EXHIBIT D

Traffic Impact Study

HALES ENGINEERING
innovative transportation solutions

OLYMPIA HILLS

Traffic Impact Study

Salt Lake County, Utah

December 13, 2019

UT19-1472

LICENSED PROFESSIONAL ENGINEER
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12/13/2019
STATE OF UTAH

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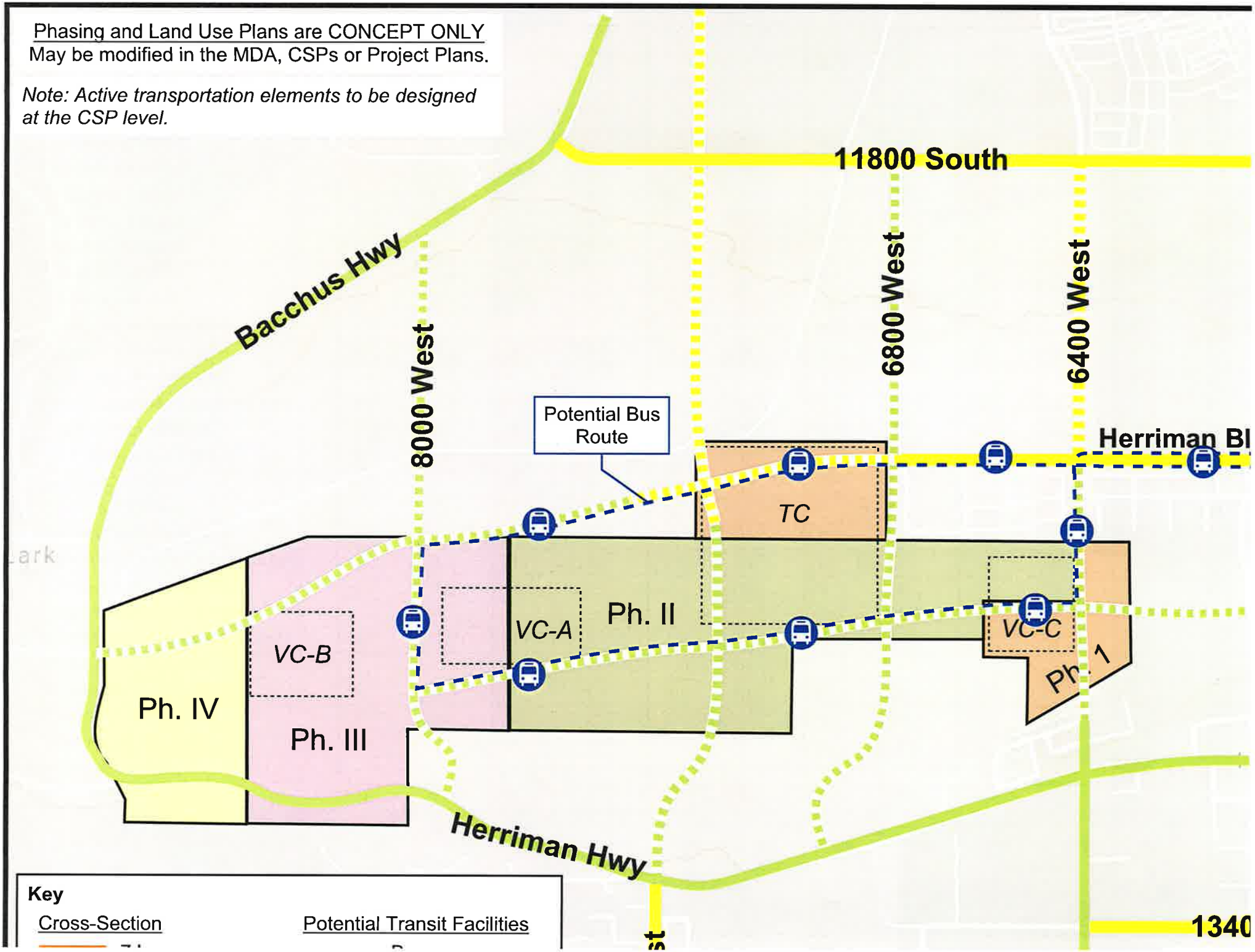
EXECUTIVE SUMMARY

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.
11800 South
Bacchus Hwy
8000 West
6800 West
6400 West
Herriman Bl
Potential Bus Route
TC
VC-A
Ph. II
VC-B
VC-C
Ph. IV
Ph. III
Herriman Hwy
Key
Cross-Section
Potential Transit Facilities
1340

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

	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			

#	Description
1.1	Signal, Turn Pockets on All Approaches, Dual SB L
1.2	NB RT Lane
2.1	Signal, Turn Pockets on All Approaches
2.2	Signal, Turn Pockets on All Approaches
2.3	PM/PT LT Phasing on All Approaches
2.4	NB & WB Dual Left Turn Lanes
3.1	Signal, Turn Pockets on All Approaches, EB & WB
3.2	EB & WB RT Lanes, NB PM/PT LT Phasing
3.3	EB Dual LT Lanes, NB & SB PM/PT LT Phasing
3.4	PM/PT LT Phasing on All Approaches, NB Dual LT
3.5	EB & WB RT Lanes
3.6	Add SB Thru Lane, Convert NB RT Lane to Shared Phase
4.1	WB PM/PT LT Phasing, Extend WB LT Storage
5.1	WB Dual LT Lanes
6.1	Signal, Turn Pockets on All Approaches
8.1	Signal, Turn Pockets on All Approaches, EB & WB
8.2	Signal, Turn Pockets on All Approaches
8.3	PM/PT LT Phasing on All Approaches
10.1	WB RT Pocket, Extend LT Lanes on All Approaches
10.2	Convert NB RT to Shared T/RT
10.3	EB Dual LT Lanes
10.4	EB & WB RT Lanes
10.5	NB & WB Dual LT Lanes, Extend NB LT Lane, Conv Shared T/RT Lanes
11.1	NB Channelized RT Lane
11.2	SB Dual LT Lanes
11.3	WB Dual LT Lanes
11.4	Additional NB Thru lane, Convert EB RT to Shared
11.5	2 NB Thru Lanes, WB Dual LT Lanes, Lengthen SB
11.6	EB RT Lane, Add WB Thru Lane
12.1	SB & WB Dual LT Lanes
12.2	Freeway Grade- Separated Interchange
12.3	Channelized EB & WB RT Lanes
13.1	Freeway Grade- Separated Interchange, Additiona Channelized EB/WB RT Lanes
13.2	Channelized EB & WB RT Lanes, Convert NB Thru
14.1	SPUI
14.2	Additional LT Lane on NB Off Ramp

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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 ≤ 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 and ≤ 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 and ≤ 35.0
D	Marginal progression with relatively elevated levels of control delay. Operating conditions are noticeably more constrained.	> 35.0 and ≤ 55.0
E	Poor progression with unacceptably elevated levels of control delay. Operating conditions are at or near capacity.	> 55.0 and ≤ 80.0
F	Unacceptable progression with forced or breakdown operating conditions.	> 80.0
	Unsignalized Intersections	**Worst Approach**
A	Free Flow / Insignificant Delay	0 ≤ 10.0
B	Stable Operations / Minimum Delays	>10.0 and ≤ 15.0
C	Stable Operations / Acceptable Delays	>15.0 and ≤ 25.0
D	Approaching Unstable Flows / Tolerable Delays	>25.0 and ≤ 35.0
E	Unstable Operations / Significant Delays Can Occur	>35.0 and ≤ 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)

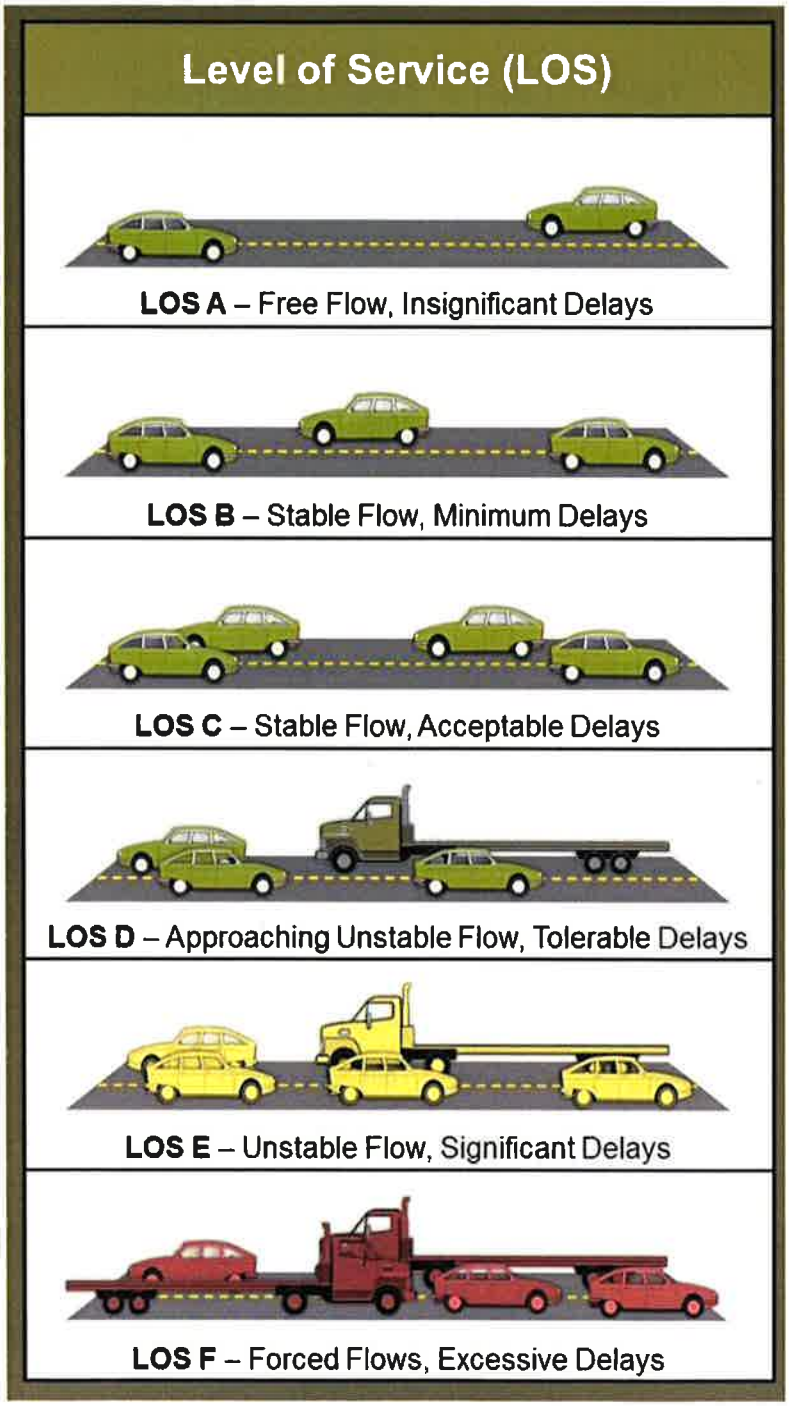


Figure 2: Visual representation of the LOS letter designations

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:

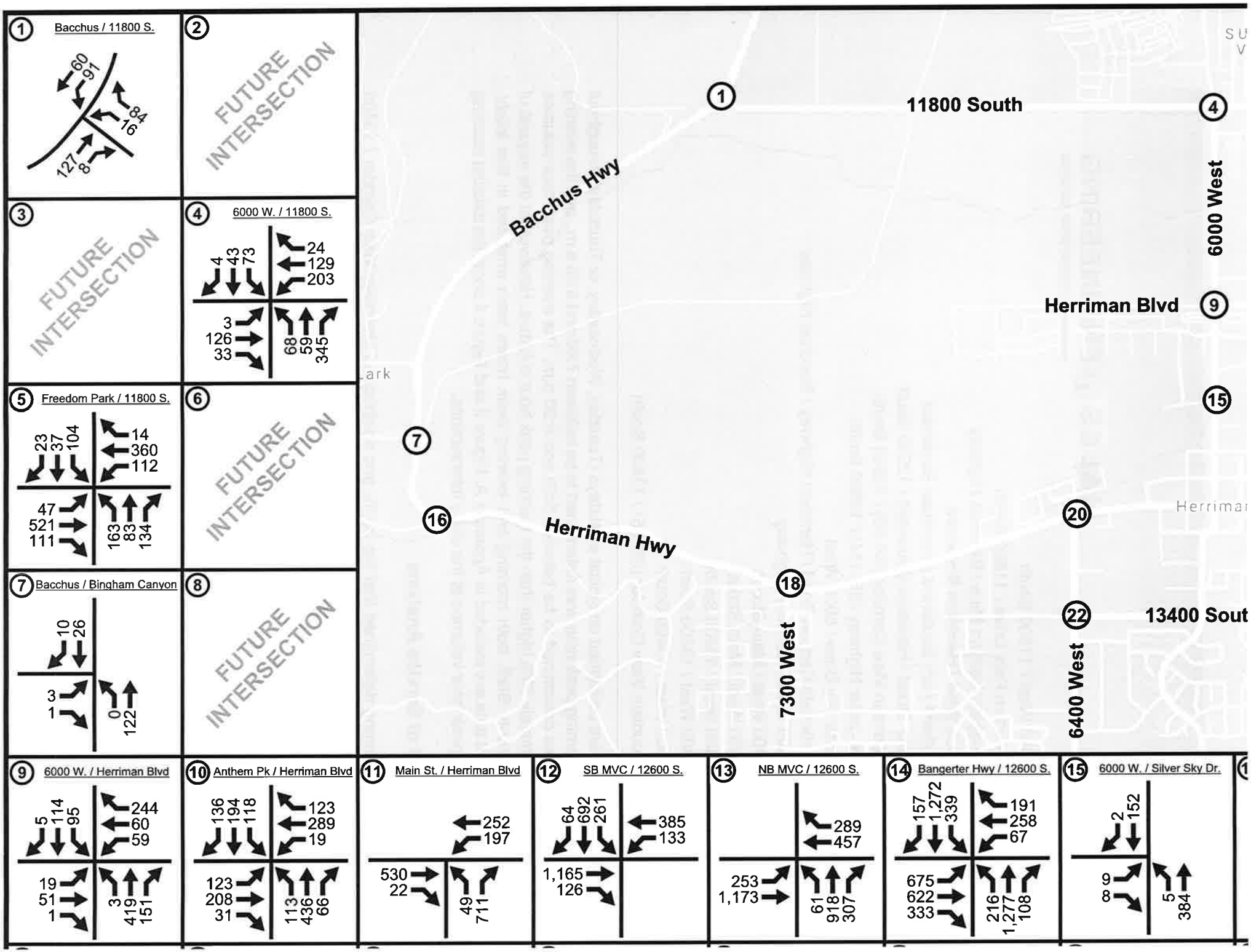
- Bacchus Highway / 11800 South

- 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.


1 Bacchus / 11800 S.
60
91
84
16
127
8
2 FUTURE INTERSECTION
3 FUTURE INTERSECTION
4 6000 W. / 11800 S.
4
43
73
24
129
203
3
126
33
68
59
345
5 Freedom Park / 11800 S.
23
37
104
14
360
112
47
521
111
163
83
134
6 FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
10
26
3
1
0
122
8 FUTURE INTERSECTION
9 6000 W. / Herriman Blvd
5
114
95
244
60
59
19
51
1
3
419
151
10 Anthem Pk / Herriman Blvd
136
194
118
123
289
19
123
208
31
113
436
66
11 Main St. / Herriman Blvd
252
197
530
22
49
711
12 SB MVC / 12600 S.
64
692
261
385
133
1,165
126
13 NB MVC / 12600 S.
289
457
253
1,173
61
918
307
14 Bangerter Hwy / 12600 S.
157
1,272
339
191
258
67
675
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333
216
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108
15 6000 W. / Silver Sky Dr.
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Bacchus Hwy
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6000 West
Herriman Blvd
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13400 Sout
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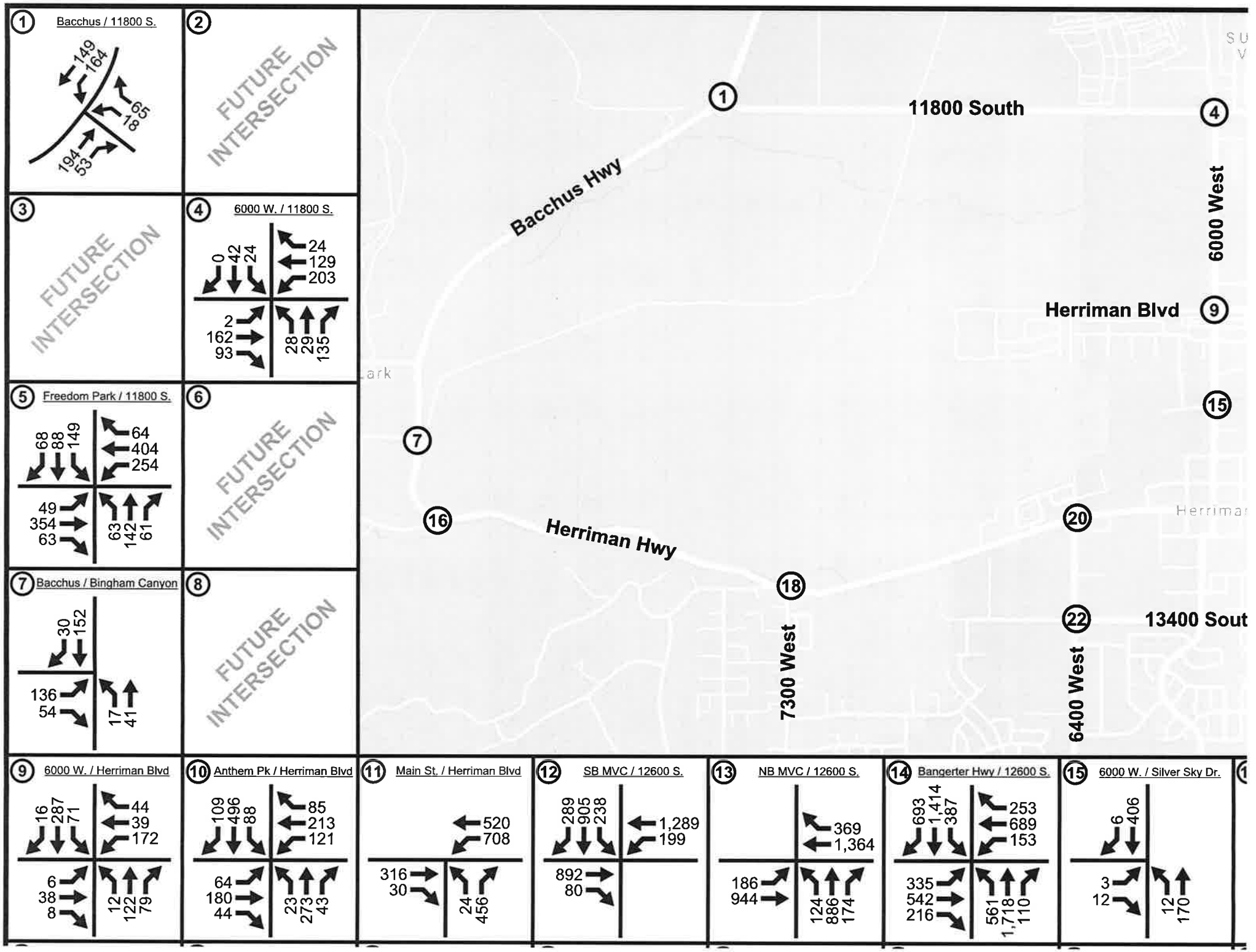
1 Bacchus / 11800 S.
149
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2 FUTURE INTERSECTION
3 FUTURE INTERSECTION
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7 Bacchus / Bingham Canyon
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10 Anthem Pk / Herriman Blvd
109
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88
85
213
121
64
180
44
23
273
43
11 Main St. / Herriman Blvd
520
708
316
30
24
456
12 SB MVC / 12600 S.
289
905
238
1,289
199
892
80
13 NB MVC / 12600 S.
369
1,364
186
944
124
886
174
14 Bangerter Hwy / 12600 S.
693
1,414
387
253
689
153
335
542
216
561
1,718
110
15 6000 W. / Silver Sky Dr.
6
406
3
12
12
170
1
11800 South
4
6000 West
Herriman Blvd
9
15
Bacchus Hwy
7
16
Herriman Hwy
20
18
7300 West
22
6400 West
13400 Sout

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.

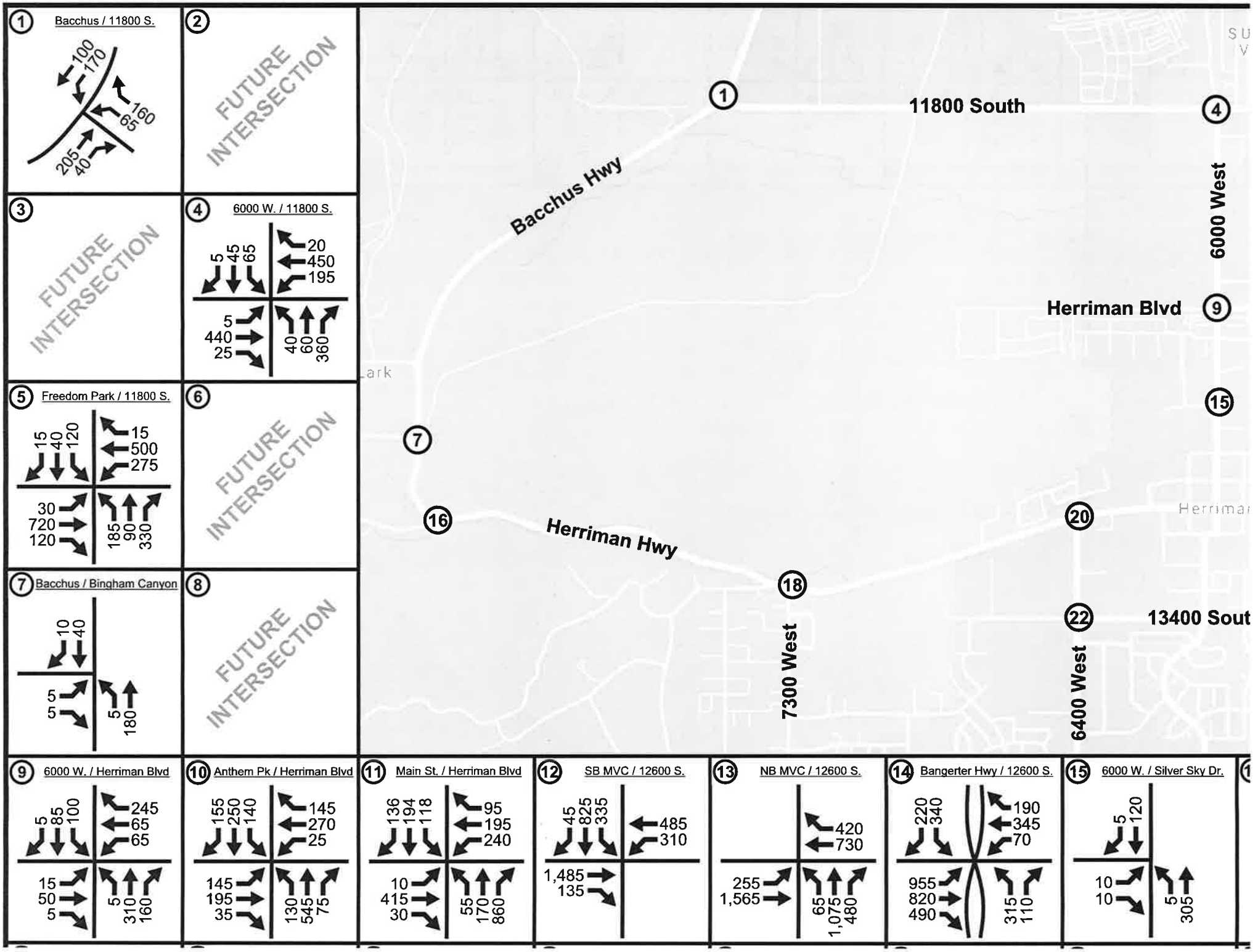
B. Roadway Network

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.


1
Bacchus / 11800 S.
100
170
160
65
205
40
2
FUTURE INTERSECTION
3
FUTURE INTERSECTION
4
6000 W. / 11800 S.
5
45
65
20
450
195
5
440
25
40
60
360
5
Freedom Park / 11800 S.
15
40
120
15
500
275
30
720
120
185
90
330
6
FUTURE INTERSECTION
7
Bacchus / Bingham Canyon
10
40
5
5
5
180
8
FUTURE INTERSECTION
9
6000 W. / Herriman Blvd
5
85
100
245
65
65
15
50
5
5
310
160
10
Anthem Pk / Herriman Blvd
155
250
140
145
270
25
145
195
35
130
545
75
11
Main St. / Herriman Blvd
136
194
118
95
195
240
10
415
30
55
170
860
12
SB MVC / 12600 S.
45
825
335
485
310
1,485
135
13
NB MVC / 12600 S.
420
730
255
1,565
65
1,075
480
14
Bangerter Hwy / 12600 S.
220
340
190
345
70
955
820
490
315
110
15
6000 W. / Silver Sky Dr.
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120
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Bacchus Hwy
11800 South
6000 West
Herriman Blvd
Herriman Hwy
7300 West
6400 West
13400 Sout
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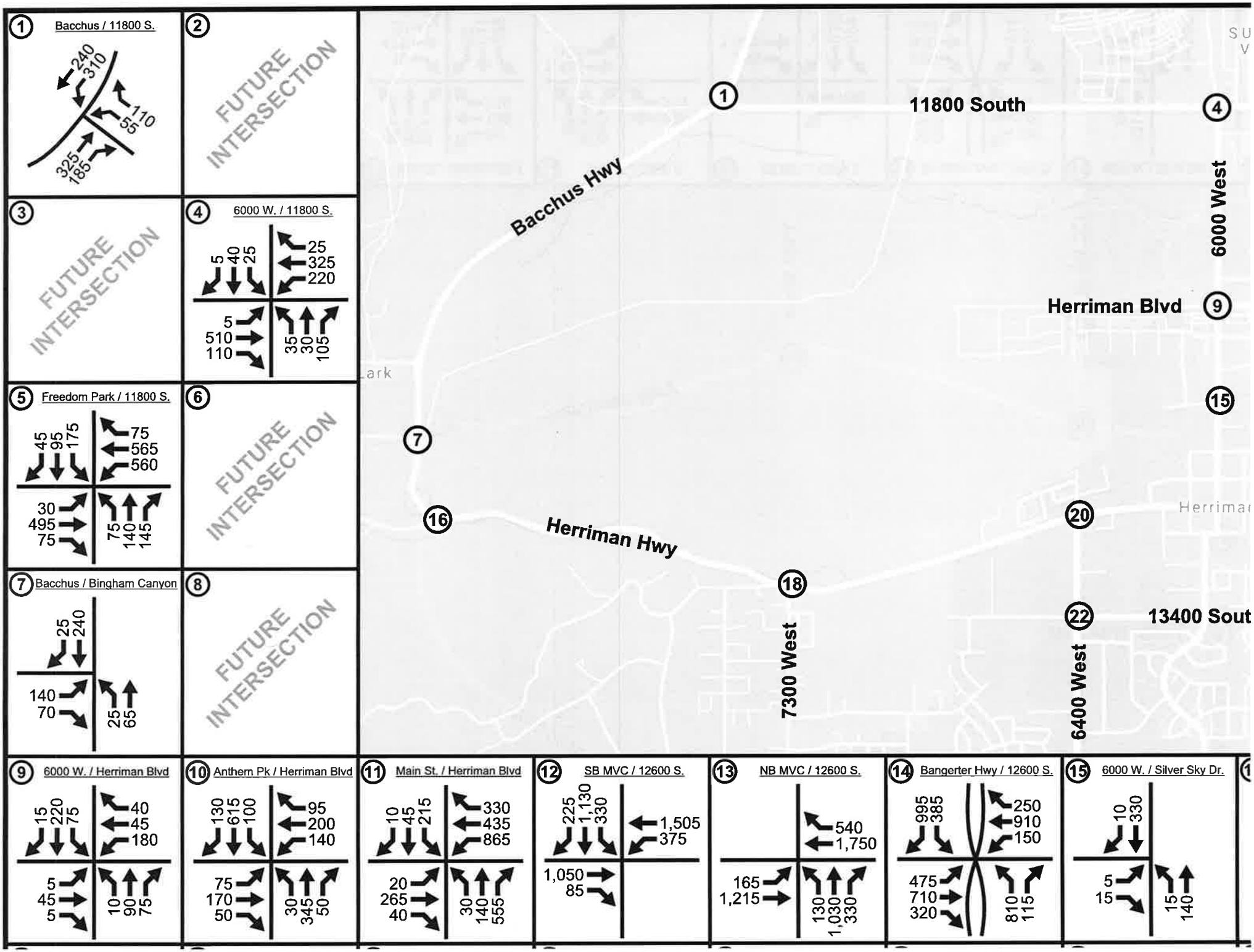

1 Bacchus / 11800 S.
240 310 110 55 325 185
2 FUTURE INTERSECTION
3 FUTURE INTERSECTION
4 6000 W. / 11800 S.
5 40 25 25 325 220 5 510 110 35 30 105
5 Freedom Park / 11800 S.
45 95 175 75 565 560 30 495 75 75 140 145
6 FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
25 240 140 70 25 65
8 FUTURE INTERSECTION
9 6000 W. / Herriman Blvd
15 220 75 40 45 180 5 45 5 10 90 75
10 Anthem Pk / Herriman Blvd
130 615 100 95 200 140 75 170 50 30 345 50
11 Main St. / Herriman Blvd
10 45 215 330 435 865 20 265 40 30 140 555
12 SB MVC / 12600 S.
225 1,130 330 1,505 375 1,050 85
13 NB MVC / 12600 S.
540 1,750 165 1,215 130 1,030 330
14 Bangerter Hwy / 12600 S.
995 385 250 910 150 475 710 320 810 115
15 6000 W. / Silver Sky Dr.
10 330 5 15 15 140
1 11800 South
4
6000 West
Herriman Blvd
9
15
Bacchus Hwy
7
16
Herriman Hwy
18
20
22
13400 Sout
7300 West
6400 West

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		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	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		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	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 WFRC RTP, 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

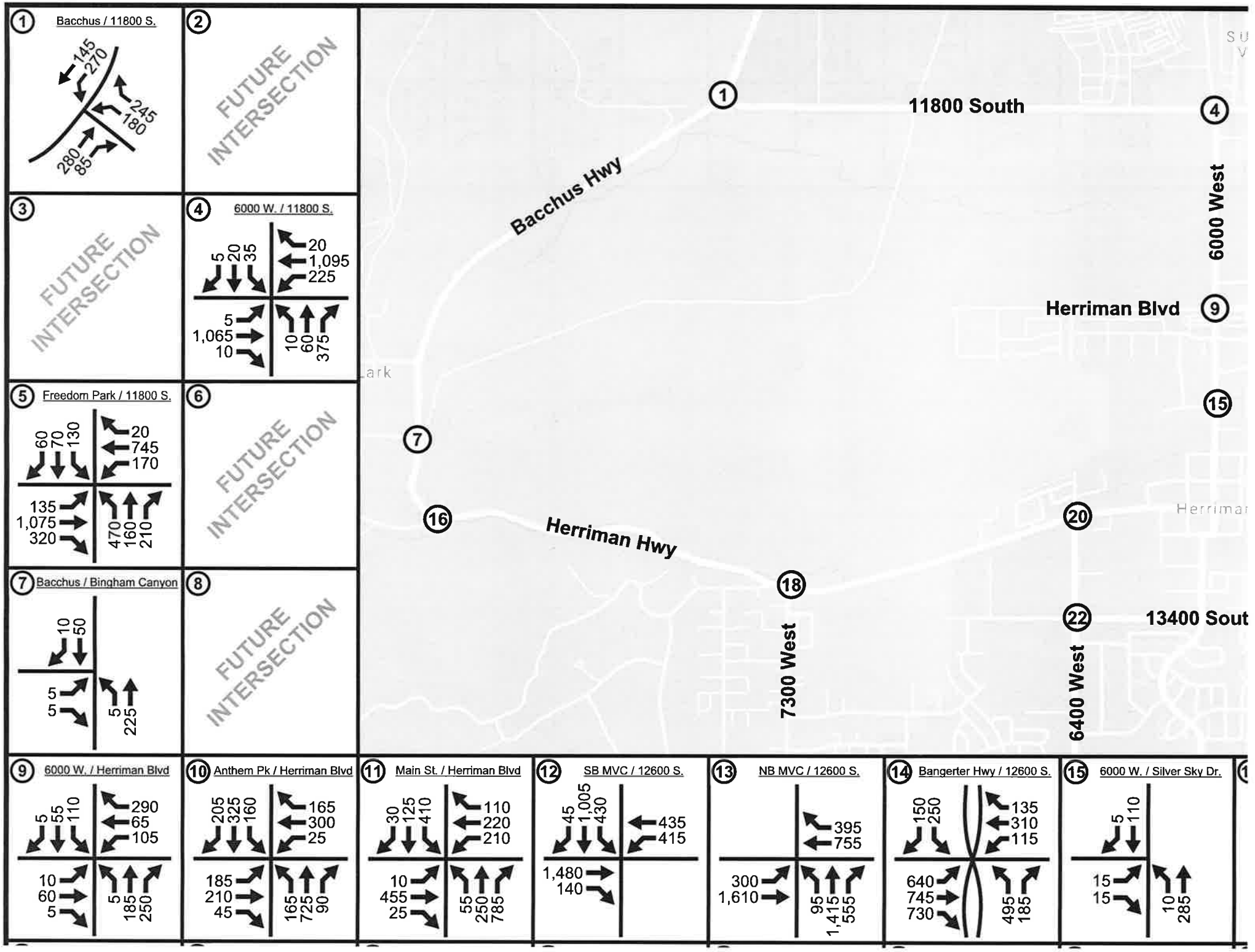
It was assumed that all previously recommended mitigation measures had been implemented prior to 2027. These mitigation measures include:

- 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.


1
Bacchus / 11800 S.
145
270
245
180
280
85
2
FUTURE INTERSECTION
3
FUTURE INTERSECTION
4
6000 W. / 11800 S.
5
20
35
20
1,095
225
5
1,065
10
10
60
375
5
Freedom Park / 11800 S.
60
70
130
20
745
170
135
1,075
320
470
160
210
6
FUTURE INTERSECTION
7
Bacchus / Bingham Canyon
10
50
5
5
5
225
8
FUTURE INTERSECTION
9
6000 W. / Herriman Blvd
5
55
110
290
65
105
10
60
5
5
185
250
10
Anthem Pk / Herriman Blvd
205
325
160
165
300
25
185
210
45
165
725
90
11
Main St. / Herriman Blvd
30
125
410
110
220
210
10
455
25
55
250
785
12
SB MVC / 12600 S.
45
1,005
430
435
415
1,480
140
13
NB MVC / 12600 S.
395
755
300
1,610
95
1,415
555
14
Bangerter Hwy / 12600 S.
150
250
135
310
115
640
745
730
495
185
15
6000 W. / Silver Sky Dr.
5
110
15
15
10
285
Bacchus Hwy
11800 South
6000 West
Herriman Blvd
Herriman Hwy
7300 West
6400 West
13400 Sout
Herriman
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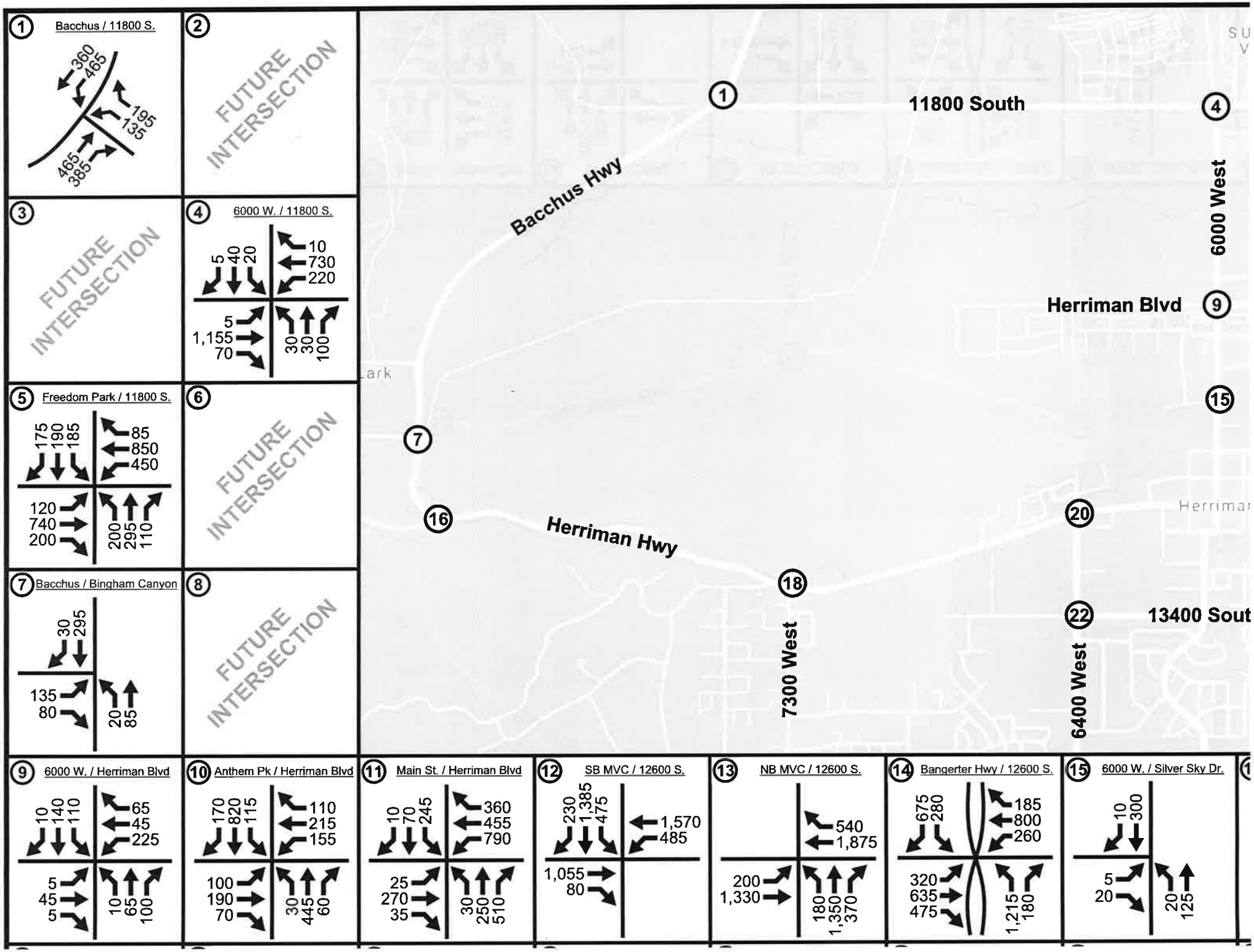

1 Bacchus / 11800 S.
360
465
195
135
465
385
2 FUTURE INTERSECTION
3 FUTURE INTERSECTION
4 6000 W. / 11800 S.
5
40
20
10
730
220
5
1,155
70
30
30
100
5 Freedom Park / 11800 S.
175
190
185
85
850
450
120
740
200
200
295
110
6 FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
30
295
135
80
20
85
8 FUTURE INTERSECTION
9 6000 W. / Herriman Blvd
10
140
110
65
45
225
5
45
5
10
65
100
10 Anthem Pk / Herriman Blvd
170
820
115
110
215
155
100
190
70
30
445
60
11 Main St. / Herriman Blvd
10
70
245
360
455
790
25
270
35
30
250
510
12 SB MVC / 12600 S.
230
1,385
475
1,570
485
1,055
80
13 NB MVC / 12600 S.
540
1,875
200
1,330
180
1,350
370
14 Bangerter Hwy / 12600 S.
675
280
185
800
260
320
635
475
1,215
180
15 6000 W. / Silver Sky Dr.
10
300
5
20
20
125
Bacchus Hwy
11800 South
6000 West
Herriman Blvd
Herriman Hwy
7300 West
6400 West
13400 Sout
Herriman
Lark

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		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 (40.6)
6000 West / 11800 South	Signal	-	-	-	66.6	E	C (26.8)
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	C (27.9)
SB MVC / 12600 South	Signal	-	-	-	70.4	E	D (54.2)
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	C (22.1)
NB MVC / 13400 South	Signal	-	-	-	62.6	E	B (18.3)

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 WFRC 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.

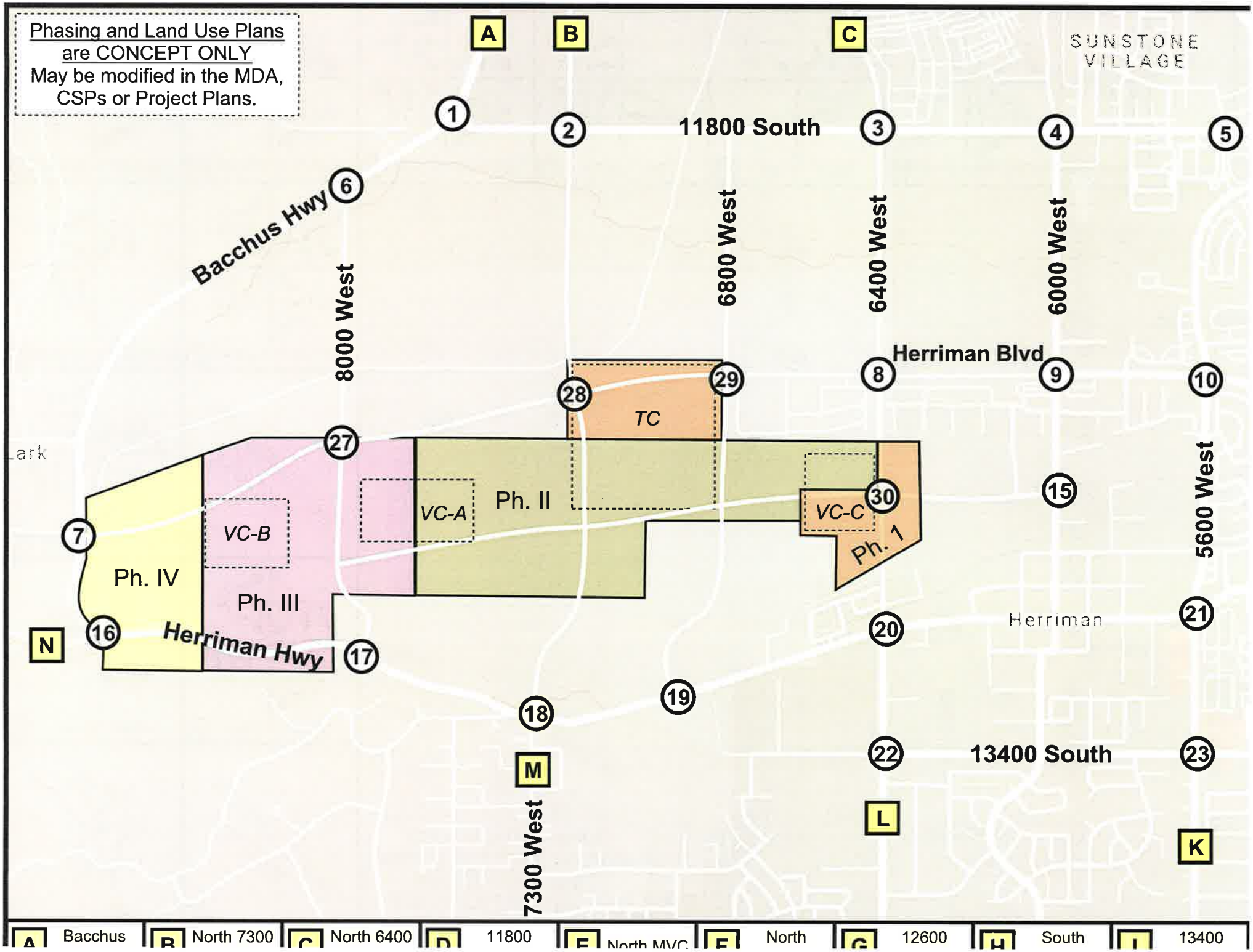
Table 8: Trip Generation Summary

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.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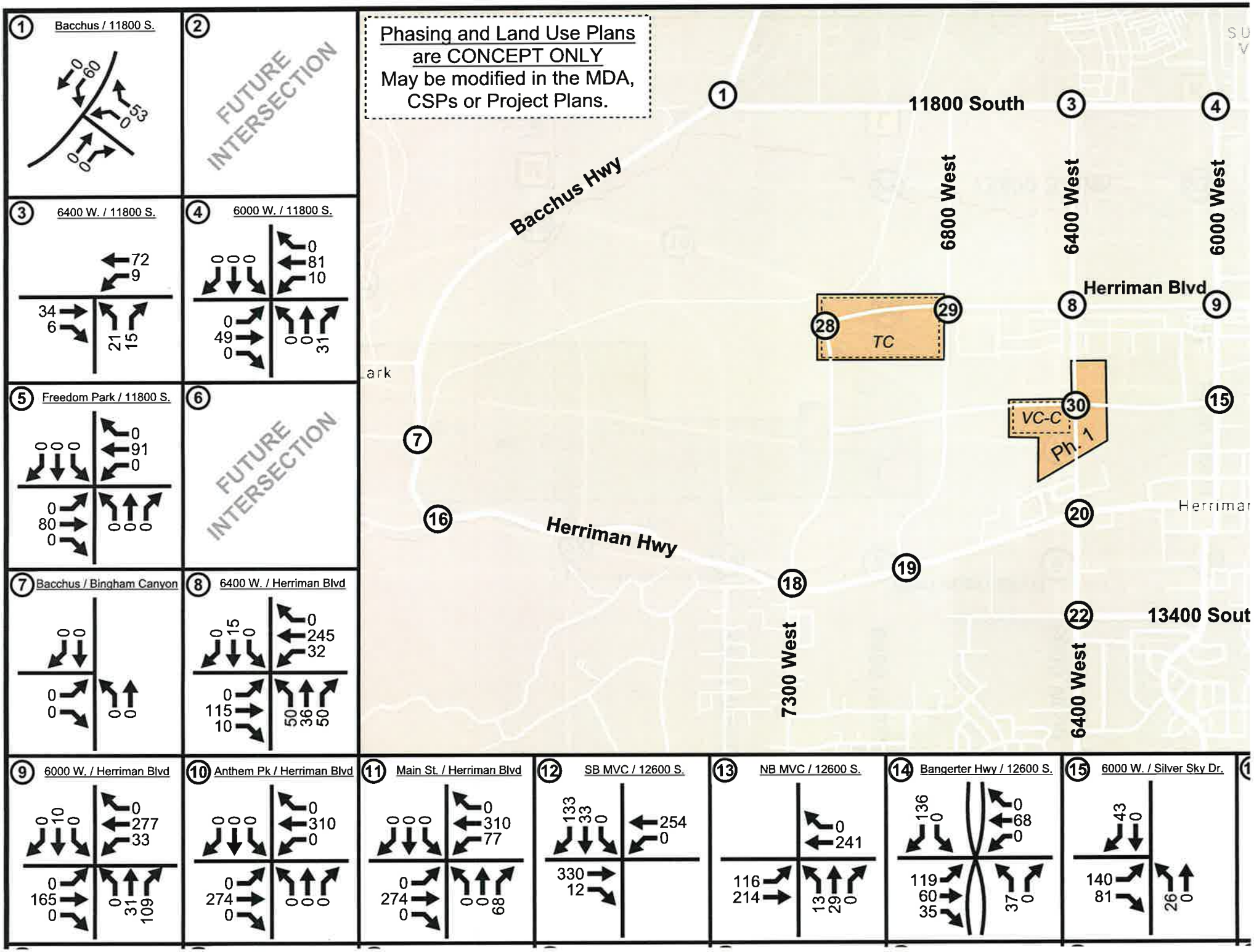
A
B
C
SUNSTONE VILLAGE
1
2
11800 South
3
4
5
Bacchus Hwy
6
8000 West
6800 West
6400 West
6000 West
5600 West
Herriman Blvd
8
9
10
28
29
TC
27
ark
7
VC-B
VC-A
Ph. II
VC-C
30
15
Ph. 1
Ph. IV
Ph. III
N
16
Herriman Hwy
17
20
Herriman
21
18
19
M
7300 West
22
13400 South
23
L
K
A Bacchus
B North 7300
C North 6400
D 11800
E North MVC
F North
G 12600
H South
I 13400


Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.
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2 FUTURE INTERSECTION
3 6400 W. / 11800 S.
72 9 34 6 21 15
4 6000 W. / 11800 S.
0 81 10 0 49 0 0 0 31
5 Freedom Park / 11800 S.
0 91 0 0 80 0
6 FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
0 0 0 0
8 6400 W. / Herriman Blvd
0 15 0 0 245 32 0 115 10 50 36 50
9 6000 W. / Herriman Blvd
0 10 0 0 277 33 0 165 0 31 109
10 Anthem Pk / Herriman Blvd
0 0 0 0 310 0 0 274 0
11 Main St. / Herriman Blvd
0 0 0 0 310 77 0 274 0 0 0 68
12 SB MVC / 12600 S.
133 33 0 254 0 330 12
13 NB MVC / 12600 S.
0 241 116 214 13 29 0
14 Bangerter Hwy / 12600 S.
136 0 0 68 0 119 60 35 37 0
15 6000 W. / Silver Sky Dr.
43 0 140 81 26 0
11800 South
Bacchus Hwy
6800 West
6400 West
6000 West
Herriman Blvd
TC
VC-C
Ph. 1
Herriman Hwy
7300 West
6400 West
13400 Sout

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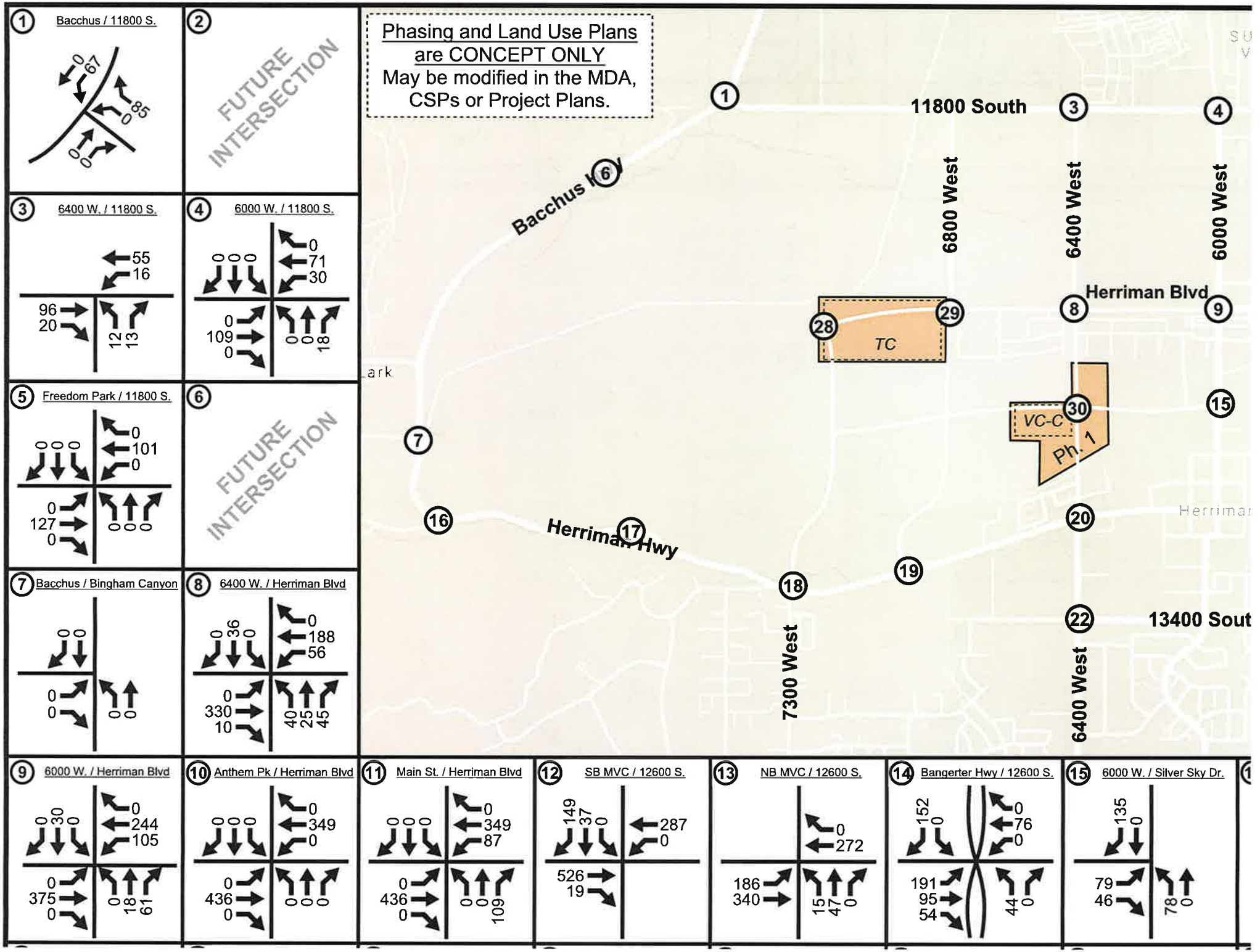

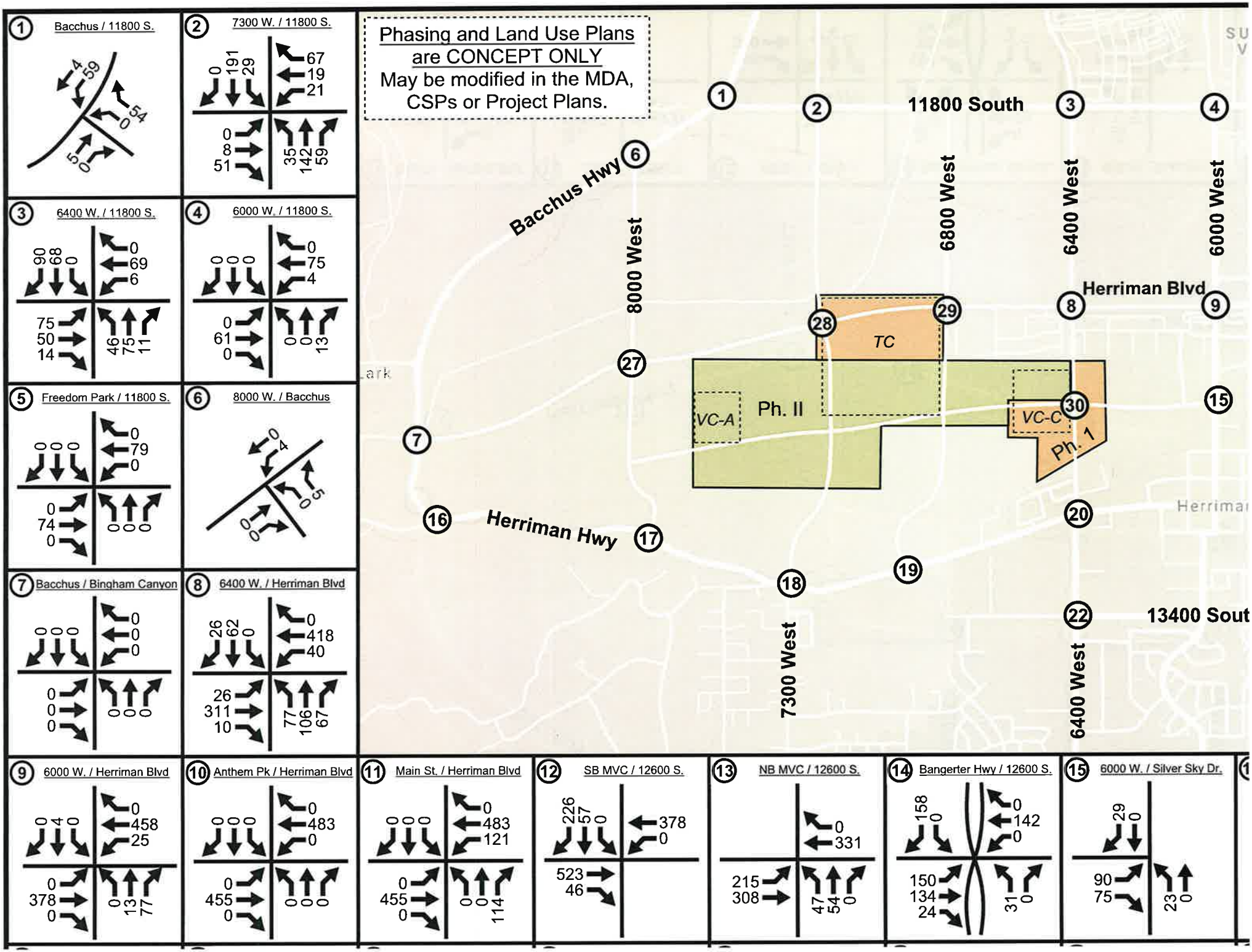
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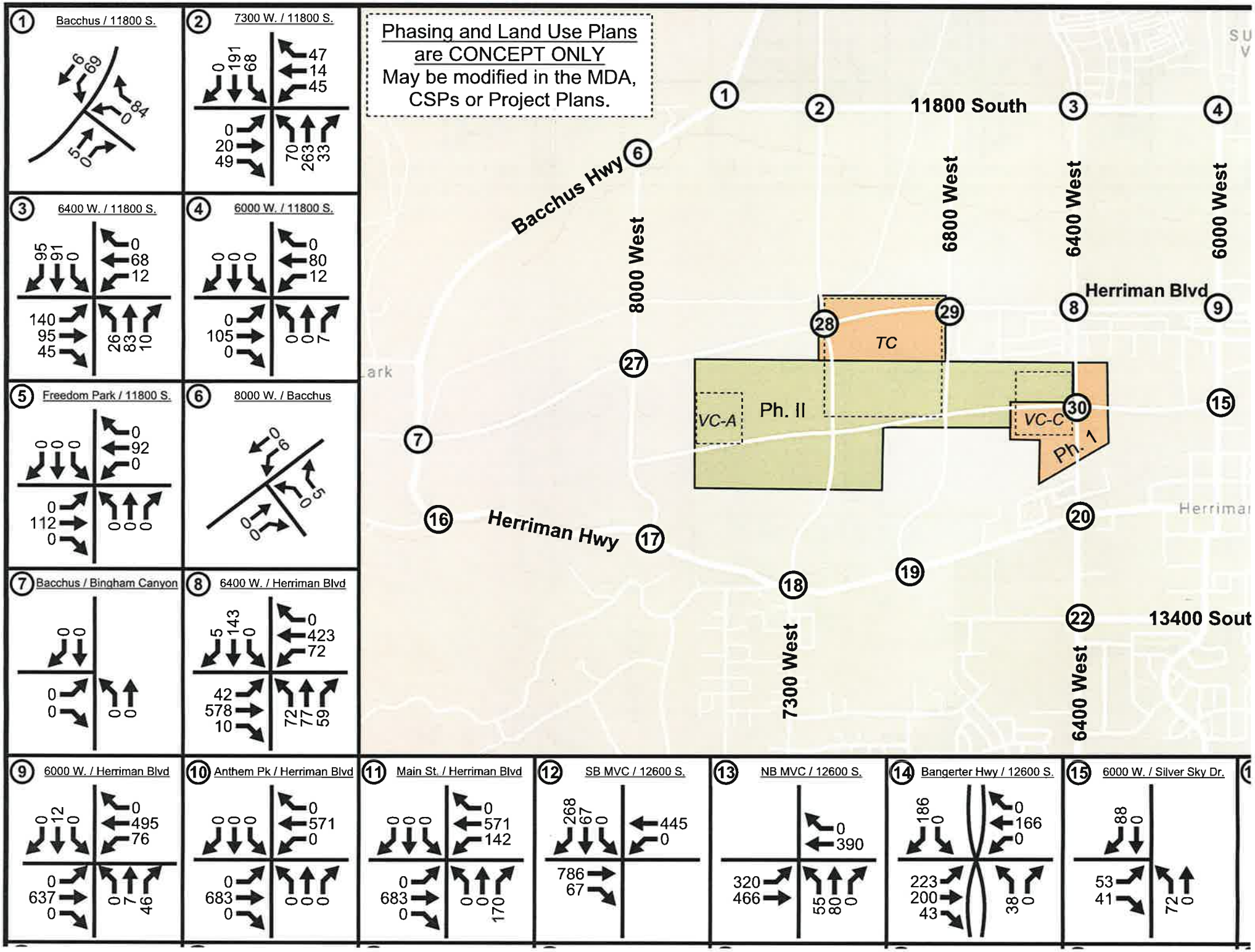
2 7300 W. / 11800 S.
3 6400 W. / 11800 S.
4 6000 W. / 11800 S.
5 Freedom Park / 11800 S.
6 8000 W. / Bacchus
7 Bacchus / Bingham Canyon
8 6400 W. / Herriman Blvd
9 6000 W. / Herriman Blvd
10 Anthem Pk / Herriman Blvd
11 Main St. / Herriman Blvd
12 SB MVC / 12600 S.
13 NB MVC / 12600 S.
14 Bangerter Hwy / 12600 S.
15 6000 W. / Silver Sky Dr.
11800 South
Bacchus Hwy
8000 West
6800 West
6400 West
6000 West
Herriman Blvd
TC
Ph. II
VC-A
VC-C
Ph. 1
Herriman Hwy
7300 West
6400 West
13400 Sout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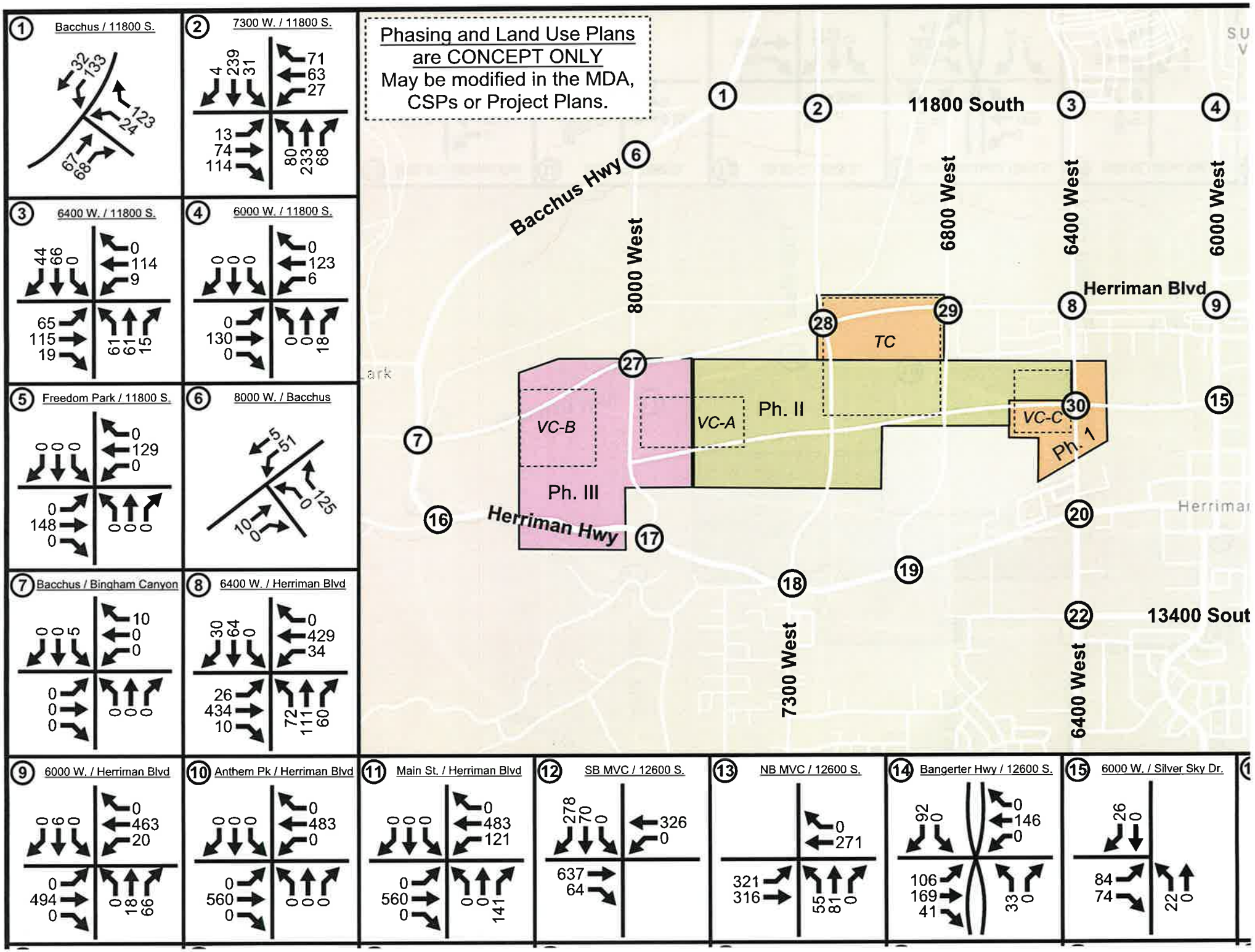
1 Bacchus / 11800 S.
6 69 84 0 5 0
2 7300 W. / 11800 S.
0 191 68 47 14 45 0 20 49 70 263 33
3 6400 W. / 11800 S.
95 91 0 0 68 12 140 95 45 26 83 10
4 6000 W. / 11800 S.
0 0 0 0 80 12 0 105 0 0 0 7
5 Freedom Park / 11800 S.
0 0 0 0 92 0 0 112 0 0 0 0
6 8000 W. / Bacchus
0 6 0 5 0 0
7 Bacchus / Bingham Canyon
0 0 0 0 0 0
8 6400 W. / Herriman Blvd
5 143 0 0 423 72 42 578 10 72 77 59
9 6000 W. / Herriman Blvd
0 12 0 0 495 76 0 637 0 0 7 46
10 Anthem Pk / Herriman Blvd
0 0 0 0 571 0 0 683 0 0 0 0
11 Main St. / Herriman Blvd
0 0 0 0 571 142 0 683 0 0 0 170
12 SB MVC / 12600 S.
268 67 0 445 0 786 67
13 NB MVC / 12600 S.
0 390 320 466 55 80 0
14 Bangerter Hwy / 12600 S.
186 0 0 166 0 223 200 43 38 0
15 6000 W. / Silver Sky Dr.
88 0 53 41 72 0
11800 South
Bacchus Hwy
8000 West
6800 West
6400 West
6000 West
Herriman Blvd
TC
VC-A
Ph. II
VC-C
Ph. 1
Herriman Hwy
7300 West
6400 West
13400 Sout
1 2 3 4 6 7 8 9 15 16 17 18 19 20 22 27 28 29 30


Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.
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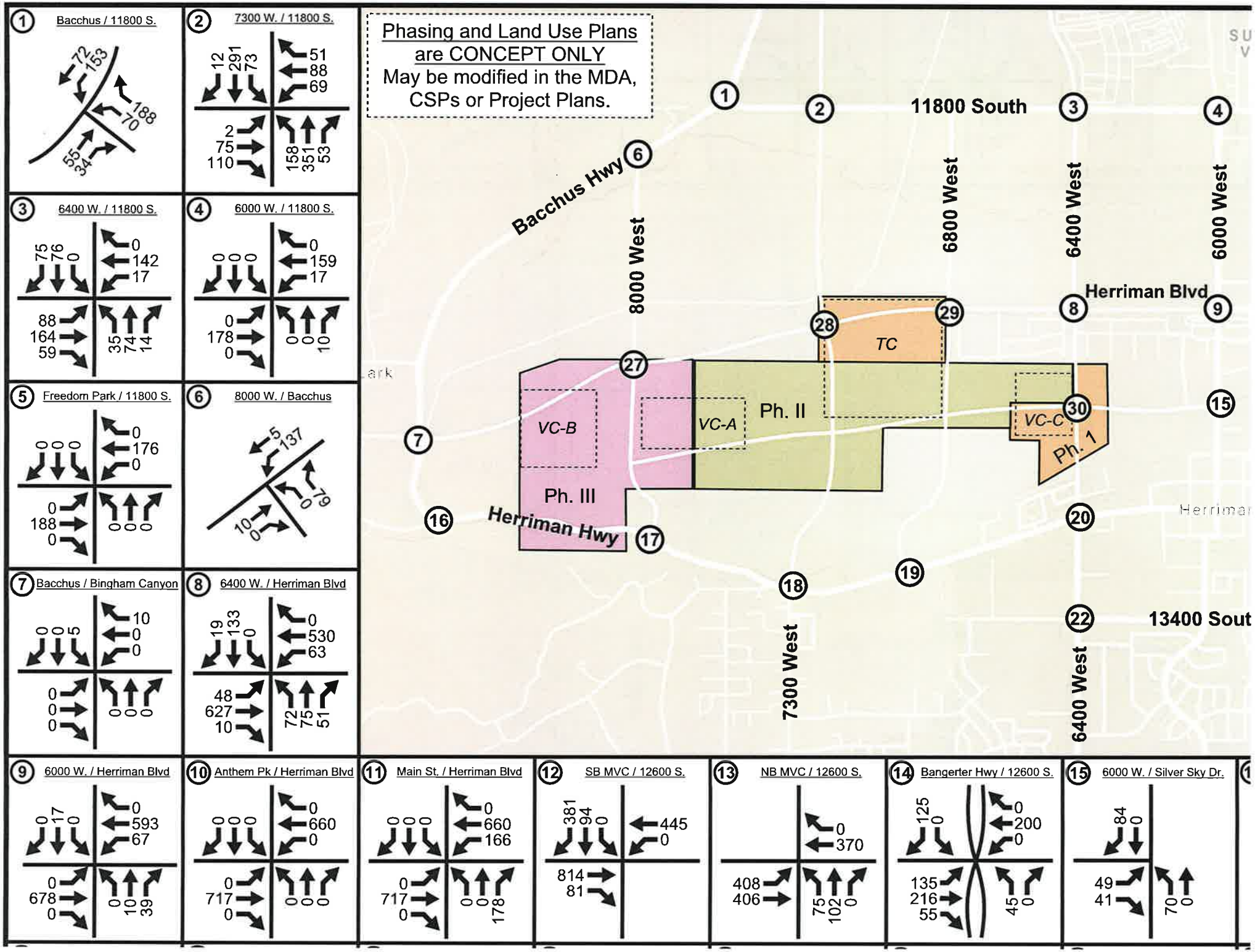
32 133 123 24 67 68
2 7300 W. / 11800 S.
4 239 31 71 63 27 13 74 114 80 233 68
3 6400 W. / 11800 S.
44 66 0 0 114 9 65 115 19 61 61 15
4 6000 W. / 11800 S.
0 0 0 0 123 6 0 130 0 0 0 18
5 Freedom Park / 11800 S.
0 0 0 0 129 0 0 148 0 0 0 0
6 8000 W. / Bacchus
5 51 125 0 10 0
7 Bacchus / Bingham Canyon
0 0 5 10 0 0 0 0 0 0 0 0
8 6400 W. / Herriman Blvd
30 64 0 0 429 34 26 434 10 72 111 60
9 6000 W. / Herriman Blvd
0 6 0 0 463 20 0 494 0 0 18 66
10 Anthem Pk / Herriman Blvd
0 0 0 0 483 0 0 560 0 0 0 0
11 Main St. / Herriman Blvd
0 0 0 0 483 121 0 560 0 0 0 141
12 SB MVC / 12600 S.
278 70 0 326 0 637 64
13 NB MVC / 12600 S.
0 271 321 316 55 81 0
14 Bangerter Hwy / 12600 S.
92 0 0 146 0 106 169 41 33 0
15 6000 W. / Silver Sky Dr.
26 0 84 74 22 0
11800 South
Herriman Blvd
Bacchus Hwy
8000 West
6800 West
6400 West
6000 West
TC
VC-A
VC-B
VC-C
Ph. II
Ph. III
Ph. 1
Herriman Hwy
7300 West
6400 West
13400 Sout
Herriman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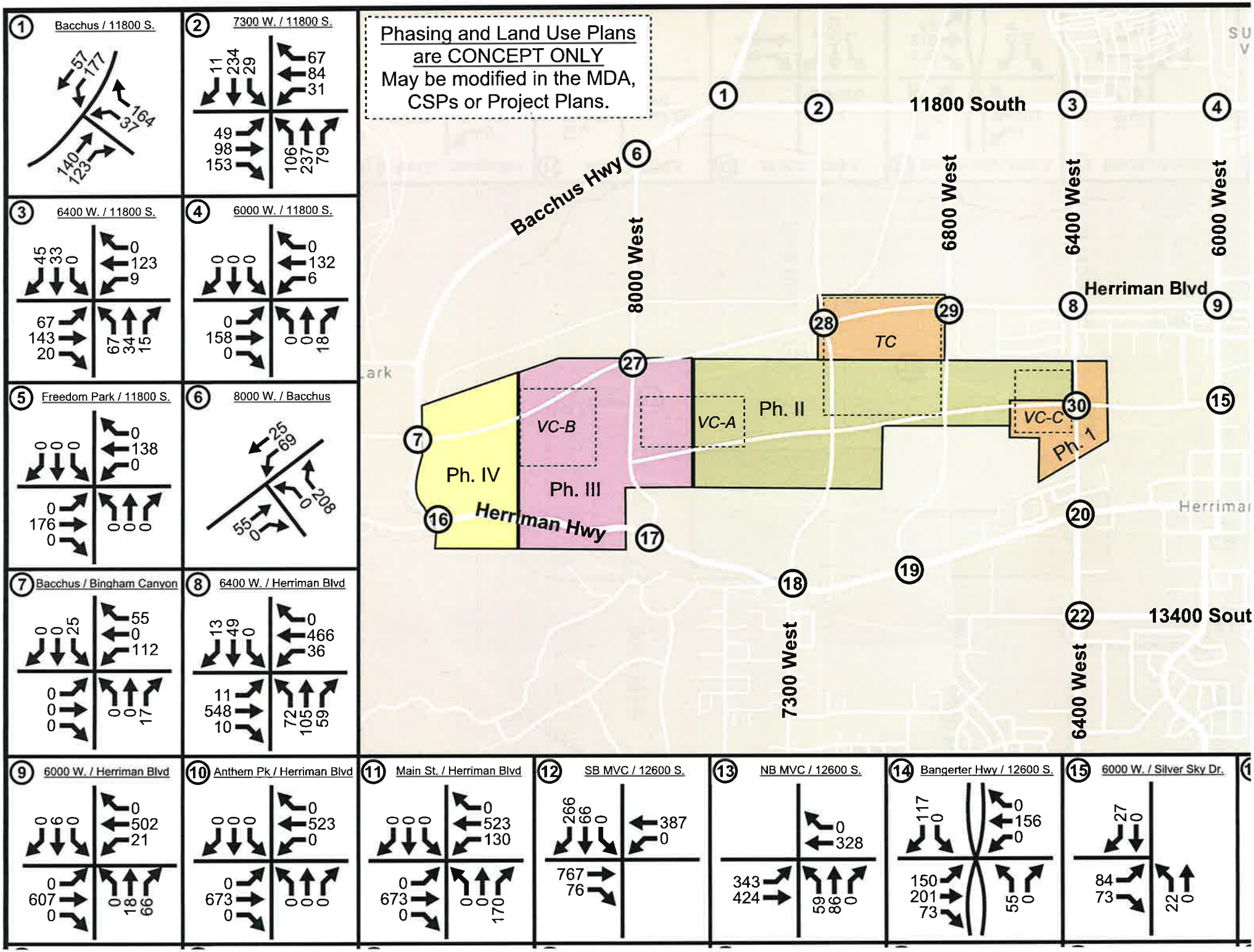
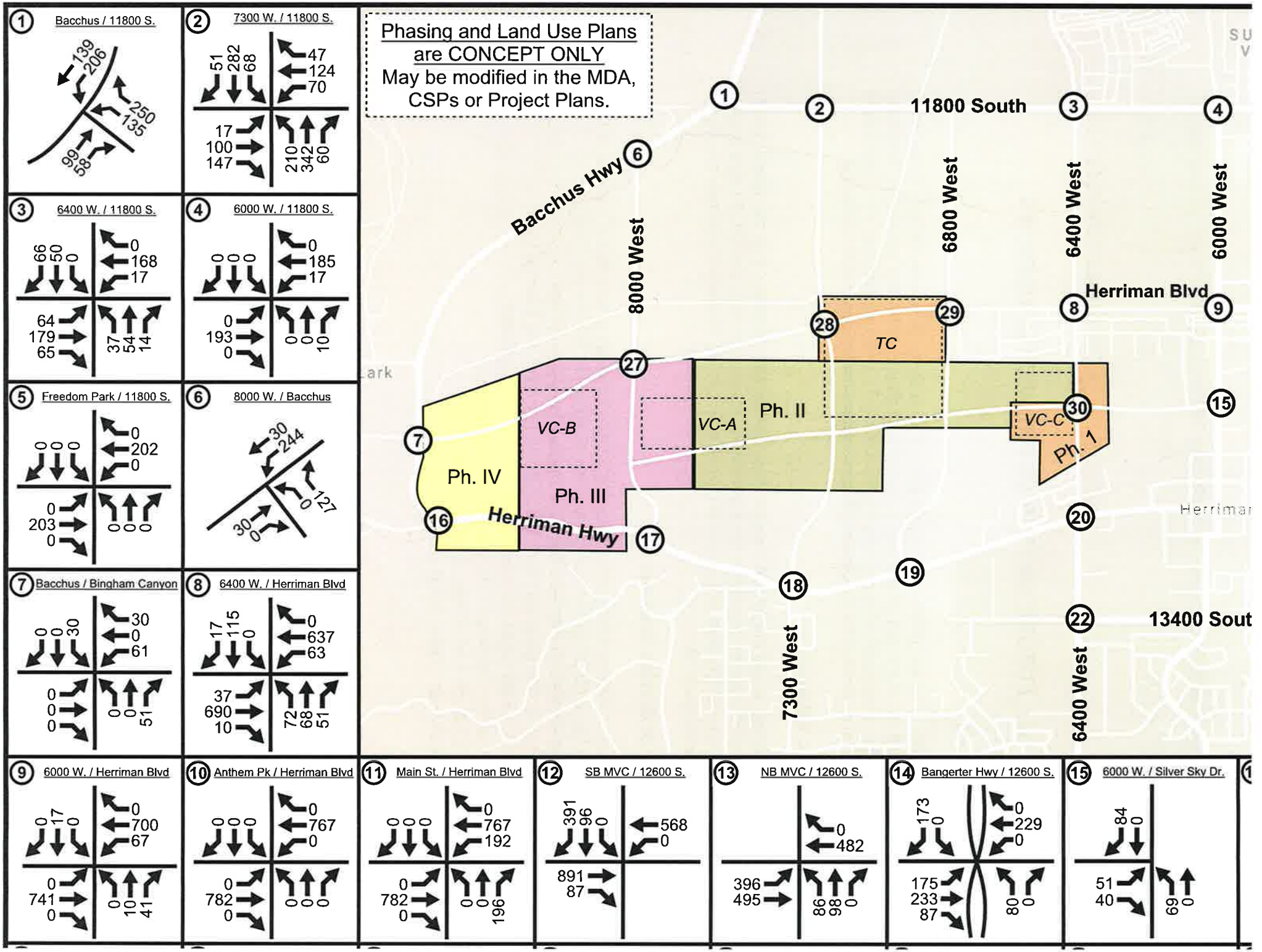
1 Bacchus / 11800 S.
72 153 188 70 55 34
2 7300 W. / 11800 S.
12 291 73 51 88 69 2 75 110 158 351 53
3 6400 W. / 11800 S.
75 76 0 0 142 17 88 164 59 35 74 14
4 6000 W. / 11800 S.
0 0 0 0 159 17 0 178 0 0 0 10
5 Freedom Park / 11800 S.
0 0 0 0 176 0 0 188 0 0 0 0
6 8000 W. / Bacchus
5 137 10 0 0 79
7 Bacchus / Bingham Canyon
0 0 5 10 0 0 0 0 0 0 0 0
8 6400 W. / Herriman Blvd
19 133 0 0 530 63 48 627 10 72 75 51
9 6000 W. / Herriman Blvd
0 17 0 0 593 67 0 678 0 0 10 39
10 Anthem Pk / Herriman Blvd
0 0 0 0 660 0 0 717 0 0 0 0
11 Main St. / Herriman Blvd
0 0 0 0 660 166 0 717 0 0 0 178
12 SB MVC / 12600 S.
381 94 0 445 0 814 81
13 NB MVC / 12600 S.
0 370 408 406 75 102 0
14 Bangerter Hwy / 12600 S.
125 0 0 200 0 135 216 55 45 0
15 6000 W. / Silver Sky Dr.
84 0 49 41 70 0
11800 South
Bacchus Hwy
8000 West
6800 West
6400 West
6000 West
Herriman Blvd
TC
VC-A
VC-B
VC-C
Ph. II
Ph. III
Ph. 1
Herriman Hwy
7300 West
6400 West
13400 Sout
1 2 3 4 6 7 8 9 15 16 17 18 19 20 22 27 28 29 30


Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.
1 Bacchus / 11800 S.
57 177 164 37 140 123
2 7300 W. / 11800 S.
11 234 29 67 84 31 49 98 153 106 237 79
3 6400 W. / 11800 S.
45 33 0 0 123 9 67 143 20 67 34 15
4 6000 W. / 11800 S.
0 0 0 0 132 6 0 158 0 0 18
5 Freedom Park / 11800 S.
0 0 0 0 138 0 0 176 0 0 0 0
6 8000 W. / Bacchus
25 69 208 0 55 0
7 Bacchus / Bingham Canyon
0 0 25 55 0 112 0 0 0 0 0 17
8 6400 W. / Herriman Blvd
13 49 0 0 466 36 11 548 10 72 105 59
9 6000 W. / Herriman Blvd
0 6 0 0 502 21 0 607 0 0 18 66
10 Anthem Pk / Herriman Blvd
0 0 0 0 523 0 0 673 0 0 0 0
11 Main St. / Herriman Blvd
0 0 0 0 523 130 0 673 0 0 0 170
12 SB MVC / 12600 S.
266 66 0 387 0 767 76
13 NB MVC / 12600 S.
0 328 343 424 59 86 0
14 Bangerter Hwy / 12600 S.
117 0 0 156 0 150 201 73 55 0
15 6000 W. / Silver Sky Dr.
27 0 84 73 22 0
11800 South
Bacchus Hwy
8000 West
6800 West
6400 West
6000 West
Herriman Blvd
TC
VC-A
VC-B
VC-C
Ph. II
Ph. 1
Ph. III
Ph. IV
Herriman Hwy
7300 West
6400 West
13400 Sout
Herriman


Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.
1 Bacchus / 11800 S.
2 7300 W. / 11800 S.
3 6400 W. / 11800 S.
4 6000 W. / 11800 S.
5 Freedom Park / 11800 S.
6 8000 W. / Bacchus
7 Bacchus / Bingham Canyon
8 6400 W. / Herriman Blvd
9 6000 W. / Herriman Blvd
10 Anthem Pk / Herriman Blvd
11 Main St. / Herriman Blvd
12 SB MVC / 12600 S.
13 NB MVC / 12600 S.
14 Bangerter Hwy / 12600 S.
15 6000 W. / Silver Sky Dr.
11800 South
Bacchus Hwy
8000 West
6800 West
6400 West
6000 West
Herriman Blvd
TC
VC-A
VC-B
VC-C
Ph. II
Ph. 1
Ph. III
Ph. IV
Herriman Hwy
7300 West
6400 West
13400 Sout

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.

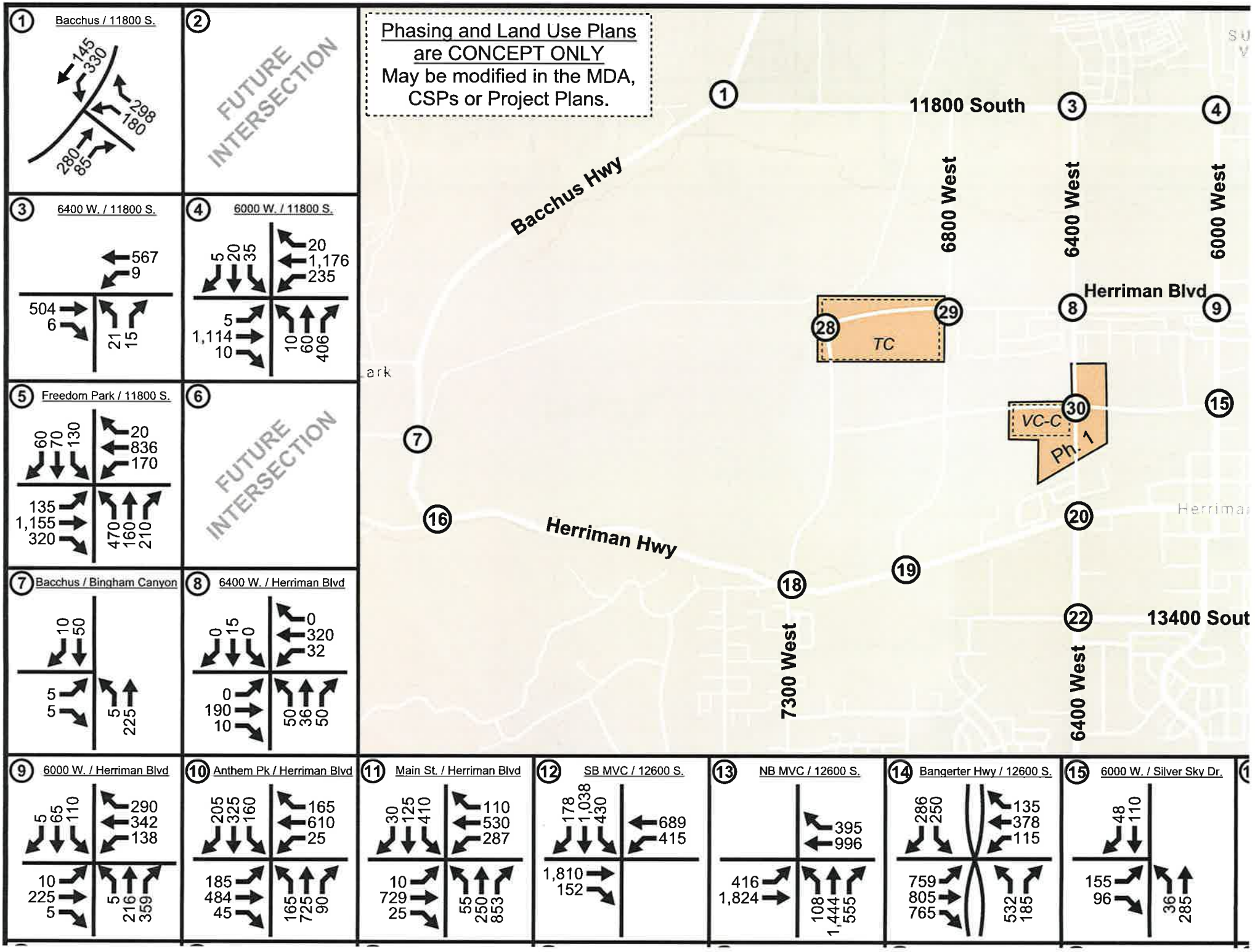
B. Traffic Volumes

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)


Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.
1 Bacchus / 11800 S.
145
330
298
180
280
85
2 FUTURE INTERSECTION
3 6400 W. / 11800 S.
567
9
504
6
21
15
4 6000 W. / 11800 S.
5
20
35
20
1,176
235
5
1,114
10
10
60
406
5 Freedom Park / 11800 S.
60
70
130
20
836
170
135
1,155
320
470
160
210
6 FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
10
50
5
5
5
225
8 6400 W. / Herriman Blvd
0
15
0
0
320
32
0
190
10
50
36
50
9 6000 W. / Herriman Blvd
5
65
110
290
342
138
10
225
5
5
216
359
10 Anthem Pk / Herriman Blvd
205
325
160
165
610
25
185
484
45
165
725
90
11 Main St. / Herriman Blvd
30
125
410
110
530
287
10
729
25
55
250
853
12 SB MVC / 12600 S.
178
1,038
430
689
415
1,810
152
13 NB MVC / 12600 S.
395
996
416
1,824
108
1,444
555
14 Bangerter Hwy / 12600 S.
286
250
135
378
115
759
805
765
532
185
15 6000 W. / Silver Sky Dr.
48
110
155
96
36
285
1
11800 South
Bacchus Hwy
6800 West
6400 West
6000 West
Herriman Blvd
28
29
TC
30
VC-C
Ph. 1
15
7
16
Herriman Hwy
18
19
20
22
13400 Sout
7300 West
6400 West

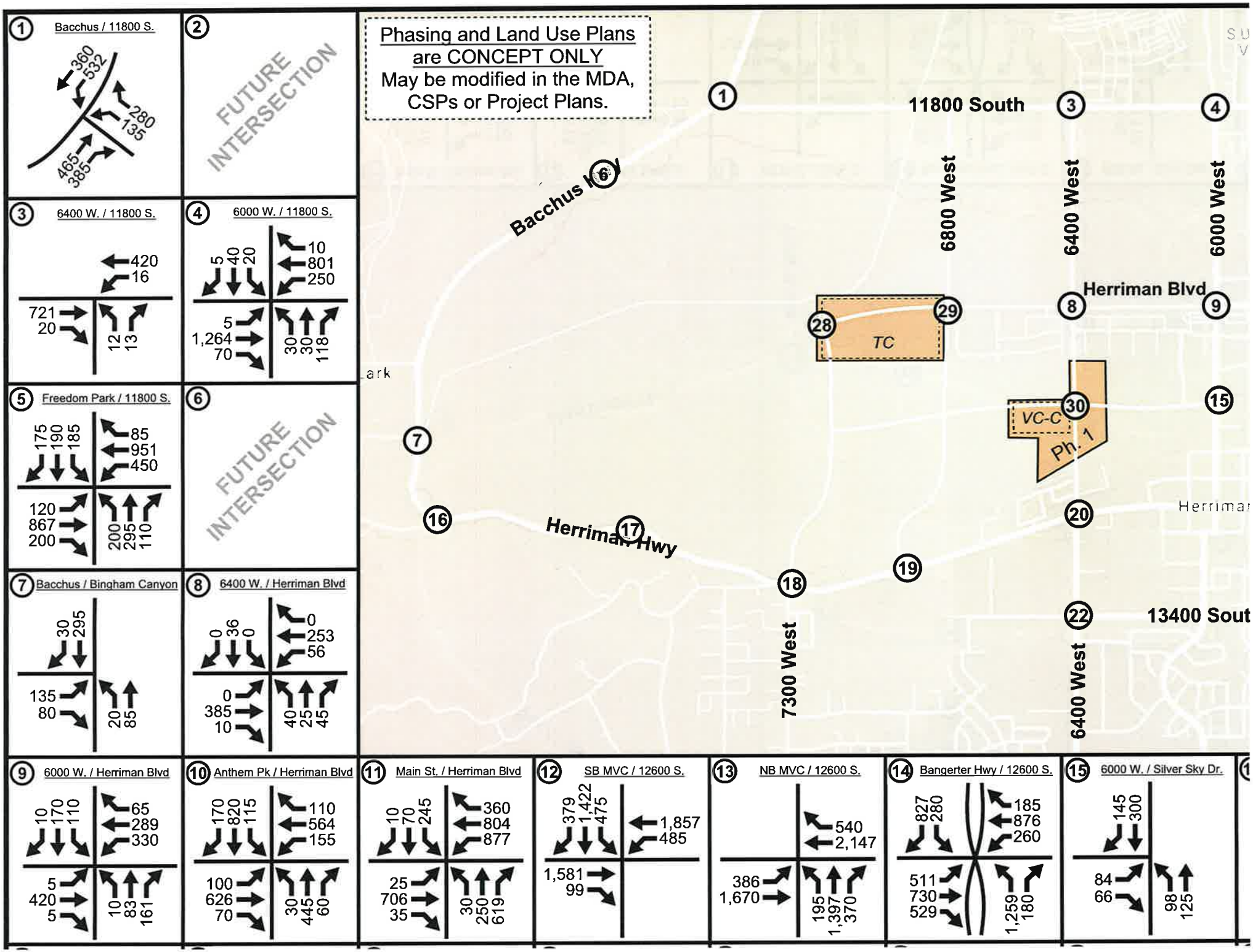

Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.
1 Bacchus / 11800 S.
360
532
280
135
465
385
2 FUTURE INTERSECTION
3 6400 W. / 11800 S.
420
16
721
20
12
13
4 6000 W. / 11800 S.
5
40
20
10
801
250
5
1,264
70
30
30
118
5 Freedom Park / 11800 S.
175
190
185
85
951
450
120
867
200
200
295
110
6 FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
30
295
135
80
20
85
8 6400 W. / Herriman Blvd
0
36
0
0
253
56
0
385
10
40
25
45
9 6000 W. / Herriman Blvd
10
170
110
65
289
330
5
420
5
10
83
161
10 Anthem Pk / Herriman Blvd
170
820
115
110
564
155
100
626
70
30
445
60
11 Main St. / Herriman Blvd
10
70
245
360
804
877
25
706
35
30
250
619
12 SB MVC / 12600 S.
379
1,422
475
1,857
485
1,581
99
13 NB MVC / 12600 S.
540
2,147
386
1,670
195
1,397
370
14 Bangerter Hwy / 12600 S.
827
280
185
876
260
511
730
529
1,259
180
15 6000 W. / Silver Sky Dr.
145
300
84
66
98
125
11800 South
Herriman Blvd
Bacchus Hwy
6800 West
6400 West
6000 West
7300 West
6400 West
Herriman Hwy
13400 Sout
TC
VC-C
Ph. 1
ark
Herriman

Table 9: Future (2027) 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	-	-	-	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		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	-	-	-	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, 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.

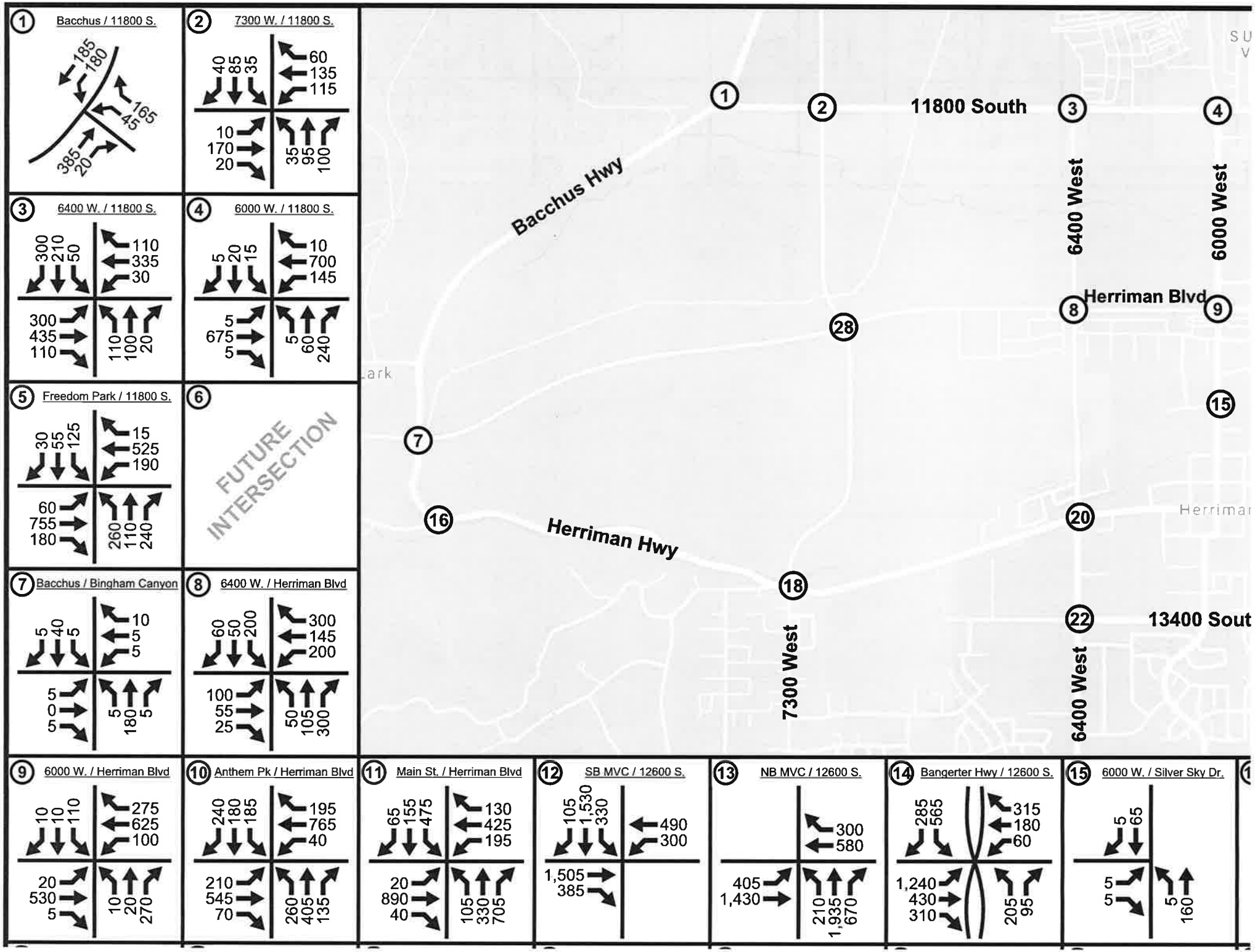
E. Queuing Analysis

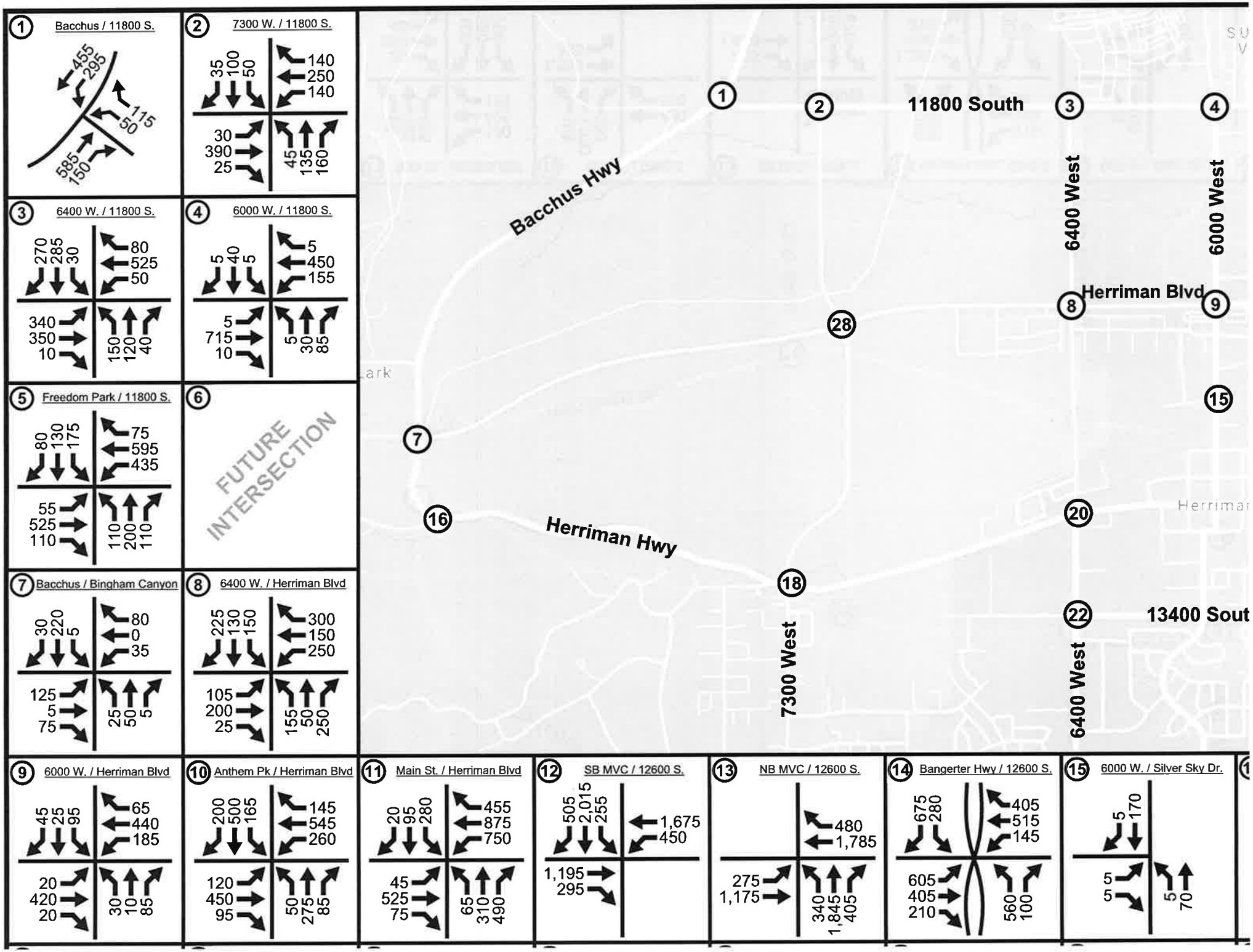
Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- 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.


1 Bacchus / 11800 S.
185 180 165 45 385 20
2 7300 W. / 11800 S.
40 85 35 60 135 115 10 170 20 35 95 100
3 6400 W. / 11800 S.
300 210 50 110 335 30 300 435 110 110 100 20
4 6000 W. / 11800 S.
5 20 15 10 700 145 5 675 5 5 60 240
5 Freedom Park / 11800 S.
30 55 125 15 525 190 60 755 180 260 110 240
6 FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
5 40 5 10 5 5 5 0 5 5 180 5
8 6400 W. / Herriman Blvd
60 50 200 300 145 200 100 55 25 50 105 300
9 6000 W. / Herriman Blvd
10 10 110 275 625 100 20 530 5 10 20 270
10 Anthem Pk / Herriman Blvd
240 180 185 195 765 40 210 545 70 260 405 135
11 Main St. / Herriman Blvd
65 155 475 130 425 195 20 890 40 105 330 705
12 SB MVC / 12600 S.
105 1,530 330 490 300 1,505 385
13 NB MVC / 12600 S.
300 580 405 1,430 210 1,935 670
14 Bangerter Hwy / 12600 S.
285 565 315 180 60 1,240 430 310 205 95
15 6000 W. / Silver Sky Dr.
5 65 5 5 5 160
Bacchus Hwy
Herriman Hwy
11800 South
6400 West
6000 West
Herriman Blvd
7300 West
6400 West
13400 Sout
Herriman
Lark
1 2 3 4 8 9 15 16 7 28 18 20 22


1 Bacchus / 11800 S.
455 295 115 50 585 150
2 7300 W. / 11800 S.
35 100 50 140 250 140 30 390 25 45 135 160
3 6400 W. / 11800 S.
270 285 30 80 525 50 340 350 10 150 120 40
4 6000 W. / 11800 S.
5 40 5 5 450 155 5 715 10 5 30 85
5 Freedom Park / 11800 S.
80 130 175 75 595 435 55 525 110 110 200 110
6 FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
30 220 5 80 0 35 125 5 75 25 50 5
8 6400 W. / Herriman Blvd
225 130 150 300 150 250 105 200 25 155 50 250
9 6000 W. / Herriman Blvd
45 25 95 65 440 185 20 420 20 30 10 85
10 Anthem Pk / Herriman Blvd
200 500 165 145 545 260 120 450 95 50 275 85
11 Main St. / Herriman Blvd
20 95 280 455 875 750 45 525 75 65 310 490
12 SB MVC / 12600 S.
505 2,015 255 1,675 450 1,195 295
13 NB MVC / 12600 S.
480 1,785 275 1,175 340 1,845 405
14 Bangerter Hwy / 12600 S.
675 280 405 515 145 605 405 210 560 100
15 6000 W. / Silver Sky Dr.
5 170 5 5 5 70
Bacchus Hwy
Herriman Hwy
11800 South
6400 West
6000 West
Herriman Blvd
7300 West
6400 West
13400 Sout
Herriman
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18
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Table 11: Future (2032) 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	-	-	-	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.

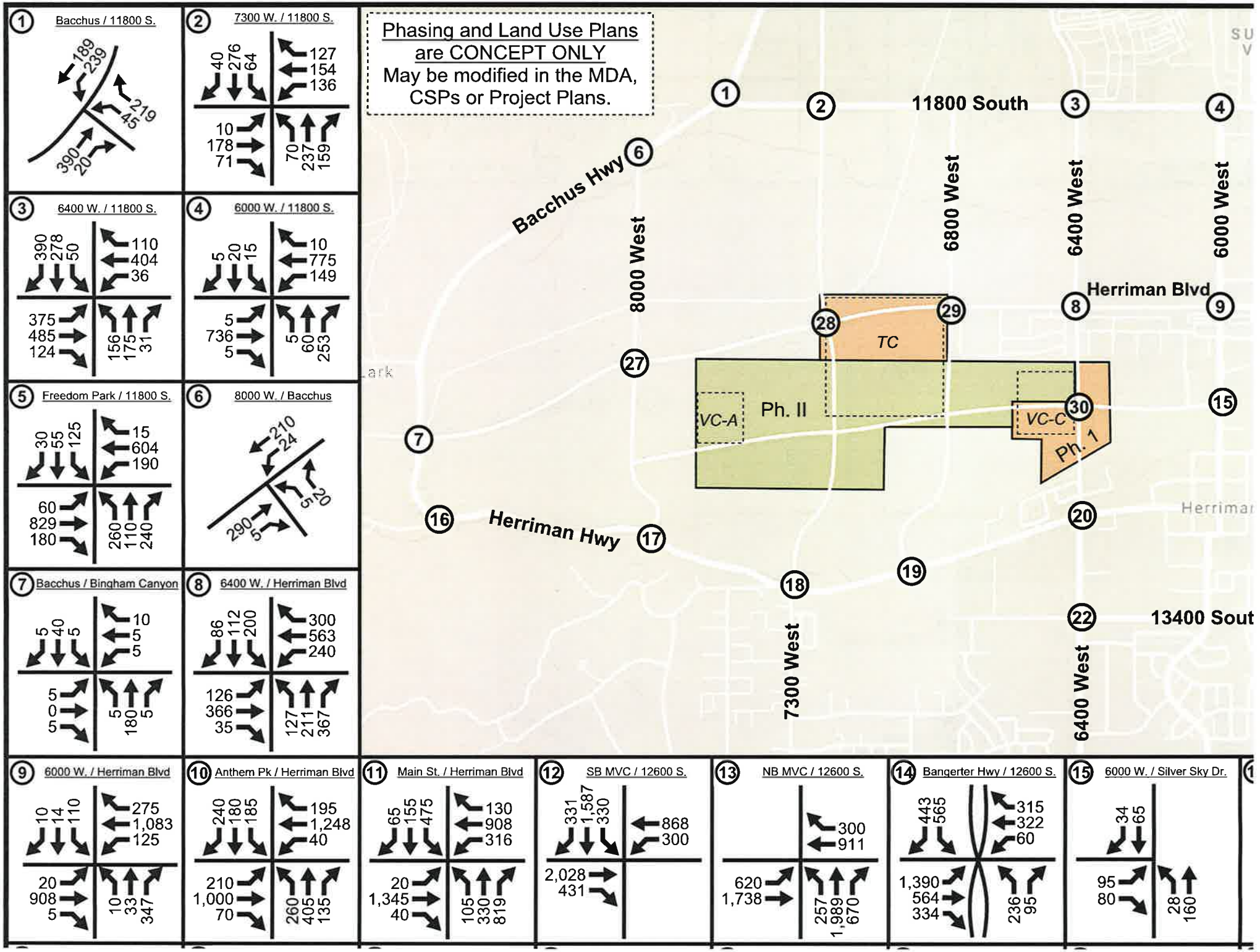
B. Traffic Volumes

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)


Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.
1 Bacchus / 11800 S.
189 239 219 45 390 20
2 7300 W. / 11800 S.
40 276 64 127 154 136 10 178 71 70 237 159
3 6400 W. / 11800 S.
390 278 50 110 404 36 375 485 124 156 175 31
4 6000 W. / 11800 S.
5 20 15 10 775 149 5 736 5 5 60 253
5 Freedom Park / 11800 S.
30 55 125 15 604 190 60 829 180 260 110 240
6 8000 W. / Bacchus
210 24 20 290 5
7 Bacchus / Bingham Canyon
5 40 5 10 5 5 5 0 5 5 180 5
8 6400 W. / Herriman Blvd
86 112 200 300 563 240 126 366 35 127 211 367
9 6000 W. / Herriman Blvd
10 14 110 275 1,083 125 20 908 5 10 33 347
10 Anthem Pk / Herriman Blvd
240 180 185 195 1,248 40 210 1,000 70 260 405 135
11 Main St. / Herriman Blvd
65 155 475 130 908 316 20 1,345 40 105 330 819
12 SB MVC / 12600 S.
331 1,587 330 868 300 2,028 431
13 NB MVC / 12600 S.
300 911 620 1,738 257 1,989 670
14 Bangerter Hwy / 12600 S.
443 565 315 322 60 1,390 564 334 236 95
15 6000 W. / Silver Sky Dr.
34 65 95 80 28 160
Bacchus Hwy
8000 West
6800 West
6400 West
6000 West
11800 South
Herriman Blvd
Herriman Hwy
7300 West
6400 West
13400 Sout
TC
Ph. II
VC-A
VC-C
Ph. 1
1 2 3 4 6 7 8 9 15 16 17 18 19 20 22 27 28 29 30

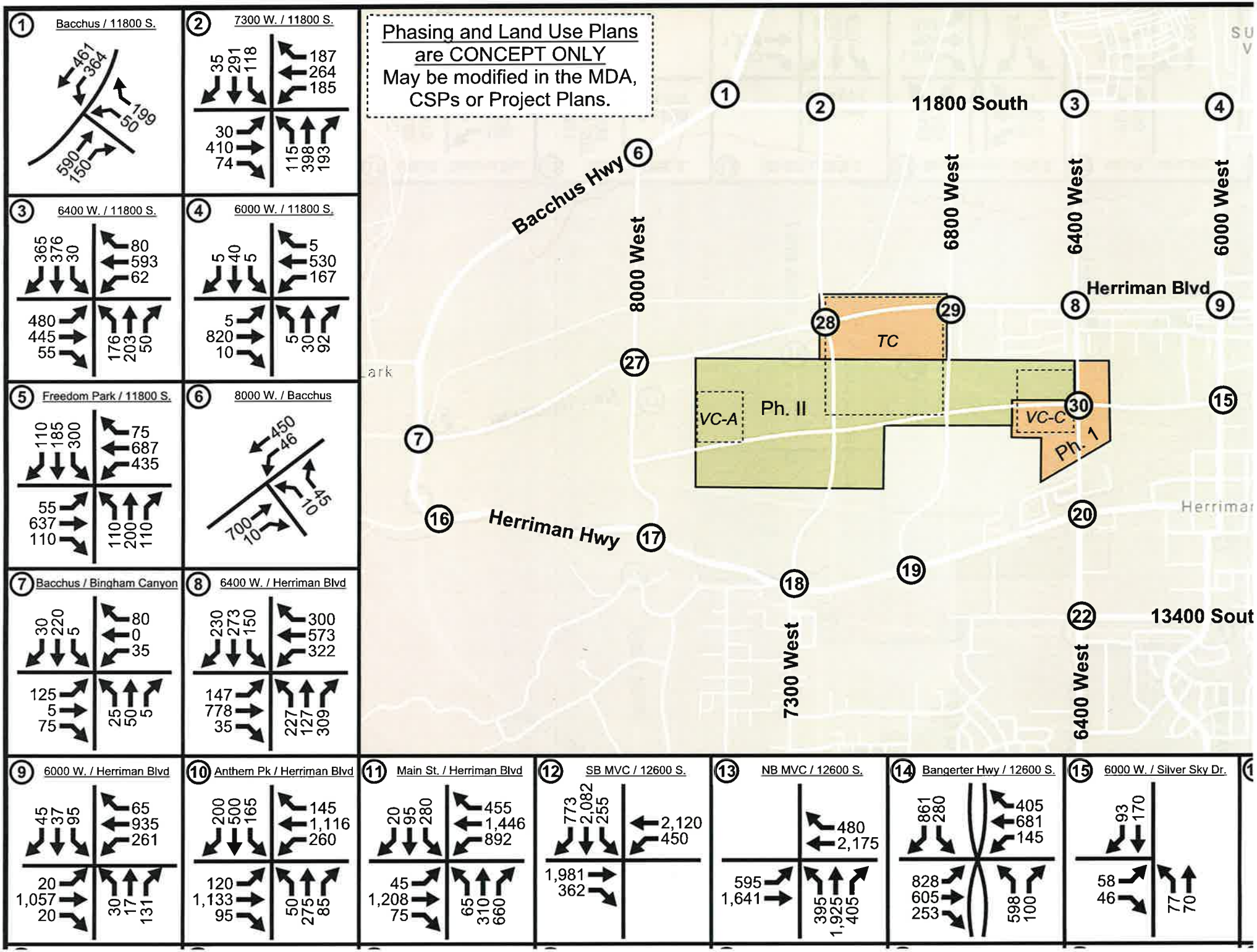

Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.
1 Bacchus / 11800 S.
461 364 199 50 590 150
2 7300 W. / 11800 S.
35 291 118 187 264 185 30 410 74 115 398 193
3 6400 W. / 11800 S.
365 376 30 80 593 62 480 445 55 176 203 50
4 6000 W. / 11800 S.
5 40 5 5 530 167 5 820 10 5 30 92
5 Freedom Park / 11800 S.
110 185 300 75 687 435 55 637 110 110 200 110
6 8000 W. / Bacchus
450 46 45 10 700 10
7 Bacchus / Bingham Canyon
30 220 5 80 0 35 125 5 75 25 50 5
8 6400 W. / Herriman Blvd
230 273 150 300 573 322 147 778 35 227 127 309
9 6000 W. / Herriman Blvd
45 37 95 65 935 261 20 1,057 20 30 17 131
10 Anthem Pk / Herriman Blvd
200 500 165 145 1,116 260 120 1,133 95 50 275 85
11 Main St. / Herriman Blvd
20 95 280 455 1,446 892 45 1,208 75 65 310 660
12 SB MVC / 12600 S.
773 2,082 255 2,120 450 1,981 362
13 NB MVC / 12600 S.
480 2,175 595 1,641 395 1,925 405
14 Bangerter Hwy / 12600 S.
861 280 405 681 145 828 605 253 598 100
15 6000 W. / Silver Sky Dr.
93 170 58 46 77 70
11800 South
Herriman Blvd
Bacchus Hwy
8000 West
6800 West
6400 West
6000 West
7300 West
Herriman Hwy
13400 Sout
TC
Ph. II
VC-A
VC-C
Ph. 1

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, 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.

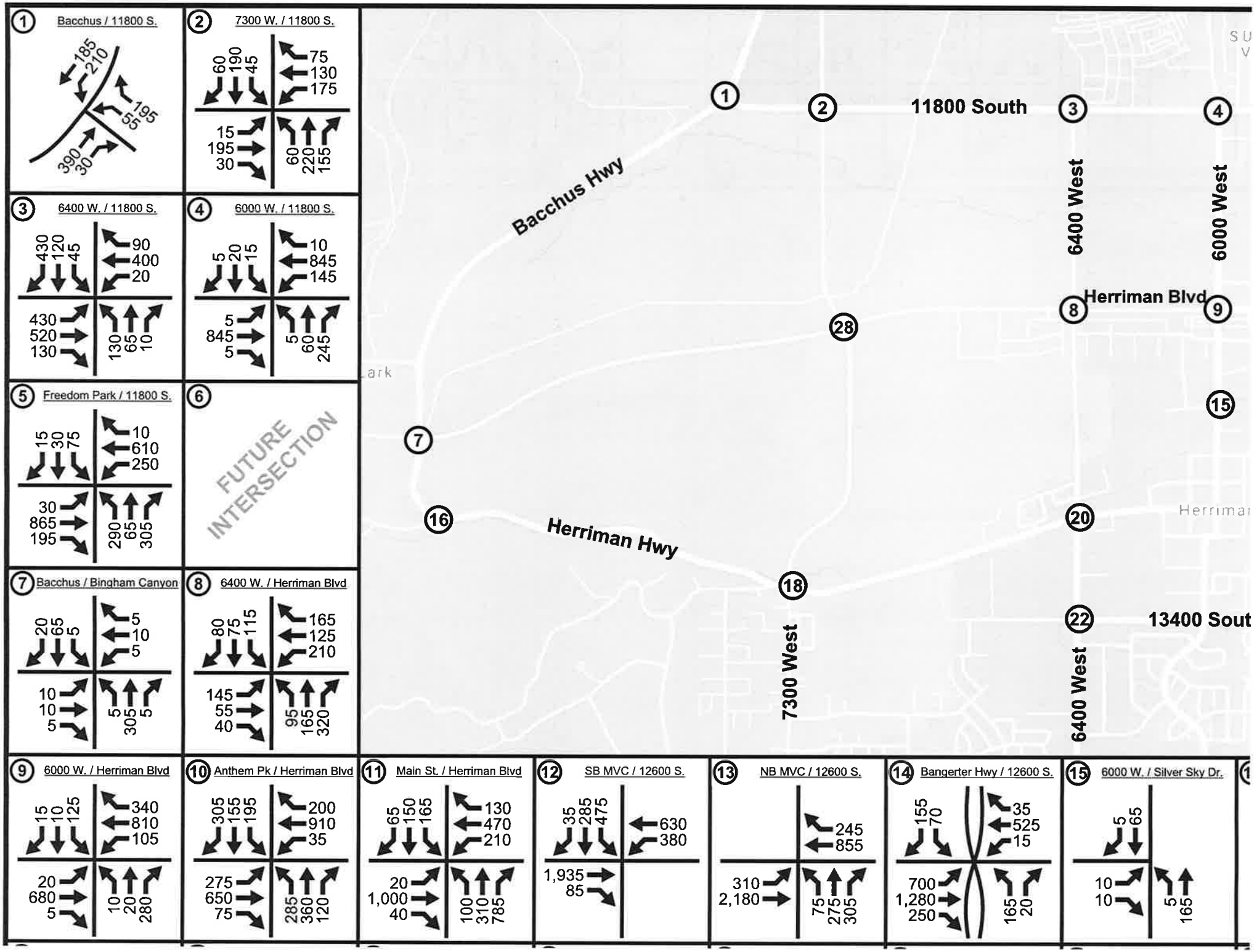
E. Queuing Analysis

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.


1 Bacchus / 11800 S.
185
210
195
55
390
30
2 7300 W. / 11800 S.
60
190
45
75
130
175
15
195
30
60
220
155
3 6400 W. / 11800 S.
430
120
45
90
400
20
430
520
130
130
65
10
4 6000 W. / 11800 S.
5
20
15
10
845
145
5
845
5
5
60
245
5 Freedom Park / 11800 S.
15
30
75
10
610
250
30
865
195
290
65
305
6
FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
20
65
5
5
10
5
10
10
5
5
305
5
8 6400 W. / Herriman Blvd
80
75
115
165
125
210
145
55
40
95
165
320
9 6000 W. / Herriman Blvd
15
10
125
340
810
105
20
680
5
10
20
280
10 Anthem Pk / Herriman Blvd
305
155
195
200
910
35
275
650
75
285
360
120
11 Main St. / Herriman Blvd
65
150
165
130
470
210
20
1,000
40
100
310
785
12 SB MVC / 12600 S.
35
285
475
630
380
1,935
85
13 NB MVC / 12600 S.
245
855
310
2,180
75
275
305
14 Bangerter Hwy / 12600 S.
155
70
35
525
15
700
1,280
250
165
20
15 6000 W. / Silver Sky Dr.
5
65
10
10
5
165
Bacchus Hwy
11800 South
6400 West
6000 West
Herriman Blvd
Herriman Hwy
7300 West
6400 West
13400 Sout
Herriman
ark
1
2
3
4
8
9
28
15
7
16
20
18
22

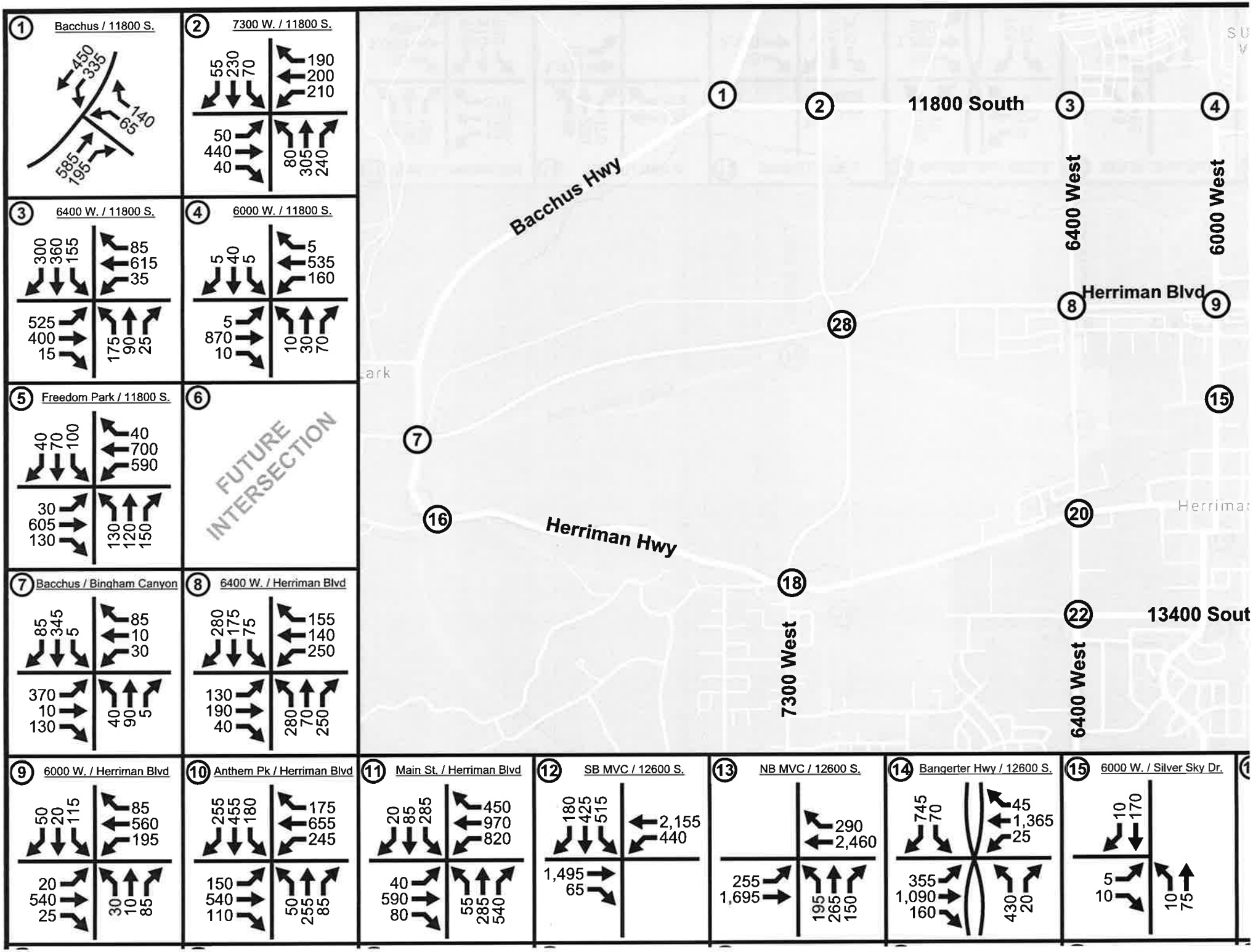

1 Bacchus / 11800 S.
450 335 140 65 585 195
2 7300 W. / 11800 S.
55 230 70 190 200 210 50 440 40 80 305 240
3 6400 W. / 11800 S.
300 360 155 85 615 35 525 400 15 175 90 25
4 6000 W. / 11800 S.
5 40 5 5 535 160 5 870 10 10 30 70
5 Freedom Park / 11800 S.
40 70 100 40 700 590 30 605 130 130 120 150
6 FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
85 345 5 85 10 30 370 10 130 40 90 5
8 6400 W. / Herriman Blvd
280 175 75 155 140 250 130 190 40 280 70 250
9 6000 W. / Herriman Blvd
50 20 115 85 560 195 20 540 25 30 10 85
10 Anthem Pk / Herriman Blvd
255 455 180 175 655 245 150 540 110 50 255 85
11 Main St. / Herriman Blvd
20 85 285 450 970 820 40 590 80 55 285 540
12 SB MVC / 12600 S.
180 425 515 2,155 440 1,495 65
13 NB MVC / 12600 S.
290 2,460 255 1,695 195 265 150
14 Bangerter Hwy / 12600 S.
745 70 45 1,365 25 355 1,090 160 430 20
15 6000 W. / Silver Sky Dr.
10 170 5 10 10 75
Bacchus Hwy
Herriman Hwy
11800 South
6400 West
6000 West
Herriman Blvd
7300 West
6400 West
13400 Sout
Herriman
1
2
3
4
8
9
28
15
7
16
20
18
22

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.

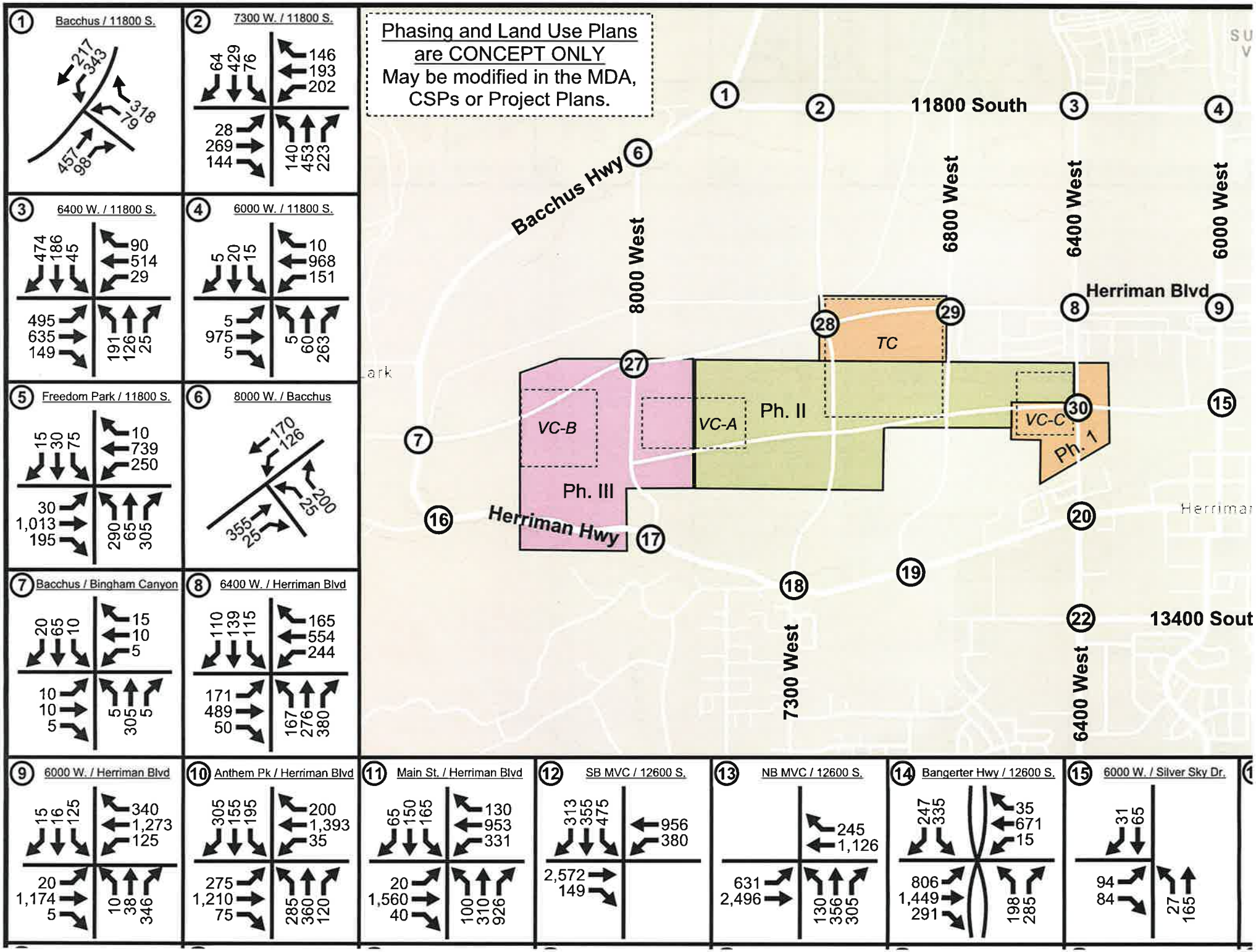
B. Traffic Volumes

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


Phasing and Land Use Plans
are CONCEPT ONLY
May be modified in the MDA,
CSPs or Project Plans.
1 Bacchus / 11800 S.
217
343
318
79
457
98
2 7300 W. / 11800 S.
64
429
76
146
193
202
28
269
144
140
453
223
3 6400 W. / 11800 S.
474
186
45
90
514
29
495
635
149
191
126
25
4 6000 W. / 11800 S.
5
20
15
10
968
151
5
975
5
5
60
263
5 Freedom Park / 11800 S.
15
30
75
10
739
250
30
1,013
195
290
65
305
6 8000 W. / Bacchus
170
126
200
25
355
25
7 Bacchus / Bingham Canyon
20
65
10
15
10
5
10
10
5
5
305
5
8 6400 W. / Herriman Blvd
110
139
115
165
554
244
171
489
50
167
276
380
9 6000 W. / Herriman Blvd
15
16
125
340
1,273
125
20
1,174
5
10
38
346
10 Anthem Pk / Herriman Blvd
305
155
195
200
1,393
35
275
1,210
75
285
360
120
11 Main St. / Herriman Blvd
65
150
165
130
953
331
20
1,560
40
100
310
926
12 SB MVC / 12600 S.
313
355
475
956
380
2,572
149
13 NB MVC / 12600 S.
245
1,126
631
2,496
130
356
305
14 Bangerter Hwy / 12600 S.
247
335
35
671
15
806
1,449
291
198
285
15 6000 W. / Silver Sky Dr.
31
65
94
84
27
165
Bacchus Hwy
8000 West
6800 West
6400 West
6000 West
11800 South
Herriman Blvd
Herriman Hwy
7300 West
6400 West
13400 Sout
TC
VC-A
VC-B
VC-C
Ph. II
Ph. III
Ph. 1
1
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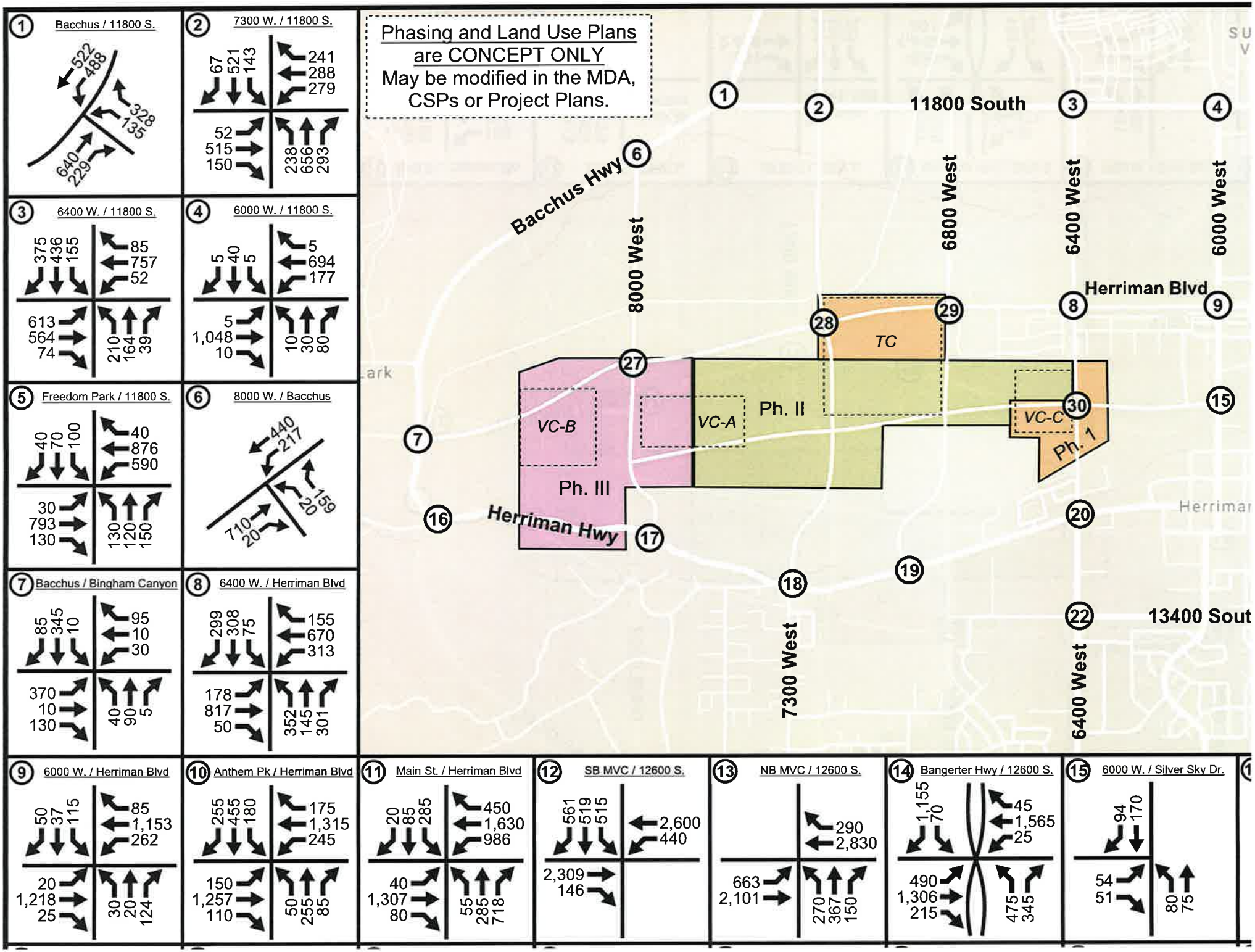

Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.
1 Bacchus / 11800 S.
522 488 328 135 640 229
2 7300 W. / 11800 S.
67 521 143 241 288 279 52 515 150 238 656 293
3 6400 W. / 11800 S.
375 436 155 85 757 52 613 564 74 210 164 39
4 6000 W. / 11800 S.
5 40 5 5 694 177 5 1,048 10 10 30 80
5 Freedom Park / 11800 S.
40 70 100 40 876 590 30 793 130 130 120 150
6 8000 W. / Bacchus
440 217 159 20 710 20
7 Bacchus / Bingham Canyon
85 345 10 95 10 30 370 10 130 40 90 5
8 6400 W. / Herriman Blvd
299 308 75 155 670 313 178 817 50 352 145 301
9 6000 W. / Herriman Blvd
50 37 115 85 1,153 262 20 1,218 25 30 20 124
10 Anthem Pk / Herriman Blvd
255 455 180 175 1,315 245 150 1,257 110 50 255 85
11 Main St. / Herriman Blvd
20 85 285 450 1,630 986 40 1,307 80 55 285 718
12 SB MVC / 12600 S.
561 519 515 2,600 440 2,309 146
13 NB MVC / 12600 S.
290 2,830 663 2,101 270 367 150
14 Bangerter Hwy / 12600 S.
1,155 70 45 1,565 25 490 1,306 215 475 345
15 6000 W. / Silver Sky Dr.
94 170 54 51 80 75
11800 South
Bacchus Hwy
8000 West
6800 West
6400 West
6000 West
Herriman Blvd
TC
VC-A
VC-B
VC-C
Ph. II
Ph. III
Ph. 1
Herriman Hwy
7300 West
6400 West
13400 Sout
Herriman

Table 17: Future (2037) 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	-	-	-	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		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	-	-	-	29.8	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.

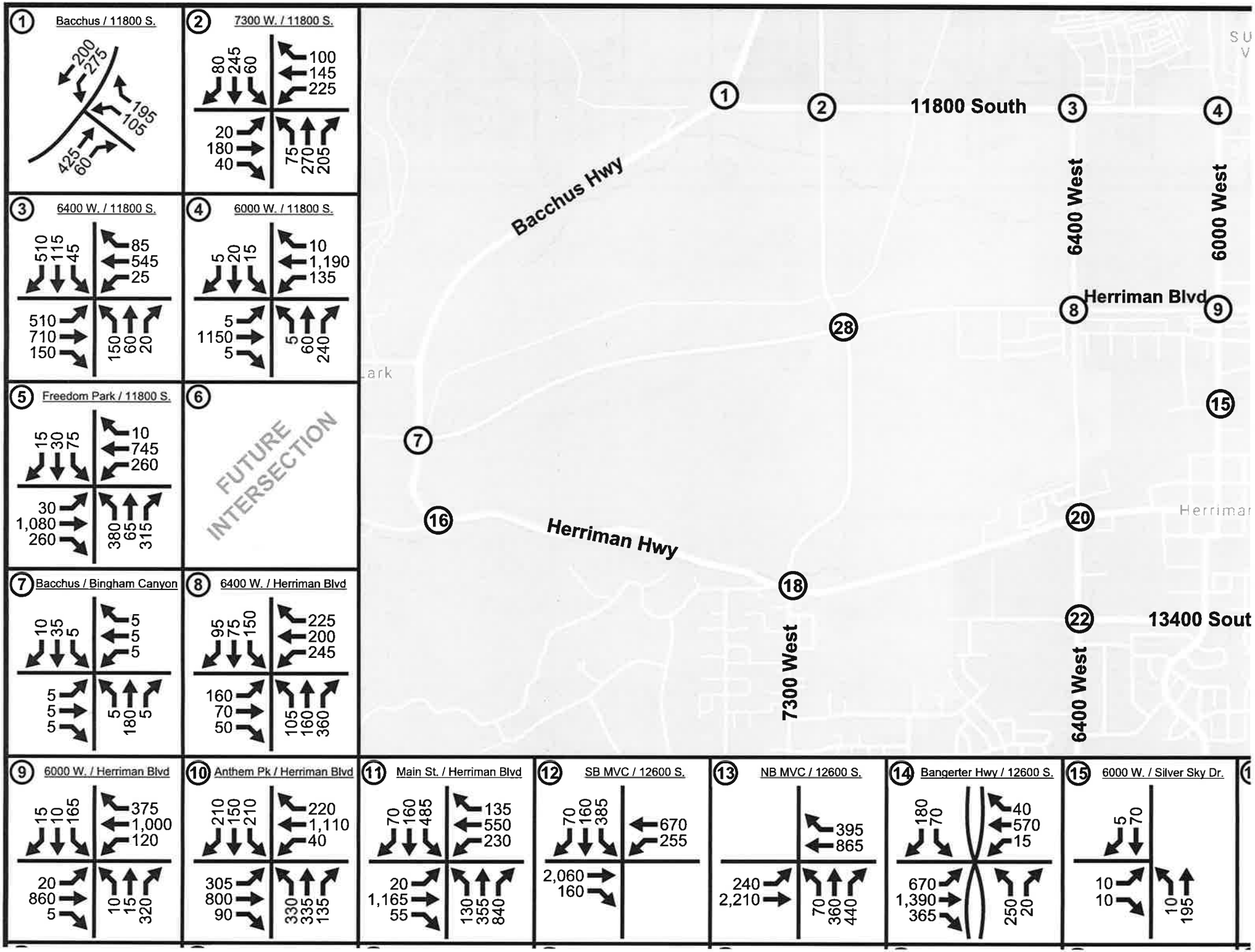
E. Queuing Analysis

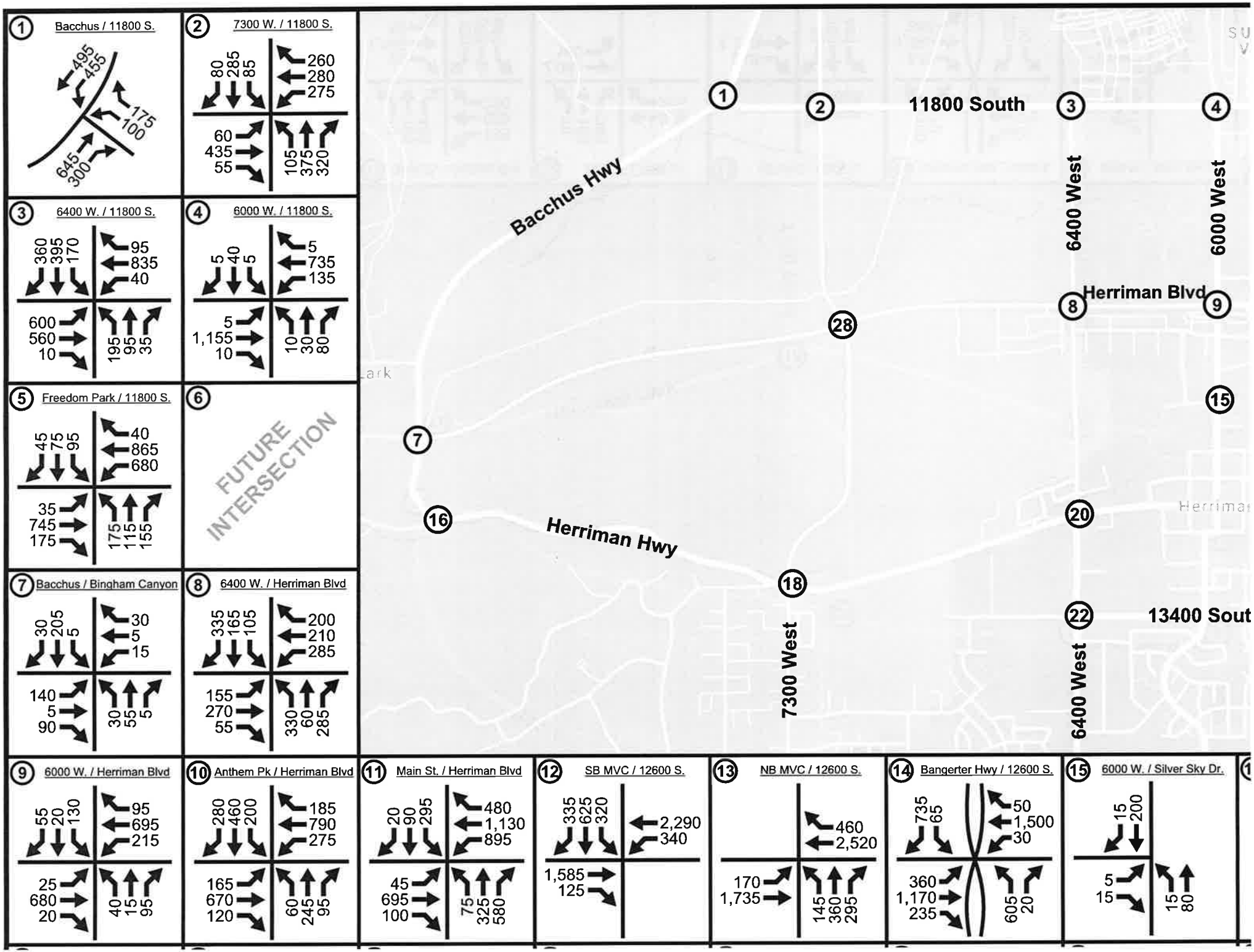
Hales Engineering calculated the 95th percentile queue lengths for each of the study intersections. Notable 95th percentile queues are listed below:

- 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.


1 Bacchus / 11800 S.
200 275 195 105 425 60
2 7300 W. / 11800 S.
80 245 60 100 145 225 20 180 40 75 270 205
3 6400 W. / 11800 S.
510 115 45 85 545 25 510 710 150 150 60 20
4 6000 W. / 11800 S.
5 20 15 10 1,190 135 5 1150 5 5 60 240
5 Freedom Park / 11800 S.
15 30 75 10 745 260 30 1,080 260 380 65 315
6 FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
10 35 5 5 5 5 5 5 5 5 180 5
8 6400 W. / Herriman Blvd
95 75 150 225 200 245 160 70 50 105 160 360
9 6000 W. / Herriman Blvd
15 10 165 375 1,000 120 20 860 5 10 15 320
10 Anthem Pk / Herriman Blvd
210 150 210 220 1,110 40 305 800 90 330 335 135
11 Main St. / Herriman Blvd
70 160 485 135 550 230 20 1,165 55 130 355 840
12 SB MVC / 12600 S.
70 160 385 670 255 2,060 160
13 NB MVC / 12600 S.
395 865 240 2,210 70 360 440
14 Bangerter Hwy / 12600 S.
180 70 40 570 15 670 1,390 365 250 20
15 6000 W. / Silver Sky Dr.
5 70 10 10 10 195
Bacchus Hwy
Herriman Hwy
7300 West
6400 West
6000 West
11800 South
Herriman Blvd
13400 Sout
Herriman
28
16
18
20
22


1 Bacchus / 11800 S.
495 455 175 100 645 300
2 7300 W. / 11800 S.
80 285 85 260 280 275 60 435 55 105 375 320
3 6400 W. / 11800 S.
360 395 170 95 835 40 600 560 10 195 95 35
4 6000 W. / 11800 S.
5 40 5 5 735 135 5 1,155 10 10 30 80
5 Freedom Park / 11800 S.
45 75 95 40 865 680 35 745 175 175 115 155
6 FUTURE INTERSECTION
7 Bacchus / Bingham Canyon
30 205 5 30 5 15 140 5 90 30 55 5
8 6400 W. / Herriman Blvd
335 165 105 200 210 285 155 270 55 330 60 285
9 6000 W. / Herriman Blvd
55 20 130 95 695 215 25 680 20 40 15 95
10 Anthem Pk / Herriman Blvd
280 460 200 185 790 275 165 670 120 60 245 95
11 Main St. / Herriman Blvd
20 90 295 480 1,130 895 45 695 100 75 325 580
12 SB MVC / 12600 S.
335 625 320 2,290 340 1,585 125
13 NB MVC / 12600 S.
460 2,520 170 1,735 145 360 295
14 Bangerter Hwy / 12600 S.
735 65 50 1,500 30 360 1,170 235 605 20
15 6000 W. / Silver Sky Dr.
15 200 5 15 15 80
Bacchus Hwy
Herriman Hwy
11800 South
6400 West
6000 West
Herriman Blvd
7300 West
6400 West
13400 Sout
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18
22

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.

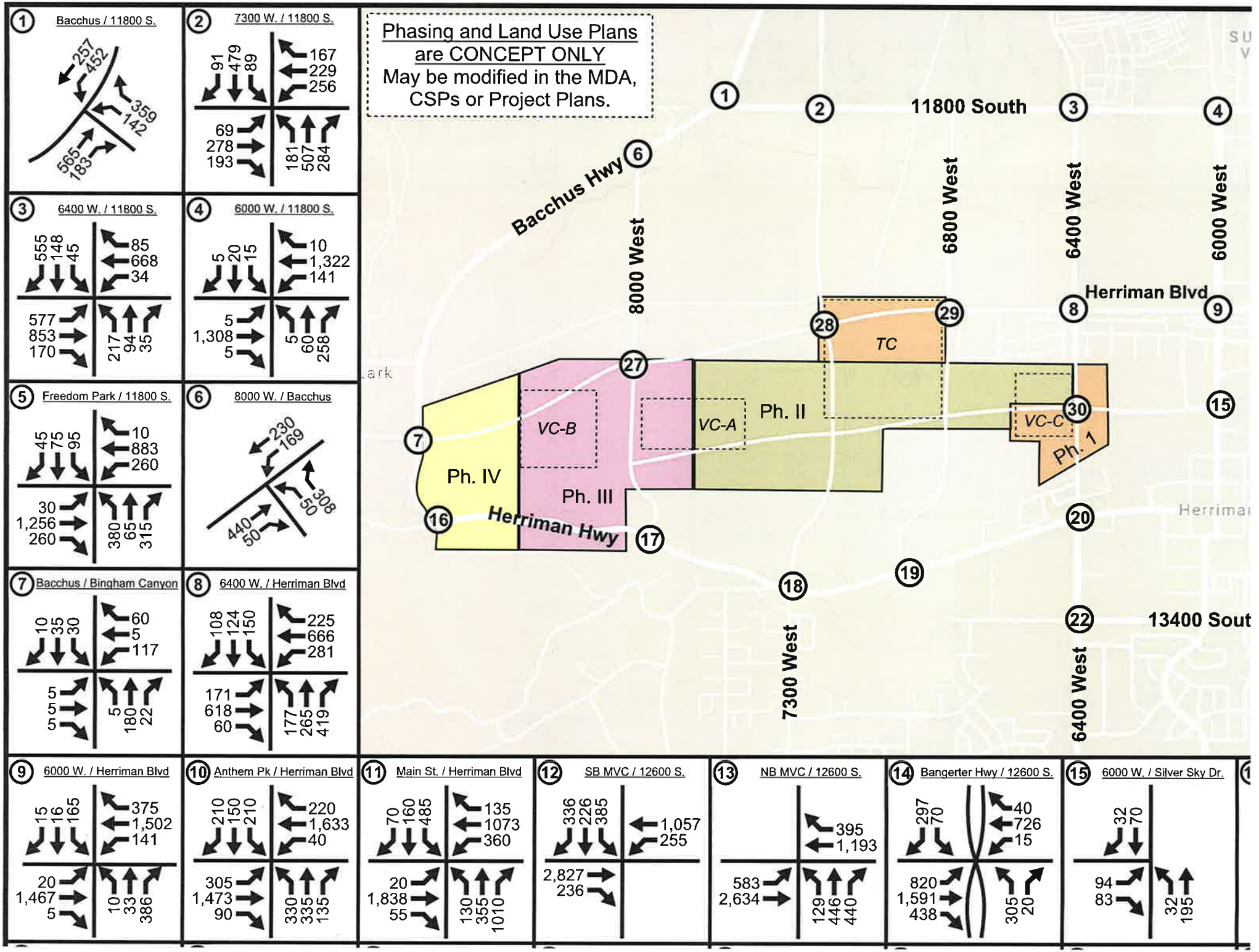
B. Traffic Volumes

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)


Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.
1 Bacchus / 11800 S.
257 452 359 142 565 183
2 7300 W. / 11800 S.
91 479 89 167 229 256 69 278 193 181 507 284
3 6400 W. / 11800 S.
555 148 45 85 668 34 577 853 170 217 94 35
4 6000 W. / 11800 S.
5 20 15 10 1,322 141 5 1,308 5 5 60 258
5 Freedom Park / 11800 S.
45 75 95 10 883 260 30 1,256 260 380 65 315
6 8000 W. / Bacchus
230 169 308 50 440 50
7 Bacchus / Bingham Canyon
10 35 30 60 5 117 5 5 5 5 180 22
8 6400 W. / Herriman Blvd
108 124 150 225 666 281 171 618 60 177 265 419
11800 South
Bacchus Hwy
8000 West
6800 West
6400 West
6000 West
Herriman Blvd
TC
VC-B
VC-A
Ph. II
VC-C
Ph. 1
Ph. IV
Ph. III
Herriman Hwy
7300 West
6400 West
13400 Sout
9 6000 W. / Herriman Blvd
15 16 165 375 1,502 141 20 1,467 5 10 33 386
10 Anthem Pk / Herriman Blvd
210 150 210 220 1,633 40 305 1,473 90 330 335 135
11 Main St. / Herriman Blvd
70 160 485 135 1073 360 20 1,838 55 130 355 1010
12 SB MVC / 12600 S.
336 226 385 1,057 255 2,827 236
13 NB MVC / 12600 S.
395 1,193 583 2,634 129 446 440
14 Bangerter Hwy / 12600 S.
297 70 40 726 15 820 1,591 438 305 20
15 6000 W. / Silver Sky Dr.
32 70 94 83 32 195

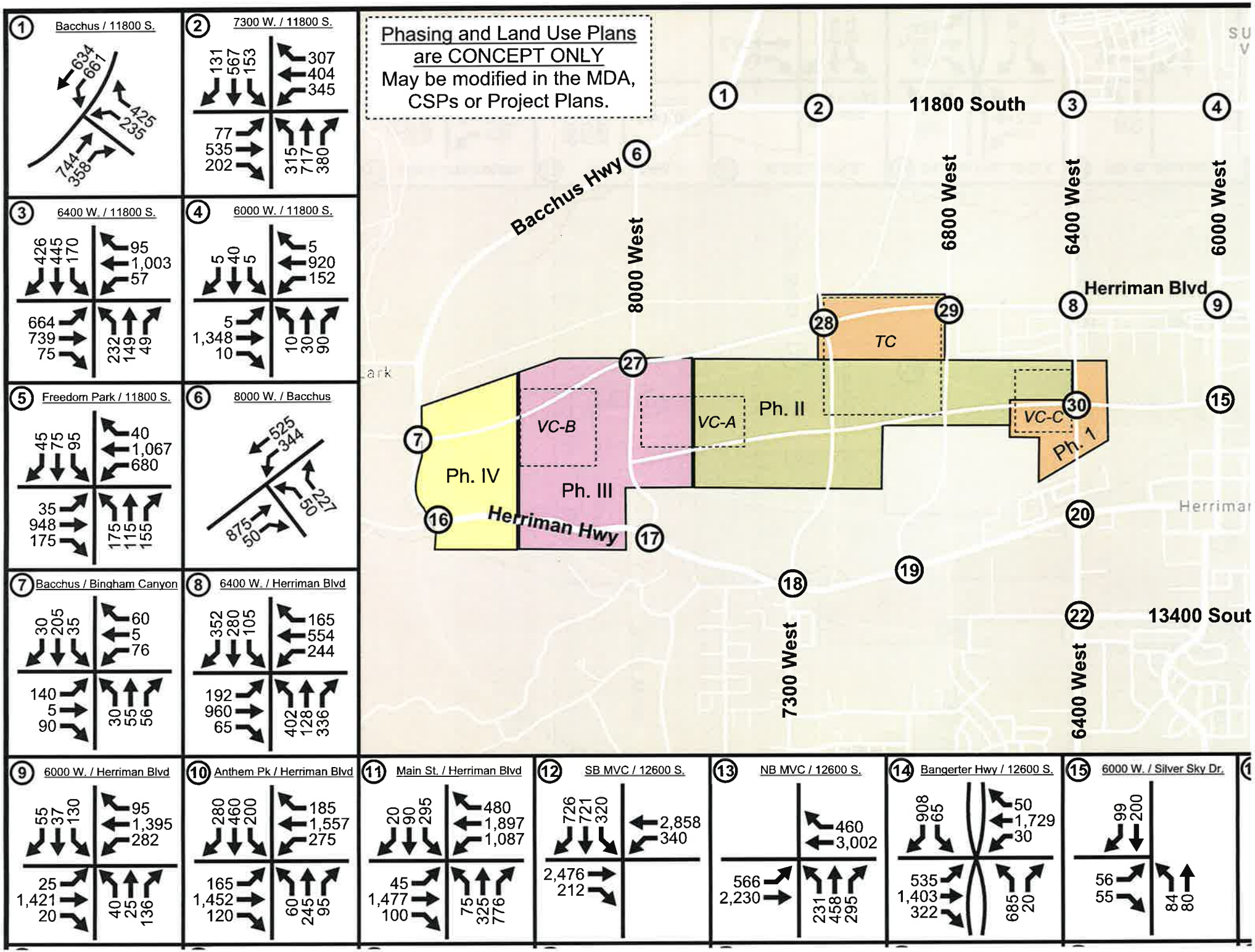

Phasing and Land Use Plans are CONCEPT ONLY
May be modified in the MDA, CSPs or Project Plans.
1 Bacchus / 11800 S.
634 667 425 235 744 358
2 7300 W. / 11800 S.
131 567 153 307 404 345 77 535 202 315 717 380
3 6400 W. / 11800 S.
426 445 170 95 1,003 57 664 739 75 232 149 49
4 6000 W. / 11800 S.
5 40 5 5 920 152 5 1,348 10 10 30 90
5 Freedom Park / 11800 S.
45 75 95 40 1,067 680 35 948 175 175 115 155
6 8000 W. / Bacchus
525 344 227 50 875 50
7 Bacchus / Bingham Canyon
30 205 35 60 5 76 140 5 90 30 55 56
8 6400 W. / Herriman Blvd
352 280 105 165 554 244 192 960 65 402 128 336
9 6000 W. / Herriman Blvd
55 37 130 95 1,395 282 25 1,421 20 40 25 136
10 Anthem Pk / Herriman Blvd
280 460 200 185 1,557 275 165 1,452 120 60 245 95
11 Main St. / Herriman Blvd
20 90 295 480 1,897 1,087 45 1,477 100 75 325 776
12 SB MVC / 12600 S.
726 721 320 2,858 340 2,476 212
13 NB MVC / 12600 S.
460 3,002 566 2,230 231 458 295
14 Bangerter Hwy / 12600 S.
908 65 50 1,729 30 535 1,403 322 685 20
15 6000 W. / Silver Sky Dr.
99 200 56 55 84 80
11800 South
Herriman Blvd
13400 Sout
Bacchus Hwy
Herriman Hwy
8000 West
6800 West
6400 West
6000 West
7300 West
6400 West
TC
VC-A
VC-B
VC-C
Ph. II
Ph. III
Ph. IV
Ph. 1

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.

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APPENDIX A

Turning Movement Counts

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APPENDIX B

Project Phasing Plan

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APPENDIX C

Trip Generation

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APPENDIX D

LOS Reports

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APPENDIX E

95th Percentile Queue Length Reports

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APPENDIX F

Recommended Improvements

MEMORANDUM

Date: December 12, 2019

To: Salt Lake County

From: Hales Engineering

Subject: Salt Lake County – Olympia Hills TIS Addendum

UT19-1472

This memorandum discusses the trip generation for the proposed Olympia Hills development in Salt Lake County, Utah. This memorandum serves as an addendum to the traffic impact study (TIS) that was completed in December 2019.

Background

Since the TIS has been completed, additional details regarding land uses have been determined for the project. It was determined that the project will include more single-family housing than originally proposed and some senior housing. The TIS assumed that all multi-family would be low-rise housing (1 to 2 stories). However, with additional details provided, the multi-family housing was broken up into low-rise (1 to 2 stories) and mid-rise (3+ stories) as each generates different trip numbers according to the Institute of Transportation Engineering (ITE). A comparison of the land uses in the TIS with the refined land uses are shown in Table 1. As identified, the total number of dwelling units and the total square footage of office and retail was kept the same.

Table 1: Land Use Comparison

Land Use		Original TIS	Refined Land Uses	Δ
Residential	Single-family	950 DU	1,480 DU	+ 530 DU
	Multi-family (Low-Rise)	5,380 DU	862 DU	- 4,518 DU
	Multi-family (Mid-Rise)	-	3,269 DU	+ 3,269 DU
	Senior Housing – Detached	-	425 DU	+ 425 DU
	Senior Housing - Attached	-	294 DU	+ 294 DU
	TOTAL	6,330 DU	6,330 DU	-
Office		1,394,000 sf	1,394,000 sf	-
Retail		381,000 sf	381,000 sf	-

Trip Generation

Trip generation for the development was calculated using trip generation rates published in the ITE *Trip Generation (10th Edition, 2017)*. Detailed trip generation sheets for both the original TIS and the refined land uses are provided in Appendix A and Appendix B, respectively. Hales Engineering recalculated the internal capture rates for the Town Center and Village Centers based on the refined trip generation as well. Those sheets are also found in Appendix B.

The trip generation of the original TIS compared with the refined trip generation is shown in Table 2. As identified, the refined land uses have a lower daily trip generation than the uses in the original TIS; however, the peak hour trip generation is slightly higher with the refined land uses. Although the refined peak hour trips are a little higher when compared to the original TIS, it is not anticipated that the additional trips will impact the results and recommendations of the TIS.

Table 2: Trip Generation Comparison

Trip Generation	Original TIS	Refined LU	Δ
Weekday Daily	76,182	68,640	-7,542
Morning Peak Hour	4,472	4,535	63
Evening Peak Hour	5,775	6,009	234

Conclusions

The key findings are as follows:

- The Olympia Hills land uses were refined to a more realistic scenario for the project. More single-family homes were included in the refined land uses as well as some senior housing. The type of multi-family dwelling units was also refined.
- It is anticipated that the refined land uses will generate approximately 7,542 less daily trips, 63 additional morning peak hour trips, and 234 additional evening peak hour trips.
    - Although the refined peak hour trips are a little higher when compared to the original TIS, it is not anticipated that the additional trips will impact the results and recommendations of the TIS.

APPENDIX A

TIS Trip Generation

Salt Lake County - Olympia Hills TIS
Trip Generation - Phase 4 (2042)

Weekday Daily

Phase	Area	Land Use[1]	# of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Internal Capture[2]	Transit Reduction[3]	Net Trips Entering	Net Trips Exiting	Total Daily Trips
1 & 2	TC	Multifamily Housing (Low-Rise) (220)	795	Dwelling Units	5,970	50%	50%	2,985	2,985	0%	2.5%	2,910	2,910	**5,820**
1 & 2	TC	Single-Family Detached Housing (210)	119	Dwelling Units	1,222	50%	50%	611	611	0%	2.5%	596	596	**1,192**
1 & 2	TC	General Office Building (710)	1272	1,000 Sq. Ft. GFA	12,506	50%	50%	6,253	6,253	0%	2.5%	6,097	6,097	**12,194**
1 & 2	TC	Shopping Center (820)	258.8	1,000 Sq. Ft. GLA	9,770	50%	50%	4,885	4,885	0%	2.5%	4,763	4,763	**9,526**
1 & 2	VC-C	Multifamily Housing (Low-Rise) (220)	498	Dwelling Units	3,726	50%	50%	1,863	1,863	0%	2.5%	1,816	1,816	**3,632**
1 & 2	VC-C	Single-Family Detached Housing (210)	78	Dwelling Units	828	50%	50%	414	414	0%	2.5%	404	404	**808**
1 & 2	VC-C	General Office Building (710)	31.9	1,000 Sq. Ft. GFA	352	50%	50%	176	176	0%	2.5%	172	172	**344**
1 & 2	VC-C	Shopping Center (820)	36.3	1,000 Sq. Ft. GLA	1,372	50%	50%	686	686	0%	2.5%	669	669	**1,338**
1	Other	Multifamily Housing (Low-Rise) (220)	573	Dwelling Units	4,292	50%	50%	2,146	2,146	0%	2.5%	2,092	2,092	**4,184**
1	Other	Single-Family Detached Housing (210)	119	Dwelling Units	1,222	50%	50%	611	611	0%	2.5%	596	596	**1,192**
2 & 3	VC-A	Multifamily Housing (Low-Rise) (220)	570	Dwelling Units	4,270	50%	50%	2,135	2,135	0%	2.5%	2,082	2,082	**4,164**
2 & 3	VC-A	Single-Family Detached Housing (210)	60	Dwelling Units	650	50%	50%	325	325	0%	2.5%	317	317	**634**
2 & 3	VC-A	General Office Building (710)	90.1	1,000 Sq. Ft. GFA	960	50%	50%	480	480	0%	2.5%	468	468	**936**
2 & 3	VC-A	Shopping Center (820)	45.4	1,000 Sq. Ft. GLA	1,714	50%	50%	857	857	0%	2.5%	836	836	**1,672**
2	Other	Multifamily Housing (Low-Rise) (220)	486	Dwelling Units	3,634	50%	50%	1,817	1,817	0%	2.5%	1,772	1,772	**3,544**
2	Other	Single-Family Detached Housing (210)	369	Dwelling Units	3,458	50%	50%	1,729	1,729	0%	2.5%	1,686	1,686	**3,372**
3	VC-B	Multifamily Housing (Low-Rise) (220)	900	Dwelling Units	6,764	50%	50%	3,382	3,382	0%	2.5%	3,297	3,297	**6,594**
3	VC-B	Single-Family Detached Housing (210)	72	Dwelling Units	770	50%	50%	385	385	0%	2.5%	375	375	**750**
3	VC-B	Shopping Center (820)	40.5	1,000 Sq. Ft. GLA	1,530	50%	50%	765	765	0%	2.5%	746	746	**1,492**
3	Other	Multifamily Housing (Low-Rise) (220)	449	Dwelling Units	3,354	50%	50%	1,677	1,677	0%	2.5%	1,635	1,635	**3,270**
3	Other	Single-Family Detached Housing (210)	43	Dwelling Units	480	50%	50%	240	240	0%	2.5%	234	234	**468**
4	Other	Multifamily Housing (Low-Rise) (220)	1109	Dwelling Units	8,344	50%	50%	4,172	4,172	0%	2.5%	4,068	4,068	**8,136**
4	Other	Single-Family Detached Housing (210)	90	Dwelling Units	944	50%	50%	472	472	0%	2.5%	460	460	**920**
		Project Total Daily Trips			**78,132**			**39,066**	**39,066**			**38,091**	**38,091**	**76,182**

Morning Peak Hour

Phase	Area	Land Use[1]	# of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Internal Capture[2]	Transit Reduction[3]	Net Trips Entering	Net Trips Exiting	Total a.m. Trips
1 & 2	TC	Multifamily Housing (Low-Rise) (220)	795	Dwelling Units	342	23%	77%	79	263	9%	2.5%	70	233	**303**
1 & 2	TC	Single-Family Detached Housing (210)	119	Dwelling Units	90	25%	75%	23	68	9%	2.5%	20	60	**80**
1 & 2	TC	General Office Building (710)	1272	1,000 Sq. Ft. GFA	1,224	86%	14%	1,053	171	9%	2.5%	934	152	**1,086**
1 & 2	TC	Shopping Center (820)	258.8	1,000 Sq. Ft. GLA	244	62%	38%	151	93	9%	2.5%	134	83	**217**
1 & 2	VC-C	Multifamily Housing (Low-Rise) (220)	498	Dwelling Units	220	23%	77%	51	169	5%	2.5%	47	157	**204**
1 & 2	VC-C	Single-Family Detached Housing (210)	78	Dwelling Units	62	25%	75%	16	47	5%	2.5%	15	44	**59**
1 & 2	VC-C	General Office Building (710)	31.9	1,000 Sq. Ft. GFA	58	86%	14%	50	8	5%	2.5%	46	7	**53**
1 & 2	VC-C	Shopping Center (820)	36.3	1,000 Sq. Ft. GLA	36	62%	38%	22	14	5%	2.5%	20	13	**33**
1	Other	Multifamily Housing (Low-Rise) (220)	573	Dwelling Units	252	23%	77%	58	194	0%	2.5%	57	189	**246**
1	Other	Single-Family Detached Housing (210)	119	Dwelling Units	90	25%	75%	23	68	0%	2.5%	22	66	**88**
2 & 3	VC-A	Multifamily Housing (Low-Rise) (220)	570	Dwelling Units	250	23%	77%	58	193	7%	2.5%	53	175	**228**
2 & 3	VC-A	Single-Family Detached Housing (210)	60	Dwelling Units	48	25%	75%	12	36	7%	2.5%	11	33	**44**
2 & 3	VC-A	General Office Building (710)	90.1	1,000 Sq. Ft. GFA	112	86%	14%	96	16	7%	2.5%	87	15	**102**
2 & 3	VC-A	Shopping Center (820)	45.4	1,000 Sq. Ft. GLA	44	62%	38%	27	17	7%	2.5%	24	15	**39**
2	Other	Multifamily Housing (Low-Rise) (220)	486	Dwelling Units	216	23%	77%	50	166	0%	2.5%	49	162	**211**
2	Other	Single-Family Detached Housing (210)	369	Dwelling Units	268	25%	75%	67	201	0%	2.5%	65	196	**261**
3	VC-B	Multifamily Housing (Low-Rise) (220)	900	Dwelling Units	386	23%	77%	89	297	2%	2.5%	85	284	**369**
3	VC-B	Single-Family Detached Housing (210)	72	Dwelling Units	56	25%	75%	14	42	2%	2.5%	13	40	**53**
3	VC-B	Shopping Center (820)	40.5	1,000 Sq. Ft. GLA	40	62%	38%	25	15	2%	2.5%	24	14	**38**
3	Other	Multifamily Housing (Low-Rise) (220)	449	Dwelling Units	200	23%	77%	46	154	0%	2.5%	45	150	**195**
3	Other	Single-Family Detached Housing (210)	43	Dwelling Units	36	25%	75%	9	27	0%	2.5%	9	26	**35**
4	Other	Multifamily Housing (Low-Rise) (220)	1109	Dwelling Units	470	23%	77%	108	362	0%	2.5%	105	353	**458**
4	Other	Single-Family Detached Housing (210)	90	Dwelling Units	70	25%	75%	18	53	0%	2.5%	18	52	**70**
		Project Total a.m. Peak Hour Trips			**4,814**			**2,145**	**2,674**			**1,953**	**2,519**	**4,472**

Evening Peak Hour

Phase	Area	Land Use[1]	# of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Internal Capture[2]	Transit Reduction[3]	Net Trips Entering	Net Trips Exiting	Total p.m. Trips
1 & 2	TC	Multifamily Housing (Low-Rise) (220)	795	Dwelling Units	374	63%	37%	236	138	11%	2.5%	205	120	**325**
1 & 2	TC	Single-Family Detached Housing (210)	119	Dwelling Units	122	63%	37%	77	45	11%	2.5%	67	39	**106**
1 & 2	TC	General Office Building (710)	1272	1,000 Sq. Ft. GFA	1,276	16%	84%	204	1,072	11%	2.5%	177	930	**1,107**
1 & 2	TC	Shopping Center (820)	258.8	1,000 Sq. Ft. GLA	988	48%	52%	474	514	11%	2.5%	411	446	**857**
1 & 2	VC-C	Multifamily Housing (Low-Rise) (220)	498	Dwelling Units	248	63%	37%	156	92	13%	2.5%	132	78	**210**
1 & 2	VC-C	Single-Family Detached Housing (210)	78	Dwelling Units	82	63%	37%	52	30	13%	2.5%	44	25	**69**
1 & 2	VC-C	General Office Building (710)	31.9	1,000 Sq. Ft. GFA	40	16%	84%	6	34	13%	2.5%	5	29	**34**
1 & 2	VC-C	Shopping Center (820)	36.3	1,000 Sq. Ft. GLA	140	48%	52%	67	73	13%	2.5%	57	62	**119**
1	Other	Multifamily Housing (Low-Rise) (220)	573	Dwelling Units	280	63%	37%	176	104	0%	2.5%	172	101	**273**
1	Other	Single-Family Detached Housing (210)	119	Dwelling Units	122	63%	37%	77	45	0%	2.5%	75	44	**119**
2 & 3	VC-A	Multifamily Housing (Low-Rise) (220)	570	Dwelling Units	278	63%	37%	175	103	11%	2.5%	152	89	**241**
2 & 3	VC-A	Single-Family Detached Housing (210)	60	Dwelling Units	64	63%	37%	40	24	11%	2.5%	35	21	**56**
2 & 3	VC-A	General Office Building (710)	90.1	1,000 Sq. Ft. GFA	104	16%	84%	17	87	11%	2.5%	15	75	**90**
2 & 3	VC-A	Shopping Center (820)	45.4	1,000 Sq. Ft. GLA	174	48%	52%	84	90	11%	2.5%	73	78	**151**
2	Other	Multifamily Housing (Low-Rise) (220)	486	Dwelling Units	242	63%	37%	152	90	0%	2.5%	148	88	**236**
2	Other	Single-Family Detached Housing (210)	369	Dwelling Units	356	63%	37%	224	132	0%	2.5%	218	129	**347**
3	VC-B	Multifamily Housing (Low-Rise) (220)	900	Dwelling Units	418	63%	37%	263	155	7%	2.5%	238	141	**379**
3	VC-B	Single-Family Detached Housing (210)	72	Dwelling Units	76	63%	37%	48	28	7%	2.5%	44	25	**69**
3	VC-B	Shopping Center (820)	40.5	1,000 Sq. Ft. GLA	156	48%	52%	75	81	7%	2.5%	68	73	**141**
3	Other	Multifamily Housing (Low-Rise) (220)	449	Dwelling Units	226	63%	37%	142	84	0%	2.5%	138	82	**220**
3	Other	Single-Family Detached Housing (210)	43	Dwelling Units	46	63%	37%	29	17	0%	2.5%	28	17	**45**
4	Other	Multifamily Housing (Low-Rise) (220)	1109	Dwelling Units	504	63%	37%	318	186	0%	2.5%	310	181	**491**
4	Other	Single-Family Detached Housing (210)	90	Dwelling Units	92	63%	37%	58	34	0%	2.5%	57	33	**90**
		Project Total p.m. Peak Hour Trips			**6,408**			**3,150**	**3,258**			**2,869**	**2,906**	**5,775**

1. Land Use Code from the Institute of Transportation Engineers (ITE) *Trip Generation*, 10th Edition,2017.
2. Internal capture rates based on the NCHRP 684 Internal Trip Capture Estimation Tool, which follows ITE methodologies for internal capture.
3. Transit reduction of 2.5% based on the transit ridership of comparable nearby Riverton City, based on 2017 American Community Survey estimates. Assumes bus-only transit and no light-rail.

SOURCE: Hales Engineering, December 2019

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Town Center Area	**Date:**	10/22/2019
Analysis Year:	2032	**Checked By:**	Scott Johnson
Analysis Period:	AM Street Peak Hour	**Date:**	10/22/2019

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	1,272	1,000 sq ft	1,224	1,053	171
Retail	820	258.8	1,000 sq ft	244	151	93
Restaurant				0		
Cinema/Entertainment				0		
Residential	210 & 220	914	dwelling units	433	102	331
Hotel				0		
All Other Land Uses[2]				0		
				1,901	1,306	595

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.06	2.5%	0%	1.06	2.5%	0%
Retail	1.17	2.5%	0%	1.17	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.13	2.5%	0%	1.13	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		51	0	0	0	0
Retail	32		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	7	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	2,072	1,408	664
Internal Capture Percentage	9%	7%	14%
External Vehicle-Trips[5]	1,685	1,190	495
External Transit-Trips[6]	47	33	14
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	3%	28%
Retail	31%	31%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	3%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Town Center Area	**Date:**	10/22/2019
Analysis Year:	2032	**Checked By:**	Scott Johnson
Analysis Period:	**PM Street Peak Hour**	**Date:**	10/22/2019

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	1,272	1,000 sq ft	1,276	204	1,072
Retail	820	258.8	1,000 sq ft	988	474	514
Restaurant				0		
Cinema/Entertainment				0		
Residential	210 & 220	914	dwelling units	496	313	183
Hotel				0		
All Other Land Uses[2]				0		
				2,760	991	1,769

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.11	2.5%	0%	1.11	2.5%	0%
Retail	1.21	2.5%	0%	1.21	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.15	2.5%	0%	1.15	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2000			2000	
Retail					2000	
Restaurant						
Cinema/Entertainment						
Residential		2000				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		15	0	0	14	0
Retail	12		0	0	102	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	8	18	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	3,182	1,160	2,022
Internal Capture Percentage	11%	15%	8%
External Vehicle-Trips[5]	2,409	824	1,585
External Transit-Trips[6]	72	25	47
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	9%	2%
Retail	6%	18%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	32%	12%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Village Center A Area	**Date:**	10/22/2019
Analysis Year:	2037	**Checked By:**	Scott Johnson
Analysis Period:	AM Street Peak Hour	**Date:**	10/22/2019

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	90.1	1,000 sq ft	112	96	16
Retail	820	45.4	1,000 sq ft	44	27	17
Restaurant				0		
Cinema/Entertainment				0		
Residential	210 & 220	630	dwelling units	299	70	229
Hotel				0		
All Other Land Uses[2]				0		
				455	193	262

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.06	2.5%	0%	1.06	2.5%	0%
Retail	1.17	2.5%	0%	1.17	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.13	2.5%	0%	1.13	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	0	0	0	0
Retail	4		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	3	3	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	509	213	296
Internal Capture Percentage	7%	8%	6%
External Vehicle-Trips[5]	416	174	242
External Transit-Trips[6]	11	5	6
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	7%	29%
Retail	25%	30%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	3%	2%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Village Center A Area	**Date:**	10/22/2019
Analysis Year:	2037	**Checked By:**	Scott Johnson
Analysis Period:	**PM Street Peak Hour**	**Date:**	10/22/2019

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	90.1	1,000 sq ft	104	17	87
Retail	820	45.4	1,000 sq ft	174	84	90
Restaurant				0		
Cinema/Entertainment				0		
Residential	210 & 220	630	dwelling units	342	215	127
Hotel				0		
All Other Land Uses[2]				0		
				620	316	304

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.11	2.5%	0%	1.11	2.5%	0%
Retail	1.21	2.5%	0%	1.21	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.15	2.5%	0%	1.15	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1750			1750	
Retail					1750	
Restaurant						
Cinema/Entertainment						
Residential		1750				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	0	0	1	0
Retail	2		0	0	20	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	6	5	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	720	368	352
Internal Capture Percentage	11%	10%	11%
External Vehicle-Trips[5]	542	276	266
External Transit-Trips[6]	15	8	7
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	42%	5%
Retail	9%	20%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	9%	8%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Village Center B Area	**Date:**	10/22/2019
Analysis Year:	2037	**Checked By:**	Scott Johnson
Analysis Period:	**AM Street Peak Hour**	**Date:**	10/22/2019

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	40.5	1,000 sq ft	40	25	15
Restaurant				0		
Cinema/Entertainment				0		
Residential	210 & 220	972	dwelling units	442	103	339
Hotel				0		
All Other Land Uses[2]				0		
				482	128	354

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail	1.17	2.5%	0%	1.17	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.13	2.5%	0%	1.13	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	546	145	401
Internal Capture Percentage	2%	4%	1%
External Vehicle-Trips[5]	460	119	341
External Transit-Trips[6]	13	4	9
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	14%	11%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Village Center B Area	**Date:**	10/22/2019
Analysis Year:	2037	**Checked By:**	Scott Johnson
Analysis Period:	PM Street Peak Hour	**Date:**	10/22/2019

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	40.5	1,000 sq ft	156	75	81
Restaurant				0		
Cinema/Entertainment				0		
Residential	210 & 220	972	dwelling units	494	311	183
Hotel				0		
All Other Land Uses[2]				0		
				650	386	264

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail	1.21	2.5%	0%	1.21	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.15	2.5%	0%	1.15	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail					1500	
Restaurant						
Cinema/Entertainment						
Residential		1500				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	20	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	6	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	757	449	308
Internal Capture Percentage	7%	6%	8%
External Vehicle-Trips[5]	592	356	236
External Transit-Trips[6]	17	10	7
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	7%	20%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	6%	3%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Village Center C Area	**Date:**	10/22/2019
Analysis Year:	2032	**Checked By:**	Scott Johnson
Analysis Period:	AM Street Peak Hour	**Date:**	10/22/2019

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	31.9	1,000 sq ft	58	50	8
Retail	820	36.3	1,000 sq ft	36	22	14
Restaurant				0		
Cinema/Entertainment				0		
Residential	210 & 220	576	dwelling units	283	67	216
Hotel				0		
All Other Land Uses[2]				0		
				377	139	238

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.06	2.5%	0%	1.06	2.5%	0%
Retail	1.17	2.5%	0%	1.17	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.13	2.5%	0%	1.13	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2	0	0	0	0
Retail	2		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	2	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	423	155	268
Internal Capture Percentage	5%	6%	4%
External Vehicle-Trips[5]	350	127	223
External Transit-Trips[6]	10	4	6
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	8%	25%
Retail	15%	25%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	3%	2%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Village Center C Area	**Date:**	10/22/2019
Analysis Year:	2032	**Checked By:**	Scott Johnson
Analysis Period:	PM Street Peak Hour	**Date:**	10/22/2019

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	31.9	1,000 sq ft	40	6	34
Retail	820	36.3	1,000 sq ft	140	67	73
Restaurant				0		
Cinema/Entertainment				0		
Residential	210 & 220	576	dwelling units	330	208	122
Hotel				0		
All Other Land Uses[2]				0		
				510	281	229

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.11	2.5%	0%	1.11	2.5%	0%
Retail	1.21	2.5%	0%	1.21	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.15	2.5%	0%	1.15	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1000			1000	
Retail					1000	
Restaurant						
Cinema/Entertainment						
Residential		1000				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	0	0	1	0
Retail	2		0	0	21	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	6	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	593	327	266
Internal Capture Percentage	13%	12%	15%
External Vehicle-Trips[5]	431	241	190
External Transit-Trips[6]	13	7	6
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	86%	16%
Retail	14%	26%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	9%	7%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

APPENDIX B

Updated Land Use Trip Generation

Salt Lake County - Olympia Hills TIS
Trip Generation - Phase 4 (2042)

Weekday Daily

Phase	Area	Land Use[1]	# of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Internal Capture[2]	Transit Reduction[3]	Net Trips Entering	Net Trips Exiting	Total Daily Trips
1 & 2	TC	Multifamily Housing (Low-Rise) (220)	125	Dwelling Units	906	50%	50%	453	453	0%	2.5%	442	442	884
1 & 2	TC	Single-Family Detached Housing (210)	215	Dwelling Units	2,104	50%	50%	1,052	1,052	0%	2.5%	1,026	1,026	2,052
1 & 2	TC	General Office Building (710)	1272	1,000 Sq. Ft. GFA	12,506	50%	50%	6,253	6,253	0%	2.5%	6,097	6,097	12,194
1 & 2	TC	Shopping Center (820)	258.8	1,000 Sq. Ft. GLA	9,770	50%	50%	4,885	4,885	0%	2.5%	4,763	4,763	9,526
1 & 2	VC-C	Multifamily Housing (Low-Rise) (220)	75	Dwelling Units	528	50%	50%	264	264	0%	2.5%	257	257	514
1 & 2	VC-C	Single-Family Detached Housing (210)	137	Dwelling Units	1,390	50%	50%	695	695	0%	2.5%	678	678	1,356
1 & 2	VC-C	General Office Building (710)	31.9	1,000 Sq. Ft. GFA	352	50%	50%	176	176	0%	2.5%	172	172	344
1 & 2	VC-C	Shopping Center (820)	36.3	1,000 Sq. Ft. GLA	1,372	50%	50%	686	686	0%	2.5%	669	669	1,338
1	Other	Multifamily Housing (Low-Rise) (220)	95	Dwelling Units	678	50%	50%	339	339	0%	2.5%	331	331	662
1	Other	Single-Family Detached Housing (210)	162	Dwelling Units	1,622	50%	50%	811	811	0%	2.5%	791	791	1,582
2 & 3	VC-A	Multifamily Housing (Low-Rise) (220)	88	Dwelling Units	610	50%	50%	305	305	0%	2.5%	297	297	594
2 & 3	VC-A	Single-Family Detached Housing (210)	148	Dwelling Units	1,492	50%	50%	746	746	0%	2.5%	727	727	1,454
2 & 3	VC-A	General Office Building (710)	90.1	1,000 Sq. Ft. GFA	960	50%	50%	480	480	0%	2.5%	468	468	936
2 & 3	VC-A	Shopping Center (820)	45.4	1,000 Sq. Ft. GLA	1,714	50%	50%	857	857	0%	2.5%	836	836	1,672
2	Other	Multifamily Housing (Low-Rise) (220)	116	Dwelling Units	838	50%	50%	419	419	0%	2.5%	409	409	818
2	Other	Single-Family Detached Housing (210)	200	Dwelling Units	1,968	50%	50%	984	984	0%	2.5%	959	959	1,918
3	VC-B	Multifamily Housing (Low-Rise) (220)	133	Dwelling Units	966	50%	50%	483	483	0%	2.5%	471	471	942
3	VC-B	Single-Family Detached Housing (210)	227	Dwelling Units	2,212	50%	50%	1,106	1,106	0%	2.5%	1,078	1,078	2,156
3	VC-B	Shopping Center (820)	40.5	1,000 Sq. Ft. GLA	1,530	50%	50%	765	765	0%	2.5%	746	746	1,492
3	Other	Multifamily Housing (Low-Rise) (220)	67	Dwelling Units	466	50%	50%	233	233	0%	2.5%	227	227	454
3	Other	Single-Family Detached Housing (210)	115	Dwelling Units	1,184	50%	50%	592	592	0%	2.5%	577	577	1,154
4	Other	Multifamily Housing (Low-Rise) (220)	165	Dwelling Units	1,208	50%	50%	604	604	0%	2.5%	589	589	1,178
4	Other	Single-Family Detached Housing (210)	276	Dwelling Units	2,646	50%	50%	1,323	1,323	0%	2.5%	1,290	1,290	2,580
1 & 2	TC	Multifamily Housing (Mid-Rise) (221)	470	Dwelling Units	2,560	50%	50%	1,280	1,280	0%	2.5%	1,248	1,248	2,496
1 & 2	TC	Senior Adult Housing-Detached (251)	61	Dwelling Units	366	50%	50%	183	183	0%	2.5%	178	178	356
1 & 2	TC	Senior Adult Housing-Attached (252)	43	Dwelling Units	148	50%	50%	74	74	0%	2.5%	72	72	144
1 & 2	VC-C	Multifamily Housing (Mid-Rise) (221)	300	Dwelling Units	1,634	50%	50%	817	817	0%	2.5%	797	797	1,594
1 & 2	VC-C	Senior Adult Housing-Detached (251)	38	Dwelling Units	242	50%	50%	121	121	0%	2.5%	118	118	236
1 & 2	VC-C	Senior Adult Housing-Attached (252)	26	Dwelling Units	80	50%	50%	40	40	0%	2.5%	39	39	78
1	Other	Multifamily Housing (Mid-Rise) (221)	357	Dwelling Units	1,944	50%	50%	972	972	0%	2.5%	948	948	1,896
1	Other	Senior Adult Housing-Detached (251)	46	Dwelling Units	286	50%	50%	143	143	0%	2.5%	139	139	278
1	Other	Senior Adult Housing-Attached (252)	32	Dwelling Units	104	50%	50%	52	52	0%	2.5%	51	51	102
2 & 3	VC-A	Multifamily Housing (Mid-Rise) (221)	325	Dwelling Units	1,770	50%	50%	885	885	0%	2.5%	863	863	1,726
2 & 3	VC-A	Senior Adult Housing-Detached (251)	42	Dwelling Units	264	50%	50%	132	132	0%	2.5%	129	129	258
2 & 3	VC-A	Senior Adult Housing-Attached (252)	29	Dwelling Units	92	50%	50%	46	46	0%	2.5%	45	45	90
2	Other	Multifamily Housing (Mid-Rise) (221)	442	Dwelling Units	2,408	50%	50%	1,204	1,204	0%	2.5%	1,174	1,174	2,348
2	Other	Senior Adult Housing-Detached (251)	57	Dwelling Units	344	50%	50%	172	172	0%	2.5%	168	168	336
2	Other	Senior Adult Housing-Attached (252)	40	Dwelling Units	136	50%	50%	68	68	0%	2.5%	66	66	132
3	VC-B	Multifamily Housing (Mid-Rise) (221)	502	Dwelling Units	2,736	50%	50%	1,368	1,368	0%	2.5%	1,334	1,334	2,668
3	VC-B	Senior Adult Housing-Detached (251)	65	Dwelling Units	386	50%	50%	193	193	0%	2.5%	188	188	376
3	VC-B	Senior Adult Housing-Attached (252)	45	Dwelling Units	156	50%	50%	78	78	0%	2.5%	76	76	152
3	Other	Multifamily Housing (Mid-Rise) (221)	254	Dwelling Units	1,384	50%	50%	692	692	0%	2.5%	675	675	1,350
3	Other	Senior Adult Housing-Detached (251)	33	Dwelling Units	214	50%	50%	107	107	0%	2.5%	104	104	208
3	Other	Senior Adult Housing-Attached (252)	23	Dwelling Units	68	50%	50%	34	34	0%	2.5%	33	33	66
4	Other	Multifamily Housing (Mid-Rise) (221)	619	Dwelling Units	3,372	50%	50%	1,686	1,686	0%	2.5%	1,644	1,644	3,288
4	Other	Senior Adult Housing-Detached (251)	83	Dwelling Units	478	50%	50%	239	239	0%	2.5%	233	233	466
4	Other	Senior Adult Housing-Attached (252)	56	Dwelling Units	200	50%	50%	100	100	0%	2.5%	98	98	196
		Project Total Daily Trips			70,394			35,197	35,197			34,320	34,320	68,640

Morning Peak Hour

Phase	Area	Land Use[1]	# of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Internal Capture[2]	Transit Reduction[3]	Net Trips Entering	Net Trips Exiting	Total a.m. Trips
1 & 2	TC	Multifamily Housing (Low-Rise) (220)	125	Dwelling Units	60	23%	77%	14	46	9%	2.5%	12	41	53
1 & 2	TC	Single-Family Detached Housing (210)	215	Dwelling Units	158	25%	75%	40	119	9%	2.5%	35	106	141
1 & 2	TC	General Office Building (710)	1272	1,000 Sq. Ft. GFA	1,224	86%	14%	1,053	171	9%	2.5%	934	152	1,086
1 & 2	TC	Shopping Center (820)	258.8	1,000 Sq. Ft. GLA	244	62%	38%	151	93	9%	2.5%	134	83	217
1 & 2	VC-C	Multifamily Housing (Low-Rise) (220)	75	Dwelling Units	38	23%	77%	9	29	5%	2.5%	8	27	35
1 & 2	VC-C	Single-Family Detached Housing (210)	137	Dwelling Units	104	25%	75%	26	78	5%	2.5%	24	72	96
1 & 2	VC-C	General Office Building (710)	31.9	1,000 Sq. Ft. GFA	58	86%	14%	50	8	5%	2.5%	46	7	53
1 & 2	VC-C	Shopping Center (820)	36.3	1,000 Sq. Ft. GLA	36	62%	38%	22	14	5%	2.5%	20	13	33
1	Other	Multifamily Housing (Low-Rise) (220)	95	Dwelling Units	46	23%	77%	11	35	0%	2.5%	11	34	45
1	Other	Single-Family Detached Housing (210)	162	Dwelling Units	120	25%	75%	30	90	0%	2.5%	29	88	117
2 & 3	VC-A	Multifamily Housing (Low-Rise) (220)	570	Dwelling Units	250	23%	77%	58	193	5%	2.5%	54	179	233
2 & 3	VC-A	Single-Family Detached Housing (210)	60	Dwelling Units	48	25%	75%	12	36	5%	2.5%	11	33	44
2 & 3	VC-A	General Office Building (710)	90.1	1,000 Sq. Ft. GFA	112	86%	14%	96	16	5%	2.5%	89	15	104
2 & 3	VC-A	Shopping Center (820)	45.4	1,000 Sq. Ft. GLA	44	62%	38%	27	17	5%	2.5%	25	16	41
2	Other	Multifamily Housing (Low-Rise) (220)	116	Dwelling Units	56	23%	77%	13	43	0%	2.5%	13	42	55
2	Other	Single-Family Detached Housing (210)	200	Dwelling Units	148	25%	75%	37	111	0%	2.5%	36	108	144
3	VC-B	Multifamily Housing (Low-Rise) (220)	133	Dwelling Units	64	23%	77%	15	49	3%	2.5%	14	46	60
3	VC-B	Single-Family Detached Housing (210)	227	Dwelling Units	166	25%	75%	42	125	3%	2.5%	40	118	158
3	VC-B	Shopping Center (820)	40.5	1,000 Sq. Ft. GLA	40	62%	38%	25	15	3%	2.5%	24	14	38
3	Other	Multifamily Housing (Low-Rise) (220)	67	Dwelling Units	34	23%	77%	8	26	0%	2.5%	8	25	33
3	Other	Single-Family Detached Housing (210)	115	Dwelling Units	88	25%	75%	22	66	0%	2.5%	21	64	85
4	Other	Multifamily Housing (Low-Rise) (220)	165	Dwelling Units	78	23%	77%	18	60	0%	2.5%	18	59	77
4	Other	Single-Family Detached Housing (210)	276	Dwelling Units	202	25%	75%	51	152	0%	2.5%	50	148	198
1 & 2	TC	Multifamily Housing (Mid-Rise) (221)	470	Dwelling Units	170	26%	74%	44	126	9%	2.5%	39	112	151
1 & 2	TC	Senior Adult Housing-Detached (251)	61	Dwelling Units	30	33%	67%	10	20	9%	2.5%	9	18	27
1 & 2	TC	Senior Adult Housing-Attached (252)	43	Dwelling Units	10	35%	65%	4	7	9%	2.5%	4	6	10
1 & 2	VC-C	Multifamily Housing (Mid-Rise) (221)	300	Dwelling Units	108	26%	74%	28	80	5%	2.5%	25	74	100
1 & 2	VC-C	Senior Adult Housing-Detached (251)	38	Dwelling Units	20	33%	67%	7	13	5%	2.5%	6	12	18
1 & 2	VC-C	Senior Adult Housing-Attached (252)	26	Dwelling Units	6	35%	65%	2	4	5%	2.5%	2	4	6
1	Other	Multifamily Housing (Mid-Rise) (221)	357	Dwelling Units	130	26%	74%	34	96	0%	2.5%	33	94	127
1	Other	Senior Adult Housing-Detached (251)	46	Dwelling Units	24	33%	67%	8	16	0%	2.5%	8	16	24
1	Other	Senior Adult Housing-Attached (252)	32	Dwelling Units	8	35%	65%	3	5	0%	2.5%	3	5	8
2 & 3	VC-A	Multifamily Housing (Mid-Rise) (221)	325	Dwelling Units	118	26%	74%	31	87	5%	2.5%	29	81	110
2 & 3	VC-A	Senior Adult Housing-Detached (251)	42	Dwelling Units	22	33%	67%	7	15	5%	2.5%	6	14	20
2 & 3	VC-A	Senior Adult Housing-Attached (252)	29	Dwelling Units	6	35%	65%	2	4	5%	2.5%	2	4	6
2	Other	Multifamily Housing (Mid-Rise) (221)	442	Dwelling Units	160	26%	74%	42	118	0%	2.5%	41	115	156
2	Other	Senior Adult Housing-Detached (251)	57	Dwelling Units	28	33%	67%	9	19	0%	2.5%	9	19	28
2	Other	Senior Adult Housing-Attached (252)	40	Dwelling Units	8	35%	65%	3	5	0%	2.5%	3	5	8
3	VC-B	Multifamily Housing (Mid-Rise) (221)	502	Dwelling Units	182	26%	74%	47	135	3%	2.5%	44	128	172
3	VC-B	Senior Adult Housing-Detached (251)	65	Dwelling Units	30	33%	67%	10	20	3%	2.5%	9	19	28
3	VC-B	Senior Adult Housing-Attached (252)	45	Dwelling Units	10	35%	65%	4	7	3%	2.5%	4	7	11
3	Other	Multifamily Housing (Mid-Rise) (221)	254	Dwelling Units	92	26%	74%	24	68	0%	2.5%	23	66	89
3	Other	Senior Adult Housing-Detached (251)	33	Dwelling Units	18	33%	67%	6	12	0%	2.5%	6	12	18
3	Other	Senior Adult Housing-Attached (252)	23	Dwelling Units	6	35%	65%	2	4	0%	2.5%	2	4	6
4	Other	Multifamily Housing (Mid-Rise) (221)	619	Dwelling Units	224	26%	74%	58	166	0%	2.5%	57	162	219
4	Other	Senior Adult Housing-Detached (251)	83	Dwelling Units	36	33%	67%	12	24	0%	2.5%	12	23	35
4	Other	Senior Adult Housing-Attached (252)	56	Dwelling Units	12	35%	65%	4	8	0%	2.5%	4	8	12
		Project Total a.m. Peak Hour Trips			4,878			2,231	2,651			2,037	2,498	4,535

Evening Peak Hour

Phase	Area	Land Use[1]	# of Units	Unit Type	Trip Generation	% Entering	% Exiting	Trips Entering	Trips Exiting	Internal Capture[2]	Transit Reduction[3]	Net Trips Entering	Net Trips Exiting	Total p.m. Trips
1 & 2	TC	Multifamily Housing (Low-Rise) (220)	125	Dwelling Units	74	63%	37%	47	27	11%	2.5%	41	23	64
1 & 2	TC	Single-Family Detached Housing (210)	215	Dwelling Units	212	63%	37%	134	78	11%	2.5%	116	68	184
1 & 2	TC	General Office Building (710)	1272	1,000 Sq. Ft. GFA	1,276	16%	84%	204	1,072	11%	2.5%	177	930	1,107
1 & 2	TC	Shopping Center (820)	258.8	1,000 Sq. Ft. GLA	988	48%	52%	474	514	11%	2.5%	411	446	857
1 & 2	VC-C	Multifamily Housing (Low-Rise) (220)	75	Dwelling Units	46	63%	37%	29	17	13%	2.5%	25	14	39
1 & 2	VC-C	Single-Family Detached Housing (210)	137	Dwelling Units	138	63%	37%	87	51	13%	2.5%	74	43	117
1 & 2	VC-C	General Office Building (710)	31.9	1,000 Sq. Ft. GFA	40	16%	84%	6	34	13%	2.5%	5	29	34
1 & 2	VC-C	Shopping Center (820)	36.3	1,000 Sq. Ft. GLA	140	48%	52%	67	73	13%	2.5%	57	62	119
1	Other	Multifamily Housing (Low-Rise) (220)	95	Dwelling Units	58	63%	37%	37	21	0%	2.5%	36	20	56
1	Other	Single-Family Detached Housing (210)	162	Dwelling Units	162	63%	37%	102	60	0%	2.5%	99	59	158
2 & 3	VC-A	Multifamily Housing (Low-Rise) (220)	88	Dwelling Units	52	63%	37%	33	19	10%	2.5%	29	17	46
2 & 3	VC-A	Single-Family Detached Housing (210)	148	Dwelling Units	150	63%	37%	95	56	10%	2.5%	83	49	132
2 & 3	VC-A	General Office Building (710)	90.1	1,000 Sq. Ft. GFA	104	16%	84%	17	87	10%	2.5%	15	76	91
2 & 3	VC-A	Shopping Center (820)	45.4	1,000 Sq. Ft. GLA	174	48%	52%	84	90	10%	2.5%	74	79	153
2	Other	Multifamily Housing (Low-Rise) (220)	116	Dwelling Units	66	63%	37%	43	25	0%	2.5%	42	24	66
2	Other	Single-Family Detached Housing (210)	200	Dwelling Units	198	63%	37%	125	73	0%	2.5%	122	71	193
3	VC-B	Multifamily Housing (Low-Rise) (220)	133	Dwelling Units	78	63%	37%	49	29	6%	2.5%	45	27	72
3	VC-B	Single-Family Detached Housing (210)	227	Dwelling Units	224	63%	37%	141	83	6%	2.5%	129	76	205
3	VC-B	Shopping Center (820)	40.5	1,000 Sq. Ft. GLA	156	48%	52%	75	81	6%	2.5%	69	74	143
3	Other	Multifamily Housing (Low-Rise) (220)	67	Dwelling Units	42	63%	37%	26	16	0%	2.5%	25	16	41
3	Other	Single-Family Detached Housing (210)	115	Dwelling Units	118	63%	37%	74	44	0%	2.5%	72	43	115
4	Other	Multifamily Housing (Low-Rise) (220)	165	Dwelling Units	94	63%	37%	59	35	0%	2.5%	58	34	92
4	Other	Single-Family Detached Housing (210)	276	Dwelling Units	270	63%	37%	170	100	0%	2.5%	166	98	264
1 & 2	TC	Multifamily Housing (Mid-Rise) (221)	470	Dwelling Units	208	61%	39%	127	81	11%	2.5%	110	70	180
1 & 2	TC	Senior Adult Housing-Detached (251)	61	Dwelling Units	34	61%	39%	21	13	11%	2.5%	18	11	29
1 & 2	TC	Senior Adult Housing-Attached (252)	43	Dwelling Units	14	55%	45%	8	6	11%	2.5%	7	5	12
1 & 2	VC-C	Multifamily Housing (Mid-Rise) (221)	300	Dwelling Units	132	61%	39%	81	51	13%	2.5%	69	43	112
1 & 2	VC-C	Senior Adult Housing-Detached (251)	38	Dwelling Units	24	61%	39%	15	9	13%	2.5%	13	8	21
1 & 2	VC-C	Senior Adult Housing-Attached (252)	26	Dwelling Units	10	55%	45%	6	5	13%	2.5%	5	4	9
1	Other	Multifamily Housing (Mid-Rise) (221)	357	Dwelling Units	158	61%	39%	96	62	0%	2.5%	94	60	154
1	Other	Senior Adult Housing-Detached (251)	46	Dwelling Units	28	61%	39%	17	11	0%	2.5%	17	11	28
1	Other	Senior Adult Housing-Attached (252)	32	Dwelling Units	10	55%	45%	6	5	0%	2.5%	6	5	11
2 & 3	VC-A	Multifamily Housing (Mid-Rise) (221)	325	Dwelling Units	144	61%	39%	88	56	10%	2.5%	77	49	126
2 & 3	VC-A	Senior Adult Housing-Detached (251)	42	Dwelling Units	26	61%	39%	16	10	10%	2.5%	14	9	23
2 & 3	VC-A	Senior Adult Housing-Attached (252)	29	Dwelling Units	10	55%	45%	6	5	10%	2.5%	5	4	9
2	Other	Multifamily Housing (Mid-Rise) (221)	442	Dwelling Units	198	61%	39%	120	78	0%	2.5%	117	74	191
2	Other	Senior Adult Housing-Detached (251)	57	Dwelling Units	32	61%	39%	20	12	0%	2.5%	20	12	32
2	Other	Senior Adult Housing-Attached (252)	40	Dwelling Units	12	55%	45%	7	5	0%	2.5%	7	5	12
3	VC-B	Multifamily Housing (Mid-Rise) (221)	502	Dwelling Units	222	61%	39%	135	87	6%	2.5%	124	80	204
3	VC-B	Senior Adult Housing-Detached (251)	65	Dwelling Units	36	61%	39%	22	14	6%	2.5%	20	13	33
3	VC-B	Senior Adult Housing-Attached (252)	45	Dwelling Units	14	55%	45%	8	6	6%	2.5%	7	5	12
3	Other	Multifamily Housing (Mid-Rise) (221)	254	Dwelling Units	112	61%	39%	68	44	0%	2.5%	66	43	109
3	Other	Senior Adult Housing-Detached (251)	33	Dwelling Units	22	61%	39%	13	9	0%	2.5%	13	9	22
3	Other	Senior Adult Housing-Attached (252)	23	Dwelling Units	8	55%	45%	4	4	0%	2.5%	4	4	8
4	Other	Multifamily Housing (Mid-Rise) (221)	619	Dwelling Units	274	61%	39%	167	107	0%	2.5%	163	104	267
4	Other	Senior Adult Housing-Detached (251)	83	Dwelling Units	42	61%	39%	26	16	0%	2.5%	25	16	41
4	Other	Senior Adult Housing-Attached (252)	56	Dwelling Units	16	55%	45%	9	7	0%	2.5%	9	7	16
		Project Total p.m. Peak Hour Trips			6,648			3,264	3,384			2,980	3,029	6,009

1. Land Use code from the Institute of Transportation Engineers (ITE) [illegible]
2. Internal capture rates derived [illegible]
3. Transit reduction of 2.5% [illegible]

SOURCE: Hales Engineering, [illegible]

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Town Center Area	**Date:**	12/6/2019
Analysis Year:	2042	**Checked By:**	
Analysis Period:	AM Street Peak Hour	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	1,272	1,000 sq ft	1,224	1,053	171
Retail	820	258.8	1,000 sq ft	244	151	93
Restaurant				0		
Cinema/Entertainment				0		
Residential	,220,221,251,	914	dwelling units	430	112	318
Hotel				0		
All Other Land Uses[2]				0		
				1,898	1,316	582

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.06	2.5%	0%	1.06	2.5%	0%
Retail	1.17	2.5%	0%	1.17	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.13	2.5%	0%	1.13	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		51	0	0	0	0
Retail	32		0	0	3	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	7	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	2,069	1,420	649
Internal Capture Percentage	9%	7%	15%
External Vehicle-Trips[5]	1,682	1,200	482
External Transit-Trips[6]	47	33	14
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	3%	28%
Retail	31%	32%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	3%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Town Center Area	**Date:**	12/6/2019
Analysis Year:	2042	**Checked By:**	
Analysis Period:	PM Street Peak Hour	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	1,272	1,000 sq ft	1,276	204	1,072
Retail	820	258.8	1,000 sq ft	988	474	514
Restaurant				0		
Cinema/Entertainment				0		
Residential	,220,221,251,	914	dwelling units	542	337	205
Hotel				0		
All Other Land Uses[2]				0		
				2,806	1,015	1,791

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.11	2.5%	0%	1.11	2.5%	0%
Retail	1.21	2.5%	0%	1.21	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.15	2.5%	0%	1.15	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2000			2000	
Retail					2000	
Restaurant						
Cinema/Entertainment						
Residential		2000				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		15	0	0	15	0
Retail	12		0	0	102	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	9	18	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	3,236	1,188	2,048
Internal Capture Percentage	11%	14%	8%
External Vehicle-Trips[5]	2,451	846	1,605
External Transit-Trips[6]	73	26	47
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	9%	3%
Retail	6%	18%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	30%	11%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Village Center A Area	**Date:**	12/6/2019
Analysis Year:	2042	**Checked By:**	
Analysis Period:	AM Street Peak Hour	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	90.1	1,000 sq ft	112	96	16
Retail	820	45.4	1,000 sq ft	44	27	17
Restaurant				0		
Cinema/Entertainment				0		
Residential	),220,221,251,.	630	dwelling units	445	110	335
Hotel				0		
All Other Land Uses[2]				0		
				601	233	368

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.06	2.5%	0%	1.06	2.5%	0%
Retail	1.17	2.5%	0%	1.17	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.13	2.5%	0%	1.13	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	0	0	0	0
Retail	4		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	3	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	674	258	416
Internal Capture Percentage	5%	7%	4%
External Vehicle-Trips[5]	556	212	344
External Transit-Trips[6]	15	6	9
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	7%	29%
Retail	28%	30%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	2%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Village Center A Area	**Date:**	10/22/2019
Analysis Year:	2042	**Checked By:**	Scott Johnson
Analysis Period:	PM Street Peak Hour	**Date:**	10/22/2019

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	90.1	1,000 sq ft	104	17	87
Retail	820	45.4	1,000 sq ft	174	84	90
Restaurant				0		
Cinema/Entertainment				0		
Residential	,220,221,251,	630	dwelling units	384	238	146
Hotel				0		
All Other Land Uses[2]				0		
				662	339	323

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.11	2.5%	0%	1.11	2.5%	0%
Retail	1.21	2.5%	0%	1.21	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.15	2.5%	0%	1.15	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1750			1750	
Retail					1750	
Restaurant						
Cinema/Entertainment						
Residential		1750				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	0	0	1	0
Retail	2		0	0	20	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	7	5	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	769	395	374
Internal Capture Percentage	10%	10%	10%
External Vehicle-Trips[5]	582	299	283
External Transit-Trips[6]	16	8	8
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	47%	5%
Retail	9%	20%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	8%	7%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Village Center B Area	**Date:**	12/6/2019
Analysis Year:	2042	**Checked By:**	
Analysis Period:	AM Street Peak Hour	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	40.5	1,000 sq ft	40	25	15
Restaurant				0		
Cinema/Entertainment				0		
Residential	),220,221,251,	972	dwelling units	454	118	336
Hotel				0		
All Other Land Uses[2]				0		
				494	143	351

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail	1.17	2.5%	0%	1.17	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.13	2.5%	0%	1.13	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	3	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	560	162	398
Internal Capture Percentage	3%	4%	2%
External Vehicle-Trips[5]	471	133	338
External Transit-Trips[6]	13	4	9
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	14%	17%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Village Center B Area	**Date:**	12/6/2019
Analysis Year:	2042	**Checked By:**	
Analysis Period:	PM Street Peak Hour	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	40.5	1,000 sq ft	156	75	81
Restaurant				0		
Cinema/Entertainment				0		
Residential	,220,221,251,	972	dwelling units	574	355	219
Hotel				0		
All Other Land Uses[2]				0		
				730	430	300

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail	1.21	2.5%	0%	1.21	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.15	2.5%	0%	1.15	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail					1500	
Restaurant						
Cinema/Entertainment						
Residential		1500				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	20	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	6	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	849	499	350
Internal Capture Percentage	6%	5%	7%
External Vehicle-Trips[5]	670	398	272
External Transit-Trips[6]	20	12	8
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	7%	20%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	5%	2%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Olympia Hills	**Organization:**	Hales Engineering
Project Location:	Salt Lake County	**Performed By:**	Josh Gibbons
Scenario Description:	Village Center C Area	**Date:**	12/6/2019
Analysis Year:	2042	**Checked By:**	
Analysis Period:	AM Street Peak Hour	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	31.9	1,000 sq ft	58	50	8
Retail	820	36.3	1,000 sq ft	36	22	14
Restaurant				0		
Cinema/Entertainment				0		
Residential	),220,221,251,	576	dwelling units	276	72	204
Hotel				0		
All Other Land Uses[2]				0		
				370	144	226

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.06	2.5%	0%	1.06	2.5%	0%
Retail	1.17	2.5%	0%	1.17	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.13	2.5%	0%	1.13	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2	0	0	0	0
Retail	2		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	2	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	415	160	255
Internal Capture Percentage	5%	6%	4%
External Vehicle-Trips[5]	343	131	212
External Transit-Trips[6]	10	4	6
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	8%	25%
Retail	15%	25%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	2%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

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Analysis Period:	PM Street Peak Hour	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	31.9	1,000 sq ft	40	6	34
Retail	820	36.3	1,000 sq ft	140	67	73
Restaurant				0		
Cinema/Entertainment				0		
Residential	,220,221,251,	576	dwelling units	351	218	133
Hotel				0		
All Other Land Uses[2]				0		
				531	291	240

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.11	2.5%	0%	1.11	2.5%	0%
Retail	1.21	2.5%	0%	1.21	2.5%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.15	2.5%	0%	1.15	2.5%	0%
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1000			1000	
Retail					1000	
Restaurant						
Cinema/Entertainment						
Residential		1000				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	0	0	1	0
Retail	2		0	0	21	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	6	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	618	339	279
Internal Capture Percentage	13%	12%	14%
External Vehicle-Trips[5]	452	251	201
External Transit-Trips[6]	15	8	7
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	86%	16%
Retail	14%	26%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	9%	7%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Exhibit "E"

Regional Compatibility Plan and Guidelines

1.1. Master Developer and the County have, through the zoning of the Planned Community and the adoption of this MDA have intended to respect existing communities and neighborhoods. Through the subsequent adoptions of CSPs, Project Plans, Site Plans, and subdivision plats, the Parties shall further respect existing communities and neighborhoods. This shall be achieved by acknowledging important components of these areas in the planning and design of Planned Community (e.g., their history, established direction, significant places/features and views, and relationship to other communities).

1.2. Master Developer in future CSPs, Project Plans, Site Plans, and subdivision plats shall understand existing conditions in neighboring cities and developments and be a part of collaborative solutions for features that commonly link one community/neighborhood with another, such as transportation, parks, trails, utilities, etc.

1.3. Master Developer and the County shall work together to make all future Project Plans/Subdivision Plats/Site Plans compatible with the General Plan as modified by the P-C Zoning, this MDA and any future CSPs.

1.4. Community Structure Plan(s) and Project Plan(s)/Subdivision Plats/Site Plans shall be consistent with the General Plan, and WFRC's current Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP).

Exhibit "F"

Parking Authority and Parking Policies

1.1 A Parking Authority Management Plan shall be required as part of a CSP for a Town Center, Commercial Center, and Village Center, but not for a Neighborhood (as those terms are used in Exhibit C of this MDA).

1.2 The CSP shall provide provisions for the governance of the Parking Authority. The Parking Authority shall be a public private partnership. The Developer representation of the Parking Authority shall manage off street parking and the County representation shall manage on street parking.

1.3 Subject to any modification in a future CSP, the following parking policies apply to the development and shall be part of the Parking Authority Management Plan

1.3.1 On-street parking, which generally reduces traffic speeds and provides easy access for quick-stop shopping, shall be provided according to MDA or CSP Design Standards in all centers and destinations.

1.3.2 Although surface parking lots are permitted in Town and Village Centers, structured parking and subterranean or semi-depressed garages are encouraged wherever economically practicable. Community Structure Plan(s) shall implement Design Standards relating to surface parking lots, by, among other design elements, determining when some or all buildings should front the street with doors facing the street and parking located behind or between buildings and occupying only a limited portion of the street frontage.

1.3.3 Shared parking strategies shall be used when there are adjoining land uses with different periods of peak activity in order to accommodate parking demand.

1.3.4 The location and design of off-street parking facilities in residential districts shall mitigate visual intrusion into the public right-of-way and community spaces. Parking for multi-family, civic, and commercial buildings shall generally be located in structures, underground facilities, or in locations obscured from street view by buildings or landscaping. Local streets may include on-street parking to accommodate visitors and serve as a buffer between street and sidewalk.

1.3.5 The design of surfaced and structured parking shall be according to MDA or CSP Design Standards and shall be well-landscaped, incorporating shade trees, shrubs, perennials and other plants and treatments to reduce the negative impacts of the surface lots and structured parking areas.

1.3.6 The design of surfaced and structured parking shall accommodate and prioritize alternative transportation modalities such as ride-sharing, transportation network company (TNC) drop-off and pick-up zones, EV-charging and mass transit.

1.3.7 CSP(s) shall implement Design Standards intended to accomplish the following: the location and design of off-street parking facilities in

residential districts shall minimize visual intrusion into the public right-of-way and community spaces; parking for multi-family, civic, and commercial buildings shall be located in structures, underground facilities, or in locations obscured from street view by buildings or landscaping; and local streets may include on-street parking to accommodate visitors and serve as a buffer between street and sidewalk.

Exhibit "G"

County's Vested Laws

Exhibit "H"

Affordable/Workforce Housing Plan

1.1 Olympia Hills shall use an inclusionary approach that allows for a mixture of housing types and prices distributed throughout the communities of Olympia Hills, as well as near employment centers, recognizing that housing affordability is integral to the long-term success of Olympia Hills and the region. Olympia Hills is committed to helping ease the affordable housing problem including by using the economic and planning advantages of being a master-planned community.

1.2 Both attached and detached Accessory Dwelling Units (ADUs) are allowed; being secondary or ancillary units, ADUs must be compatible in architectural style to the single-family home they accompany. ADUs will be subject to future ADU ordinances, which shall include design standards for ADUs. Building typologies for ADUs shall be determined at the CSP.

1.3 Affordable housing units in various types of housing stock shall be provided through incentive programs and/or partnerships with a range of entities, including home builders, developers, non-profit organizations, and public agencies (such as the Olene Walker Fund and tax credits).

1.4 Developer shall encourage major employers locating within Olympia Hills to develop employer-assisted housing programs for lower income employees.

1.5 A minimum of 10% of the total number of approved housing units shall be Affordable Units reserved for households earning between 0% and 80% of the Area Median Income (AMI) as determined by the annual updated HUD level incomes. The average income limit for all Affordable Units for rent (per phase) shall not exceed 60% AMI. Notwithstanding the previous restrictions, any RDU that meets the requirements of IRC Section 42 and is eligible for low income housing credits (LIHTCs) shall automatically qualify as an Affordable Unit. Each Affordable Unit for rent shall be subject to the same income restrictions for a period of 30 years, or for a term determined by the Utah State tax credit administrative agency or other applicable low-income housing program sponsor, whichever is longer.

1.5.1 Affordable Units shall be developed roughly proportionate with market units and interspersed at each phase. The Planned Community shall have a mix of Affordable Units for rent (minimum of 30%) and for sale (minimum of 30%). Affordable Units for sale need only comply with the 0%-80% AMI requirement in section 1.5 and no average AMI is required. Affordable Units for sale are not subject to a deed restriction, but initial purchasers' incomes must comply with the 0%-80% AMI requirements. Affordable Units for sale shall be individually platted and may include condominiums, townhomes, single family homes, or other types of for-sale units.

1.6 5% of the total number of approved housing units shall be reserved for Workforce Units for households earning between 80% and 120% of the Area Median Income (AMI) as determined by HUD. Workforce Units can be for rent or for sale. Workforce Units shall be developed roughly proportionate with market units and interspersed at each phase. Developer is encouraged to work with employers and builders to facilitate community-based housing within Olympia Hills.

1.7 Developer shall implement strategies as part of CSPs or Project Plans to encourage and/or require the levels of Affordable Housing specified herein. The results of these strategies, as well as methods of ensuring that Affordable Housing remains affordable while recognizing the desires and needs of homeowners to build equity, will produce the results outlined in this Exhibit. Developer shall submit an Affordable Housing report and proposed plan for how the requirements of this Exhibit will be accomplished, and shall submit that report and plan with a Community Structure Plan.