (NCHRP) 255 methodologies which utilize existing peak period turn volumes and future AWDT volumes to project the future turn volumes at the major intersections. Future (2037) morning and evening peak hour turning movement volumes are shown in Figure 24 and Figure 25.

D. Level of Service Analysis

Hales Engineering determined that the following intersections are anticipated to operate at LOS E or LOS F in future (2037) background conditions as shown in Table 15 and Table 16:

- 7300 West / 11800 South (Morning and Evening Peak)
- 7300 West / Herriman Boulevard (Evening Peak)
- 6400 West / Herriman Boulevard (Morning and Evening Peak)
- Anthem Park Boulevard / Herriman Boulevard (Morning Peak)
- 7300 West / Herriman Highway (Morning and Evening Peak)
- 5600 West / 13400 South (Evening Peak)

These results serve as a baseline condition for the impact analysis of the proposed development for future (2037) conditions.

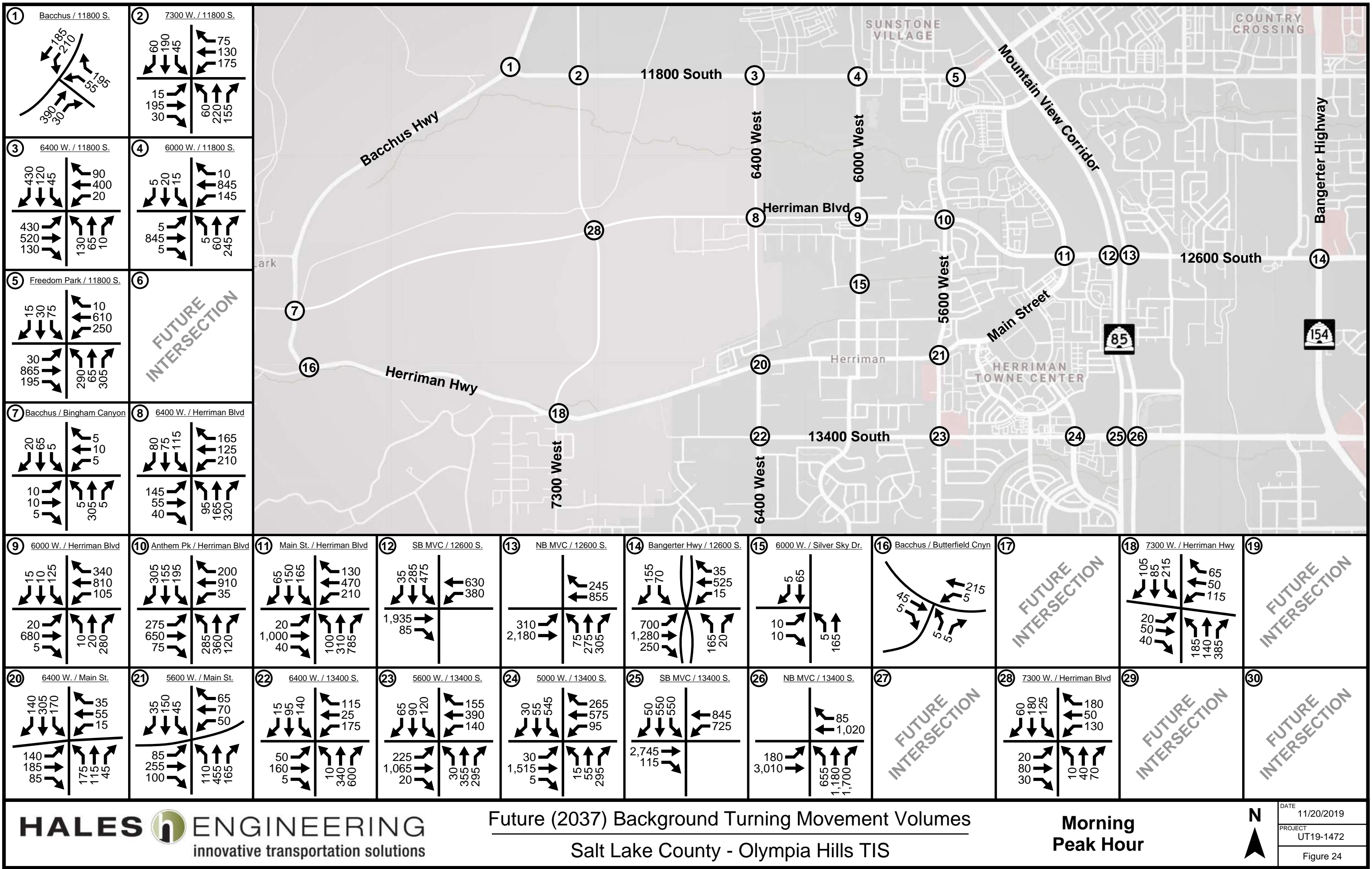
E. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- Bacchus Highway / 11800 South
 - Northbound Approach – 585 feet (a.m. peak), 525 feet (p.m. peak)
- 7300 West / 11800 South
 - Northbound Approach – 390 feet (a.m. peak), >1,000 feet (p.m. peak)
 - Southbound Approach – >1,000 feet (p.m. peak)
- 6400 West / 11800 South
 - Northbound Approach – 750 feet (p.m. peak)
 - Eastbound Approach – 355 feet (p.m. peak)
- 7300 West / Herriman Boulevard
 - Northbound Approach – 815 feet (p.m. peak)
 - Eastbound Approach – 690 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (p.m. peak)
- 6400 West / Herriman Boulevard
 - Northbound Approach – 715 feet (a.m. peak, >1,000 feet (p.m. peak)
 - Southbound Approach – >1,000 feet (p.m. peak)
- Anthem Park Boulevard / Herriman Boulevard
 - Northbound Approach – >1,000 feet (a.m. peak)
 - Southbound Approach – 560 feet (a.m. peak), 515 feet (p.m. peak)
 - Eastbound Approach – 515 feet (a.m. peak)
 - Westbound Approach – 700 feet (a.m. peak)
- Main Street / Herriman Boulevard / 12600 South
 - Southbound Approach – 380 feet (a.m. peak)
 - Westbound Approach – 795 feet (p.m. peak)
- 7300 West / Herriman Highway
 - Northbound Approach – >1,000 feet (a.m. and p.m. peak)
 - Southbound Approach – 410 feet (p.m. peak)
- 6400 West / Main Street
 - Northbound Approach – 355 feet (a.m. peak)
 - Southbound Approach – 380 feet (a.m. peak), 350 feet (p.m. peak)
- 5600 West / Main Street
 - Northbound Approach – 550 feet (a.m. peak), 350 feet (p.m. peak)
 - Southbound Approach – 515 feet (p.m. peak)
- 6400 West / 13400 South
 - Northbound Approach – 530 feet (a.m. peak)
 - Southbound Approach – 615 feet (p.m. peak)

- 5600 West / 13400 South
 - Northbound Approach – 495 feet (a.m. peak), 380 feet (p.m. peak)
 - Eastbound Approach – 645 feet (a.m. peak), 805 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (p.m. peak)
- 5000 West / 13400 South
 - Southbound Approach – 990 feet (a.m. peak)
 - Westbound Approach – >1,000 feet (p.m. peak)

Detailed queueing reports are included in Appendix E.



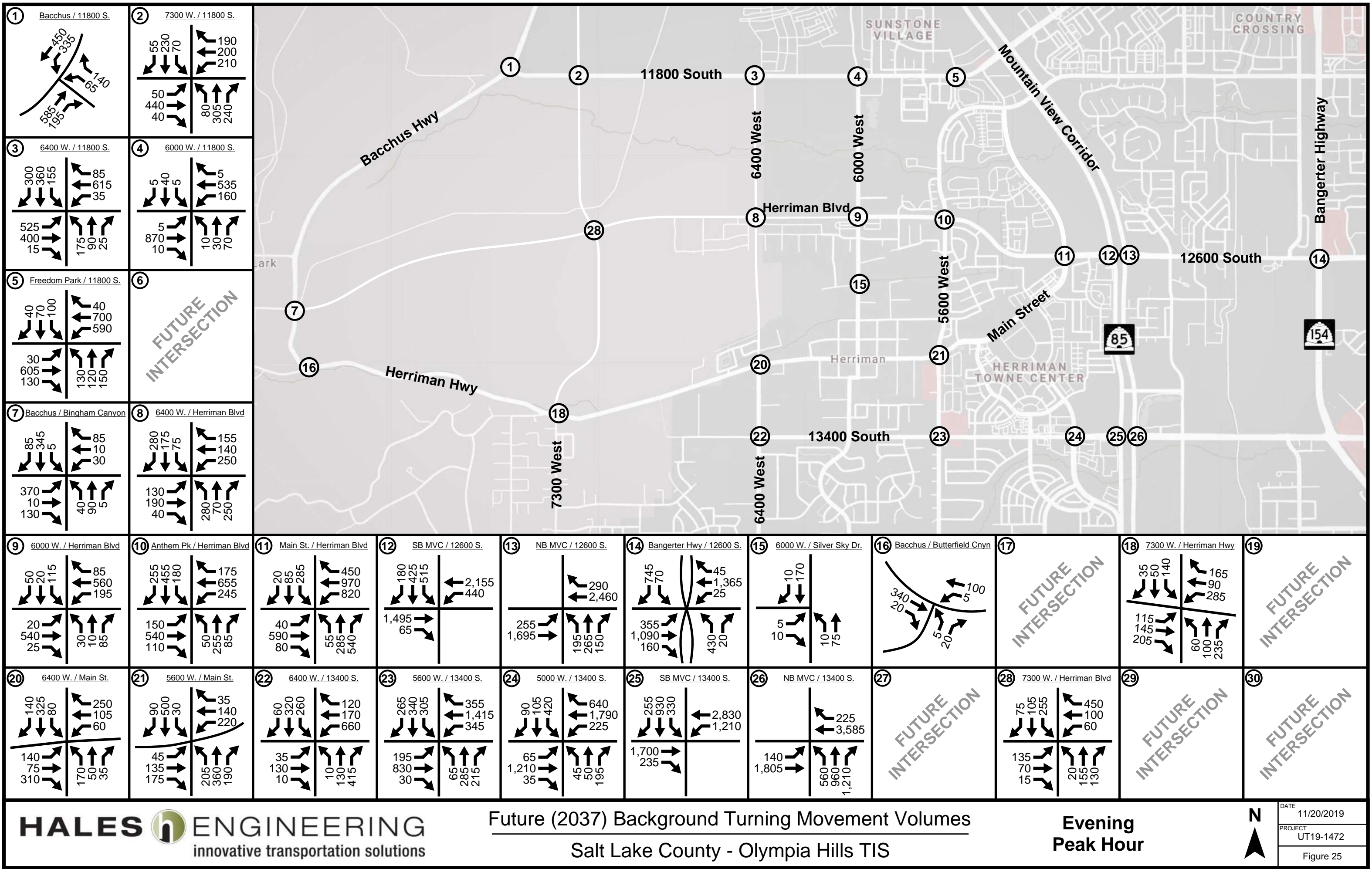


Table 15: Future (2037) Background Morning Peak Hour Level of Service

Intersection		Worst Approach			Overall Intersection		Mitigated
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	LOS (Delay)
Bacchus Highway / 11800 South	Signal	-	-	-	36.9	C	-
7300 West / 11800 South	NB/SB Stop	NB	36.5	E	-	-	B (17.1)
6400 West / 11800 South	Signal	-	-	-	16.9	B	-
6000 West / 11800 South	Signal	-	-	-	13.3	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	21.6	C	-
Bingham Canyon Mine / Bacchus Highway	EB/WB Stop	EB	6.5	A	-	-	-
7300 West / Herriman Boulevard	NB/SB Stop	SB	10.2	B	-	-	-
6400 West / Herriman Boulevard	NB/SB Stop	NB	52.9	F	-	-	B (15.5)
6000 West / Herriman Boulevard	Signal	-	-	-	12.2	B	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	57.8	E	D (46.7)
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	22.2	C	-
SB MVC / 12600 South	Signal	-	-	-	-	-	-
NB MVC / 12600 South	Signal	-	-	-	-	-	-
Bangerter Highway / 12600 South	Signal	-	-	-	-	-	-
Silver Sky Drive / 6000 West	EB Stop	EB	4.0	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	3.9	A	-	-	-
7300 West / Herriman Highway	NB/SB Stop	NB	>120.0	F	-	-	B (18.6)
6400 West / Main Street	Signal	-	-	-	27.1	C	-
5600 West / Main Street	Signal	-	-	-	23.4	C	-
6400 West / 13400 South	Signal	-	-	-	23.8	C	-
5600 West / 13400 South	Signal	-	-	-	37.1	D	-
5000 West / 13400 South	Signal	-	-	-	38.2	D	-
SB MVC / 13400 South	Signal	-	-	-	-	-	-
NB MVC / 13400 South	Signal	-	-	-	-	-	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

Table 16: Future (2037) Background Evening Peak Hour Level of Service

Intersection		Worst Approach			Overall Intersection		Mitigated
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	LOS (Delay)
Bacchus Highway / 11800 South	Signal	-	-	-	28.9	C	-
7300 West / 11800 South	NB/SB Stop	NB	>120.0	F	-	-	C (25.6)
6400 West / 11800 South	Signal	-	-	-	48.5	D	-
6000 West / 11800 South	Signal	-	-	-	11.9	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	21.1	C	-
Bingham Canyon Mine / Bacchus Highway	EB/WB Stop	EB	14.4	B	-	-	-
7300 West / Herriman Boulevard	NB/SB Stop	NB	>75.0	F	-	-	D (40.1)
6400 West / Herriman Boulevard	NB/SB Stop	SB	>75.0	F	-	-	B (17.2)
6000 West / Herriman Boulevard	Signal	-	-	-	11.1	B	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	27.5	C	-
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	50.1	D	-
SB MVC / 12600 South	Signal	-	-	-	-	-	-
NB MVC / 12600 South	Signal	-	-	-	-	-	-
Bangerter Highway / 12600 South	Signal	-	-	-	-	-	-
Silver Sky Drive / 6000 West	EB Stop	EB	3.4	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	5.0	A	-	-	-
7300 West / Herriman Highway	NB/SB Stop	NB	>120.0	F	-	-	C (32.6)
6400 West / Main Street	Signal	-	-	-	28.8	C	-
5600 West / Main Street	Signal	-	-	-	22.6	C	-
6400 West / 13400 South	Signal	-	-	-	27.4	C	-
5600 West / 13400 South	Signal	-	-	-	>120.0	F	D (42.7)
5000 West / 13400 South	Signal	-	-	-	54.5	D	-
SB MVC / 13400 South	Signal	-	-	-	-	-	-
NB MVC / 13400 South	Signal	-	-	-	-	-	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

F. Mitigation Measures

It is anticipated that traffic signals will be warranted at the following intersections based on projected 2037 traffic volumes:

- 7300 West / 11800 South
- 7300 West / Herriman Boulevard
- 6400 West / Herriman Boulevard
- 7300 West / Herriman Highway

It is recommended that traffic signals be installed at these intersections when appropriate warrants are met. In addition to a traffic signal, it is recommended that right-turn lanes be constructed on the north- and southbound approaches to the 6400 West / Herriman Boulevard intersection.

It is recommended that dual left-turn lanes be constructed on the eastbound approach to the 6400 West / 11800 South intersection, and that permissive/protected left-turn phasing be installed on the north- and southbound approaches. Dual left-turn lanes are also recommended on the eastbound approach to the Anthem Park Boulevard / Herriman Boulevard intersection.

It is recommended that separate left- and right-turn lanes be constructed on the northbound approach to the 7300 West / Herriman Highway intersection. According to the WFRC RTP, 7300 West is planned to be expanded to a five-lane cross section south of Herriman Highway as a Phase 2 (2031-2040) project. This planned improvement would coincide with the recommended improvement at the intersection.

It is anticipated that additional capacity will be needed at the 5600 West / 13400 South intersection. It is recommended that the left- and right-turn lanes on all approaches to the 5600 West / 13400 South intersection be extended to accommodate the anticipated queueing and that separate right-turn lanes be added to the south- and eastbound approaches. It is also recommended that the five-lane cross section on 13400 South be extended to the west of 5600 West and that an additional through lane be added to the north- and southbound approaches.

Hales Engineering analyzed a mitigated scenario which assumed that these recommended mitigation measures had been implemented. Based on this analysis the recommended mitigation measures are anticipated to result in acceptable levels of service throughout the study area.

No additional mitigation measures are recommended.

IX. FUTURE (2037) PLUS PROJECT CONDITIONS

A. Purpose

The purpose of the future (2037) plus project analysis is to study the intersections and roadways during the peak travel periods of the day for future background traffic and geometric conditions plus the net trips generated by the proposed development. This scenario provides valuable insight into the potential impacts of the proposed project on future background traffic conditions.

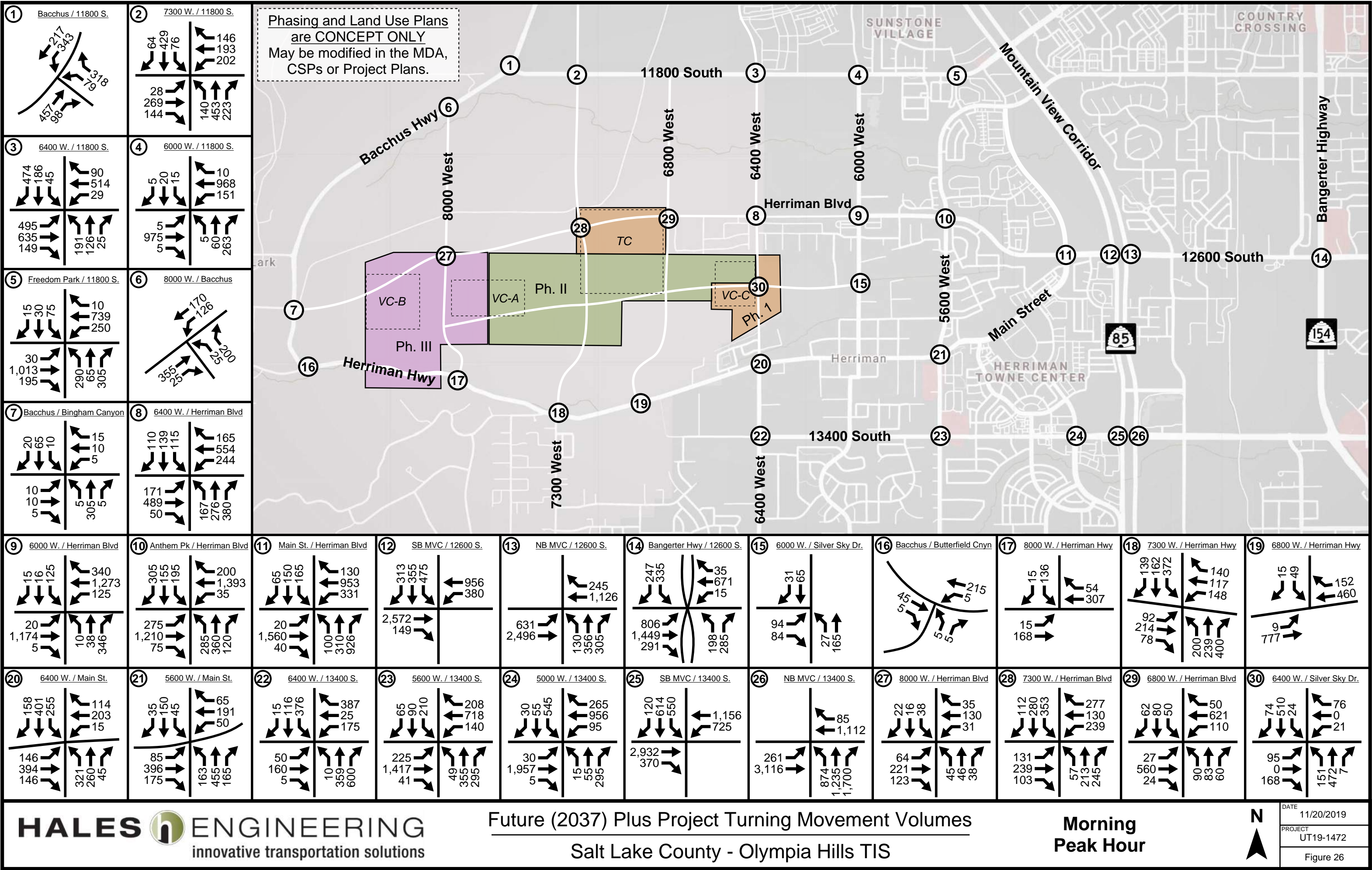
B. Traffic Volumes

Hales Engineering added the Phase III project trips discussed in Chapter V to the future (2037) background traffic volumes to predict turning movement volumes for future (2037) plus project conditions. Additional turning movement volumes were added manually to new project roadways as well to match better with the volumes provided by Horrocks in the build travel demand models. Future (2037) plus project evening peak hour turning movement volumes are shown in Figure 26 and Figure 27.

C. Level of Service Analysis

Hales Engineering determined that the following intersections are anticipated to operate at acceptable levels of service during the morning peak hour in future (2037) plus project conditions as shown in Table 17. The following intersections are anticipated to operate at LOS E or LOS F during the evening peak hour as shown in Table 18:

- 7300 West / 11800 South
- 6400 West / 11800 South
- 7300 West / Herriman Highway
- 6400 West / Main Street
- 6400 West / 13400 South
- 7300 West / Herriman Boulevard



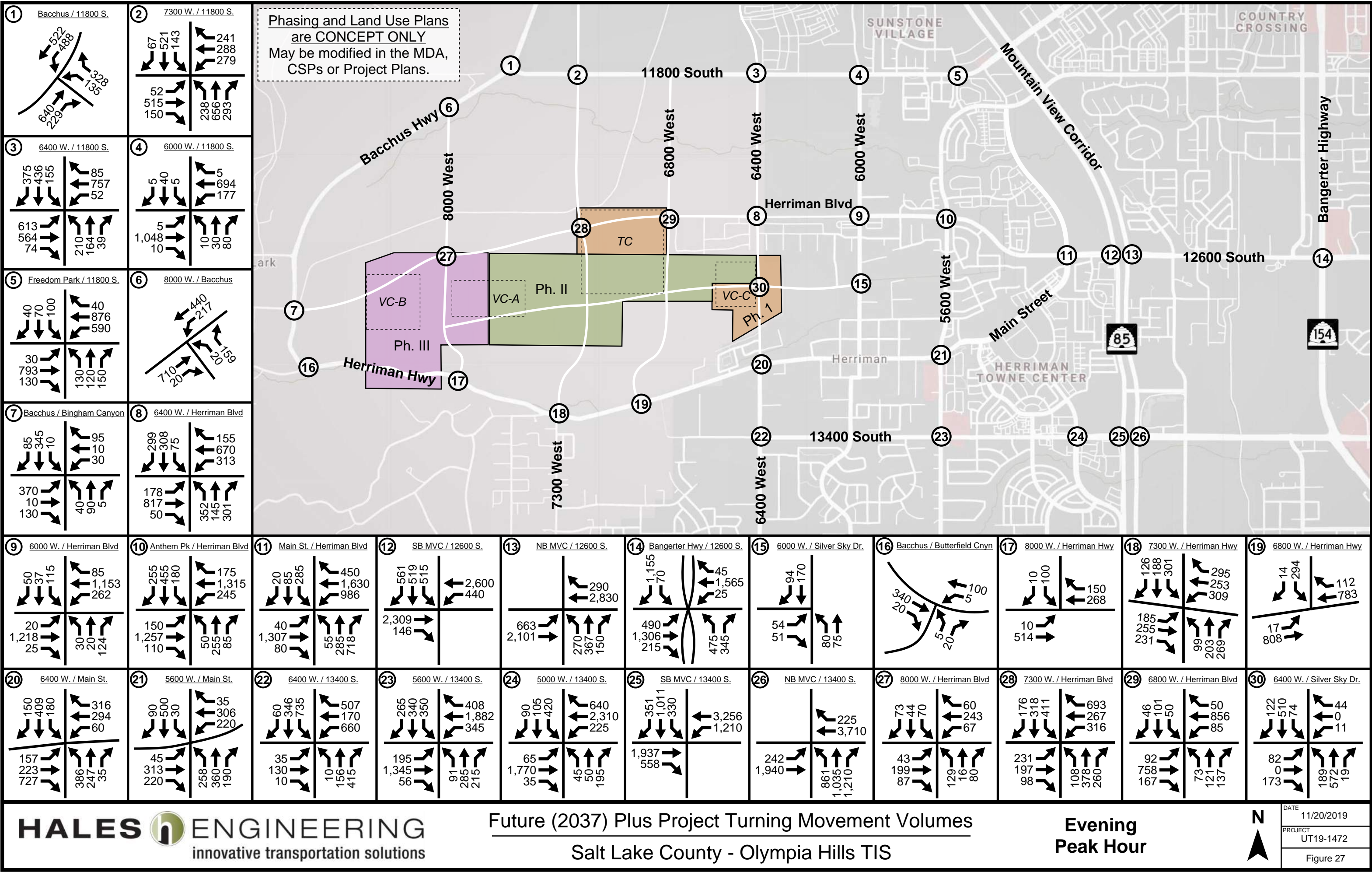


Table 17: Future (2037) Plus Project Morning Peak Hour Level of Service

Intersection Description	Control	Worst Approach			Overall Intersection		Mitigated LOS (Delay)
		Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	
Bacchus Highway / 11800 South	Signal	-	-	-	32.0	C	-
7300 West / 11800 South	Signal	-	-	-	30.0	C	-
6400 West / 11800 South	Signal	-	-	-	24.3	C	-
6000 West / 11800 South	Signal	-	-	-	15.5	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	23.4	C	-
8000 West / Bacchus Highway	NB Stop	NB	8.8	A	-	-	-
Bingham Canyon Mine / Bacchus Highway	EB/WB Stop	EB	5.0	A	-	-	-
6400 West / Herriman Boulevard	Signal	-	-	-	21.4	C	-
6000 West / Herriman Boulevard	Signal	-	-	-	21.6	C	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	46.0	D	-
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	37.6	D	-
Silver Sky Drive / 6000 West	EB Stop	EB	5.5	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	3.1	A	-	-	-
8000 West / Herriman Highway	SB Stop	SB	8.3	A	-	-	-
7300 West / Herriman Highway	Signal	-	-	-	49.0	D	-
6800 West / Herriman Highway	Signal	-	-	-	22.6	C	-
6400 West / Main Street	Signal	-	-	-	33.0	C	-
5600 West / Main Street	Signal	-	-	-	22.1	C	-
6400 West / 13400 South	Signal	-	-	-	26.2	C	-
5600 West / 13400 South	Signal	-	-	-	27.6	C	-
5000 West / 13400 South	Signal	-	-	-	29.7	C	-
8000 West / Herriman Boulevard	NB/SB Stop	SB	7.5	A	-	-	-
7300 West / Herriman Boulevard	Signal	-	-	-	32.7	C	-
6800 West / Herriman Boulevard	Signal	-	-	-	30.0	C	-
Silver Sky Drive / 6400 West	EB/WB Stop	EB	20.5	C	-	-	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

Table 18: Future (2037) Plus Project Evening Peak Hour Level of Service

Intersection Description	Control	Worst Approach			Overall Intersection		Mitigated LOS (Delay)
		Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	
Bacchus Highway / 11800 South	Signal	-	-	-	29.8	C	-
7300 West / 11800 South	Signal	-	-	-	112.1	F	C (31.3)
6400 West / 11800 South	Signal	-	-	-	59.2	E	D (52.0)
6000 West / 11800 South	Signal	-	-	-	11.9	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	22.5	C	-
8000 West / Bacchus Highway	NB Stop	NB	15.0	B	-	-	-
Bingham Canyon Mine / Bacchus Highway	EB/WB Stop	EB	11.2	B	-	-	-
6400 West / Herriman Boulevard	Signal	-	-	-	52.8	D	-
6000 West / Herriman Boulevard	Signal	-	-	-	18.6	B	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	48.0	D	-
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	32.7	C	-
Silver Sky Drive / 6000 West	EB Stop	EB	7.0	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	4.3	A	-	-	-
8000 West / Herriman Highway	SB Stop	SB	11.6	B	-	-	-
7300 West / Herriman Highway	Signal	-	-	-	66.0	E	D (49.2)
6800 West / Herriman Highway	Signal	-	-	-	52.6	D	-
6400 West / Main Street	Signal	-	-	-	90.1	F	D (41.2)
5600 West / Main Street	Signal	-	-	-	30.1	C	-
6400 West / 13400 South	Signal	-	-	-	78.5	E	C (32.1)
5600 West / 13400 South	Signal	-	-	-	50.8	D	-
5000 West / 13400 South	Signal	-	-	-	30.4	C	-
8000 West / Herriman Boulevard	NB/SB Stop	SB	10.4	B	-	-	-
7300 West / Herriman Boulevard	Signal	-	-	-	>120.0	F	C (31.6)
6800 West / Herriman Boulevard	Signal	-	-	-	36.2	D	-
Silver Sky Drive / 6400 West	EB/WB Stop	EB	24.4	C	-	-	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

D. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- Bacchus Highway / 11800 South
 - Northbound Approach – 410 feet (a.m. peak), 525 feet (p.m. peak)
- 7300 West / 11800 South
 - Northbound Approach – 420 feet (a.m. peak), >1,000 feet (p.m. peak)
 - Southbound Approach – >1,000 feet (p.m. peak)
 - Westbound Approach – 475 feet (p.m. peak)
- 6400 West / 11800 South
 - Northbound Approach – 485 feet (p.m. peak)
 - Southbound Approach – 780 feet (p.m. peak)
 - Eastbound Approach – 610 feet (p.m. peak)
 - Westbound Approach – 410 feet (p.m. peak)
- 6400 West / Herriman Boulevard
 - Northbound Approach – >1,000 feet (p.m. peak)
 - Eastbound Approach – 395 feet (p.m. peak)
 - Westbound Approach – 355 feet (p.m. peak)
- 6000 West / Herriman Boulevard
 - Westbound Approach – 370 feet (a.m. peak)
- Anthem Park Boulevard / Herriman Boulevard
 - Northbound Approach – 735 feet (a.m. peak)
 - Southbound Approach – 700 feet (p.m. peak)
 - Eastbound Approach – 365 feet (a.m. peak), 460 feet (p.m. peak)
 - Westbound Approach – 635 feet (a.m. peak), 400 feet (p.m. peak)
- Main Street / Herriman Boulevard / 12600 South
 - Eastbound Approach – >1,000 feet (a.m. peak)
 - Westbound Approach – 545 feet (p.m. peak)
- 6800 West / Herriman Highway
 - Eastbound Approach – 610 feet (a.m. peak), >1,000 feet (p.m. peak)
 - Westbound Approach – 515 feet (p.m. peak)
- 7300 West / Herriman Highway
 - Southbound Approach – >1,000 feet (a.m. and p.m. peak)
 - Eastbound Approach – 665 feet (p.m. peak)
 - Westbound Approach – 415 feet (a.m. peak), 865 feet (p.m. peak)
- 6400 West / Main Street
 - Northbound Approach – 430 feet (a.m. peak)
 - Southbound Approach – 670 feet (a.m. peak), 675 feet (p.m. peak)

- Eastbound Approach – >1,000 feet (p.m. peak)
 - Westbound Approach – 395 feet (p.m. peak)
- 5600 West / Main Street
 - Northbound Approach – 590 feet (a.m. peak), 725 feet (p.m. peak)
 - Southbound Approach – 540 feet (p.m. peak)
- 6400 West / 13400 South
 - Northbound Approach – 545 feet (a.m. peak)
 - Southbound Approach – 375 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (p.m. peak)
- 5600 West / 13400 South
 - Eastbound Approach – 455 feet (a.m. peak), 530 feet (p.m. peak)
 - Westbound Approach – 880 feet (p.m. peak)
- 5000 West / 13400 South
 - Southbound Approach – >1,000 feet (a.m. peak)
 - Westbound Approach – 530 feet (p.m. peak)
- 7300 West / Herriman Boulevard
 - Southbound Approach – 475 feet (a.m. peak), 905 feet (p.m. peak)
 - Eastbound Approach – 390 feet (a.m. peak), >1,000 feet (p.m. peak)
 - Westbound Approach – 415 feet (a.m. peak), >1,000 feet (p.m. peak)
- 6800 West / Herriman Boulevard
 - Eastbound Approach – 510 feet (a.m. peak), 650 feet (p.m. peak)
 - Westbound Approach – 620 feet (a.m. peak), >1,000 feet (p.m. peak)

Detailed queueing reports are included in Appendix E.

E. Mitigation Measures

It is recommended that permissive/protected left-turn phasing be installed on all approaches to the 7300 West / 11800 South, 6400 West / 11800 South, 7300 West / Herriman Boulevard, 6400 West / Herriman Boulevard, and 6400 West / Main Street intersections.

It is also recommended that dual left-turn lanes be constructed on the northbound approach to the 6400 West / 11800 South intersection and on the westbound approach to the 6400 West / 13400 South intersection.

It is also anticipated that 7300 West will need to be expanded to a five-lane cross section north of Herriman Boulevard to accommodate the projected traffic volumes.



Hales Engineering analyzed a mitigated scenario which assumed that these recommended mitigation measures had been implemented. Based on this analysis the recommended mitigation measures are anticipated to result in acceptable levels of service throughout the study area.

No additional mitigation measures are recommended.

X. FUTURE (2042) BACKGROUND CONDITIONS

A. Purpose

The purpose of the future (2042) background analysis is to study the intersections and roadways during the peak travel periods of the day for future background traffic and geometric conditions. Through this analysis, future background traffic operational deficiencies can be identified, and potential mitigation measures recommended.

B. Roadway Network

According to the WFRC Regional Transportation Plan, 7300 West is planned to be expanded to a five-lane cross section south of Herriman Highway as Phase 2 (2031-2040) project. It was assumed that this improvement, as well as all previously recommended background mitigation measures, had been completed prior to 2042.

C. Traffic Volumes

Hales Engineering obtained future (2042) forecasted volumes from a modified version of the WFRC / MAG TDM. This version of the WFRC/MAG TDM was tailored specifically for this project by Horrocks Engineers (and reviewed by Salt Lake County) to forecast future average weekday daily traffic (AWDT) volumes within the study area. Peak period turning movement counts were estimated using National Cooperative Highway Research Program (NCHRP) 255 methodologies which utilize existing peak period turn volumes and future AWDT volumes to project the future turn volumes at the major intersections. Future (2042) morning and evening peak hour turning movement volumes are shown in Figure 28 and Figure 29.

D. Level of Service Analysis

Hales Engineering determined that the following intersections are anticipated to operate at LOS E or LOS F in future (2042) background conditions as shown in Table 19 and Table 20:

- 6400 West / 11800 South (Evening Peak)
- 7300 West / Herriman Boulevard (Evening Peak)
- Anthem Park Boulevard / Herriman Boulevard (Morning Peak)
- Main Street / Herriman Boulevard / 12600 South (Morning and Evening Peak)
- 6400 West / Main Street (Evening Peak)
- 6400 West / 13400 South (Evening Peak)

These results serve as a baseline condition for the impact analysis of the proposed development for future (2042) conditions.

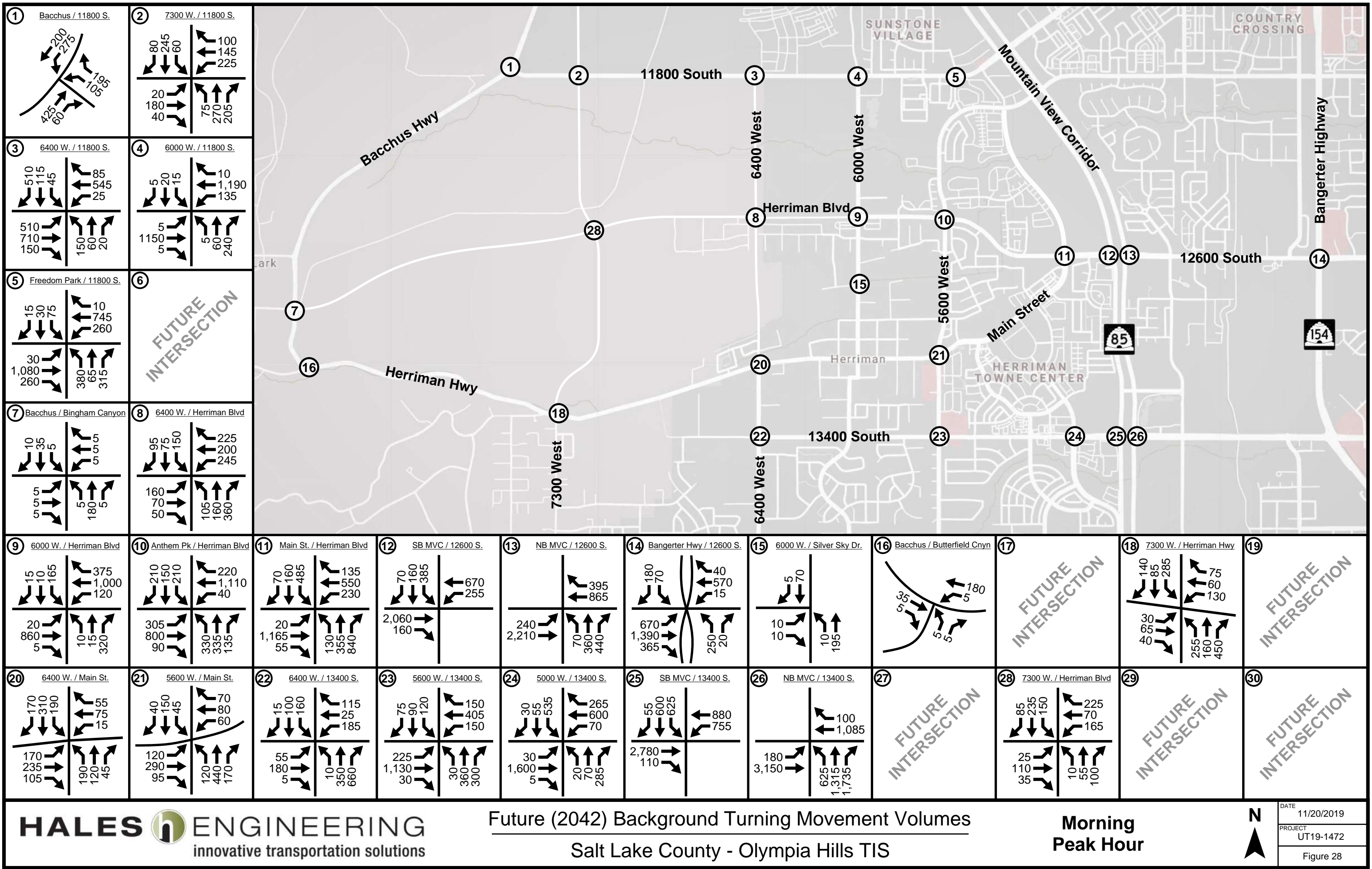
E. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- Bacchus Highway / 11800 South
 - Northbound Approach – 720 feet (a.m. peak), 495 feet (p.m. peak)
- 7300 West / 11800 South
 - Northbound Approach – 360 feet (a.m. peak), 655 feet (p.m. peak)
 - Southbound Approach – 855 feet (p.m. peak)
 - Westbound Approach – 825 feet (p.m. peak)
- 6400 West / 11800 South
 - Southbound Approach – 840 feet (p.m. peak)
 - Eastbound Approach – 415 feet (p.m. peak)
 - Westbound Approach – 460 feet (p.m. peak)
- Freedom Park Drive / 11800 South
 - Northbound Approach – 410 feet (p.m. peak)
 - Westbound Approach – 445 feet (p.m. peak)
- 7300 West / Herriman Boulevard
 - Northbound Approach – 425 feet (p.m. peak)
 - Southbound Approach – >1,000 feet (p.m. peak)
 - Eastbound Approach – >1,000 feet (p.m. peak)
 - Westbound Approach – 565 feet (p.m. peak)
- 6400 West / Herriman Boulevard
 - Northbound Approach – 375 feet (p.m. peak)
- Anthem Park Boulevard / Herriman Boulevard
 - Northbound Approach – >1,000 feet (a.m. peak)
 - Southbound Approach – 460 feet (a.m. peak), 635 feet (p.m. peak)
 - Westbound Approach – 925 feet (a.m. peak)
- Main Street / Herriman Boulevard / 12600 South
 - Northbound Approach – 990 feet (a.m. peak), 385 feet (p.m. peak)
 - Southbound Approach – >1,000 feet (a.m. peak), 780 feet (p.m. peak)
 - Eastbound Approach – 355 feet (a.m. peak), 605 feet (p.m. peak)
 - Westbound Approach – 765 feet (p.m. peak)
- 7300 West / Herriman Highway
 - Southbound Approach – 360 feet (a.m. peak)
 - Westbound Approach – 390 feet (p.m. peak)

- 6400 West / Main Street
 - Northbound Approach – 505 feet (p.m. peak)
 - Southbound Approach – 905 feet (p.m. peak)
 - Eastbound Approach – >1,000 feet (p.m. peak)
 - Westbound Approach – 750 feet (p.m. peak)
- 5600 West / Main Street
 - Northbound Approach – 610 feet (a.m. peak), 445 feet (p.m. peak)
 - Southbound Approach – 460 feet (p.m. peak)
- 6400 West / 13400 South
 - Northbound Approach – 765 feet (a.m. peak)
 - Southbound Approach – >1,000 feet (p.m. peak)
 - Westbound Approach – 565 feet (p.m. peak)
- 5600 West / 13400 South
 - Westbound Approach – 815 feet (p.m. peak)
- 5000 West / 13400 South
 - Southbound Approach – >1,000 feet (a.m. and p.m. peak)
 - Eastbound Approach – 395 feet (a.m. peak)
 - Westbound Approach – 720 feet (p.m. peak)

Detailed queueing reports are included in Appendix E.



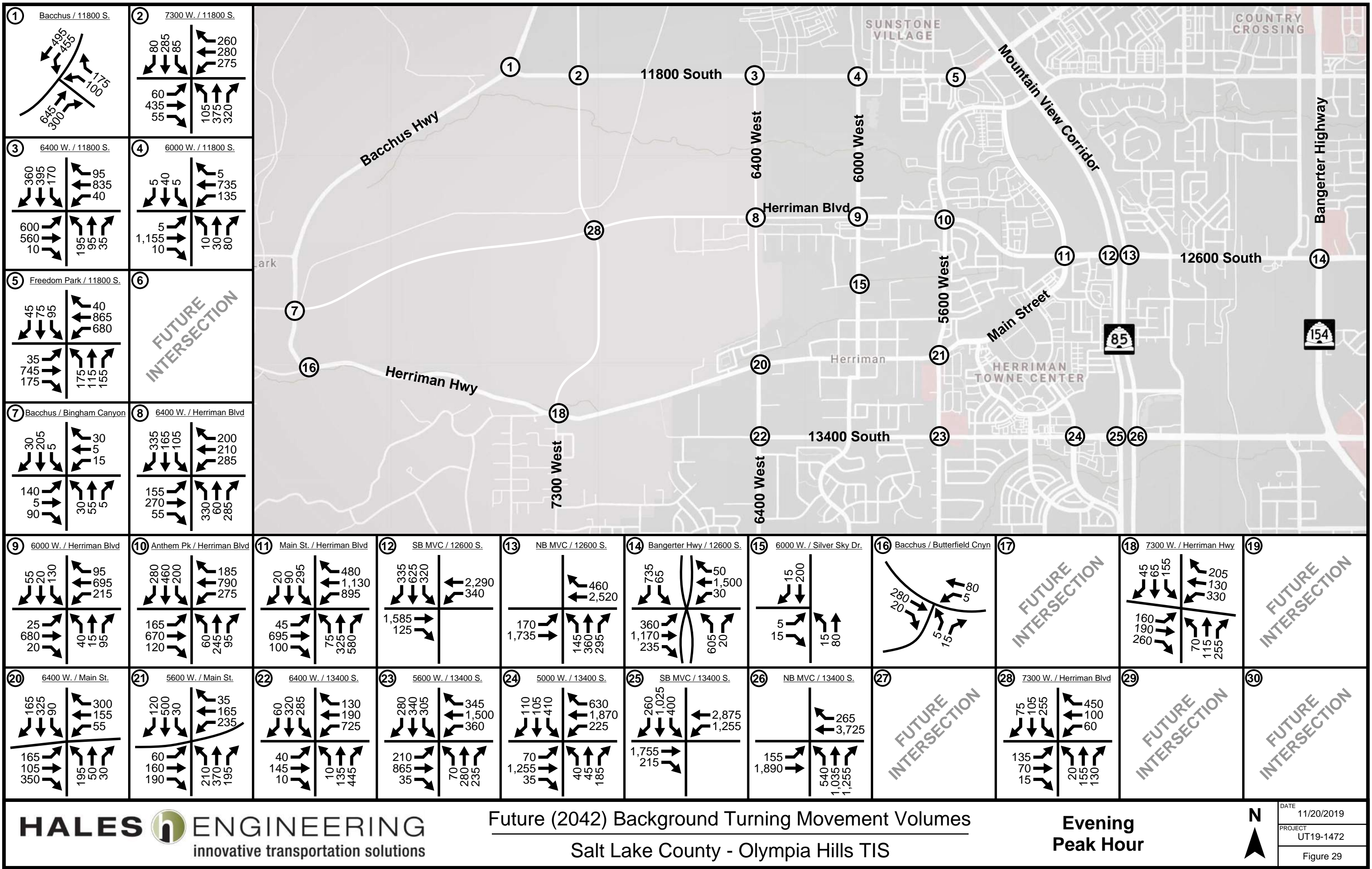


Table 19: Future (2042) Background Morning Peak Hour Level of Service

Intersection	Worst Approach			Overall Intersection		Mitigated
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ² LOS (Delay)
Bacchus Highway / 11800 South	Signal	-	-	-	42.2	D -
7300 West / 11800 South	Signal	-	-	-	19.8	B -
6400 West / 11800 South	Signal	-	-	-	22.2	C -
6000 West / 11800 South	Signal	-	-	-	15.1	B -
Freedom Park Drive / 11800 South	Signal	-	-	-	28.5	C -
Bingham Canyon Mine / Bacchus Highway	EB/WB Stop	EB	4.4	A	-	- -
7300 West / Herriman Boulevard	Signal	-	-	-	20.9	C -
6400 West / Herriman Boulevard	Signal	-	-	-	16.8	B -
6000 West / Herriman Boulevard	Signal	-	-	-	14.9	B -
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	61.5	E D (45.6)
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	75.0	E C (34.7)
SB MVC / 12600 South	Signal	-	-	-	-	- -
NB MVC / 12600 South	Signal	-	-	-	-	- -
Bangerter Highway / 12600 South	Signal	-	-	-	-	- -
Silver Sky Drive / 6000 West	EB Stop	EB	4.1	A	-	- -
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	7.2	A	-	- -
7300 West / Herriman Highway	Signal	-	-	-	21.0	C -
6400 West / Main Street	Signal	-	-	-	27.0	C -
5600 West / Main Street	Signal	-	-	-	22.6	C -
6400 West / 13400 South	Signal	-	-	-	29.9	C -
5600 West / 13400 South	Signal	-	-	-	26.7	C -
5000 West / 13400 South	Signal	-	-	-	46.6	D -
SB MVC / 13400 South	Signal	-	-	-	-	- -
NB MVC / 13400 South	Signal	-	-	-	-	- -

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.
2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.
3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

Table 20: Future (2042) Background Evening Peak Hour Level of Service

Intersection		Worst Approach			Overall Intersection		Mitigated
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	LOS (Delay)
Bacchus Highway / 11800 South	Signal	-	-	-	26.4	C	-
7300 West / 11800 South	Signal	-	-	-	45.2	D	-
6400 West / 11800 South	Signal	-	-	-	56.4	E	D (54.7)
6000 West / 11800 South	Signal	-	-	-	12.9	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	30.0	C	-
Bingham Canyon Mine / Bacchus Highway	EB/WB Stop	EB	6.3	A	-	-	-
7300 West / Herriman Boulevard	Signal	-	-	-	>120.0	F	C (31.3)
6400 West / Herriman Boulevard	Signal	-	-	-	18.8	B	-
6000 West / Herriman Boulevard	Signal	-	-	-	13.8	B	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	32.4	C	-
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	66.8	E	C (30.7)
SB MVC / 12600 South	Signal	-	-	-	-	-	-
NB MVC / 12600 South	Signal	-	-	-	-	-	-
Bangerter Highway / 12600 South	Signal	-	-	-	-	-	-
Silver Sky Drive / 6000 West	EB Stop	EB	3.5	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	4.3	A	-	-	-
7300 West / Herriman Highway	Signal	-	-	-	22.8	C	-
6400 West / Main Street	Signal	-	-	-	>120.0	F	C (29.3)
5600 West / Main Street	Signal	-	-	-	21.6	C	-
6400 West / 13400 South	Signal	-	-	-	93.1	F	C (34.0)
5600 West / 13400 South	Signal	-	-	-	45.9	D	-
5000 West / 13400 South	Signal	-	-	-	43.7	D	-
SB MVC / 13400 South	Signal	-	-	-	-	-	-
NB MVC / 13400 South	Signal	-	-	-	-	-	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

F. Mitigation Measures

It is anticipated that additional capacity will be needed at the following intersections to accommodate the projected 2042 traffic conditions:

- 6400 West / 11800 South
- 7300 West / Herriman Boulevard
- Anthem Park Boulevard / Herriman Boulevard
- Main Street / Herriman Boulevard / 12600 South
- 6400 West / Main Street
- 6400 West / 13400 South

The following mitigation measures are recommended:

- 6400 West / 11800 South
 - Add right-turn lanes to the east- and westbound approaches
- 7300 West / Herriman Boulevard
 - Add right-turn lanes to all approaches
 - Install permissive/protected left-turn phasing on all approaches
- Anthem Park Boulevard / Herriman Boulevard
 - Add right-turn lanes to the east- and westbound approaches
- Main Street / Herriman Boulevard / 12600 South
 - Add second through lane to the northbound approach
 - Increase left-turn storage length on the southbound approach
 - Construct dual left-turn lanes on the westbound approach
- 6400 West / Main Street
 - Add right-turn lanes to the east- and westbound approaches
- 6400 West / 13400 South
 - Increase left-turn storage length on the southbound approach
 - Construct dual left-turn lanes on the westbound approach

Hales Engineering analyzed a mitigated scenario which assumed that these recommended mitigation measures had been implemented. Based on this analysis the recommended mitigation measures are anticipated to result in acceptable levels of service throughout the study area.

No additional mitigation measures are recommended.

XI. FUTURE (2042) PLUS PROJECT CONDITIONS

A. Purpose

The purpose of the future (2042) plus project analysis is to study the intersections and roadways during the peak travel periods of the day for future background traffic and geometric conditions plus the net trips generated by the proposed development. This scenario provides valuable insight into the potential impacts of the proposed project on future background traffic conditions.

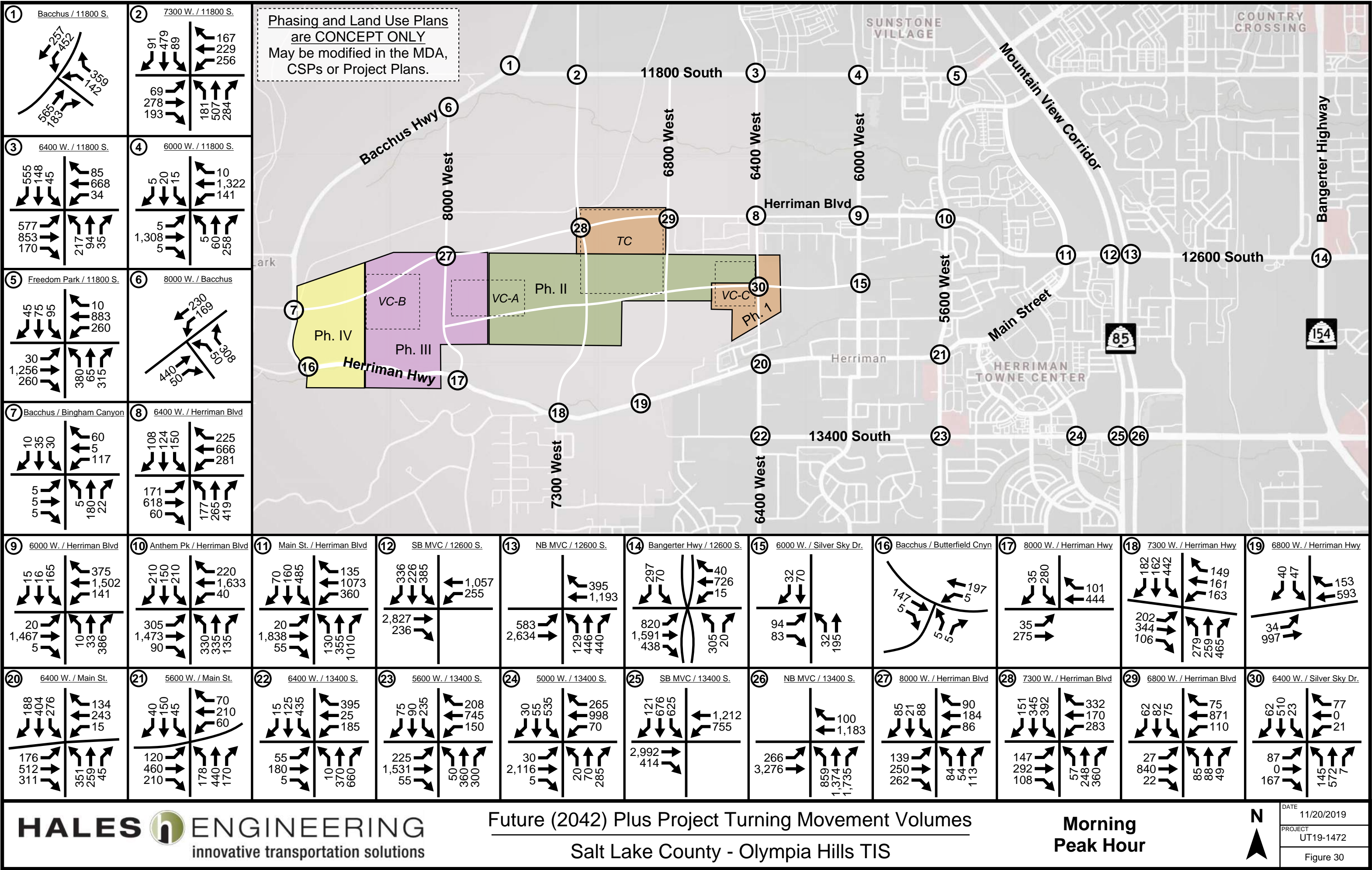
B. Traffic Volumes

Hales Engineering added the Phase IV project trips discussed in Chapter V to the future (2042) background traffic volumes to predict turning movement volumes for future (2042) plus project conditions. Additional turning movement volumes were added manually to new project roadways as well to match better with the volumes provided by Horrocks in the build travel demand models. Future (2042) plus project evening peak hour turning movement volumes are shown in Figure 30 and Figure 31.

C. Level of Service Analysis

Hales Engineering determined that the following intersections are anticipated to operate at levels of service E or F in future (2042) plus project conditions as shown in Table 21 and Table 22:

- 7300 West / 11800 South (Evening Peak)
- 6400 West / 11800 South (Evening Peak)
- 8000 West / Bacchus Highway (Evening Peak)
- Anthem Park Boulevard / Herriman Boulevard (Morning and Evening Peak)
- Main Street / Herriman Boulevard (Morning Peak)
- 8000 West / Herriman Highway (Evening Peak)
- 7300 West / Herriman Highway (Morning and Evening Peak)
- 6400 West / Main Street (Evening Peak)
- 5600 West / 13400 South (Evening Peak)
- 8000 West / Herriman Boulevard (Evening Peak)
- 7300 West / Herriman Boulevard (Evening Peak)



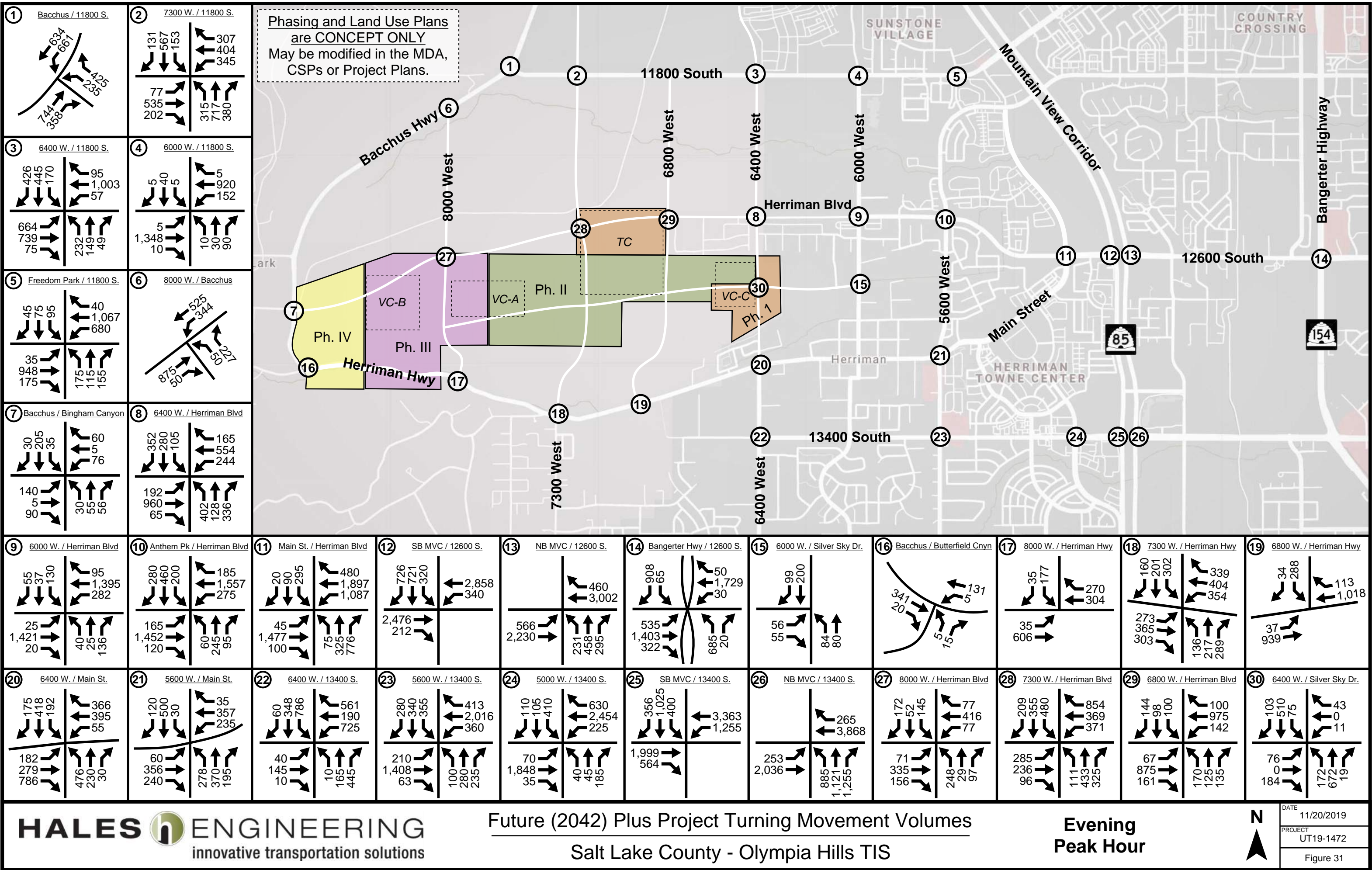


Table 21: Future (2042) Plus Project Morning Peak Hour Level of Service

Intersection		Worst Approach			Overall Intersection		Mitigated
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ²	LOS (Delay)
Bacchus Highway / 11800 South	Signal	-	-	-	30.2	C	-
7300 West / 11800 South	Signal	-	-	-	27.3	C	-
6400 West / 11800 South	Signal	-	-	-	26.0	C	-
6000 West / 11800 South	Signal	-	-	-	16.3	B	-
Freedom Park Drive / 11800 South	Signal	-	-	-	29.7	C	-
8000 West / Bacchus Highway	NB Stop	NB	15.5	C	-	-	-
Bingham Canyon Mine / Bacchus Highway	EB/WB Stop	WB	4.9	A	-	-	-
6400 West / Herriman Boulevard	Signal	-	-	-	31.7	C	-
6000 West / Herriman Boulevard	Signal	-	-	-	42.8	D	-
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	102.7	F	D (39.3)
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	75.9	E	D (39.2)
Silver Sky Drive / 6000 West	EB Stop	EB	5.8	A	-	-	-
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	3.8	A	-	-	-
8000 West / Herriman Highway	SB Stop	SB	21.5	C	-	-	-
7300 West / Herriman Highway	Signal	-	-	-	82.3	F	C (33.5)
6800 West / Herriman Highway	Signal	-	-	-	21.5	C	-
6400 West / Main Street	Signal	-	-	-	41.9	D	-
5600 West / Main Street	Signal	-	-	-	22.2	C	-
6400 West / 13400 South	Signal	-	-	-	32.0	C	-
5600 West / 13400 South	Signal	-	-	-	33.0	C	-
5000 West / 13400 South	Signal	-	-	-	29.0	C	-
8000 West / Herriman Boulevard	NB/SB Stop	SB	16.0	C	-	-	-
7300 West / Herriman Boulevard	Signal	-	-	-	33.2	C	-
6800 West / Herriman Boulevard	Signal	-	-	-	37.6	D	-
Silver Sky Drive / 6400 West	EB/WB Stop	EB	29.1	D	-	-	-

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

Table 22: Future (2042) Plus Project Evening Peak Hour Level of Service

Intersection		Worst Approach		Overall Intersection		Mitigated
Description	Control	Approach ^{1,3}	Aver. Delay (Sec/Veh) ¹	LOS ¹	Aver. Delay (Sec/Veh) ²	LOS ² LOS (Delay)
Bacchus Highway / 11800 South	Signal	-	-	-	32.2	C -
7300 West / 11800 South	Signal	-	-	-	63.4	E D (41.2)
6400 West / 11800 South	Signal	-	-	-	103.5	F D (42.1)
6000 West / 11800 South	Signal	-	-	-	13.2	B -
Freedom Park Drive / 11800 South	Signal	-	-	-	26.3	C -
8000 West / Bacchus Highway	NB Stop	NB	>75	F	-	- C (31.3)
Bingham Canyon Mine / Bacchus Highway	EB/WB Stop	EB	6.0	A	-	- -
6400 West / Herriman Boulevard	Signal	-	-	-	37.5	D -
6000 West / Herriman Boulevard	Signal	-	-	-	21.2	C -
Anthem Park Boulevard / Herriman Boulevard	Signal	-	-	-	65.1	E D (38.9)
Main Street / Herriman Boulevard / 12600 South	Signal	-	-	-	53.4	D -
Silver Sky Drive / 6000 West	EB Stop	EB	6.1	A	-	- -
Butterfield Canyon Road / Herriman Highway / Bacchus Highway	EB Stop	EB	3.9	A	-	- -
8000 West / Herriman Highway	SB Stop	SB	>75	F	-	- C (21.4)
7300 West / Herriman Highway	Signal	-	-	-	93.8	F C (30.5)
6800 West / Herriman Highway	Signal	-	-	-	26.7	D -
6400 West / Main Street	Signal	-	-	-	61.3	E D (41.1)
5600 West / Main Street	Signal	-	-	-	34.1	C -
6400 West / 13400 South	Signal	-	-	-	51.9	D -
5600 West / 13400 South	Signal	-	-	-	73.1	E D (47.2)
5000 West / 13400 South	Signal	-	-	-	40.6	D -
8000 West / Herriman Boulevard	NB/SB Stop	NB	>75	F	-	- C (21.4)
7300 West / Herriman Boulevard	Signal	-	-	-	107.9	F C (34.4)
6800 West / Herriman Boulevard	Signal	-	-	-	41.5	D -
Silver Sky Drive / 6400 West	EB/WB Stop	EB	25.7	C	-	- -

1. This represents the worst approach LOS and delay (seconds / vehicle) and is only reported for non-all-way stop unsignalized intersections.

2. This represents the overall intersection LOS and delay (seconds / vehicle) and is reported for all-way stop and signal-controlled intersections.

3. SB = Southbound approach, etc.

Source: Hales Engineering, November 2019

D. Queuing Analysis

Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- Bacchus Highway / 11800 South
 - Northbound Approach – 445 feet (a.m. peak), 625 feet (p.m. peak)
 - Southbound Approach – 400 feet (p.m. peak), 385 feet (p.m. peak)
- 7300 West / 11800 South
 - Northbound Approach – 370 feet (p.m. peak)
 - Southbound Approach – 390 feet (a.m. peak), >1,000 feet (p.m. peak)
 - Eastbound Approach – 570 feet (p.m. peak)
 - Westbound Approach – 500 feet (p.m. peak)
- 6400 West / 11800 South
 - Northbound Approach – 385 feet (p.m. peak)
 - Southbound Approach – 815 feet (p.m. peak)
 - Eastbound Approach – 535 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (p.m. peak)
- 6400 West / Herriman Boulevard
 - Northbound Approach – 490 feet (p.m. peak)
 - Southbound Approach – 485 feet (p.m. peak)
 - Eastbound Approach – 485 feet (p.m. peak)
- 6000 West / Herriman Boulevard
 - Northbound Approach – 575 feet (a.m. peak)
 - Eastbound Approach – >1,000 feet (a.m. peak)
 - Westbound Approach – 455 feet (a.m. peak)
- Freedom Park Drive / 11800 South
 - Northbound Approach – 360 feet (a.m. peak)
 - Westbound Approach – 390 feet (p.m. peak)
- 8000 West / Bacchus Highway
 - Northbound Approach – >1,000 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (p.m. peak)
- 6400 West / Herriman Boulevard
 - Northbound Approach – 490 feet (p.m. peak)
 - Southbound Approach – 485 feet (p.m. peak)
 - Eastbound Approach – 485 feet (p.m. peak)
- 6000 West / Herriman Boulevard
 - Northbound Approach – 575 feet (a.m. peak)
 - Eastbound Approach – >1,000 feet (a.m. peak)
 - Westbound Approach – 455 feet (a.m. peak)

- Anthem Park Boulevard / Herriman Boulevard
 - Northbound Approach – >1,000 feet (a.m. peak)
 - Southbound Approach – 730 feet (a.m. peak), 680 feet (p.m. peak)
 - Eastbound Approach – >1,000 feet (a.m. peak), 660 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (a.m. and p.m. peak)
- Main Street / Herriman Boulevard / 12600 South
 - Eastbound Approach – >1,000 feet (a.m. and p.m. peak)
 - Westbound Approach – 365 feet (a.m. peak), 755 feet (p.m. peak)
- 8000 West / Herriman Highway
 - Southbound Approach – 735 feet (p.m. peak)
 - Eastbound Approach – 540 feet (p.m. peak)
- 7300 West / Herriman Highway
 - Southbound Approach – >1,000 feet (a.m. and p.m. peak)
 - Eastbound Approach – 450 feet (a.m. peak), 925 feet (p.m. peak)
 - Westbound Approach – 370 feet (a.m. peak), 525 feet (p.m. peak)
- 6800 West / Herriman Highway
 - Eastbound Approach – 605 feet (a.m. peak), 535 feet (p.m. peak)
 - Westbound Approach – 445 feet (a.m. peak), 600 feet (p.m. peak)
- 6400 West / Main Street
 - Northbound Approach – >1,000 feet (a.m. peak), 905 feet (p.m. peak)
 - Southbound Approach – 605 feet (a.m. peak), 960 feet (p.m. peak)
 - Eastbound Approach – >1,000 feet (p.m. peak)
 - Westbound Approach – 695 feet (p.m. peak)
- 5600 West / Main Street
 - Northbound Approach – 540 feet (a.m. peak), 810 feet (p.m. peak)
 - Southbound Approach – 610 feet (p.m. peak)
 - Westbound Approach – 370 feet (p.m. peak)
- 6400 West / 13400 South
 - Northbound Approach – 820 feet (a.m. peak)
 - Southbound Approach – >1,000 feet (p.m. peak)
- 5600 West / 13400 South
 - Eastbound Approach – 570 feet (a.m. peak), 620 feet (p.m. peak)
 - Westbound Approach – >1,000 feet (p.m. peak)
- 5000 West / 13400 South
 - Southbound Approach – 970 feet (a.m. peak), >1,000 feet (p.m. peak)
 - Westbound Approach – 410 feet (p.m. peak)
- 7300 West / Herriman Boulevard
 - Northbound Approach – 375 feet (p.m. peak)
 - Southbound Approach – 480 feet (a.m. peak), >1,000 feet (p.m. peak)

- Eastbound Approach – 390 feet (a.m. peak), >1,000 feet (p.m. peak)
 - Westbound Approach – 385 feet (a.m. peak), >1,000 feet (p.m. peak)
- 6800 West / Herriman Highway
 - Eastbound Approach – 605 feet (a.m. peak), 535 feet (p.m. peak)
 - Westbound Approach – 445 feet (a.m. peak), 600 feet (p.m. peak)

Detailed queueing reports are included in Appendix E.

E. Mitigation Measures

At the 7300 West / 11800 South intersection, it is recommended that dual left-turn lanes be installed on the north- and westbound approaches when warranted.

At the 6400 West / 11800 South intersection, it is recommended that a southbound right-turn overlap phase be used, that a southbound through lane be added, and that the northbound right-turn lane be converted into a shared through-right.

It is recommended that 6400 West be widened to a five-lane cross-section between 11800 South and Herriman Boulevard to provide needed capacity on the roadway and nearby intersections.

At the 8000 West / Bacchus Highway intersection, it is anticipated that the volumes will warrant a traffic signal with future (2042) plus project conditions. It is recommended that a signal be installed when warranted with turn pockets.

At the Anthem Park Boulevard / Herriman Boulevard intersection, it is recommended that dual left-turn lanes be installed on the north- and westbound approaches, that the northbound left-turn storage be extended, and that the northbound and southbound right-turn lanes be converted into shared through-right lanes.

At the Main Street / Herriman Boulevard intersection, it is recommended that the eastbound left-turn signal phase be changed to the lagging phase behind the westbound through phase. It is also recommended that a separate eastbound right-turn lane be added and that a westbound through lane be added.

It is recommended that Herriman Boulevard between Main Street and 6000 West be widened to a seven-lane cross-section to accommodate the high traffic volumes.

At the 8000 West / Herriman Highway intersection, it is anticipated that the volumes will warrant a traffic signal with future (2042) plus project conditions. It is recommended that a signal be installed when warranted with turn pockets.



At the 7300 West / Herriman Highway intersection, it is recommended that a southbound right-turn lane be added, that permissive-protected phasing be implemented on all approaches, and that dual left-turns be installed on the southbound approach.

At the 6400 West / Main Street intersection, it is recommended that dual left-turns be added on the northbound approach and that the eastbound right-turn be channelized.

At the 5600 West / 13400 South intersection, it is recommended that dual left-turns be added on the eastbound approach, that the eastbound and westbound through phases be assigned as lagging phases, and that the eastbound right-turn lane be converted into a shared through-right.

At the 8000 West / Herriman Boulevard intersection, it is anticipated that the volumes will warrant a traffic signal with future (2042) plus project conditions. It is recommended that a signal be installed when warranted with turn pockets.

At the 7300 West / Herriman Boulevard intersection, it is recommended that dual left-turns be added to the south-, east-, and westbound approaches, that the westbound right-turn be channelized, that a northbound and southbound lane be added, and that the eastbound right-turn lane be converted into a shared through-right lane.

It is recommended that Herriman Boulevard be widened to a five-lane cross-section between 7300 West and 6800 West to accommodate the high traffic volumes.

Hales Engineering completed a mitigated scenario with the proposed improvements. It is anticipated that all study intersections will operate at acceptable levels of service with the proposed improvements.

APPENDIX A

Turning Movement Counts

APPENDIX B

Project Phasing Plan

APPENDIX C

Trip Generation

APPENDIX D

LOS Reports

APPENDIX E

95th Percentile Queue Length Reports

APPENDIX F

Recommended Improvements