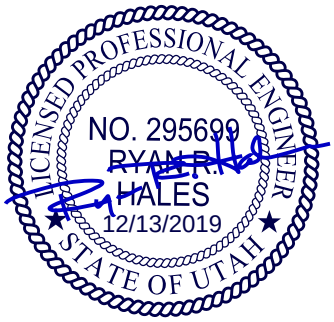
MEMORANDUM



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.

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 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.

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.

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:	**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.

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)	86	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%	26	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			**4,876**			**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)	86	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	68	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	196	61%	39%	120	76	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			**6,646**			**3,264**	**3,386**			**2,980**	**3,029**	**6,009**

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 captu
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-

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:**	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.

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:**	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.

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 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.

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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.

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

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:	**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.