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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
	Single-family	950 DU	1,480 DU	+ 530 DU
	Multi-family (Low-Rise)	5,380 DU	862 DU	- 4,518 DU
Residential	Multi-family (Mid-Rise)	-	3,269 DU	+ 3,269 DU
Residential	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	-



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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.

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

Table 2: Trip Generation Comparison

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.



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APPENDIX A

TIS Trip Generation

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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 45 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	2			486		242	63%	37%	152	90	0%	2.5%	148	88	236
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 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															
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															
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 45 Other Multifamily Housing (Low-Rise) (220) 1109 Dwelling Units 504 63% 37% 318 186 0% 2.5% 310 181 491 491 Other Single-Family Detached Housing (210) 90 Dwelling Units 92 63% 37% 58 34 0% 2.5% 57 33 90															
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	3	Other	Multifamily Housing (Low-Rise) (220)	449	Dwelling Units	226	63%	37%	142	84	0%	2.5%	138	82	220
4 Other Single-Family Detached Housing (210) 90 Dwelling Units 92 63% 37% 58 34 0% 2.5% 57 33 90					-										
1 region 1 out p.111.1 can from hips 0,700 0,100 0,200 2,000 2,000 5,110			Project Total p.m. Peak Hour Trips		.9	6,408			3,150	3,258			2,869	2,906	5,775

Land Use Code from the Institute of Transportation Engineers (ITE) <u>Trip Generation</u>, 10th Edition, 2017.
 Internal capture rates based on the NCHRP 684 Internal Trip Capture Estimation Tool, which follows ITE methodologies for internal capture.

SOURCE: Hales Engineering, December 2019

^{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.

	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 Vehi	cle-Trip Generation	Es	timates (Single-Use Sit	e Estimate)	
Land Use	Developm	Development Data (For Information Only)				Estimated Vehicle-Trips ³	
Land Ose	ITE LUCs1	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				İ	0		
All Other Land Uses ²					0		
					1,901	1,306	595

	Table 2-A: Mode Split and Vehicle Occupancy Estimates										
Land Use		Entering Trip	os			Exiting Trips					
Land Use	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)										
Origin (From)	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)										
Oligili (Fiolii)	Office	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	A: Computatio	ns 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: Interna	al Trip Capture Percentag	es 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

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

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

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

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

⁴Enter 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.

⁶Person-Trips

	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	Developm	Development Data (For Information Only)				Estimated Vehicle-Trips ³					
Land Use	ITE LUCs1	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										
l and llas		Entering Trips				Exiting Trips					
Land Use	Veh. Occ.4	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				Ī							

	Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)								
Origin (From)		Destination (To)							
Origin (From)	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)								
Origin (From)	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					

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

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

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

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

⁶Person-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 Vehi	cle-Trip Generation	Es	timates (Single-Use Site	e Estimate)	
Land Use	Developm	ent Data (For In	formation Only)			Estimated Vehicle-Trips ³	
Land Ose	ITE LUCs1	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				ll	0		
All Other Land Uses ²					0		
					455	193	262

	Table 2-A: Mode Split and Vehicle Occupancy Estimates							
Land Use		Entering Tri	os			Exiting Trips		
Land Use	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)			
Oligin (Floin)	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel	
Office							
Retail							
Restaurant							
Cinema/Entertainment							
Residential							
Hotel							

Table 4-A: Internal Person-Trip Origin-Destination Matrix*									
Origin (Fram)		Destination (To)							
Origin (From)	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					

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

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

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

⁴Enter 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.

⁶Person-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 Vehic	le-Trip Generation	Es	timates (Single-Use Sit	e Estimate)	
Land Use	Developme	ent Data (For In	formation Only)			Estimated Vehicle-Trips ³	
Land Use	ITE LUCs1	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								
		Entering Tri	ps			Exiting Trips		
Land Use	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				Ī				

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)								
Origin (From)			Destination (To)	Destination (To)				
Origin (From)	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)	Origin (From) Destination (To)									
Origin (From)	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						

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

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

⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be ⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

⁶Person-Trips

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

	NCHRP 684 Internal Trip Capture Estimation Tool								
Project Name:	Olympia Hills	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					

			imates (Single-Use Sit	,			
Land Use	Developm	ent Data (<i>For In</i>	formation Only)			Estimated Vehicle-Trips ³	
Land OSE	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								
Landillan		Entering Trip	os		Exiting Trips				
Land Use	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)									
Oligin (Floin)	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel			
Office									
Retail									
Restaurant									
Cinema/Entertainment									
Residential									
Hotel									

Table 4-A: Internal Person-Trip Origin-Destination Matrix*										
Destination (To)										
Origin (From)	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: Interna	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							

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

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

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

⁴Enter 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.

⁶Person-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	1	Date:	10/22/2019							

	Table 1	-P: Base Vehic	le-Trip Generation	Est	imates (Single-Use Sit	e Estimate)	
Land Use	Developme	ent Data (For In	formation Only)			Estimated Vehicle-Trips ³	
Land Ose	ITE LUCs1	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											
		Entering Tri	ps			Exiting Trips					
Land Use	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)										
Origin (From)	Office	Office Retail Restaurant Cinema/Entertainment F		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-F	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: Interna	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							

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

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

⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be ⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

⁶Person-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	Developm	ent Data (<i>For In</i>	formation Only)			Estimated Vehicle-Trips ³				
Land OSE	ITE LUCs1	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				i	0					
All Other Land Uses ²					0					
					377	139	238			

	Table 2-A: Mode Split and Vehicle Occupancy Estimates										
Landlia		Entering Tri	os			Exiting Trips					
Land Use	Veh. Occ.4	% Transit	% Non-Motorized	ı [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 (France)		Destination (To)										
Origin (From)	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel						
Office												
Retail												
Restaurant												
Cinema/Entertainment												
Residential												
Hotel												

Table 4-A: Internal Person-Trip Origin-Destination Matrix*												
Origin (Found) Destination (To)												
Origin (From)	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	Table 5-A: Computations Summary										
	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: Interna	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								

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

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

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

⁴Enter 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.

⁶Person-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:	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	Developm	ent Data (<i>For In</i>	formation Only)			Estimated Vehicle-Trips ³					
Land Use	ITE LUCs1	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											
l and llas		Entering Tri	ps			Exiting Trips					
Land Use	Veh. Occ.4	% Transit	% Non-Motorized	İ	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)												
Origin (From)	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)	Origin (Fram) Destination (To)												
Origin (From)	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-F	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							

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

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

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

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

⁶Person-Trips

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



APPENDIX B

Updated Land Use Trip Generation

1 & 2 TC Single-II 1 & 2 TC Genera 1 & 2 TC Genera 1 & 2 TC Genera 1 & 2 VC CS Multifar 1 & 2 VC CS CS Csple-II 1 & 2 VC CS Single-II 1 Cther Multifar 1 Cther Multifar 2 & 3 VC-A Multifar 2 & 3 VC-A Multifar 2 & 3 VC-A Single-II 2 & 3 VC-A Single-II 2 & 3 VC-A Single-II 3 VC-B Single-II 4 VC-B	Land Limit mly Hosizing (Low-Rize) (220) marily Debashed Hosizing (210) marily Debashed Hosizing (210) may be considered Hosizing (210) Quantity (200) mly Hosizing (200) mly Hosizing (100) mly Hosizing (# of Units 125 215 1272 258.8 75 137 31.9 36.3 95 162 86 148 90.1	Unit Type Dwelling Units Dwelling Units Dwelling Units 1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units Dwelling Units Dwelling Units 1,000 Sq. Ft. GFA 1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units	Generation Trip Generation 908 2,104 12,506 9,770 528 1,390 352	% Entering 50% 50% 50% 50% 50% 50%	4 (2042) % Exiting 50% 50% 50% 50%	Trips Entering 453 1,052 6,253 4,885	Trips Exiting 453 1,052 6,253 4,885	Internal Capture ² 0% 0% 0%	Transit Reduction ³ 2.5% 2.5% 2.5%	Net Trips Entering 442 1,026 6,097	Net Trips Exiting 442 1,026 6,097	Total Daily Trips 884 2,052 12,194
18.2 TC Matter 18.2 TC Graphel 18.2 TC Graphel 18.2 TC Graphel 18.2 TC Graphel 18.2 TC Graphel 18.2 VC-C Matter 18.2 VC-C Graphel 18.2 VC-C Graphel 18.2 VC-C Graphel 18.2 VC-C Graphel 18.2 VC-C Graphel 18.2 VC-C Graphel 18.2 VC-C Graphel 18.2 VC-A Matter 28.3 VC-A Matter 2 Cuther Single-I 3 VC-B Single-I 3 VC-B Single-I 3 VC-B Single-I 3 VC-B Single-I 3 VC-B Single-I 3 VC-B Single-I 3 VC-B Graphel 4 VC-B Graphel 4 VC-B Graphel 5 VC-B Gra	mly Hostaing (Lose-Reso) (203) Gramby Bedached Hostaing (210) Office Building (710) Office (71	125 215 1272 258.8 75 137 31.9 36.3 95 162 86 148 90.1	Dwelling Units Dwelling Units 1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units Dwelling Units 1,000 Sq. Ft. GFA 1,000 Sq. Ft. GFA Dwelling Units	2,104 12,506 9,770 528 1,390	50% 50% 50% 50% 50%	50% 50% 50% 50%	1,052 6,253	453 1,052 6,253	0% 0%	2.5%	1,026	1,026	884 2,052
1 & 2 TC Genera 1 & 2 TC Shoppi 1 & 2 VC-C Multifar 1 & 2 VC-C Multifar 1 & 2 VC-C Senera 1 & 2 VC-C Senera 1 & 0 VC-C Shoppi 1 Other Multifar 2 & 3 VC-A Multifar 2 & 3 VC-A Multifar 2 & 3 VC-A Shoppi 3 VC-B Single-I 3 VC-	Office Building (110) groated (2020) groated (2020) groated (2020) may Hostaired (Low-Rise) (2020) arrainly Debached Hostaine (210) Office Building (110) groated (2020) may Hostaired (Low-Rise) (2020) may Hostaired (Low-Ri	1272 258.8 75 137 31.9 36.3 95 162 86 148 90.1	1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units Dwelling Units 1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units	12,506 9,770 528 1,390	50% 50% 50%	50% 50%	6,253	6,253	0%				
1 8.2 V.C.C Single-I 18.2 V.C.C Genera 18.2 V.C.C Genera 18.2 V.C.C Shoppin 1 Other Multifar 1 Other Single-I 28.3 V.C.A Multifar 28.3 V.C.A Genera 28.3 V.C.A Genera 28.3 V.C.A Shoppin 3 V.C.B Single-I 3 V.C.B Single-I 3 V.C.B Single-I 3 V.C.B Shoppin 3 V.C.B Shoppin 3 Other Multifar Single-I Shoppin 3 Other Multifar Single-I Shoppin 3 Other Multifar Single-I Shoppin 3 Other Multifar Single-I Sin	Family Detached Housing (210) [Office Building (110) ng Centre (820) mly Housing (Low-Rise) (220) Family Detached Housing (210) mly Housing (Low-Rise) (220) Family Detached Housing (210) mly Housing (Low-Rise) (220) Family Detached Housing (210) Family Detached Housing (210)	137 31.9 36.3 95 162 86 148 90.1	Dwelling Units 1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units	1,390					0%	2.5%	4,763	4,763	9,526
1 & 2 VC.C Genera 1 & 2 VC.C Shoppi 1 Other Mutifar 1 Other Single-1 2 & 3 VC.A Single-1 2 & 3 VC.A Single-1 2 & 3 VC.A Shoppi 2 & 3 VC.A Shoppi 2 Other Mutifar 3 VC.B Single-1 3 VC.B Single-1 3 VC.B Single-1 3 VC.B Single-1 3 VC.B Single-1 3 VC.B Single-1 3 VC.B Single-1 3 VC.B Single-1 3 VC.B Single-1	Office Building (710) og Centre (1820) nlly Housing (Low-Rise) (220) nlly Housing (Low-Rise) (220) nlly Housing (Low-Rise) (220) namily Detached Housing (210) Office Building (710) og Centre (1820) nlly Housing (Low-Rise) (220) namily Detached Housing (210) iamily Detached Housing (210) iamily Detached Housing (210) iamily Building (Low-Rise) (220) namily Detached Housing (210)	36.3 95 162 86 148 90.1	1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units	352	50%	50% 50%	264 695	264 695	0% 0%	2.5%	257 678	257 678	514 1,356
1 Other Single-1 2 & 3 VC-A Multifar 2 & 3 VC-A Single-1 2 & 3 VC-A Single-1 2 & 3 VC-A Single-1 3 VC-B Single-1 3 VC-B Single-1 3 VC-B Single-1 3 VC-B Single-1 3 VC-B Single-1 3 VC-B Single-1 3 VC-B Single-1 4 Single-1 5 VC-B Single-1 6 VC-B Single-1	Family Detached Housing (210) nily Housing (Low-Rise) (220) -amily Detached Housing (210) I Office Building (710) g Center (820) -injy Housing (Low-Rise) (220) -amily Detached Housing (210) -injy Housing (Low-Rise) (220)	162 86 148 90.1		1,372	50% 50%	50% 50%	176 686	176 686	0% 0%	2.5% 2.5%	172 669	172 669	344 1,338
2 & 3 VC-A Single-I 2 & 3 VC-A Genera 2 & 3 VC-A Shoppin 2 Other Multifar 3 VC-B Single-I 3 VC-B Single-I 3 VC-B Single-I 3 VC-B Single-I 3 VC-B Single-I 3 VC-B Single-I 3 VC-B Single-I 5 VC-B Single-I 6 VC-B Single-I 7 VC-B Single-I 8 VC-B Single-I	Family Detached Housing (210) I Office Building (710) ng Center (820) nily Housing (Low-Rise) (220) Family Detached Housing (210) nily Housing (Low-Rise) (220) Family Detached Housing (210)	148 90.1	Dwelling Units	678 1,622	50% 50%	50% 50%	339 811	339 811	0%	2.5% 2.5%	331 791	331 791	662 1,582
2 & 3 VC-A Shoppin 2 Other Multifar 2 Other Single-1 3 VC-B Single-1 3 VC-B Shoppin 3 Other Multifar 3 Other Single-1	ng Center (820) nily Housing (Low-Rise) (220) Family Detached Housing (210) nily Housing (Low-Rise) (220) Family Detached Housing (210)		Dwelling Units Dwelling Units	610 1,492	50% 50%	50% 50%	305 746	305 746	0%	2.5% 2.5%	297 727	297 727	594 1,454
2 Other Single-1 3 VC-B Multifan 3 VC-B Single-1 3 VC-B Shoppin 3 Other Multifan 3 Other Single-1	Family Detached Housing (210) nily Housing (Low-Rise) (220) Family Detached Housing (210)	45.4	1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA	960 1,714	50% 50%	50% 50%	480 857	480 857	0%	2.5%	468 836	468 836	936 1,672
3 VC-B Single-I 3 VC-B Shoppir 3 Other Multifar 3 Other Single-I	amily Detached Housing (210)	116 200	Dwelling Units Dwelling Units	838 1,968	50% 50%	50% 50%	419 984	419 984	0%	2.5% 2.5%	409 959	409 959	818 1,918
3 Other Multifan 3 Other Single-I		133 227	Dwelling Units Dwelling Units	966 2,212	50% 50%	50% 50%	483 1,106	483 1,106	0%	2.5%	471 1,078	471 1,078	942 2,156
	nily Housing (Low-Rise) (220)	40.5 67	1,000 Sq. Ft. GLA Dwelling Units	1,530 466	50% 50%	50%	765 233	765 233	0%	2.5%	746 227	746 227	1,492 454
	Family Detached Housing (210) nily Housing (Low-Rise) (220)	115 165 276	Dwelling Units Dwelling Units	1,184 1,208 2,646	50% 50% 50%	50% 50% 50%	592 604 1.323	592 604 1.323	0% 0%	2.5% 2.5% 2.5%	577 589 1,290	577 589 1,290	1,154 1,178 2,580
1 & 2 TC Multifan	Family Detached Housing (210) nily Housing (Mid-Rise) (221)	470 61	Dwelling Units Dwelling Units Dwelling Units	2,646 2,560 366	50% 50% 50%	50% 50%	1,323 1,280 183	1,323 1,280 183	0% 0%	2.5% 2.5% 2.5%	1,290 1,248 178	1,290 1,248 178	2,580 2,496 356
1 & 2 TC Senior	Adult Housing-Detached (251) Adult Housing-Attached (252) nily Housing (Mid-Rise) (221)	43	Dwelling Units Dwelling Units	148 1,634	50% 50%	50%	74 817	74 817	0%	2.5%	72 797	72 797	144 1,594
1 & 2 VC-C Senior	Adult Housing-Detached (251) Adult Housing-Attached (252)	38 26	Dwelling Units Dwelling Units	242	50%	50%	121	121	0%	2.5%	118	118	236
1 Other Multifan	nily Housing (Mid-Rise) (221) Adult Housing-Detached (251)	357 46	Dwelling Units Dwelling Units	1,944 286	50% 50%	50%	972 143	972 143	0%	2.5%	948 139	948 139	1,896 278
1 Other Senior	Adult Housing-Attached (252)	32 325	Dwelling Units Dwelling Units Dwelling Units	104 1,770	50% 50%	50%	52 885	52 885	0%	2.5%	51 863	51 863	102 1,726
2 & 3 VC-A Senior	nlly Housing (Mid-Rise) (221) Adult Housing-Detached (251) Adult Housing-Attached (252)	42 29	Dwelling Units Dwelling Units	264 92	50% 50%	50%	132 46	132 46	0%	2.5%	129 45	129 45	258 90
2 Other Multifan	nily Housing (Mid-Rise) (221) Adult Housing (Detached (251)	442 57	Dwelling Units Dwelling Units Dwelling Units	2,408 344	50% 50%	50%	1,204 172	1,204 172	0%	2.5%	1,174 168	1,174 168	2,348 336
2 Other Senior A	Adult Housing-Detached (251) Adult Housing-Attached (252) nily Housing (Mid-Rise) (221)	57 40 502	Dwelling Units Dwelling Units Dwelling Units	344 136 2,736	50% 50%	50% 50%	172 68 1,368	172 68 1,368	0% 0%	2.5% 2.5% 2.5%	168 66 1,334	168 66 1,334	336 132 2,668
3 VC-B Senior a	Adult Housing (Mid-Rose) (221) Adult Housing-Detached (251) Adult Housing-Attached (252)	65 45	Dwelling Units Dwelling Units Dwelling Units	2,736 386 156	50%	50%	1,368 193 78	1,368 193 78	0%	2.5%	1,334 188 76	1,334 188 76	2,668 376 152
3 Other Multifan	nily Housing (Mid-Rise) (221)	45 254 33	Dwelling Units Dwelling Units Dwelling Units	156 1,384 214	50% 50%	50% 50%	78 692 107	78 692 107	0% 0%	2.5% 2.5% 2.5%	76 675 104	76 675 104	152 1,350 208
3 Other Senior	Adult Housing-Detached (251) Adult Housing-Attached (252) nily Housing (Mid-Rise) (221)	23 619	Dwelling Units Dwelling Units Dwelling Units	68 3,372	50% 50%	50%	34 1,686	34 1,686	0%	2.5% 2.5% 2.5%	33 1,644	33 1,644	66 3,288
4 Other Senior	Adult Housing-Detached (251) Adult Housing-Detached (252)	83 56	Dwelling Units Dwelling Units	478 200	50% 50%	50%	239	239	0%	2.5%	1,044 233 98	233 98	3,288 466 196
Morning Peak Hou	Total Daily Trips		Dwelling Units Unit	70,394 Trip	ou h	30 %	35,197 Trips	35,197	Internal		34,320 Net Trips	34,320 Net Trips	196 68,640 Total a m
Phase Area		# of Units 125		Generation 60	% Entering	% Exiting	Entering 14	Trips Exiting 46	Capture ²	Transit Reduction ³	Net Trips Entering	Net Trips Exiting	Total a.m. Trips
1 & 2 TC Single-I	nily Housing (Low-Rise) (220) Family Detached Housing (210) I Office Building (710)	125 215 1272	Dwelling Units Dwelling Units 1,000 Sq. Ft. GFA	60 158 1,224	23% 25% 86%	77% 75% 14%	14 40 1,053	119	9% 9% 9%	2.5% 2.5% 2.5%	35	106	53 141 1,086
1 & 2 TC Shoppin	l Office Building (710) ng Center (820) nily Housing (Low-Rise) (220)	1272 258.8 75	1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units	1,224 244 38	86% 62% 23%	14% 38% 77%	1,053 151 9	171 93 29	9% 9% 5%	2.5% 2.5% 2.5%	934 134 8	152 83 27	1,086 217 35
1 & 2 VC-C Single-I	Family Detached Housing (210)	75 137 31.9	Dwelling Units Dwelling Units 1,000 Sq. Ft. GFA	38 104 58	23% 25% 86%	77% 75% 14%	9 26 50	78 8	5% 5%	2.5% 2.5% 2.5%	24 46	72 7	35 96 53
1 & 2 VC-C Shoppin	l Office Building (710) ng Center (820) nily Housing (Low-Rise) (220)	31.9 36.3 95	1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units	58 36 46	86% 62% 23%	14% 38% 77%	50 22 11	8 14 35	5% 5% 0%	2.5% 2.5% 2.5%	46 20 11	7 13 34	53 33 45
1 Other Single-I	amily Detached Housing (210)	162	Dwelling Units	120 250	25% 25% 23%	75% 75%	30	90 193	0%	2.5%	29	88 179	117
2 & 3 VC-A Single-I	nily Housing (Low-Rise) (220) Family Detached Housing (210) I Office Building (710)	570 60 90.1	Dwelling Units Dwelling Units 1,000 Sq. Ft. GFA	48 112	23% 25% 86%	77% 75% 14%	58 12	193 36 16	5% 5%	2.5% 2.5% 2.5%	54 11	33	233 44 104
2 & 3 VC-A Shoppin	ng Center (820) ng Housing (Low-Rise) (220)	45.4 116	1,000 Sq. Ft. GLA Dwelling Units	44 56	62% 23%	38% 77%	96 27 13	17 43	5%	2.5%	89 25 13	15 16 42	104 41 55
2 Other Single-I	Family Detached Housing (210)	200	Dwelling Units	148 64	25% 25% 23%	75% 75%	37 15	43 111 49	0%	2.5%	36 14	108 46	144 60
3 VC-B Single-I	nily Housing (Low-Rise) (220) Family Detached Housing (210)	227 40.5	Dwelling Units Dwelling Units	166 40	25% 62%	75% 38%	42 25	125 15	3% 3%	2.5%	40 24	118 14	158 38
3 Other Multifan	ng Center (820) nily Housing (Low-Rise) (220)	67	1,000 Sq. Ft. GLA Dwelling Units	34 88	23%	77% 75%	8 22	26 66	0%	2.5%	8	25	33 85
4 Other Multifan	Family Detached Housing (210) nily Housing (Low-Rise) (220) Family Detached Housing (210)	115 165 276	Dwelling Units Dwelling Units	78 202	23% 25%	75% 77% 75%	18	60 152	0%	2.5% 2.5% 2.5%	21 18	64 59 148	77
1 & 2 TC Multifan	nily Housing (Mid-Rise) (221)	470 61	Dwelling Units Dwelling Units Dwelling Units	170 30	26% 33%	74% 67%	51 44 10	126	9%	2.5%	50 39 9	112	198 151 27
1 & 2 TC Senior	Adult Housing-Detached (251) Adult Housing-Attached (252)	43	Dwelling Units	10 108	35% 26%	65% 74%	4 28	20 7 80	9%	2.5%	4 26	18 6 74	10 100
1 & 2 VC-C Senior	nlly Housing (Mid-Rise) (221) Adult Housing-Detached (251) Adult Housing-Attached (252)	38 26	Dwelling Units Dwelling Units Dwelling Units	20	33% 35%	67% 65%	7	13	5% 5%	2.5% 2.5% 2.5%	6	12	18
1 Other Multifan	nily Housing (Mid-Rise) (221)	357	Dwelling Units	130	26% 33%	74% 67%	34	96	0%	2.5%	33 8	94 16	127
1 Other Senior	Adult Housing-Detached (251) Adult Housing-Attached (252) nily Housing (Mid-Rise) (221)	46 32 325	Dwelling Units Dwelling Units	24 8	35% 26%	65% 74%	3	16 5 87	0% 5%	2.5% 2.5% 2.5%	3	5	24 8
2 & 3 VC-A Senior	Adult Housing (Mid-Rose) (221) Adult Housing-Detached (251) Adult Housing-Attached (252)	42 29	Dwelling Units Dwelling Units Dwelling Units	118 22 6	33% 35%	67% 65%	31 7 2	15	5% 5%	2.5%	29 6 2	81 14 4	110 20 6
2 Other Multifan	nily Housing (Mid-Rise) (221)	442 57	Dwelling Units	160 28	26% 33%	74% 67%	42 9	118 19	0%	2.5%	41	115 19	156 28
2 Other Senior	Adult Housing-Detached (251) Adult Housing-Attached (252)	40 502	Dwelling Units Dwelling Units	8 182	35% 26%	65% 74%	3 47	5 135	0% 3%	2.5% 2.5% 2.5%	3 44	5 128	8 172
3 VC-B Senior A	nily Housing (Mid-Rise) (221) Adult Housing-Detached (251) Adult Housing-Attached (252)	65 45	Dwelling Units Dwelling Units	182 30 10	26% 33% 35%	74% 67% 65%	47 10 4	135 20 7	3% 3% 3%	2.5% 2.5% 2.5%	9	128 19 7	172 28 11
3 Other Multifan	Adult Housing-Attached (252) nily Housing (Mid-Rise) (221) Adult Housing-Detached (251)	45 254 33	Dwelling Units Dwelling Units Dwelling Units	10 92 18	35% 26% 33%	65% 74% 67%	4 24 6	7 68 12	3% 0% 0%	2.5% 2.5% 2.5%	4 23 6	7 66 12	11 89 18
3 Other Senior	Adult Housing-Detached (251) Adult Housing-Attached (252) nily Housing (Mid-Rise) (221)	23 619	Dwelling Units Dwelling Units Dwelling Units	18 6 224	33% 35% 26%	65% 74%	6 2 58	12 4 166	0% 0%	2.5% 2.5% 2.5%	6 2 57	12 4 162	18 6 219
4 Other Senior	Adult Housing-Detached (251)	619 83 56	Dwelling Units	224 36 12	26% 33% 35%	74% 67% 65%	12 4	166 24 8	0% 0%	2.5% 2.5% 2.5%	12 4	162 23	219 35 12
Project	Adult Housing-Attached (252) Total a.m. Peak Hour Trips	06	Dwelling Units	4,876	35%	00%	2,231	2,651	U%	2.0%	2,037	2,498	12 4,535
Phase Area	Land Use ¹	Units	Unit Type	Generation	% Entering	55 Exiting	Entering	Exiting	Capture ²	Reduction ³	Entering	Exiting	Trips
1 & 2 TC Single-I	rily Housing (Low-Rise) (220) Family Detached Housing (210)	125 215 1272	Dwelling Units Dwelling Units	74 212 1,276	63% 63% 16%	37% 37% 84%	47 134 204	27 78 1,072	11% 11% 11%	2.5% 2.5% 2.5%	41 116 177	23 68 930	64 184 1,107
1 & 2 TC Shoppin	I Office Building (710) ng Center (820) nily Housing (Law-Rise) (220)	1272 258.8 75	1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units	1,276 988 46	16% 48% 63%	84% 52% 37%	204 474 29	1,072 514 17	11% 11% 13%	2.5% 2.5% 2.5%	177 411 25	930 446 14	1,107 857 39
1 & 2 VC-C Single-I	nily Housing (Low-Rise) (220) Family Detached Housing (210) I Office Building (710)	137 31.9	Dwelling Units Dwelling Units 1,000 Sq. Ft. GFA	138 40	63% 16%	37% 37% 84%	87 6	51 34	13%	2.5%	74 5	43 29	117 34
1 & 2 VC-C Shoppin	l Office Building (710) ng Center (820) nily Housing (Low-Rise) (220)	31.9 36.3 95	1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units	40 140 58	16% 48% 63%	52% 37%	67 37	73 21	13% 13% 0%	2.5% 2.5% 2.5%	5 57 36	62 20	34 119 56
 Other Single-I 	Family Detached Housing (220) nily Housing (Low-Rise) (220)	162 86	Dwelling Units Dwelling Units	162 52	63% 63%	37% 37% 37%	102 33	60 19	0%	2.5% 2.5% 2.5%	99 29	59 17	158 46
2 & 3 VC-A Single-I	Family Detached Housing (210) I Office Building (710)	148 90.1	Dwelling Units 1,000 Sq. Ft. GFA	150 104	63% 16%	37% 37% 84%	95 17	56 87	10%	2.5%	83 15	49 76	132 91
2 & 3 VC-A Shoppin	ng Center (820) ng Housing (Low-Rise) (220)	45.4 116	1,000 Sq. Ft. GFA 1,000 Sq. Ft. GLA Dwelling Units	174 68	48% 63%	52% 37%	84 43	90 25	10%	2.5%	74 42	79 24	153 66
2 Other Single-I	Family Detached Housing (220) rolly Housing (Low-Rise) (220)	200	Dwelling Units Dwelling Units	198 78	63%	37% 37% 37%	43 125 49	73 29	0% 6%	2.5%	122 45	71 27	193 72
3 VC-B Single-I	nily Housing (Low-Rise) (220) Family Detached Housing (210) ng Center (820)	133 227 40.5	Dwelling Units Dwelling Units 1,000 Sq. Ft. GLA	78 224 156	63% 63% 48%	37% 37% 52%	49 141 75	29 83 81	6% 6%	2.5% 2.5% 2.5%	45 129 69	76 74	72 205 143
3 Other Multifan	ng Center (820) nily Housing (Low-Rise) (220) Family Detached Housing (210)	67 115	Dwelling Units Dwelling Units	42 118	63% 63%	37% 37%	26 74	16 44	0%	2.5%	25 72	16 43	143 41 115
4 Other Multifan	nily Housing (Low-Rise) (220) Family Detached Housing (210)	165 276	Dwelling Units Dwelling Units Dwelling Units	94 270	63% 63%	37% 37% 37%	59 170	35 100	0%	2.5%	58 166	43 34 98	92 264
1 & 2 TC Multifan	nily Housing (Mid-Rise) (221)	470 61	Dwelling Units	208 34	61% 61%	39% 39%	127 21	81 13	11% 11%	2.5%	110	70 11	180 29
1 & 2 TC Senior	Adult Housing-Detached (251) Adult Housing-Attached (252) nily Housing (Mid-Rise) (221)	43 300	Dwelling Units Dwelling Units Dwelling Units	34 14 132	61% 55% 61%	39% 45% 39%	21 8 81	13 6 51	11% 11% 13%	2.5% 2.5% 2.5%	18 7 69	11 5 43	12 112
1 & 2 VC-C Senior	nity Housing (Mid-Rise) (221) Adult Housing-Detached (251) Adult Housing-Attached (252)	38 26	Dwelling Units Dwelling Units Dwelling Units	132 24 10	61% 61% 55%	39% 39% 45%	81 15 6	51 9 5	13% 13% 13%	2.5% 2.5% 2.5%	69 13 5	43 8 4	112 21 9
 Other Multifan 	Adult Housing-Attached (252) nily Housing (Mid-Rise) (221) Adult Housing-Detached (251)	26 357 46	Dwelling Units	10 158 28	55% 61% 61%	45% 39% 39%	6 96 17	62 11	13% 0% 0%	2.5% 2.5% 2.5%	5 94 17	60	9 154 28
1 Other Senior	Adult Housing-Attached (252)	46 32 325	Dwelling Units Dwelling Units Dwelling Units	28 10 144	61% 55% 61%	39% 45% 39%	17 6 88	11 5 56	0% 0% 10%	2.5% 2.5% 2.5%	17 6 77	11 5 49	28 11 126
2 & 3 VC-A Senior	nily Housing (Mid-Rise) (221) Adult Housing-Detached (251)	325 42 29	Dwelling Units Dwelling Units	144 26 10	61% 61% 55%	39% 39% 45%	88 16 6	56 10 5	10% 10% 10%	2.5% 2.5% 2.5%	77 14 5	49 9 4	126 23 9
2 Other Multifan	Adult Housing-Attached (252) nily Housing (Mid-Rise) (221)	442	Dwelling Units Dwelling Units	196	61%	39%	120	76	0%	2.5%	117	74	191
2 Other Senior	Adult Housing-Detached (251) Adult Housing-Attached (252)	57 40 502	Dwelling Units Dwelling Units	32 12	61% 55% 61%	39% 45% 39%	20 7	12 5 87	0% 0%	2.5% 2.5% 2.5%	20 7	12 5	32 12 204
3 VC-B Senior in	nily Housing (Mid-Rise) (221) Adult Housing-Detached (251) Adult Housing-Attached (252)	502 65 45	Dwelling Units Dwelling Units Dwelling Units	222 36 14	61% 61% 55%	39% 39% 45%	135 22 8	87 14 6	6% 6%	2.5% 2.5% 2.5%	124 20 7	80 13	204 33 12
3 Other Multifan	nily Housing (Mid-Rise) (221)	45 254 33	Dwelling Units Dwelling Units Dwelling Units	14 112 22	61% 61%	45% 39% 39%	68 13	44 9	0% 0%	2.5% 2.5% 2.5%	66 13	5 43 9	12 109 22
3 Other Senior a	Adult Housing-Detached (251) Adult Housing-Attached (252)	33 23 619	Dwelling Units	22 8 274	61% 55% 61%	39% 45% 39%	13 4 167	9 4 107	0% 0% 0%	2.5% 2.5% 2.5%	13 4 163	9 4 104	22 8 267
4 Other Senior	nily Housing (Mid-Rise) (221) Adult Housing-Detached (251) Adult Housing-Attached (252)	619 83 56	Dwelling Units Dwelling Units	274 42 16	61% 61% 55%	39% 39% 45%	167 26 9	107 16 7	0% 0%	2.5% 2.5% 2.5%	163 25 9	104 16	267 41 16
4 Other Senior a Project	Adult Housing-Attached (252) Total p.m. Peak Hour Trips	OD ITEITein Co	Dwelling Units	6,646	U076	4076	3,264	3,386	076	4.076	2,980	3,029	16 6,009

	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:	Analysis Year: 2042 Checked By:											
Analysis Period:	AM Street Peak Hour		Date:									

	Table 1	I-A: Base Vehic	cle-Trip Generation I	stimates (Single-Use S	ite Estimate)	•
Land Use	Developme	ent Data (<i>For In</i>	formation Only)		Estimated Vehicle-Trips ³	
Land Ose	ITE LUCs1	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 Trip	os			Exiting Trips			
Land Use	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)										
Destination (To)										
Origin (From)	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel				
Office										
Retail										
Restaurant										
Cinema/Entertainment										
Residential										
Hotel										

Table 4-A: Internal Person-Trip Origin-Destination Matrix*											
Destination (To)											
Origin (From)	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						

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

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

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

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

⁴Enter 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.

⁶Person-Trips

NCHRP 684 Internal Trip Capture Estimation Tool									
Project Name:	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 Vehic	le-Trip Generation	Es	timates (Single-Use Sit	e Estimate)	
Land Use	Developme	ent Data (For In	formation Only)			Estimated Vehicle-Trips ³	
Land Ose	ITE LUCs1	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									
l and llas		Entering Tri	ps			Exiting Trips			
Land Use	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				Ī					

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)									
Origin (From)		Destination (To)							
Origin (From)	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)											
Origin (From)	Office Retail Restaurant Cinema/Entertainment Residential										
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						

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

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

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

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

⁶Person-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	Developme	ent Data (<i>For In</i>	formation Only)			Estimated Vehicle-Trips ³					
Land Use	ITE LUCs1	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											
Landlia		Entering Tri	os			Exiting Trips					
Land Use	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)						
Origin (From)	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel				
Office										
Retail										
Restaurant										
Cinema/Entertainment										
Residential										
Hotel										

Table 4-A: Internal Person-Trip Origin-Destination Matrix*												
Origin (Fram)		Destination (To)										
Origin (From)	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	Table 5-A: Computations Summary										
Total Entering Exitir											
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						

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

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

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

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

⁴Enter 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.

⁶Person-Trips

	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	Developme	ent Data (For In	formation Only)			Estimated Vehicle-Trips ³					
Land Ose	ITE LUCs1	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											
		Entering Tri	ps			Exiting Trips					
Land Use	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				Ī							

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)											
Origin (From)		Destination (To)									
Origin (From)	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel					
Office		1750			1750						
Retail					1750						
Restaurant											
Cinema/Entertainment											
Residential		1750									
Hotel											

		Table 4-P: Ir	nternal Person-Tri _l	Origin-Destination Matrix	*				
Origin (From)		Destination (To)							
Origin (From)	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: Interna	Table 6-P: Internal Trip Capture Percentages by Land Use							
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						

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

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

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

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

⁶Person-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 Vehic	cle-Trip Generation	Est	imates (Single-Use Site	e Estimate)	
Land Use	Developme	ent Data (<i>For In</i>	formation Only)			Estimated Vehicle-Trips ³	
Land Ose	ITE LUCs1	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 Veh	icle	Occupancy Estimates	3	
Land Use		Entering Trip	os			Exiting Trips	
Land Ose	Veh. Occ.⁴	% Transit	% Non-Motorized	Γ	Veh. Occ.4	% Transit	% Non-Motorized
Office				Ī			
Retail	1.17	2.5%	0%		1.17	2.5%	0%
Restaurant				Ī			
Cinema/Entertainment				Ī			
Residential	1.13	2.5%	0%	Ī	1.13	2.5%	0%
Hotel							
All Other Land Uses ²							

	Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)							
Origin (Farms)				Destination (To)				
Origin (From)	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel		
Office								
Retail								
Restaurant								
Cinema/Entertainment								
Residential								
Hotel								

		Table 4-A: I	nternal Person-Tri _l	o Origin-Destination Matrix*					
Origin (From)		Destination (To)							
Origin (From)	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: Interna	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						

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

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

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

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

⁴Enter 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.

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

⁶Person-Trips

	NCHRP 684 Internal Trip Capture Estimation Tool						
Project Name:	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 Vehic	le-Trip Generation	Estimates (Single-Use S	ite Estimate)	•
Land Use	Developme	ent Data (For In	nformation Only)		Estimated Vehicle-Trips ³	
Land Ose	ITE LUCs1	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							
Landllan		Entering Tri	ps			Exiting Trips	
Land Use	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)							
Origin (From)	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)								
Origin (From)	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						

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

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

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

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

⁶Person-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	I-A: Base Vehic	cle-Trip Generation	Es	timates (Single-Use Sit	e Estimate)	
Land Use	Developme	ent Data (<i>For In</i>	formation Only)			Estimated Vehicle-Trips ³	
Land Ose	ITE LUCs1	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 Trip	os			Exiting Trips		
Land Use	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)				
Oligin (Floin)	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel		
Office								
Retail								
Restaurant								
Cinema/Entertainment								
Residential								
Hotel								

Table 4-A: Internal Person-Trip Origin-Destination Matrix*									
Origin (Fram)		Destination (To)							
Origin (From)	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						

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

⁶Person-Trips

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

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

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

⁴Enter 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.

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 Vehic	le-Trip Generation	Estimates (Single-Use S	ite Estimate)	_	
Land Use	Developme	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs1	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	İ	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*									
Onimin (Frame)		Destination (To)							
Origin (From)	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				

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

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

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

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

⁶Person-Trips

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