

Technical Memorandum #2 Technical Appendices
Appendix C – Site Inventory

Site Inventory

A site visit was made January 28-29, 2020 by Tricia Tanner, Dejan Dudich, and Kristie Gladhill. Field data were collected, and operation observations logged.

Lane Configurations, Speeds, Roadway Characteristics and Observed Queues

Figure C-1: Barnett Road at Stewart Avenue

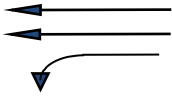
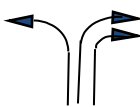

Barnett Road at Stewart Avenue		3SG (3-legged signalized intersection)						
Road Name	Barnett Rd		Stewart Ave			Barnett Rd		
Speed	35 mph		35 mph			35 mph		
Grade%	0%		0%			0%		
Median			2' raised					
Sidewalk condition	8' Good		7' Good			7' Good		
Bike lane	4' shoulder		4' shoulder			4' shoulder		
Tire Wear	Visible, with cracking		Visible, with cracking			Visible, with cracking		
Approach	Westbound		Northbound			Eastbound		
Lane Configuration								
Turning Movement	WBL	WBT	NBL	NBT	NBR	EBL	EBT	EBR
AM queues (Vehicles)	0,0,0, 0,0,0, 1	0,2,2,0, 1,3,4,2, 5,0,1,6	1,4,1, 1,2,2	0,0,0, 0,0,0	0,0,1, 0,0,0	0,1,0, 2,1,0	0,1,1, 4,1,1	0,0,1, 0,0,0
average	0.1	2.2	1.8	0	0.2	0.7	1.3	0.2

Figure C-2: Barnett Road at Alba Drive

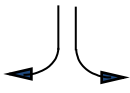
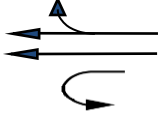

Barnett Road at Alba Drive		3SG (3-legged signalized intersection)	
Road Name	Alba Dr	Barnett Rd	Barnett Rd
Speed	25 mph	35 mph	35 mph
Grade%	0%	0%	0%
Median		14.5' raised	
Sidewalk Condition	Good	Good	Good
Bike lane		4' bike lane	4' bike lane
Approach	Southbound	Westbound	Eastbound
Lane Configuration			

Figure C-3: Barnett Road at Highland Drive

Barnett Road at Highland Drive				4SG (4-legged signalized intersection)								
Road Name	Highland Dr			Barnett Rd			Highland Dr			Barnett Rd		
Speed	35 mph			35 mph			35 mph			35 mph		
Grade%	0%			0%			0%			0%		
Median				4' raised			3' raised			4' raised		
Sidewalk Condition	10' Good			8' Good			5.6' E side, 15' W ¹ Good			4' N side, 8' S side Good		
Bike lane	5' shoulder			4' shoulder			6' bike lane			5.7' bike lane		
Tire wear	Visible			Visible			Visible			Visible		
Approach	Southbound			Westbound			Northbound			Eastbound		
Lane Configuration												
Turning Movement	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR
AM queues (Vehicles)	2, 3, 3, 5, 5, 3	6, 16, 14, 11, 21, 12	11, 18, 16, 12, 16, 16	10, 13, 11, 7,6, 7,4, 6,6, 5,1, 2,5, 1	4, 3, 2, 1, 3, 0	4, 8, 0, 4, 5, 0	1, 2, 8, 5, 4, 6	10, 12, 6, 10, 6,9, 2,2, 3,3, 4,5	32, 11, 25, 32, 19, 2, 6	2+2, 0+0, 3+2, 2+1, 4+1, 0+2	8+9, 10+6, 13+9, 14+17, 11+9, 8,7	1, 1, 2, 0, 0, 0
average	3.5	13.3	14.8	6.0	2.3	3.5	3.5	6.3	18.1	3.2	20.2	0.8
PM queues (Vehicles)	²			7+27 ³ , 10+16, 11+29, 4+17, 6+27, 13+27, 6+25, 6+17, 5+22	10,26, 16,24, 16,14, 20,15, 10,15		10, 10, 4	8, 6, 10, 10, 4	9,8, 10, 10, 9,8, 10, 13, 9, 10			
average				30.6	16.6		10	7.6	7.6			

Notes:

¹ West leg has an overhead shared use path crossing for bicycles and pedestrians; south approach is 320' from curb line; west leg is separated from street, connects with multi-use paths along Bear Creek, forces pedestrian to go north parallel to Alba and double back, taking 1180' to get to the Alba intersection; it would be 1830' to get back to street level at the NW corner of this intersections.

² North leg was observed to back up past LT lane storage, into upstream intersection.

³ East leg ~27 vehicle queue was observed to back up past LT lane storage, into upstream intersection.

Figure C-4: Barnett Road at Ellendale Drive

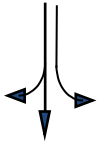
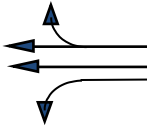
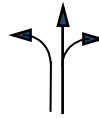
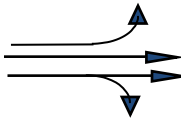
Barnett Road at Ellendale Drive				4SG (4-legged signalized intersection)								
Road Name	Ellendale Dr			Barnett Rd			Ellendale Dr			Barnett Rd		
Speed	25 mph			35 mph			25 mph			35 mph		
Grade%	0%			0%			0%			0%		
Sidewalk	5'			8'			6'			8'		
Condition	Good			Good			Good			Good		
Bike lane										3' shoulder		
Tire wear	Visible			Visible			Visible			Visible		
Approach	Southbound			Westbound			Northbound			Eastbound		
Lane Configuration												
Turning Movement	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR
AM queues (Vehicles)	0,0, 3,1, 1,2	0,0, 0,0, 1,0		1,0, 2,0, 0,1	5,5, 4,4, 4,3	4,3, 3,4, 1,1	8,3, 2,6, 1,1		1,0, 1,1, 1,1	0,0, 2,1, 1,0	13, 3, 11, 10, 1, 13	12, 7, 13, 8,5, 12
average	1.2	0.2		0.7	4.2	2.7	3.5		0.8	0.7	8.5	9.5

Figure C-5: Garfield Street at I-5 SPUI Interchange

Garfield Street at I-5 SPUI Interchange				SPUI (Single Point Urban Interchange)								
Road Name	Garfield			I-5 NB off Ramp			Garfield			I-5 SB off Ramp		
Speed	35 mph						35 mph					
Sidewalk Condition	7' Good			7' Good			7' Good			7' Good		
Bike lane	5' shoulder			4' shoulder			5' shoulder			6' shoulder		
Approach	SW bound			NW bound			NE bound			SE bound		
Lane Configuration												
Turning Movement	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR
AM queues (Vehicles)				5,3, 5,6, 3,4		5,3, 5,3, 3,5	10, 9, 13, 12, 5,6	7+4 7+9 3+4 11, 13, 11, 8, 10		20, 15, 27, 25-30 15, 12, 20, 38 ¹ , 35	20 ² , 7,8, 10, 20, 20	
average				4.3		4.0	9.2	10.9		23.7	14.2	

¹ EBL 38 vehicle queue was full SB off ramp. There is ~ 20 minute period starting ~ 7:30 am that the SB ramp off-ramp typically backs up onto mainline.

² EBT 20 vehicle queue was nearly the length of the SB off ramp.

Figure C-6: Garfield Street at Center Drive

Garfield Street at Center Drive				4SG (4-legged signalized intersection)								
Road Name	Garfield			Center Dr			Garfield			Center Dr		
Speed	35 mph			25 mph			35 mph			30 mph		
Grade%	0%			0%			0%			0%		
Median	20' grass						15' grass					
Sidewalk	7'			6'			7'			7'		
Condition	Good			Good			Good			Good		
Bike lane	4' bike lane			3' shoulder			4' bike lane			3' shoulder		
Tire Wear	Visible, with cracking			Visible, with cracking			Visible, with cracking			Visible, with cracking		
Approach	SW bound			NW bound			NE bound			SE bound		
Lane Configuration												
Turning Movement	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR
PM queues (Vehicles)	0,0, 0	10+10 7+7 3+5 10+5	7,2, 0,0				1,1, 4,5	7+2 15 7+7 5+9		5,8, 10 7+7		4,7, 4,5, 7
average	0	14.3	2.3				2.8	13		9.3		6.8

Figure C-7: Garfield Street at Riverside Avenue / OR 99

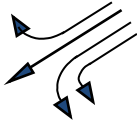
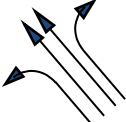
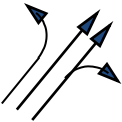

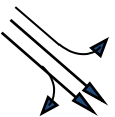
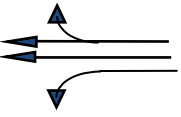
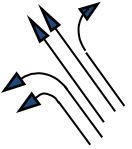
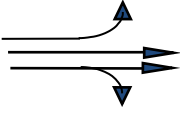
Garfield Street at Riverside Avenue / OR 99			4SG (4-legged signalized intersection)									
Road Name	Garfield		Riverside / OR 99			Garfield			Riverside/OR 99			
Speed	35 mph		45 mph			40 mph			45 mph			
Grade%	0%		0%			0%			0%			
Median	4' raised		12' raised			12' raised			4' raised			
Sidewalk Condition	6' Good		6' Good			6' Good			6' Good			
Bike lane	4' bike lane		5' bike lane			4' bike lane			5' bike lane			
Tire Wear	Visible, with cracking		Visible, with cracking			Visible, with cracking			Visible, with cracking			
Approach	SW bound		NW bound			NE bound			SE bound			
Lane Configuration												
Turning Movement	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR
AM queues (Vehicles)	2,5, 0, 10, 8,6,	5,4, 1,3, 7,3		0,0, 0,2, 4,0	7,5, 7,5, 1,6, 5		0,0, 2,1, 2,1	3,7, 8,0, 2,8		5,3, 2,2, 5,3	3,0, 1,1, 1,5	
average	5.2	3.8		1.0	5.1		1.0	4.7		3.3	1.8	

Figure C-8: Riverside Avenue / OR 99 at Stewart Avenue

Riverside Avenue / OR 99 at Stewart Avenue							4SG (4-legged signalized intersection)					
Road Name	Riverside/OR 99			Stewart Ave			Riverside/OR 99			Stewart Ave		
Speed	35 mph			35 mph			35 mph			35 mph		
Grade%	0%			0%			0%			0%		
Median	4' raised			1' raised			4' raised					
Sidewalk Condition	Good			Good			Good			Good		
Bike lane							6' bike lane					
Tire Wear	Visible, cracking through intersection			Visible, cracking through intersection			Visible, cracking through intersection			Visible, cracking through intersection		
Approach	Southbound			Westbound			Northbound			Eastbound		
Lane Configuration												
Turning Movement	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR
AM queues (Vehicles)	1,0, 1,1, 0,0	10, 6, 12, 2,4, 7		0,0, 0,1, 0,1	6,4, 6,2, 1,1		5,2, 5,3, 2,4	6,3, 6,3, 2,4		1,1, 2,1, 1,1, 0	6.7, 10, 9,9, 5, 3	
average	0.5	6.8		0.3	3.3		3.5	4.0		1.0	6.7	

Lanes and Geometrics

Synchro has lane width, crosswalk and sidewalk widths,

Figure C-9 Barnett Road at Stewart Avenue

Lanes and Geometrics

83: Stewart Avenue & Barnett Road



















05/29/2020

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↙	↑↑	↖	↗↗
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	237		151	0
Storage Lanes		1	1		1	2
Taper Length (ft)			95		78	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	0.88
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3197	1444	1630	3197	1630	2592
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3197	1444	1630	3197	1630	2592
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		65				441
Link Speed (mph)	35			35	35	
Link Distance (ft)	256			1513	442	
Travel Time (s)	5.0			29.5	8.6	
Intersection Summary						
Area Type:	Other					

Figure C-10: Barnett Road at Alba Drive
Lanes and Geometrics

91: Alba Drive & Barnett Road

06/03/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	85		0	83		0	0		0	0		32
Storage Lanes	1		0	1		0	0		0	1		1
Taper Length (ft)	50			50			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00			1.00	1.00					0.99		0.99
Frt					0.997							0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1646	3197	0	1630	3153	0	0	0	0	1630	0	1473
Flt Permitted	0.349			0.950						0.950		
Satd. Flow (perm)	603	3197	0	1625	3153	0	0	0	0	1618	0	1452
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					3							68
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1513			791			116			569	
Travel Time (s)		29.5			15.4			3.2			15.5	

Intersection Summary

Area Type: Other

Figure C-11: Barnett Road at Highland Drive
Lanes and Geometrics

90: Highland Drive & Barnett Road

05/29/2020



















































													
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	 	 		 	 			 			 		
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12	
Grade (%)	0%			0%			0%			0%			
Storage Length (ft)	300		300	360		0	465		600	250		0	
Storage Lanes	2		1	2		0	1		1	1		0	
Taper Length (ft)	90			90			90			90			
Lane Util. Factor	0.97	0.95	1.00	*0.67	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95	
Ped Bike Factor				0.850			0.981			0.850			0.967
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	3285	3353	1485	2225	3293	0	1598	3386	1500	1693	3246	0	
Flt Permitted	0.950			0.950			0.950			0.950			
Satd. Flow (perm)	3285	3353	1485	2225	3293	0	1598	3386	1500	1693	3246	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)			80			15			65			26	
Link Speed (mph)		35			35			35				35	
Link Distance (ft)		791			1001			1395				358	
Travel Time (s)		15.4			19.5			27.2				7.0	
Intersection Summary													
Area Type:	Other												
* User Entered Value													

Figure C-12 Barnett Road at Ellendale Drive

Lanes and Geometrics

94: Ellendale Drive & Barnett Road

05/29/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	82		0	80		0	105		0	95		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	90			90			90			90		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00	1.00		0.99	0.98		0.98	0.98	
Frt	0.987		0.995		0.915		0.900					
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1646	3190	0	1525	3239	0	1554	1440	0	1646	1512	0
Flt Permitted	0.950			0.950			0.649			0.732		
Satd. Flow (perm)	1633	3190	0	1521	3239	0	1048	1440	0	1248	1512	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			4			22			56	
Link Speed (mph)		30			35			30			30	
Link Distance (ft)		1001			1259			426			677	
Travel Time (s)		22.8			24.5			9.7			15.4	

Intersection Summary

Area Type: Other

Figure C-13: Garfield Street at I-5 SPUI Interchange

Lanes and Geometrics

826: Garfield Street & SB off ramp/NB off ramp

05/29/2020














































										
Lane Group	EBL	EBR2	WBL	WBR2	NBL	NBT	NBR2	SBL	SBT	SBR2
Lane Configurations										
Ideal Flow (vphpl)	1700	1700	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%						0%			
Storage Length (ft)	375		270		270		200			
Storage Lanes	2		2		2		2			
Taper Length (ft)	175		175		175		125			
Lane Util. Factor	*0.67	1.00	0.97	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor	0.850		0.850		0.850		0.850			
Flt Protected	0.950		0.950		0.950		0.950			
Satd. Flow (prot)	2081	1363	3131	1444	3043	3260	1365	3101	3228	1458
Flt Permitted	0.950		0.950		0.950		0.950			
Satd. Flow (perm)	2081	1363	3131	1444	3043	3260	1365	3101	3228	1458
Right Turn on Red	Yes		Yes				Yes		Yes	
Satd. Flow (RTOR)	393		348				346		484	
Link Speed (mph)						30			30	
Link Distance (ft)						1345			1395	
Travel Time (s)						30.6			31.7	
Intersection Summary										
Area Type:	Other									
* User Entered Value										

Figure C-14: Garfield Street at Center Drive

Lanes and Geometrics

827: Center Drive & Garfield Street

05/29/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 					 		
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	186		0	400		175	51		0	190		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	49			30			49			36		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor		0.999				0.850		0.850			0.871	
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	1553	3133	0	1589	3136	1403	1583	1376	0	2984	1401	0
Flt Permitted	0.198						0.701			0.428		
Satd. Flow (perm)	324	3133	0	1589	3136	1403	1168	1376	0	1344	1401	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				474		52			74	
Link Speed (mph)		30			30			25			35	
Link Distance (ft)		637			1345			406			1853	
Travel Time (s)		14.5			30.6			11.1			36.1	

Intersection Summary

Area Type: Other

Note: Center Drive is NB/SB, Garfield Street is EB/WB in Synchro

Figure C-15: Garfield Street at Riverside Avenue / OR 99

Lanes and Geometrics

87: Riverside/OR99 & Garfield Street

05/29/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1725	1725	1725	1750	1750	1750	1785	1785	1785	1785	1785	1785
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	220		0	300		300	250		512	220		330
Storage Lanes	1		0	2		1	2		1	1		1
Taper Length (ft)	120			155			65			130		
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.982			0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1607	3118	0	3072	1683	1403	3163	3293	1392	1585	3293	1473
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1607	3118	0	3072	1683	1403	3163	3293	1392	1585	3293	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				236			71			81
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		630			416			2548			1104	
Travel Time (s)		12.3			8.1			38.6			16.7	

Intersection Summary






















Area Type: Other

Figure C-16: Riverside Avenue / OR 99 at Stewart Avenue

Lanes and Geometrics

84: Riverside/OR99 & Stewart

05/29/2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1725	1725
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	247		0	218		0	128		0	298		488
Storage Lanes	1		0	1		0	1		0	2		1
Taper Length (ft)	113			36			47			124		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	0.97	0.95	1.00
Ped Bike Factor	0.953			0.974			0.958			0.850		
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1568	3067	0	1630	3108	0	1385	2910	0	3072	3092	1437
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1568	3067	0	1630	3108	0	1385	2910	0	3072	3092	1437
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		57			19			46				36
Link Speed (mph)		35			35			35			45	
Link Distance (ft)		1338			390			1122			2548	
Travel Time (s)		26.1			7.6			21.9			38.6	

Intersection Summary

Area Type: Other

Train schedules

There is a railroad track west of OR 99, parallel to OR 99 through the study area. Per Preston Mann with ODOT Region 3 Rail, there are ~ 4 trains/day blocking both Garfield Street and Stewart Avenue for 2-4 minutes each time.

Contact Information

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