

BURY

TRAFFIC IMPACT ANALYSIS REPORT

*Austin Oaks
Austin, Travis County, Texas
C814-2014-0120*

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TBPE #F-1048



LET'S SOLVE IT.

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CERTIFICATION STATEMENT


I hereby certify that this report complies with Ordinance requirements and applicable technical requirements of the City of Austin and the Texas Department of Transportation and is complete and accurate to the best of my knowledge.



(Signature of Responsible Engineer) Texas P.E. No. 116095

8/19/2015

Date



Signature of Submitter

8/19/2015

Date

Bobak J. Tehrany, P.E.

Printed Name of Submitter

8/19/2015

Date

EXECUTIVE SUMMARY

The purpose of this report is to summarize the findings of the Traffic Impact Analysis (TIA) performed by Bury, Inc. (Bury) for the proposed Austin Oaks development which is planned to be fully constructed by 2031. The proposed development will be located at the southwest corner of Spicewood Springs Road and Loop 1 (Mopac) in Austin, Travis County, Texas. A Site Location Map of the proposed development is included as *Exhibit 1* and a Conceptual Plan is included as *Exhibit 2* within the Appendix of this report.

The Austin Oaks site is currently fully developed and occupied with office land uses. The proposed redevelopment of the existing site will serve as a more mixed use development providing restaurant, residential, and office land uses. Given the current occupancy of the development, the redevelopment of Austin Oaks will occur in various phases of construction through the next 17 years. For the purposes of this TIA, the development has been analyzed in four (4) major build-out conditions: 2018, 2023, 2028, and 2031. Based on the proposed land use intensities, it is anticipated that the development will generate a total of 19,819 unadjusted daily trips; however, due to the existing office land uses, the proposed redevelopment is anticipated to generate a net increase of 15,701 unadjusted daily trips. This is taking into consideration the trips which already exist on the roadway network due to the existing development. A summary of the proposed phasing, land uses, and intensities can be seen within the **Table 1** below. The Trip Generation Output is included as *Exhibit 3* within the Appendix of this report.

TABLE 1– SUMMARY OF UNADJUSTED DAILY AND PEAK HOUR TRIP GENERATION

ITE Code	Land Use	Size		24-Hour Two-Way Volume	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Existing Development										
710	General Office	450,000	SF	4,118	561	76	637	99	483	582
Existing Subtotal				4118	561	76	637	99	483	582
Phase I										
710	General Office Building	252,800	SF	2,657	354	48	402	62	300	362
932	High Turnover (Sit-Down) Restaurant	30,000	SF	3,815	178	146	324	178	118	296
Phase I Subtotal				6,472	532	194	726	240	418	658
Phase II										
710	General Office Building	320,000	SF	3,178	427	58	485	74	363	437
932	High Turnover (Sit-Down) Restaurant	10,844	SF	1,378	64	53	117	64	43	107
Phase II Subtotal				4,556	491	111	602	138	406	544
Phase III										
710	General Office Building	336,520	SF	3,302	444	61	505	77	378	455
932	High Turnover (Sit-Down) Restaurant	29,000	SF	3,687	172	141	313	172	114	286
Phase III Subtotal				6,989	616	202	818	249	492	741
Phase IV										
220	Apartment	277	DU	1,802	28	111	139	111	59	170
Phase IV Subtotal				1,802	28	111	139	111	59	170
Total Proposed Development				19,819	1,667	618	2,285	738	1,375	2,113
Net Increase of Trips				15,701	1,106	542	1,648	639	892	1,531

As agreed upon during the scoping process, reductions were taken for internal circulation to account for persons using the same trip for multiple land-uses (an individual working in an office and dining at a restaurant within the same development, for example). Pass-by reductions were allowed for the various land-uses in which pass-by reductions are available. Transit reductions were not applied due to the lack of public transportation within close proximity to this property. Trip reductions were not applied to the existing office land use since the current development does not provide any internal capture opportunities nor is there any pass-by reductions available; therefore, the existing land use has the same trip generation as the Unadjusted Trip Generation Table. As a result, Table 2 summarizes the total number of trips with regard to impact on the adjacent roadway network with these reductions in mind. Calculations detailing the various reductions has been included within the Appendix of this report as *Exhibit 7*.

TABLE 2– SUMMARY OF ADJUSTED DAILY AND PEAK HOUR TRIP GENERATION

ITE Code	Land Use	Size		24-Hour Two-Way Volume	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Existing Development										
710	General Office	450,000	SF	4,118	561	76	637	99	483	582
Existing Subtotal				4,118	561	76	637	99	483	582
Phase I										
710	General Office Building	252,800	SF	2,524	336	46	382	59	285	344
932	High Turnover (Sit-Down) Restaurant	30,000	SF	2,804	169	139	308	93	61	154
Phase I Subtotal				5,328	505	184	690	151	346	498
Phase II										
710	General Office Building	320,000	SF	3,019	406	55	461	70	345	415
932	High Turnover (Sit-Down) Restaurant	10,844	SF	1,013	61	50	111	33	22	56
Phase II Subtotal				4,032	466	105	572	104	367	471
Phase III										
710	General Office Building	336,520	SF	3,137	422	58	480	73	359	432
932	High Turnover (Sit-Down) Restaurant	29,000	SF	2,710	163	134	297	89	59	149
Phase III Subtotal				5,847	585	192	777	163	418	581
Phase IV										
220	Apartment	277	DU	1,712	27	105	132	105	56	162
Phase IV Subtotal				1,712	27	105	132	105	56	162
Total Proposed Development				16,919	1,584	587	2171	523	1,188	1,711
Net Increase of Trips				12,801	1,023	511	1534	424	705	1,129

Based on the Scoping Agreement with the City of Austin, the TIA analyzed 16 existing intersections and 11 proposed driveways which have been identified in **Table 3**, below. **Table 3** summarizes the operations at each intersection under the Existing, Forecasted (future, no-build with Background Traffic), and Site+Forecasted (future, build) conditions for each of the phases. Additionally, **Table 3** represents the intersections as they would perform as they exist today, without any improvements. *Exhibit 11* within the Appendix of this report provide the level of service, delay, and volume-to-capacity (v/c) ratios by intersection approach as well as overall operations.

TABLE 3– SUMMARY OF INTERSECTION LEVEL OF SERVICE AND DELAY

Intersection	2014		2018		2018		2023		2023		2028		2028		2031		2031	
	Existing		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
	LOS																	
	Delay (s)																	
Far West Boulevard & Hart Lane	D	D	D	D	E	D	F	D	F	D	F	D	F	D	F	D	F	D
	51.6	36.2	54.9	36.7	55.5	36.9	80.8	36.2	82.1	36.5	103.9	36.5	110.7	42.3	126.9	44.3	131.0	45.1
Far West Boulevard & Wood Hollow Drive	D	D	D	D	D	D	D	D	D	D	E	E	E	E	E	E	E	E
	42.1	42.1	43.4	43.4	43.6	43.5	48.9	50.0	49.3	51.0	57.3	60.6	59.7	60.7	69.3	70.4	69.8	70.5
Far West Boulevard & Mopac SB FR	C	E	C	F	C	F	D	F	D	F	D	F	D	F	E	F	E	F
	24.8	77.5	28.0	96.5	28.2	96.5	35.9	124.2	36.4	130.4	47.1	165.9	47.4	177.5	55.3	200.5	55.6	201.7
Far West Boulevard & Mopac NB FR	B	E	C	E	C	E	C	E	C	E	C	F	C	F	C	F	C	F
	19.2	67.3	20.9	68.8	20.6	69.1	22.1	68.3	22.1	79.6	24.6	117.6	24.7	143.6	27.6	171.4	27.9	174.3
Spicewood Springs Road & Mopac SB FR	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	118.8	88.3	151.1	110.9	159.4	114.8	199.6	142.9	206.4	154.9	261.6	195.5	278.3	225.7	313.0	252.9	318.0	255.6
Spicewood Springs Road & Mopac NB FR	D	E	E	E	E	F	F	F	F	F	F	F	F	F	F	F	F	F
	53.8	61.0	67.7	77.8	75.8	81.9	98.5	101.6	108.6	104.3	130.5	123.6	148.5	136.6	167.1	147.7	169.5	159.6
Spicewood Springs Road & Wood Hollow Drive / Private Driveway	D	C	E	C	E	C	F	C	F	C	F	C	F	D	F	D	F	D
	46.2	23.7	60.3	24.9	73.9	25.9	94.0	32.4	120.9	34.6	157.4	32.0	265.4	38.8	314.1	45.2	321.6	48.3
Steck Avenue & Mopac SB FR	E	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	65.0	99.7	132.8	167.0	134.2	168.0	181.2	212.7	183.6	212.6	237.8	262.3	249.5	262.1	287.0	295.1	286.9	295.5
Steck Avenue & Mopac NB FR	C	D	D	F	D	F	E	F	E	F	E	F	F	F	F	F	F	F
	28.2	53.2	47.9	94.6	48.6	94.6	62.4	123.8	64.0	123.4	79.1	158.2	87.0	158.7	98.1	184.8	98.6	185.2
Greystone Drive & Hart Lane	C	B	C	C	D	C	E	C	E	C	E	E	F	E	F	E	F	E
	18.2	14.3	23.6	16.7	25.4	17.1	36.9	23.3	37.8	24.4	43.1	37.9	52.0	41.4	56.1	46.6	56.3	47.8
Greystone Drive & Wood Hollow Drive	B	C	B	C	B	C	C	D	C	D	C	E	C	E	D	E	D	E
	11.3	16.7	12.4	21.0	13.0	21.7	15.1	31.6	16.0	33.3	19.7	40.2	22.0	42.5	26.6	46.6	27.2	46.8

CONTINUED

Intersection		2014		2018		2018		2023		2023		2028		2028		2031		2031	
		Existing		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
		LOS																	
		Delay (s)																	
Greystone Drive & Mopac SB FR	EB	F	D	F	E	F	F	F	F	F	F	F	F	F	F	F	F	F	F
		220.2	33.9	366.1	49.6	386.4	51.4	644.9	98.3	663.5	114.6	>9999.9	225.0	>9999.9	279.4	>9999.9	393.7	>9999.9	408.7
Executive Center Drive & Mopac SB FR	EB	C	C	C	D	E	E	F	F	F	F	F	F	F	F	F	F	F	F
		21.2	24.2	24.0	30.8	43.9	37.0	72.7	62.0	174.8	156.0	335.7	282.2	778.6	588.8	>9999.9	743.9	>9999.9	835.6
Executive Center Drive & Wood Hollow Drive	EB	C	C	C	D	D	E	E	F	F	F	F	F	F	F	F	F	F	F
		19.8	24.5	23.2	34.5	31.2	44.6	44.9	82.5	255.8	419.2	537.8	748.1	>9999.9	>9999.9	>9999.9	>9999.9	>9999.9	>9999.9
	WB	B	B	C	C	C	C	D	C	F	E	F	F	F	F	F	F	F	F
		13.5	14.8	17.8	18.0	23.3	19.6	29.9	23.5	184.1	49.2	>9999.9	118.3	>9999.9	>9999.9	>9999.9	>9999.9	>9999.9	>9999.9
Executive Center Drive & Hart Lane	WB	B	B	B	B	B	B	B	C	C	C	C	C	E	F	F	F	F	F
		11.4	12.5	11.6	13.3	13.0	13.8	13.9	15.1	15.0	16.4	16.9	19.1	38.0	62.2	54.2	96.1	88.0	124.0
Spicewood Springs Road & Hart Lane	NB	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
		4068.6	466.5	4113.0	4549.6	4211.5	4574.5	4219.9	4580.3	4307.9	4679.1	4329.4	4693.6	4065.9	4529.2	4107.1	4552.0	4086.5	4541.0
Executive Center Drive & Driveway 1	NB	-	-	-	-	A	A	A	A	B	B	B	B	C	B	C	B	C	C
		-	-	-	-	0.0	0.0	0.0	0.0	13.3	10.8	14.3	11.2	20.0	13.5	21.7	14.2	23.9	15.1
Executive Center Drive & Driveway 2	SB	-	-	-	-	B	A	B	A	B	B	B	B	C	B	C	B	C	B
		-	-	-	-	10.2	9.2	10.5	9.3	11.7	10.1	12.2	10.3	18.0	11.7	19.4	12.0	21.4	12.5
Executive Center Drive & Driveway 3	NB	-	-	-	-	A	A	A	A	B	A	B	A	C	B	C	B	C	B
		-	-	-	-	0.0	0.0	0.0	0.0	11.1	9.6	11.5	9.7	15.1	10.9	16.0	11.1	17.3	11.5
Executive Center Drive & Driveway 4	SB	-	-	-	-	A	A	A	A	A	A	A	A	B	A	B	A	B	A
		-	-	-	-	8.5	8.3	8.6	8.4	8.6	8.8	8.6	8.8	10.4	8.9	10.5	8.9	10.6	9.0
Executive Center Drive & Driveway 5	SB	-	-	-	-	A	A	A	A	A	A	A	A	C	B	C	B	C	C
		-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.8	12.9	18.9	13.2	21.1	15.1
Executive Center Drive & Driveway 6	SB	-	-	-	-	A	A	A	A	A	A	A	A	C	B	C	B	C	C
		-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.1	14.1	20.9	14.9	24.7	20.0
Executive Center Drive & Driveway 7	NB	-	-	-	-	A	A	A	A	A	A	A	A	A	A	A	A	B	A
		-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	9.0
Executive Center Drive & Driveway 8	SB	-	-	-	-	A	A	A	A	A	A	A	A	B	A	B	A	B	A
		-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.2	9.7	14.9	9.8	11.7	9.9
Executive Center Drive & Driveway 9	NB	-	-	-	-	A	A	A	A	A	A	A	A	A	A	A	A	B	B
		-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	10.5
Executive Center Drive & Driveway 10	WB	-	-	-	-	B	B	C	B	C	B	C	B	D	C	E	C	E	C
		-	-	-	-	14.6	12.1	15.9	12.7	17.8	14.0	19.7	14.9	33.5	18.3	43.8	19.5	48.0	21.0
Wood Hollow Drive & Driveway 11	EB					A	A	A	A	A	A	A	A	F	D	F	D	F	D
						0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.9	26.0	120.5	28.8	135.7	31.6
	WB	-	-	-	-	A	B	B	B	B	B	B	B	B	B	B	B	B	C
		-	-	-	-	10.0	10.7	10.2	11.0	10.5	11.8	10.8	12.4	11.2	14.3	11.5	14.9	11.7	15.1

In order to mitigate the impacts to the various intersections which are failing, improvements have been evaluated for the failing intersections. Additionally, a discussion of these improvements can be found in the Findings and Recommendations. **Table 4** below provides a summary of the Level of Service (LOS) grade and delay for the intersections in which improvements have been implemented for AM and PM peak periods. *Exhibit 11* within the Appendix of this report provide the level of service, delay, and volume-to-capacity (v/c) ratios by intersection approach as well as overall operations.

TABLE 4– INTERSECTION LEVEL OF SERVICE AND DELAY WITH IMPROVEMENTS

Intersection	2014		2018		2018		2023		2023		2028		2028		2031		2031	
	Existing		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
	LOS																	
	Delay (s)																	
Far West Boulevard & Hart Lane	D	D	E	D	D	C	F	D	D	C	F	D	F	C	F	D	F	D
	51.6	36.2	55.5	36.9	42.7	26.6	82.1	36.5	54.0	29.6	110.7	42.3	81.0	32.8	131.0	45.1	97.3	35.7
Far West Boulevard & Wood Hollow Drive	D	D	D	D	D	C	D	D	D	D	E	E	D	C	E	E	D	D
	42.1	42.1	43.6	43.5	36.8	32.6	49.3	51.0	36.4	39.6	59.7	60.7	46.4	33.4	69.8	70.5	49.8	35.3
Far West Boulevard & Mopac SB FR	C	E	C	F	B	C	D	F	B	D	D	F	B	D	E	F	B	D
	24.8	77.5	28.2	96.5	15.8	22.2	36.4	130.4	17.8	35.8	47.4	177.5	14.0	39.9	55.6	201.7	17.9	46.6
Far West Boulevard & Mopac NB FR	B	E	C	E	C	D	C	E	C	E	C	F	C	E	C	F	D	E
	19.2	67.3	20.6	69.1	29.5	35.2	22.1	79.6	30.6	65.6	24.7	143.6	28.1	66.6	27.9	174.3	35.8	66.8
Spicewood Springs Road & Mopac SB FR	F	F	F	F	F	E	F	F	F	F	F	F	F	F	F	F	F	F
	118.8	88.3	159.4	114.8	91.9	63.8	206.4	154.9	123.2	97.5	278.3	225.7	179.3	193.9	318.0	255.6	207.0	160.3
Spicewood Springs Road & Mopac NB FR	D	E	E	F	D	E	F	F	E	E	F	F	F	F	F	F	F	F
	53.8	61.0	75.8	81.9	49.9	66.7	108.6	104.3	67.7	79.1	148.5	136.6	94.9	133.8	169.5	159.6	112.9	127.7
Spicewood Springs Road & Wood Hollow Drive / Private Driveway	D	C	E	C	E	C	F	C	F	C	F	D	F	C	F	D	F	C
	46.2	23.7	73.9	25.9	66.4	20.5	120.9	34.6	108.7	22.9	265.4	38.8	204.5	22.8	321.6	48.3	233.4	25.0
Steck Avenue & Mopac SB FR	E	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	65.0	99.7	134.2	168.0	123.0	100.5	183.6	212.6	166.0	149.7	249.5	262.1	237.2	183.9	286.9	295.5	280.3	207.8
Steck Avenue & Mopac NB FR	C	D	D	F	D	F	E	F	E	F	F	F	F	F	F	F	F	F
	28.2	53.2	48.6	94.6	49.5	106.1	64.0	123.4	63.0	134.6	87.0	158.7	87.0	174.9	98.6	185.2	96.1	199.4
Greystone Drive & Hart Lane	C	B	D	C	D	C	E	C	C	B	F	E	C	C	F	E	D	C
	18.2	14.3	25.4	17.1	25.4	17.1	37.8	24.4	16.8	12.6	52.0	41.4	23.1	15.2	56.3	47.8	28.6	17.1
Greystone Drive & Wood Hollow Drive	B	C	B	C	B	C	C	D	C	D	C	E	C	C	D	E	C	C
	11.3	16.7	13.0	21.7	13.0	21.7	16.0	33.3	16.0	33.3	22.0	42.5	17.7	19.3	27.2	46.8	20.8	22.4
*Spicewood Springs Road & Hart Lane	F	F	F	F	B	B	F	F	B	B	F	F	B	B	F	F	B	B
	4068.6	466.5	4211.5	4574.5	13.3	11.4	4307.9	4679.1	11.7	13.5	4065.9	4529.2	13.3	15.3	4086.5	4541.0	15.8	16.4

* Signalized as an Improvement

CONTINUED

Intersection		2014		2018		2018		2023		2023		2028		2028		2031		2031	
		Existing		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
		LOS																	
		Delay (s)																	
Greystone Drive & Mopac SB FR	EB	F	D	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
		220.2	33.9	386.4	51.4	386.4	51.4	663.5	114.6	663.5	114.6	>9999.9	279.4	>9999.9	279.4	>9999.9	408.7	>9999.9	408.7
Executive Center Drive & Mopac SB FR	EB	C	C	E	E	D	D	F	F	F	F	F	F	F	F	F	F	F	F
		21.2	24.2	43.9	37.0	34.8	32.8	174.8	156.0	103.8	124.5	778.6	588.8	523.8	505.1	>9999.9	835.6	>9999.9	705.1
Executive Center Drive & Wood Hollow Drive	EB	C	C	D	E	A	A	F	F	A	A	F	F	C	F	F	F	F	F
		19.8	24.5	31.2	44.6	5.3	6.2	255.8	419.2	7.6	7.4	>9999.9	>9999.9	22.5	105.2	>9999.9	>9999.9	96.2	181.5
	WB	B	B	C	C	A	A	F	E	A	A	F	F	F	C	F	F	F	F
		13.5	14.8	23.3	19.6	3.4	5.4	184.1	49.2	2.7	3.2	>9999.9	>9999.9	97.3	17.8	>9999.9	>9999.9	197.9	61.3
	NB	-	-	-	-	A	B	-	-	A	B	-	-	C	F	-	-	F	F
		-	-	-	-	6.5	10.1	-	-	8.0	12.0	-	-	19.8	153.6	-	-	50.5	284.8
	SB	-	-	-	-	A	A	-	-	A	A	-	-	E	A	-	-	F	A
		-	-	-	-	5.1	4.4	-	-	7.0	5.1	-	-	44.5	5.4	-	-	72.0	5.3
Executive Center Drive & Hart Lane	WB	B	B	B	B	B	B	C	C	C	C	E	F	C	C	F	F	D	C
		11.4	12.5	13.0	13.8	13.0	13.8	15.0	16.4	15.0	16.4	38.0	62.2	20.4	18.9	88.0	124.0	28.3	22.4
Executive Center Drive & Driveway 1	NB	-	-	A	A	A	A	B	B	B	B	C	B	C	B	C	C	C	C
		-	-	0.0	0.0	0.0	0.0	13.3	10.8	13.3	10.8	20.0	13.5	20.0	13.5	23.9	15.1	23.9	15.1
Executive Center Drive & Driveway 2	SB	-	-	B	A	B	A	B	B	B	B	C	B	C	B	C	B	C	B
		-	-	10.2	9.2	10.2	9.2	11.7	10.1	11.7	10.1	18.0	11.7	18.0	11.7	21.4	12.5	21.4	12.5
Executive Center Drive & Driveway 3	NB	-	-	A	A	A	A	B	A	B	A	C	B	C	B	C	B	C	B
		-	-	0.0	0.0	0.0	0.0	11.1	9.6	11.1	9.6	15.1	10.9	15.1	10.9	17.3	11.5	17.3	11.5
Executive Center Drive & Driveway 4	SB	-	-	A	A	A	A	A	A	A	A	B	A	B	A	B	A	B	A
		-	-	8.5	8.3	8.5	8.3	8.6	8.8	8.6	8.8	10.4	8.9	10.4	8.9	10.6	9.0	10.6	9.0
Executive Center Drive & Driveway 5	SB	-	-	A	A	A	A	A	A	A	A	C	B	C	B	C	C	C	C
		-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.8	12.9	17.8	12.8	21.1	15.1	21.0	15.0
Executive Center Drive & Driveway 6	SB	-	-	A	A	A	A	A	A	A	A	C	B	C	B	C	C	C	C
		-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.1	14.1	19.1	14.1	24.7	20.0	24.7	20.0
Executive Center Drive & Driveway 7	NB	-	-	A	A	A	A	A	A	A	A	A	A	A	A	B	A	B	A
		-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	9.0	10.6	9.0
Executive Center Drive & Driveway 8	SB	-	-	A	A	A	A	A	A	A	A	B	A	B	A	B	A	B	A
		-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.2	9.7	14.2	9.7	11.7	9.9	11.7	9.9
Executive Center Drive & Driveway 9	NB	-	-	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
		-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	10.5	11.7	10.5
Executive Center Drive & Driveway 10	WB	-	-	B	B	B	B	C	B	C	B	D	C	C	C	E	C	E	C
		-	-	14.6	12.1	14.5	12.1	17.8	14.0	17.6	13.9	33.5	18.3	24.4	18.1	48.0	21.0	47.4	20.7
Wood Hollow Drive & Driveway 11	EB			A	A	A	A	A	A	A	A	F	D	F	D	F	D	F	D
				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.9	26.0	86.5	25.9	135.7	31.6	193.5	31.5
	WB	-	-	A	B	A	B	B	B	B	B	B	B	B	B	B	C	B	C
		-	-	10.0	10.7	10.0	10.7	10.5	11.8	10.5	11.8	11.2	14.3	11.2	14.3	11.7	15.1	11.7	15.1

FINDINGS AND RECOMMENDATIONS

Upon completing the analysis for the roadway network, it became evident that with the anticipated future growth of the area and with the proposed development, improvements will be needed in order to mitigate the degradation of specific intersections. The intersections identified below will require traffic improvements to improve the LOS. All other intersections perform at an acceptable LOS and do not require any improvements. The recommended improvements, when constructed, adequately mitigate the traffic created by the proposed development. *Exhibit 4* within the Appendix of this report provide a summary of all improvements, pro-rata share for all proposed mitigation, detailed calculations of the pro-rata share, and exhibit detailing the existing conditions versus with the improvements relative to existing pavement and right-of-way.

Far West Boulevard and Hart Lane

The intersection of Far West Boulevard and Hart Lane currently performs at acceptable LOS until the 2018 Site+Forecasted AM Peak condition at which it operates at a LOS E in the AM Peak Hour. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- Revise the Southbound Approach lane configuration to provide exclusive left, thru, and shared thru-right lanes. This would provide three southbound movements; therefore the Southbound Approach would be revised to only provide one (1) northbound receiving lane. The Northbound Approach would then be revised to provide an exclusive left and shared thru-right lanes.
- Convert the split phasing on the North and Southbound Approach to a permissive phase on the Northbound and a Permissive+Protected phase on the Southbound Approach.

With the addition of these improvements, the LOS for this intersection improves through the 2023 conditions, however the AM begins to fail during the 2028 conditions. All options have been evaluated and no other vehicle specific improvements can be provided at this time due to the physical constraints of the existing roadway and adjacent developments. It is recommended to improve the pedestrian ramps at all four corners, and also upgrade the pedestrian facilities of the traffic signal to provide APS push buttons and pedestrian signal heads.

Far West Boulevard and Wood Hollow Drive

The intersection of Far West Boulevard and Wood Hollow Drive currently operates at an acceptable LOS until the 2028 Forecasted condition at which it operates at a LOS E. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- The addition of second northbound right-turn lane which would ultimately provide a left, thru, right, and right-turn lanes for the Northbound Approach. The eastbound receiving lanes along Far West Boulevard have adequate space to accept a dual-right turning movement.
- Provide left-turn Permissive+Protected phase for the North and Southbound Approaches.

The recommended signal phasing for the northbound and southbound approaches have been incorporated starting with 2028 Site+Forecasted condition; with this mitigation measure the intersection will operate at an acceptable LOS on all conditions. It is also recommended to improve the pedestrian ramps at all four corners, and also upgrade the pedestrian facilities of the traffic signal to provide APS push buttons and pedestrian signal heads. No additional improvements are recommended at this time.

Far West Boulevard and Mopac

The diamond interchange of Far West Boulevard and Mopac currently operates at an acceptable level of service during the AM Peak Hour, but is failing during the PM Peak Hour. This condition continues until the final phase of the development is constructed in 2031. At the 2031 condition, the intersections begin to fail during both the AM and PM Peak Hour. In order to mitigate the failing condition of the intersection, the following improvements are recommended to be implemented in the 2018 phase of development:

- Widen the Northbound Mopac Frontage Road north of the intersection with Far West Boulevard to provide two (2) lanes of traffic to the physical gore of the Entrance Ramp. This will allow two (2) lanes of traffic to continue further north than what is currently provided. This improvement will allow less que-backup from weaving along the Frontage Road which would ultimately allow for more eastbound left-turn movements to occur.
- The Southbound Mopac Frontage Road north of the intersection with Far West would be widened to provide an exclusive channelized right-turn lane and modify the existing travel lane striping to provide a thru, shared thru-left, and exclusive left turn lanes.

With this improvement, the diamond interchange drastically improves with regards to LOS and performs at an acceptable LOS during all conditions of the analysis. It is also recommended to improve the pedestrian ramps at all corners of the diamond interchange, and also upgrade the pedestrian facilities of the traffic signal to provide APS push buttons and pedestrian signal heads. No additional improvements are recommended at this time.

Spicewood Springs Road and Mopac

The diamond interchange of Spicewood Springs Road and Mopac currently operates at an unacceptable LOS and continues to do so through all conditions of the analysis. The primary reason for the failure of this intersection is the limitation of the bridge. Additional lanes cannot be added since the bridge cannot be replaced at this time. The following improvements are recommended to assist in traffic operations and safety:

- A right-turn acceleration/deceleration lane shall be constructed between Spicewood Springs Road and Executive Center Drive. This will allow for free eastbound right turn movements at Spicewood Springs Road and Mopac Southbound Frontage Road. Providing a free right will significantly reduce this approach delay. This lane would then turn into a right-turn only lane once it has reached Executive Drive.
- Widen the Southbound Mopac Frontage Road to provide an exclusive right-turn lane, and restripe the existing travel lanes to provide thru, thru, left, and left turn lanes. Modification to the existing channelized island will be required. This will significantly reduce delay for this approach.
- Signal timings will be required to be modified to accommodate the new lane configurations and volumes.

With this improvement, the diamond interchange drastically improves with regards to LOS and performs at an acceptable LOS during all conditions of the analysis. It is also recommended to improve the pedestrian ramps at all corners of the diamond interchange, and also upgrade the pedestrian facilities of the traffic signal to provide APS push buttons and pedestrian signal heads. No additional improvements are recommended at this time.

Spicewood Springs Road and Wood Hollow Drive/Private Driveway

The Spicewood Springs Road and Wood Hollow Drive/Private Driveway currently operates at acceptable LOS, however the LOS is unacceptable starting with 2018 Forecasted AM condition. The intersection is starting to fail at 2023 Site+Forecasted condition. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- Revise the northbound lane configuration to provide left, shared thru-right, and right turn lanes. Northbound and Southbound Bicycle lanes will be unaffected and shall remain with this improvement.
- Revise the signal timing to accommodate the new lane configurations and assignments.

With these improvements the intersection continues to operate at LOS F, but with improved delay. No additional improvements are recommended at this time.

Steck Avenue and Mopac

The diamond interchange of Steck Avenue and Mopac currently operates at an unacceptable LOS. This intersection is extremely limited by the existing bridge and upstream and

downstream conditions. The only improvement recommended at this time is to optimize the splits in order to accommodate the new traffic volumes as growth occurs in the area. No additional improvements are recommended at this time.

Greystone Drive and Hart Lane

The intersection of Greystone Drive and Hart Lane currently operates at acceptable LOS and continues to do the same until 2023 Forecasted condition. Therefore, mitigations measures have been evaluated starting with 2023 Site+Forecasted condition. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- It is recommend to convert this intersection to a single-lane roundabout which also accommodates pedestrian and bicycles. The existing geometry, pavement availability, and ROW availability allows for this improvement to be put in place.

With these improvements the intersection performs at an acceptable level of service through all conditions of development. No additional improvements are recommended at this time.

Greystone Drive and Wood Hollow Drive

The intersection of Greystone Drive and Wood Hollow Drive currently operates at acceptable LOS and continues to do the same until 2023 Forecasted condition. Therefore, mitigations measures have been evaluated starting with 2023 Site+Forecasted condition. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- It is recommend to convert this intersection to a single-lane roundabout which also accommodates pedestrian and bicycles. The existing geometry, pavement availability, and ROW availability allows for this improvement to be put in place.

With these improvements the intersection performs at an acceptable level of service through all conditions of development. No additional improvements are recommended at this time.

Executive Center Drive and Wood Hollow Drive

The intersection of Executive Center Drive and Wood Hollow Drive currently operates at an acceptable LOS until the 2018 Site+Forecasted PM Peak condition. As part of this development, this intersection will be converted from a four (4) way stop controlled intersection to a single lane roundabout with right-turn lane bypasses for all approaches. With the addition of this improvement this intersection shall perform at an acceptable level of service until the 2028 condition where it begins to fail predominately in the PM Peak Hour. No additional improvements are recommended at this time.

Executive Center Drive and Hart Lane

The intersection of Executive Center Drive and Hart Lane currently operates at an acceptable LOS until 2028 Site+Forecasted PM peak condition. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- Separated movements for all approached are recommended. All approached provide adequate pavement width to accommodate separated movements; therefore, the striping will be revised/added for this improvement. Bicycle lanes will remain with the revised striping.

It is also recommended to improve the pedestrian ramps at all corners of the intersection, and also complete the sidewalk gap between Executive Drive and Spicewood Springs Road along Hart Lane. With these improvements the intersection performs at an acceptable level of service through all conditions of development. No additional improvements are recommended at this time.

Spicewood Springs Road and Hart Lane

The intersection of Spicewood Springs Road and Hart Lane is failing in the existing condition and it continues to operate the same with increased delay through to the 2031 Site+Forecasted conditions. This intersection geometry is very unique given the upstream/downstream condition as well as the fact that it is a T-intersection. Signalization of this intersection is the only means in which it will perform at an acceptable LOS. This allows for a higher level of capacity at this intersection. With this recommended improvement, the intersection operates at acceptable LOS D or better through all the phases where it is completely built out in 2031 Site+Forecasted. A signal warrant analysis has been completed for this intersection and is presented later in this report. No additional improvements are recommended at this time.

NTS Results and Recommendations

Based on the results of the Neighborhood Traffic Study (NTS), the maximum desirable volumes are currently being exceeded along the roadway segments which were evaluated. Additionally, without the proposed development and only considering the natural growth of the area and traffic volumes, the roadway segments will continue to exceed the desirable volumes. With the Austin Oaks redevelopment, the volumes along those roadway segments will continue to increase, however the traffic volumes associated with the redevelopment is a small percentage than that of the overall traffic volumes present on the roadways.

Although the volumes along the segments exceed the City of Austin's maximum desirable volumes, it does not mean that the roadways have exceeded its capacity. The results of the Roadway Capacity Analysis show us that roadway segments are performing at an acceptable LOS in the existing conditions as well and all future conditions of the redevelopment. None of the roadway segments analyzed have exceeded capacity.

In order to address the roadway segments exceeding the City of Austin's maximum desirable volumes, the following mitigation measures are recommended to persuade drivers to utilize the major arterials and minimize the use of the neighborhood collectors. Since all these six (6) segments are 2-lane roadways with on-street parking and bicycle lanes, new improvements are limited. The intersection improvements recommended in the previous section will reduce the intersection delays and thus, improving the travel time on the arterial roadway. This will encourage through traffic to return to the arterial roadway system rather than the use of residential streets. The other mitigation measures recommended are as follows:

- Provide adequate striping and signage;
- Install speed limit signs along all street segments;
- Speed cushion installation;
- Upgraded bicycle facilities;
- Improvement pedestrian facilities (e.g. sidewalk, curb ramps, mid-block crossings);
- Improved Capital Metro Bus Stop Facilities; and
- Speed enforcement.

As development moves forward, each NTA Roadway shall be evaluated at the time of development to understand what improvements are necessary and where. Coordination with Austin Transportation Department and Capital Metro will be required on an on-going basis.

Signal Warrant Recommendations

The following results and recommendations are based on the data that has been collected, and standards and criteria for signal warrant analysis set by the TMUTCD.

The signal warrant analysis evaluated the 2018 Forecasted condition for the approach roadways at the Spicewood Springs Road and Hart Lane intersection. Based on the capacity analysis for the intersection for the 2018 Site+Forecasted Condition, it was evident that a traffic signal is required at this intersection to mitigate the failing level of service due to the high delay for the minor approach (Northbound Hart Lane) due to the heavy volume on Spicewood Springs Road. While the delay at this intersection signifies the need for a traffic signal, a signal warrant analysis was completed to understand if the necessary traffic volumes are present in order to meet warrants. Per the results of the Signal Warrant Analysis, warrants will be met beginning with the 2018 Forecasted condition (Phase I); therefore, it will be necessary for the traffic signal to be constructed and operational by the completion of Phase I of the development in 2018.

According to the Signal Warrant Analysis, specifically warrants one (1), two (2) and three (3) were satisfied. Therefore, a traffic signal is warranted and recommended at Spicewood Springs Road and Hart Lane intersection. Please refer to *Exhibit 13* within the Appendix of this report for the detailed Signal Warrant Worksheets.

INTRODUCTION

STUDY PURPOSE AND OBJECTIVE

The purpose of this report is to summarize the findings of the TIA performed by Bury for the proposed Austin Oaks development which is planned to be fully constructed by 2031. The proposed development will be located at the southwest corner of Spicewood Springs Road and Loop 1 (Mopac) in Austin, Travis County, Texas. A Site Location Map of the proposed development is included as *Exhibit 1*. This report will document the change in existing traffic volumes to be generated by the development and understand the impacts of it on the roadway network. The scope of this study includes the following:

- Data collection of the existing roadway system;
- Estimate the number of trips to be generated by the existing development and the net increase of trips at the completion of the redevelopment;
- Distribute new trips to the proposed full build-out years for four (4) phases at 2018, 2023, 2028, and 2031, respectively;
- Evaluate capacity of the study area intersections using the latest version of Synchro and SimTraffic software for the 2014 Existing, 2018 Forecasted (future, no-build with Background), 2018 Site+Forecasted (future, build), 2023 Forecasted and Site+Forecasted, 2028 Forecasted and Site+Forecasted, 2031 Forecasted and Site+Forecasted traffic conditions;
- Suggest roadway or intersection improvements to mitigate significant impacts, if any, due to the proposed development;
- Perform NTS to evaluate the traffic issues on the neighborhood bounded by the study intersections due to the proposed development.

The Austin Oaks site is currently fully developed and occupied with office land uses. The proposed redevelopment of the existing site will serve as a more mixed use development providing restaurant, residential, and office land uses. Given the current occupancy of the development, the redevelopment of Austin Oaks will occur in various phases of construction. The Conceptual Plan for the proposed development has been included within the Appendix of this report as *Exhibit 2*. The land uses proposed for each phases are as follows:

- **Phase I – 2018:** Denoted as Block C in the Conceptual Plan. Block C will consist of restaurant and office land uses.
- **Phase II – 2023:** Denoted as Block E in the Conceptual Plan. Block E will consist of restaurant and office land uses.
- **Phase III – 2028:** Denoted as Block A in the Conceptual Plan. Block A will consist of restaurant and office land uses.
- **Phase IV – 2031:** Denoted as Block G in the Conceptual Plan. Block G will consist of residential land uses.

A summary of the proposed phasing, land uses, and intensities can be seen within the **Table 5** below. The TIA Scoping Document, defining the parameters of this report, is contained within the Appendix as **Exhibit 3**. The Trip Generation outputs generated based on the Institute of Transportation Engineers (ITE) Trip Generation Handbook, 9th Edition, are also contained within **Exhibit 3**.

STUDY METHODOLOGY

This study consists of six (6) major components listed below.

- Data Collection and Roadway System – Peak hour manual turning movement counts (TMC) were performed at the existing study intersections. Additionally, for the Neighborhood Traffic Study, Average Daily Traffic (ADT) counts were also collected along adjacent roadways. All TMC and ADT data is included within the Appendix of this report as **Exhibit 5**;
- Trip Generation – An estimation of new trips generated by the existing and proposed development was determined using the ITE Trip Generation Handbook, 9th Edition as well as research done by Bury;
- Trip Distribution – The origins and destinations of site-related trips were determined by comparing existing traffic patterns on the study area roadways and by observing the existing land use in the area;
- Trip Assignment – New trips were assigned to the completion of the development for each phase of development: 2018, 2023, 2028, and 2031;
- Analysis – An operational analysis of the surrounding roadway network was completed for the 2014 Existing, 2018 Forecasted (future, no-build with Background), 2018 Site+Forecasted (future, build), 2023 Forecasted and Site+Forecasted, 2028 Forecasted and Site+Forecasted, 2031 Forecasted and Site+Forecasted traffic conditions. The existing and projected traffic volume figures have been included within the Appendix of this report as **Exhibit 6**.
- Neighborhood Traffic Study – A Neighborhood Traffic Study was conducted for six (6) neighborhood street segments bounded by the study intersections. The study evaluated the existing 24-hour bi-directional traffic volumes along the roadways, identified capacity deficiencies, if any, and provided recommendations for improvements to the roadway segments.

DATA COLLECTION OF ROADWAY SYSTEM

Manual TMC's for the peak periods were performed for 7:00 a.m. to 9:00 a.m. for AM Peak Hour and 4:00 p.m. to 6:00 p.m. for the PM Peak Hour in March 2014 while schools were in session. TMC for the addition of Steck Avenue and Mopac Frontage Road intersection was performed in July 2014 while schools were not in session; therefore, a 10% adjustment factor was applied to the counts obtained for this intersection for volume adjustments to account for schools being out of session. 24-hour bi-directional tube counts, ADT's, were also performed on the six (6) street segments selected for the NTS. All TMC and ADT traffic data has been included within the Appendix of this report as *Exhibit 5*. The roadway network with the associated traffic volumes for the 2014 existing and future conditions can be seen within Appendix of this report as *Exhibit 6*.

A site investigation was performed to understand the existing conditions of the roadway network within the analysis. Intersection geometries, traffic behavior, and unique characteristics were noted during the investigation. The following provides a description of the roadway system within the study area based upon the data obtained in the field:

- Far West Boulevard is classified as a 6-lane divided major arterial in the vicinity of the proposed redevelopment. The roadway provides east-west travel with a posted speed limit of 35 miles per hour (mph). Far West Boulevard is traffic signal controlled at its intersection with Hart Lane, Wood Hollow Drive, and Mopac.
- Hart Lane is classified as a 2-lane undivided neighborhood collector in the vicinity of the proposed redevelopment. The roadway provides north-south travel with a posted speed limit of 30 mph. A bicycle lane is provided for both northbound and southbound travel along Hart Lane with on-street parking along the northbound side of the roadway. Hart Lane is traffic signal controlled at its intersection with Far West Boulevard, an all-way stop controlled at its intersection with Greystone Drive, and one-way stop controlled at its intersection with Executive Center Drive. Based on traffic counts obtained by Bury in March 2014, Hart Lane experienced 4,266 vehicles per hour (vph) between Greystone Drive and Executive Center Drive, and 6,196 vph between Far West Boulevard and Greystone Drive.
- Wood Hollow Drive is classified as a 2-lane undivided neighborhood collector in the vicinity of the proposed redevelopment. The roadway provides north-south travel with a posted speed limit of 30 mph. The roadway provides for on-street parking on both the northbound and southbound sides of the roadway. Wood Hollow Drive is signal controlled where it intersects at Far West Boulevard, and also at Spicewood Springs Road. Wood Hollow Drive at Greystone Drive is all-way stop controlled while at Executive Center Drive it is two-way stop controlled. Based on traffic counts obtained by Bury in March 2014, Wood Hollow Drive experienced 4,755 vph between Greystone Drive and Executive Center Drive, and 6,595 vph between Far West Boulevard and Greystone Drive.

- Loop 1 (Mopac) is classified as a 6-lane freeway with a 3-lane southbound frontage road. A northbound frontage road is not provided between Far West Boulevard and Spicewood Springs Road. The posted speed limit along the Mopac southbound frontage road is 50 mph. Based on the Texas Department of Transportation (TxDOT) District Traffic Map for Austin, the 2012 Annual Average Daily Traffic (AADT) on Mopac main-lanes, near Far West Boulevard is approximately 148,000 vpd. Additionally, the future addition of the express lanes along Mopac have been designed such that an entrance/exit to and from the express lane has been provided to be able to access Far West Boulevard and Spicewood Springs Road. This improvement will allow patrons and residents of the Austin Oaks redevelopment to travel to downtown efficiently via the new express lane if they so choose.
- Greystone Drive is classified as a 2-lane undivided neighborhood collector in the vicinity of the proposed redevelopment. The roadway provides east-west travel with assumed speed limit of 30 mph since there is no posted speed limit. A bicycle lane is provided for both eastbound and westbound travel along Greystone Drive with on-street parking along the westbound side of the roadway. There are no intersections along Greystone Drive which are signal controlled. Based on traffic counts obtained by Bury in March 2014, Greystone Drive experienced 4,853 vph between Wood Hollow Drive and Hart Lane, and 5,785 vph between Mopac and Wood Hollow Drive.
- Executive Center Drive is classified as a 2-lane undivided commercial collector in the vicinity of the proposed redevelopment. The roadway provides east-west travel with an assumed 30 mph speed limit since there is not a posted speed limit. There are no signal controls provided on Executive Center Drive within the study limits; all the study intersections on Executive Center Drive are stop controlled. The roadway provides on-street parking on both the westbound and eastbound sides.
- Spicewood Springs Road is classified as a 4-lane divided major arterial within the vicinity of the proposed redevelopment. The roadway provides east-west travel with a posted speed limit of 35 mph. The roadway provides bicycle lanes both the eastbound and westbound sides of the roadway.
- Steck Avenue is classified as a 4-lane undivided major arterial within the vicinity of the proposed redevelopment. The roadway provides east-west travel with a posted speed limit of 30 mph. The roadway provides bicycle lanes both the eastbound and westbound sides of the roadway.

TRIP GENERATION

SITE TRAFFIC

The proposed Austin Oaks development will be a redevelopment of a site which is currently fully developed with office land uses. Per the City of Austin Transportation Criteria Manual, the existing traffic associated with the existing land uses may be utilized and adjusted within the trip generation calculations for the proposed redevelopment. Since these trips are already

on the roadway network, the proposed redevelopment will be a net increase to take the existing trips into account.

Based on the proposed Conceptual Plan and the area, site generated trips were estimated using the equation based on recommendations and data contained in the Trip Generation Manual, 9th Edition by ITE. The proposed project will generate 19,819 unadjusted daily trips by full build out year in 2031, which is a net increase of 15,701 trips with the existing trips applied. **Table 5** provides a detailed summary of traffic production for each land use, which is directly related to the assumed land use plan. The trip generation outputs have been included as *Exhibit 3* within the Appendix of this report. The Conceptual Plan for the proposed redevelopment has also been included within the Appendix of this report as *Exhibit 2*.

TABLE 5– SUMMARY OF UNADJUSTED DAILY AND PEAK HOUR TRIP GENERATION

ITE Code	Land Use	Size		24-Hour Two-Way Volume	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Existing Development										
710	General Office	450,000	SF	4,118	561	76	637	99	483	582
Existing Subtotal				4118	561	76	637	99	483	582
Phase I										
710	General Office Building	252,800	SF	2,657	354	48	402	62	300	362
932	High Turnover (Sit-Down) Restaurant	30,000	SF	3,815	178	146	324	178	118	296
Phase I Subtotal				6,472	532	194	726	240	418	658
Phase II										
710	General Office Building	320,000	SF	3,178	427	58	485	74	363	437
932	High Turnover (Sit-Down) Restaurant	10,844	SF	1,378	64	53	117	64	43	107
Phase II Subtotal				4,556	491	111	602	138	406	544
Phase III										
710	General Office Building	336,520	SF	3,302	444	61	505	77	378	455
932	High Turnover (Sit-Down) Restaurant	29,000	SF	3,687	172	141	313	172	114	286
Phase III Subtotal				6,989	616	202	818	249	492	741
Phase IV										
220	Apartment	277	DU	1,802	28	111	139	111	59	170
Phase IV Subtotal				1,802	28	111	139	111	59	170
Total Proposed Development				19,819	1,667	618	2,285	738	1,375	2,113
Net Increase of Trips				15,701	1,106	542	1,648	639	892	1,531

Pass-by and internal trips can account for a significant portion of a site's generated traffic. Internal trips use only internal roadways within the site, traveling from one land use to another. Per the approved TIA Scope provided by the City of Austin and TxDOT, a 5 percent internal reduction has been applied to this analysis.

Pass-by trips are attracted to the site from traffic passing on an adjacent street and are based on information contained in the ITE Trip Generation Handbook (Trip Generation Handbook,

ITE). Pass-by reductions, therefore, allow for a reduction in site traffic at the existing intersections, but not at site driveways. Pass-by trips have been assumed only for the following land-uses:

	AM Peak	PM Peak
High-Turnover Sit-Down Restaurant	0%	43%

The intent of this mixed use development is to work, live, and play within the site and thus, eliminating the excess number of generated trips to be in the roadway network on adjacent roadways. **Table 6**, below, provides a summary of the proposed land uses and trips after adjustments and a detailed calculations on trip reductions have been provided in the Appendix of this report as *Exhibit 7*. Trip reductions are not applied to the existing land use since the current state of the development does not provide any mix of uses.

TABLE 6– SUMMARY OF ADJUSTED DAILY AND PEAK HOUR TRIP GENERATION

ITE Code	Land Use	Size		24-Hour Two-Way Volume	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Existing Development										
710	General Office	450,000	SF	4,118	561	76	637	99	483	582
Existing Subtotal				4118	561	76	637	99	483	582
Phase I										
710	General Office Building	252,800	SF	2,524	336	46	382	59	285	344
932	High Turnover (Sit-Down) Restaurant	30,000	SF	2,804	169	139	308	93	61	154
Phase I Subtotal				5,328	505	184	690	151	346	498
Phase II										
710	General Office Building	320,000	SF	3,019	406	55	461	70	345	415
932	High Turnover (Sit-Down) Restaurant	10,844	SF	1,013	61	50	111	33	22	56
Phase II Subtotal				4,032	466	105	572	104	367	471
Phase III										
710	General Office Building	336,520	SF	3,137	422	58	480	73	359	432
932	High Turnover (Sit-Down) Restaurant	29,000	SF	2,710	163	134	297	89	59	149
Phase III Subtotal				5,847	585	192	777	163	418	581
Phase IV										
220	Apartment	277	DU	1,712	27	105	132	105	56	162
Phase IV Subtotal				1,712	27	105	132	105	56	162
Total Proposed Development				16,919	1,584	587	2171	523	1,188	1,711
Net Increase of Trips				12,801	1,023	511	1534	424	705	1,129

BACKGROUND TRAFFIC

Background traffic is the traffic generated by other proposed developments to be constructed during or before the time period of the proposed redevelopment within the boundary of the proposed study area. Within the vicinity of the Austin Oaks redevelopment, various developments are expected to occur within the time period of this development. The following projects have been included as background traffic per scoping with the City of Austin:

- Northwest Skyline (C8-2012-00530A)
- Austin Oaks Restaurant (SP-2013-0058CT)

The above developments have been included within the analysis of this report and fall within the Phase I (2018) Forecasted condition. The land uses assumed for the Northwest Skyline background projects is a Single Family units and the Austin Oaks Restaurant as High Turnover (Sit-Down) Restaurant. The roadway network with the associated trips from the background projects have been distributed within the Austin Oaks study area network. **Table 7** provides a detailed summary of traffic production for each background projects used in this TIA.

TABLE 7– SUMMARY OF BACKGROUND DEVELOPMENT TRIP GENERATION

Background Developments	ITE Code	Land Use	Size		24-Hour Two-Way Volume	AM Peak Hour		PM Peak Hour	
						Enter	Exit	Enter	Exit
Austin Oaks Restaurant	932	High Turnover (Sit-Down) Restaurant	3,700	sf	470	22	20	24	17
Northwest Skyline	210	Single Family Detached Housing	6	du	78	3	10	5	3
Total Proposed Background Development					548	25	30	29	20

TRIP DISTRIBUTION

The distribution for the site traffic has been based on the existing TMC as well as evaluating where major attractors and residential areas are located relative to the proposed Austin Oaks redevelopment. These data provided the basis for the directional distribution of traffic approaching and departing the site as well as applying engineering judgment for the projected traffic utilizing the study roadways accessing to and from the site and is summarized in **Table 8**. Two (2) different trip distributions for the proposed development were utilized; one for Commercial Uses, and a second one for Residential Uses. Traffic distribution maps for both Commercial and Residential Uses can also be seen in the Appendix of this report as *Exhibit 8*.

TABLE 8– OVERALL DIRECTIONAL DISTRIBUTION OF SITE TRAFFIC

Direction	% of Site Traffic	
	Commercial Uses	Residential Uses
West Spicewood Springs Road	15%	5%
East Anderson Lane	15%	15%
West Steck Avenue	10%	5%
East Steck Avenue	10%	5%
North Mopac	25%	20%
South Mopac	10%	35%
South Hart Lane	5%	5%
South Wood Hollow Drive	5%	5%
West Greystone Drive	0%	0%
West Far West Boulevard	5%	5%

TRIP ASSIGNMENT

New site trips were assigned to the roadway network in accordance with the trip distribution patterns identified in the **Table 8** above. Trips to and from the site were assigned to each study area roadway and intersection. The existing trips captured in March 2014 were increased using a conservative growth factor of 2% which was calculated by evaluating historical Average Annual Daily Trips obtained from the Texas Department of Transportation (TxDOT). The maps showing the specific volumes utilized have been provided in the Appendix of this report as *Exhibit 3*.

This growth rate was applied to the existing counts to calculate the volumes at each of the Forecasted traffic conditions to account for the natural growth of the area. Given the total site generated traffic and the directional distribution patterns identified in **Table 8**, the site trips were assigned to and from the proposed development with the most likely travel paths. This was performed by considering a number of alternative travel patterns as well as ingress/egress points surrounding the proposed site. Moreover, site trips were evaluated on a Phase by Phase (or Block by Block) basis. Each Phase of development was evaluated to understand where the site trips for specific a specific use would travel to and from. Each site driveway was assigned an origination node, destination node, and travel path to dictate how the individual trips would access the various site driveway from various origination and/or destination nodes.

All traffic generated by the proposed Austin Oaks development was distributed throughout the study area and the travel paths were assigned utilizing the PTV Vistro 2.0 Software. These assigned site trips were then added to the Forecasted AM and PM Peak Hour conditions, which can be seen within *Exhibit 6* as the Site+Forecasted Condition for each of the phases.

ANALYSIS

INTERSECTION OPERATIONAL ANALYSIS

Following the assignment of projected traffic volumes onto the study area roadways, a detailed Operational Analysis was undertaken using techniques outlined in the Highway Capacity Manual 2010 (HCM 2010). For purposes of Traffic Operational Analyses, geometric conditions within the study area were input into the microcomputer based traffic model, Synchro, Version 9.0 (by David Hush in Trafficware, Synchro 9.0). Synchro follows procedures developed in the HCM 2010 and analyzes the study area in its entirety, rather than as a series of isolated intersections and driveways. All of the various scenarios, including Existing, Forecasted, and Site+Forecasted conditions for this study area were analyzed using Synchro. Traffic Signal Timing Plans were provided by City of Austin and TxDOT and these timing plans have been included with the Synchro Outputs for each scenario within the Appendix as *Exhibit 9*.

For the evaluation of existing and proposed conditions, measures of effectiveness were utilized such as intersection LOS and delay associated with these LOS. The intersection delay is the average control delay for the signalized intersection and is calculated by taking a volumes-weighted average of all the delays occurring at the intersection. Control delay is defined as 'the component of delay that results when a traffic control device such as signal, stop etc. causes a lane group to reduce speed or brings traffic to a complete stop'. Control delay includes deceleration delay, queue move-up time, stopped delay, and acceleration delay. LOS refers to the operational conditions within a traffic stream and their perception by motorists in terms of delay, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. There are six (6) LOS capacity conditions for each roadway facility. These are designated from "A" to "F," with "A" representing a free-flow optimal best condition and "F" representing a congested forced flow worst condition. The LOS criteria for signalized and un-signalized intersections are different and is mainly because how the drivers function at a signalized versus un-signalized intersections. The general criteria associated with each LOS reported for signalized and un-signalized intersections are presented in **Table 9** below.

TABLE 9– LEVEL OF SERVICE MEASUREMENT AND QUALITATIVE DESCRIPTIONS

Level of Service	Control Delay for Signalized Intersection (sec/veh)	Control Delay for Unsignalized Intersection (sec/veh)	Description
A	≤ 10	≤ 10	Good progression and short cycle lengths
B	> 10 and ≤ 20	> 10 and ≤ 15	Good progression or short cycle lengths, more vehicle stops
C	> 20 and ≤ 35	> 15 and ≤ 25	Fair progression and/or longer cycle lengths, some cycle failures
D	> 35 and ≤ 55	> 25 and ≤ 35	Congestion becomes noticeable, high volume-to-capacity ratio
E	> 55 and ≤ 80	> 35 and ≤ 50	Limit of acceptable delay, poor progression, long cycles, and/or high volume
F	> 80	> 50	Unacceptable to drivers, volume greater than capacity

Table 10 provided below presents the analysis results in terms of LOS and Delay for each study intersection for the existing and proposed AM and PM peak Hours conditions. The results below show how the intersections perform as the network currently lies with no improvements.

TABLE 10– SUMMARY OF INTERSECTION LEVEL OF SERVICE AND DELAY

Intersection	2014		2018		2018		2023		2023		2028		2028		2031		2031	
	Existing		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
	LOS																	
	Delay (s)																	
Far West Boulevard & Hart Lane	D	D	D	D	E	D	F	D	F	D	F	D	F	D	F	D	F	D
	51.6	36.2	54.9	36.7	55.5	36.9	80.8	36.2	82.1	36.5	103.9	36.5	110.7	42.3	126.9	44.3	131.0	45.1
Far West Boulevard & Wood Hollow Drive	D	D	D	D	D	D	D	D	D	D	E	E	E	E	E	E	E	E
	42.1	42.1	43.4	43.4	43.6	43.5	48.9	50.0	49.3	51.0	57.3	60.6	59.7	60.7	69.3	70.4	69.8	70.5
Far West Boulevard & Mopac SB FR	C	E	C	F	C	F	D	F	D	F	D	F	D	F	E	F	E	F
	24.8	77.5	28.0	96.5	28.2	96.5	35.9	124.2	36.4	130.4	47.1	165.9	47.4	177.5	55.3	200.5	55.6	201.7
Far West Boulevard & Mopac NB FR	B	E	C	E	C	E	C	E	C	E	C	F	C	F	C	F	C	F
	19.2	67.3	20.9	68.8	20.6	69.1	22.1	68.3	22.1	79.6	24.6	117.6	24.7	143.6	27.6	171.4	27.9	174.3
Spicewood Springs Road & Mopac SB FR	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	118.8	88.3	151.1	110.9	159.4	114.8	199.6	142.9	206.4	154.9	261.6	195.5	278.3	225.7	313.0	252.9	318.0	255.6
Spicewood Springs Road & Mopac NB FR	D	E	E	E	E	F	F	F	F	F	F	F	F	F	F	F	F	F
	53.8	61.0	67.7	77.8	75.8	81.9	98.5	101.6	108.6	104.3	130.5	123.6	148.5	136.6	167.1	147.7	169.5	159.6
Spicewood Springs Road & Wood Hollow Drive / Private Driveway	D	C	E	C	E	C	F	C	F	C	F	C	F	D	F	D	F	D
	46.2	23.7	60.3	24.9	73.9	25.9	94.0	32.4	120.9	34.6	157.4	32.0	265.4	38.8	314.1	45.2	321.6	48.3
Steck Avenue & Mopac SB FR	E	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	65.0	99.7	132.8	167.0	134.2	168.0	181.2	212.7	183.6	212.6	237.8	262.3	249.5	262.1	287.0	295.1	286.9	295.5
Steck Avenue & Mopac NB FR	C	D	D	F	D	F	E	F	E	F	E	F	F	F	F	F	F	F
	28.2	53.2	47.9	94.6	48.6	94.6	62.4	123.8	64.0	123.4	79.1	158.2	87.0	158.7	98.1	184.8	98.6	185.2
Greystone Drive & Hart Lane	C	B	C	C	D	C	E	C	E	C	E	E	F	E	F	E	F	E
	18.2	14.3	23.6	16.7	25.4	17.1	36.9	23.3	37.8	24.4	43.1	37.9	52.0	41.4	56.1	46.6	56.3	47.8
Greystone Drive & Wood Hollow Drive	B	C	B	C	B	C	C	D	C	D	C	E	C	E	D	E	D	E
	11.3	16.7	12.4	21.0	13.0	21.7	15.1	31.6	16.0	33.3	19.7	40.2	22.0	42.5	26.6	46.6	27.2	46.8

CONTINUED

Intersection		2014		2018		2018		2023		2023		2028		2028		2031		2031	
		Existing		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
		LOS																	
		Delay (s)																	
Greystone Drive & Mopac SB FR	EB	F	D	F	E	F	F	F	F	F	F	F	F	F	F	F	F	F	F
		220.2	33.9	366.1	49.6	386.4	51.4	644.9	98.3	663.5	114.6	>9999.9	225.0	>9999.9	279.4	>9999.9	393.7	>9999.9	408.7
Executive Center Drive & Mopac SB FR	EB	C	C	C	D	E	E	F	F	F	F	F	F	F	F	F	F	F	F
		21.2	24.2	24.0	30.8	43.9	37.0	72.7	62.0	174.8	156.0	335.7	282.2	778.6	588.8	>9999.9	743.9	>9999.9	835.6
Executive Center Drive & Wood Hollow Drive	EB	C	C	C	D	D	E	E	F	F	F	F	F	F	F	F	F	F	F
		19.8	24.5	23.2	34.5	31.2	44.6	44.9	82.5	255.8	419.2	537.8	748.1	>9999.9	>9999.9	>9999.9	>9999.9	>9999.9	>9999.9
	WB	B	B	C	C	C	C	D	C	F	E	F	F	F	F	F	F	F	F
		13.5	14.8	17.8	18.0	23.3	19.6	29.9	23.5	184.1	49.2	>9999.9	118.3	>9999.9	>9999.9	>9999.9	>9999.9	>9999.9	>9999.9
Executive Center Drive & Hart Lane	WB	B	B	B	B	B	B	B	C	C	C	C	C	E	F	F	F	F	F
		11.4	12.5	11.6	13.3	13.0	13.8	13.9	15.1	15.0	16.4	16.9	19.1	38.0	62.2	54.2	96.1	88.0	124.0
Spicewood Springs Road & Hart Lane	NB	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
		4068.6	466.5	4113.0	4549.6	4211.5	4574.5	4219.9	4580.3	4307.9	4679.1	4329.4	4693.6	4065.9	4529.2	4107.1	4552.0	4086.5	4541.0
Executive Center Drive & Driveway 1	NB	-	-	-	-	A	A	A	A	B	B	B	B	C	B	C	B	C	C
		-	-	-	-	0.0	0.0	0.0	0.0	13.3	10.8	14.3	11.2	20.0	13.5	21.7	14.2	23.9	15.1
Executive Center Drive & Driveway 2	SB	-	-	-	-	B	A	B	A	B	B	B	B	C	B	C	B	C	B
		-	-	-	-	10.2	9.2	10.5	9.3	11.7	10.1	12.2	10.3	18.0	11.7	19.4	12.0	21.4	12.5
Executive Center Drive & Driveway 3	NB	-	-	-	-	A	A	A	A	B	A	B	A	C	B	C	B	C	B
		-	-	-	-	0.0	0.0	0.0	0.0	11.1	9.6	11.5	9.7	15.1	10.9	16.0	11.1	17.3	11.5
Executive Center Drive & Driveway 4	SB	-	-	-	-	A	A	A	A	A	A	A	A	B	A	B	A	B	A
		-	-	-	-	8.5	8.3	8.6	8.4	8.6	8.8	8.6	8.8	10.4	8.9	10.5	8.9	10.6	9.0
Executive Center Drive & Driveway 5	SB	-	-	-	-	A	A	A	A	A	A	A	A	C	B	C	B	C	C
		-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.8	12.9	18.9	13.2	21.1	15.1
Executive Center Drive & Driveway 6	SB	-	-	-	-	A	A	A	A	A	A	A	A	C	B	C	B	C	C
		-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.1	14.1	20.9	14.9	24.7	20.0
Executive Center Drive & Driveway 7	NB	-	-	-	-	A	A	A	A	A	A	A	A	A	A	A	A	B	A
		-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	9.0
Executive Center Drive & Driveway 8	SB	-	-	-	-	A	A	A	A	A	A	A	A	B	A	B	A	B	A
		-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.2	9.7	14.9	9.8	11.7	9.9
Executive Center Drive & Driveway 9	NB	-	-	-	-	A	A	A	A	A	A	A	A	A	A	A	A	B	B
		-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	10.5
Executive Center Drive & Driveway 10	WB	-	-	-	-	B	B	C	B	C	B	C	B	D	C	E	C	E	C
		-	-	-	-	14.6	12.1	15.9	12.7	17.8	14.0	19.7	14.9	33.5	18.3	43.8	19.5	48.0	21.0
Wood Hollow Drive & Driveway 11	EB					A	A	A	A	A	A	A	A	F	D	F	D	F	D
						0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.9	26.0	120.5	28.8	135.7	31.6
	WB	-	-	-	-	A	B	B	B	B	B	B	B	B	B	B	B	B	C
		-	-	-	-	10.0	10.7	10.2	11.0	10.5	11.8	10.8	12.4	11.2	14.3	11.5	14.9	11.7	15.1

In order to mitigate the impacts to the various intersections which are failing, improvements has been evaluated for the failing intersections. Additionally, a discussion of these improvements can be found in the Findings and Recommendations. **Table 11** below provides a summary of the LOS grade and delay for the intersection in which improvements have been implemented for both AM and PM peak periods. The Synchro files associated with proposed improvements has been included within the Appendix of this report as *Exhibit 10*. Additionally, a detailed table has been provided in the Appendix of this report as *Exhibit 11* showing the approach LOS, delay, and volume-to-capacity ratios for each intersections.

TABLE 11– INTERSECTION LEVEL OF SERVICE AND DELAY WITH IMPROVEMENTS

Intersection	2014		2018		2018		2023		2023		2028		2028		2031		2031	
	Existing		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
	LOS																	
	Delay (s)																	
Far West Boulevard & Hart Lane	D	D	E	D	D	C	F	D	D	C	F	D	F	C	F	D	F	D
	51.6	36.2	55.5	36.9	42.7	26.6	82.1	36.5	54.0	29.6	110.7	42.3	81.0	32.8	131.0	45.1	97.3	35.7
Far West Boulevard & Wood Hollow Drive	D	D	D	D	D	C	D	D	D	D	E	E	D	C	E	E	D	D
	42.1	42.1	43.6	43.5	36.8	32.6	49.3	51.0	36.4	39.6	59.7	60.7	46.4	33.4	69.8	70.5	49.8	35.3
Far West Boulevard & Mopac SB FR	C	E	C	F	B	C	D	F	B	D	D	F	B	D	E	F	B	D
	24.8	77.5	28.2	96.5	15.8	22.2	36.4	130.4	17.8	35.8	47.4	177.5	14.0	39.9	55.6	201.7	17.9	46.6
Far West Boulevard & Mopac NB FR	B	E	C	E	C	D	C	E	C	E	C	F	C	E	C	F	D	E
	19.2	67.3	20.6	69.1	29.5	35.2	22.1	79.6	30.6	65.6	24.7	143.6	28.1	66.6	27.9	174.3	35.8	66.8
Spicewood Springs Road & Mopac SB FR	F	F	F	F	F	E	F	F	F	F	F	F	F	F	F	F	F	F
	118.8	88.3	159.4	114.8	91.9	63.8	206.4	154.9	123.2	97.5	278.3	225.7	179.3	193.9	318.0	255.6	207.0	160.3
Spicewood Springs Road & Mopac NB FR	D	E	E	F	D	E	F	F	E	E	F	F	F	F	F	F	F	F
	53.8	61.0	75.8	81.9	49.9	66.7	108.6	104.3	67.7	79.1	148.5	136.6	94.9	133.8	169.5	159.6	112.9	127.7
Spicewood Springs Road & Wood Hollow Drive / Private Driveway	D	C	E	C	E	C	F	C	F	C	F	D	F	C	F	D	F	C
	46.2	23.7	73.9	25.9	66.4	20.5	120.9	34.6	108.7	22.9	265.4	38.8	204.5	22.8	321.6	48.3	233.4	25.0
Steck Avenue & Mopac SB FR	E	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	65.0	99.7	134.2	168.0	123.0	100.5	183.6	212.6	166.0	149.7	249.5	262.1	237.2	183.9	286.9	295.5	280.3	207.8
Steck Avenue & Mopac NB FR	C	D	D	F	D	F	E	F	E	F	F	F	F	F	F	F	F	F
	28.2	53.2	48.6	94.6	49.5	106.1	64.0	123.4	63.0	134.6	87.0	158.7	87.0	174.9	98.6	185.2	96.1	199.4
Greystone Drive & Hart Lane	C	B	D	C	D	C	E	C	C	B	F	E	C	C	F	E	D	C
	18.2	14.3	25.4	17.1	25.4	17.1	37.8	24.4	16.8	12.6	52.0	41.4	23.1	15.2	56.3	47.8	28.6	17.1
Greystone Drive & Wood Hollow Drive	B	C	B	C	B	C	C	D	C	D	C	E	C	C	D	E	C	C
	11.3	16.7	13.0	21.7	13.0	21.7	16.0	33.3	16.0	33.3	22.0	42.5	17.7	19.3	27.2	46.8	20.8	22.4
*Spicewood Springs Road & Hart Lane	F	F	F	F	B	B	F	F	B	B	F	F	B	B	F	F	B	B
	4068.6	466.5	4211.5	4574.5	13.3	11.4	4307.9	4679.1	11.7	13.5	4065.9	4529.2	13.3	15.3	4086.5	4541.0	15.8	16.4

* Signalized as an Improvement

CONTINUED

Intersection		2014		2018		2018		2023		2023		2028		2028		2031		2031	
		Existing		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps		Site + Forecasted		Site + Forecasted w/Imps	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
		LOS																	
		Delay (s)																	
Greystone Drive & Mopac SB FR	EB	F	D	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
		220.2	33.9	386.4	51.4	386.4	51.4	663.5	114.6	663.5	114.6	>9999.9	279.4	>9999.9	279.4	>9999.9	408.7	>9999.9	408.7
Executive Center Drive & Mopac SB FR	EB	C	C	E	E	D	D	F	F	F	F	F	F	F	F	F	F	F	F
		21.2	24.2	43.9	37.0	34.8	32.8	174.8	156.0	103.8	124.5	778.6	588.8	523.8	505.1	>9999.9	835.6	>9999.9	705.1
Executive Center Drive & Wood Hollow Drive	EB	C	C	D	E	A	A	F	F	A	A	F	F	C	F	F	F	F	F
		19.8	24.5	31.2	44.6	5.3	6.2	255.8	419.2	7.6	7.4	>9999.9	>9999.9	22.5	105.2	>9999.9	>9999.9	96.2	181.5
	WB	B	B	C	C	A	A	F	E	A	A	F	F	F	C	F	F	F	F
		13.5	14.8	23.3	19.6	3.4	5.4	184.1	49.2	2.7	3.2	>9999.9	>9999.9	97.3	17.8	>9999.9	>9999.9	197.9	61.3
	NB	-	-	-	-	A	B	-	-	A	B	-	-	C	F	-	-	F	F
		-	-	-	-	6.5	10.1	-	-	8.0	12.0	-	-	19.8	153.6	-	-	50.5	284.8
	SB	-	-	-	-	A	A	-	-	A	A	-	-	E	A	-	-	F	A
		-	-	-	-	5.1	4.4	-	-	7.0	5.1	-	-	44.5	5.4	-	-	72.0	5.3
Executive Center Drive & Hart Lane	WB	B	B	B	B	B	B	C	C	C	C	E	F	C	C	F	F	D	C
		11.4	12.5	13.0	13.8	13.0	13.8	15.0	16.4	15.0	16.4	38.0	62.2	20.4	18.9	88.0	124.0	28.3	22.4
Executive Center Drive & Driveway 1	NB	-	-	A	A	A	A	B	B	B	B	C	B	C	B	C	C	C	C
		-	-	0.0	0.0	0.0	0.0	13.3	10.8	13.3	10.8	20.0	13.5	20.0	13.5	23.9	15.1	23.9	15.1
Executive Center Drive & Driveway 2	SB	-	-	B	A	B	A	B	B	B	B	C	B	C	B	C	B	C	B
		-	-	10.2	9.2	10.2	9.2	11.7	10.1	11.7	10.1	18.0	11.7	18.0	11.7	21.4	12.5	21.4	12.5
Executive Center Drive & Driveway 3	NB	-	-	A	A	A	A	B	A	B	A	C	B	C	B	C	B	C	B
		-	-	0.0	0.0	0.0	0.0	11.1	9.6	11.1	9.6	15.1	10.9	15.1	10.9	17.3	11.5	17.3	11.5
Executive Center Drive & Driveway 4	SB	-	-	A	A	A	A	A	A	A	A	B	A	B	A	B	A	B	A
		-	-	8.5	8.3	8.5	8.3	8.6	8.8	8.6	8.8	10.4	8.9	10.4	8.9	10.6	9.0	10.6	9.0
Executive Center Drive & Driveway 5	SB	-	-	A	A	A	A	A	A	A	A	C	B	C	B	C	C	C	C
		-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.8	12.9	17.8	12.8	21.1	15.1	21.0	15.0
Executive Center Drive & Driveway 6	SB	-	-	A	A	A	A	A	A	A	A	C	B	C	B	C	C	C	C
		-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.1	14.1	19.1	14.1	24.7	20.0	24.7	20.0
Executive Center Drive & Driveway 7	NB	-	-	A	A	A	A	A	A	A	A	A	A	A	A	B	A	B	A
		-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	9.0	10.6	9.0
Executive Center Drive & Driveway 8	SB	-	-	A	A	A	A	A	A	A	A	B	A	B	A	B	A	B	A
		-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.2	9.7	14.2	9.7	11.7	9.9	11.7	9.9
Executive Center Drive & Driveway 9	NB	-	-	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
		-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	10.5	11.7	10.5
Executive Center Drive & Driveway 10	WB	-	-	B	B	B	B	C	B	C	B	D	C	C	C	E	C	E	C
		-	-	14.6	12.1	14.5	12.1	17.8	14.0	17.6	13.9	33.5	18.3	24.4	18.1	48.0	21.0	47.4	20.7
Wood Hollow Drive & Driveway 11	EB			A	A	A	A	A	A	A	A	F	D	F	D	F	D	F	D
				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.9	26.0	86.5	25.9	135.7	31.6	193.5	31.5
	WB	-	-	A	B	A	B	B	B	B	B	B	B	B	B	B	C	B	C
		-	-	10.0	10.7	10.0	10.7	10.5	11.8	10.5	11.8	11.2	14.3	11.2	14.3	11.7	15.1	11.7	15.1

QUEUE LENGTH ANALYSIS

A queue length analysis was conducted for the study intersections. Table 12 and 13 presents the results of the queuing analysis for signalized and unsignalized intersections, respectively. The 95th percentile queue lengths provided in the table are obtained from Synchro outputs.

TABLE 12– QUEUE ANALYSIS FOR SIGNALIZED INTERSECTIONS

Intersection	Movement	2014		2018		2018		2023		2023		2028		2028		2031		2031	
		Existing		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
		95 th Percentile Queue Length (ft)																	
Far West Boulevard & Wood Hollow Drive	EBL	57	56	62	58	65	62	71	63	77	65	86.0	67.0	109.0	74.0	114.0	77.0	115.0	81.0
	EBThR	352	287	388	305	390	306	443	327	447	329	510.0	352.0	511.0	352.0	#558	368.0	#558	368.0
	WBL	166	63	176	86	178	90	#231	133	#239	139	#306	162.0	#306	m162	#343	m173	m#343	m172
	WBTh	117	82	126	88	126	88	138	91	139	90	m156	92.0	m155	m92	m165	m100	m165	m100
	WBR	52	5	56	5	55	5	m60	6	m61	5	m66	5.0	m65	m5	m67	m4	m67	m4
	NBLThR	105	105	119	119	123	122	143	146	152	150	173.0	182.0	201.0	191.0	217.0	208.0	218.0	213.0
	SBLThR	211	147	230	159	235	161	261	178	263	182	292.0	199.0	#320	222.0	#354	#247	#365	#253
Far West Boulevard & Wood Hollow Drive	EBL	82	48	m78	m49	m87	m51	m78	54	m88	57	m92	61.0	m91	m59	m92	m60	m92	m60
	EBTh	498	171	m526	180	m522	181	m544	195	m545	195	m588	210.0	m585	m205	m593	m213	m591	m212
	EBR	12	m4	m12	m3	m12	m3	m10	m4	m10	m3	m12	m4	m12	m4	m12	m4	m12	m4
	WBL	m108	m151	m106	m147	m106	m147	m106	m#154	m107	m#158	m106	m#156	m106	m#156	m105	m#165	m105	m#165
	WBTh	m272	m226	m268	m219	m268	m219	m267	m211	m267	m209	m266	m197	m266	m197	m265	m192	m265	m192
	WBR	m31	m17	m27	m147	m27	m147	m22	m9	m22	m8	m19	m4	m19	m4	m18	m213	m18	m212
	NBL	42	113	46	125	46	125	50	142	50	142	54.0	162.0	54.0	162.0	57.0	172.0	57.0	1744.0
	NBTh	107	197	118	220	128	226	141	258	158	263	171.0	#337	#241	#357	#262	#417	#264	#429
	NBR	165	107	#259	158	#259	158	#358	229	#358	229	#447	#368	#447	#368	#499	#449	#499	#449
	SBL	#361	179	#403	193	#403	193	#459	210	#459	210	#522	232.0	#522	232.0	#565	#248	#565	#248
Far West Boulevard & Mopac SB FR	SBThR	197	162	217	176	234	184	260	202	#267	216	#321	240.0	#346	#293	#382	#321	#394	#326
	EBTh	382	538	410	#648	410	#648	m437	m#803	m437	m#803	m459	m#906	m458	m#906	m473	m#931	m476	m#931
	EBR	240	m180	m266	202	m266	202	m294	m220	m295	m219	m326	m233	m326	m233	m338	m239	m338	m239
	WBL	m16	7	m15	6	m15	6	m17	6	m17	6	m18	5.0	m18	5.0	m18	6.0	m18	6.0
	WBT	2	12	1	13	1	13	2	14	2	14	2.0	14.0	2.0	14.0	m265	15.0	m265	15.0
	SBLTh	279	371	308	#421	331	#421	372	#510	385	#556	435.0	#643	484.0	#741	512.0	#804	531.0	#812
Far West Boulevard & Mopac NB FR	SBR	706	#874	#927	#1043	#927	#1043	#1115	#1259	#1220	#1280	#1309	#1515	#1309	#1515	#1428	#1666	#1428	#1666
	EBL	11	691	12	#827	14	#841	17	m#967	22	m#991	34.0	m#1102	50.0	m#1146	62.0	m#1119	169.0	m#1123
	NBL	307	174	336	189	336	189	372	208	372	208	#443	229.0	#443	229.0	#482	245.0	#485	245.0
	NBLTh	70	111	76	121	76	121	83	133	83	133	90.0	146.0	90.0	146.0	94.0	154.0	94.0	154.0

m indicates that the volume for the 95th percentile queue is metered by an upstream signal

indicates that the volume for the 95th percentile cycle exceeds capacity

TABLE 12– QUEUE ANALYSIS FOR SIGNALIZED INTERSECTIONS (CONTINUED)

Intersection	Movement	2014		2018		2018		2023		2023		2028		2028		2031		2031	
		Existing		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
		95 th Percentile Queue Length (ft)																	
Spicewood Springs Road & Mopac SB FR	EBTh	#645	#968	58	74	#781	#1126	#878	#1259	#905	#1339	m#970	#1502	m#1012	#1687	m#1024	#1815	m#1044	#1827
	EBR	#842	245	37	4	m#914	275	m#921	310	m#906	310	m#927	369.0	m#877	m360	m#875	m377	m#855	m369
	WBL	m568	m549	12	11	m#650	m606	m#688	m703	m#686	m719	m#707	m#941	m#694	m#934	m#709	m#969	m#705	m#966
	WBTh	m28	m549	4	7	m30	m57	m32	m63	m32	m63	m32	m69	m31	m69	m32	m77	m32	m71
	SBL	m205	#551	11	18	m189	#609	m193	#687	m194	#687	m194	#774	m191	#774	m192	#828	m191	#828
	SBLTh	m#687	298	82	26	m#616	#358	m#628	#417	m#639	#421	m#653	#486	m#632	#486	m#632	#529	m#632	#529
	SBR	m#431	#419	32	19	m280	#491	m291	#584	m300	#584	m308	#680	m#326	#701	m320	#767	m321	#775
Spicewood Springs Road & Mopac NB FR	EBL	m23	m105	m26	6	m26	m107	m267	m107	m267	m111	m266	m111	m27	m119	m27	m118	m265	m118
	EBTh	m0	m0	m0	4	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0
	WBTh	442	556	491	21	m508	635	#619	734	#658	743	#767	#916	#854	#945	#931	#1042	#935	#1060
	WBR	32	185	32	4	32	253	33	335	41	m348	61.0	439.0	77.0	458.0	94.0	519.0	95.0	520.0
	NBL	#553	#473	#605	17	#622	#548	#683	#608	#712	#625	#791	#697	#833	#733	#889	#783	#900	#866
	NBLThR	185	#427	#226	20	#256	#484	#314	#561	#346	#562	#401	#640	#467	#646	#505	#691	#510	#707
	NBR	173	204	208	5	213	229	249	267	257	267	301.0	311.0	326.0	311.0	360.0	352.0	360.0	352.0
Spicewood Springs Road & Wood Hollow Drive / Private Driveway	EBL	11	10	12	10	12	10	13	12	13	12	13.0	15.0	13.0	15.0	14.0	15.0	14.0	16.0
	EBThR	231	257	255	292	255	301	290	350	294	352	334.0	272.0	347.0	300.0	387.0	316.0	380.0	328.0
	WBL	351	m549	#375	m62	#501	m74	#612	m118	#704	m127	#808	m82	#1082	m173	#1156	m178	#11557	m222
	WBT	m303	m206	m310	m225	m309	m248	m313	m337	m320	m336	m334	m292	m337	m328	m354	m346	m355	m353
	WBR	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0	m0
	NBLTh	79	101	86	108	102	110	108	117	117	128	127.0	128.0	151.0	145.0	158.0	159.0	162.0	164.0
	NBR	0	127	0	154	0	171	13	202	37	273	61.0	299.0	99.0	439.0	121.0	512.0	146.0	542.0
Steck Avenue & Mopac SB FR	SBLThR	0	4	0	4	0	3	0	3	0	3	0.0	2.0	0.0	2.0	0.0	1.0	0.0	1.0
	EBThR	#430	#445	#550	#572	#566	#582	#644	#663	#666	#670	#760	#757	#836	#775	#899	#833	#900	#838
	WBL	m85	m40	m114	m55	m136	m57	m139	m65	m170	m72	m187	m77	m#319	m90	m#322	m92	m#323	m92
	WBT	m6	m14	m8	m17	m7	m17	m8	m18	m7	m18	m7	m19	m65	m18	m67	m18	m7	m18
	SBL	#1125	#865	#1440	#1073	#1440	#1073	#1638	#1198	#1638	#1198	#153	#1341	#1853	#1341	#1996	#1434	#1996	#1434
Steck Avenue & Mopac NB FR	SBLThR	#939	#668	#1252	#865	#1252	#865	#1446	#988	#1446	#988	#1660	#1120	#1660	#1120	#1800	#1208	#1800	#1208
	EBL	m101	m429	m101	m430	m101	m427	m101	m427	m101	m425	m100	m425	m96	m422	m96	m442	m96	m420
	EBTh	m1	m1	m1	m1	m1	m1	m1	m1	m1	m1	m1	m1	m1	m1	m1	m1	m1	m1
	WBTh	166	268	196	325	206	331	#235	368	#266	374	#306	#440	#368	#457	#400	#503	#401	#508
	WBR	73	#490	149	#657	149	#657	#236	#762	#236	#762	#309	#878	#309	#878	#346	#952	#346	#952
	NBL	m162	168	m#208	198	m#253	205	m#292	225	m#308	249	m#354	271.0	m#402	325.0	m#430	348.0	m#430	351.0
	NBLTh	m#316	#565	m#415	#732	m#417	#734	m#477	#835	m#478	#836	m#541	#947	m#543	#953	m#585	#1026	m#585	#1026
	NBR	m7	18	m12	43	m17	45	m45	69	m63	89	m116	143.0	m#161	192.0	m#283	234.0	m#292	237.0

TABLE 13– QUEUE ANALYSIS FOR UNSIGNALIZED INTERSECTIONS

Intersection	Movement	2014		2018		2018		2023		2023		2028		2028		2031		2031	
		Existing		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
		95 th Percentile Queue (veh)																	
Greystone Drive & Hart Lane	EBLTh	3.1	1.0	3.9	1.2	4.2	1.2	5.4	1.5	5.6	1.6	7.5	2.0	8.1	2.0	9.6	2.3	9.5	2.3
	EBR	1.5	0.4	1.8	0.5	1.9	0.5	2.3	0.6	2.4	0.6	3.0	0.7	3.3	0.8	3.7	0.8	3.7	0.8
	WBLTh	1.5	2.2	1.9	2.7	2.0	2.8	2.4	3.8	2.5	3.8	3.1	5.2	3.3	5.4	3.7	6.4	3.7	6.5
	WBR	0.1	0.3	0.1	0.4	0.1	0.4	0.1	0.5	0.1	0.5	0.1	0.6	12.6	0.6	0.1	0.7	0.1	0.7
	NBLThR	2.5	4.1	3.3	5.5	3.6	5.8	4.8	8.5	5.7	4.2	7.8	13.5	0.1	13.3	12.6	13.0	12.6	12.9
	SBLThR	6.5	2.1	0.9	2.7	9.7	2.7	13.5	3.9	13.4	4.2	13.0	5.9	12.6	8.5	12.6	10.5	12.6	11.1
Greystone Drive & Wood Hollow Drive	EBLTh	1.3	1.1	1.6	1.3	1.6	1.3	2.0	0.4	2.2	1.8	2.9	2.1	3.1	2.2	3.8	2.4	3.8	2.4
	EBR	1.8	0.5	2.2	0.6	2.3	0.3	3.1	0.2	3.2	0.8	4.6	0.9	4.9	1.0	6.3	1.0	6.4	1.0
	WBLTh	1.8	6.6	2.2	8.9	2.3	9.2	2.9	1.0	3.1	12.8	4.2	12.6	4.5	12.4	5.6	12.5	5.6	12.5
	WBR	0.2	0.4	0.2	0.5	0.3	0.5	0.3	0.2	0.3	0.6	0.4	0.7	0.4	0.8	0.4	0.8	0.4	0.8
	NBLT	0.3	0.7	0.3	0.8	0.3	0.8	0.4	0.2	0.4	1.0	0.5	1.1	0.5	1.2	0.5	1.3	0.4	1.3
	NBThR	1.5	3.8	1.9	5.1	2.2	5.6	2.8	0.8	3.5	8.9	4.9	11.5	6.6	12.7	8.3	12.7	9.1	12.7
	SBL	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.1	0.3	0.4	0.3	0.6	0.3	0.4	0.4	0.4	0.5	0.4
Greystone Drive & Mopac SB FR	SBThR	2.0	1.5	2.5	1.9	2.9	2.1	3.8	0.5	4.1	3.0	5.9	3.8	6.9	4.6	8.7	5.3	8.5	5.5
	EBR	26.5	11.8	30.8	15.9	31.2	16.2	36.2	21.7	36.3	22.6	41.5	28.3	41.6	29.7	44.9	33.3	45.0	33.5
Executive Center Drive & Mopac SB FR	SBThR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	EBR	1.3	9.1	1.7	12.4	10.7	15.4	14.0	20.8	22.0	32.8	26.5	40.2	43.8	63.0	47.5	69.1	62.1	74.0
Executive Center Drive & Wood Hollow Drive	SBThR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	EBLThR	0.8	3.9	1.1	5.7	2.2	7.3	3.5	11.3	12.1	23.5	17.6	32.4	Error	129.7	Error	Error	Error	Error
	WBLThR	0.4	0.5	0.8	0.8	1.5	1.0	2.2	1.4	13.0	7.5	Error	12.0	Error	Error	Error	Error	Error	Error
	NBLThR	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.3	0.1	0.4	0.2
Executive Center Drive & Hart Lane	SBLThR	0.3	0.0	0.3	0.1	0.3	0.1	0.3	0.1	0.6	0.1	0.7	0.2	0.7	0.2	0.7	0.2	0.7	0.2
	WBLR	0.2	1.1	0.2	1.3	0.4	1.4	0.5	1.7	0.7	2.2	0.9	2.9	5.4	11.7	7.6	15.5	11.0	18.2
	NBThR	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0
Spicewood Springs Road & Hart Lane	SBLTh	0.2	0.1	0.2	0.0	0.3	0.1	0.3	0.1	0.0	0.0	0.5	0.1	0.9	0.3	0.0	0.0	1.1	0.3
	EBThR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WBL	1.1	0.6	1.4	0.7	1.4	0.7	1.9	0.8	2.0	0.8	2.9	1.1	2.9	1.1	3.7	1.2	3.7	1.2
	WBTh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	NBL	11.2	23.5	13.7	27.8	14.3	28.3	16.9	33.3	17.6	34.8	20.2	40.1	21.5	43.2	23.2	46.5	23.5	46.7
Spicewood Springs Road & Hart Lane	NBR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*HCM 2010 - 95th Percentile Queue (veh)

TABLE 13– QUEUE ANALYSIS FOR UNSIGNALIZED INTERSECTIONS (CONTINUED)

Intersection	Movement	2014		2018		2018		2023		2023		2028		2028		2031		2031	
		Existing		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted		Forecasted		Site + Forecasted	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
		95 th Percentile Queue (veh)																	
Executive Center Drive & Driveway 1	EBThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WBLTh	-	-	-	-	0.0	0.0	0.0	0.0	0.3	0.0	0.4	0.1	0.4	0.1	0.5	0.1	0.5	0.1
	NBLR	-	-	-	-	0.0	0.0	0.0	0.0	0.2	0.9	0.3	1.1	0.4	1.4	0.5	1.6	0.6	1.8
Executive Center Drive & Driveway 2	EBLTh	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WBThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SBLR	-	-	-	-	0.2	0.1	0.3	0.1	0.3	0.1	0.4	0.1	0.7	0.2	0.8	0.2	0.9	0.2
Executive Center Drive & Driveway 3	EBThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WBLTh	-	-	-	-	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
	NBLR	-	-	-	-	0.0	0.0	0.0	0.0	0.3	0.1	0.3	0.1	0.5	0.1	0.6	0.1	0.7	0.1
Executive Center Drive & Driveway 4	EBLTh	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0
	WBThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SBLR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0
Executive Center Drive & Driveway 5	EBLTh	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WBThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SBLR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0
Executive Center Drive & Driveway 6	EBLTh	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.2	0.0
	WBThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SBLR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.6	1.1	2.9	1.4	4.2
Executive Center Drive & Driveway 7	EBThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	WBLTh	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.2
	NBLR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2
Executive Center Drive & Driveway 8	EBLTh	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.3	0.1	0.2	0.1
	WBThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
	SBLR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.4	1.0	0.4	0.7	0.0
Executive Center Drive & Driveway 9	EBThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	WBLTh	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	NBLR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Executive Center Drive & Driveway 10	WBLR	-	-	-	-	0.1	0.0	0.1	0.0	0.2	0.1	0.2	0.1	0.3	0.1	0.4	0.1	0.4	0.1
	NBThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SBLTh	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wood Hollow Drive & Driveway 11	EBLThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.3	0.1	0.3	0.1
	WBLThR	-	-	-	-	0.3	0.1	0.3	0.2	0.4	0.2	0.4	0.2	0.4	0.3	0.5	0.3	0.5	0.3
	NBLThR	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
	SBLThR	-	-	-	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.0	0.2	0.1

NEIGHBORHOOD TRAFFIC STUDY

STUDY PURPOSE

A Neighborhood Traffic Study (NTS) was performed to analyze the conditions of roadway segments for the roadways identified by the City of Austin to be included within the NTS. The goal of the study is to examine the existing capacities along the roadway segments, identify operational deficiencies, if any, and provide recommendations, if warranted, which may improve the roadway capacity along the segments analyzed. The roadway segments considered for the neighborhood study are as follows:

- Hart Lane between Far West Boulevard and Greystone Drive;
- Hart Lane between Greystone Drive and Executive Center Drive;
- Wood Hollow Drive between Far West Boulevard and Greystone Drive;
- Wood Hollow Drive Between Greystone Drive and Executive Center Drive;
- Greystone Drive between Hart Lane and Wood Hollow Drive and
- Greystone Drive between Wood Hollow Drive and Mopac Southbound Service Drive.

Exhibit 12 highlights the six (6) roadway segments listed above. The NTS was conducted for these roadway segments based on the desirable operation levels described in Section 25-6-114 (Neighborhood Traffic Analysis Required) and Section 25-6-116 (Desirable Operating Levels for Certain Streets) of the City of Austin Land Development Code (LDC). According to the LDC, the desirable operating criteria for a local or a collector roadway is as follows:

TABLE 14– DESIRABLE OPERATING CRITERIA FOR ROADWAYS

Pavement Width	Vehicles Per Day
<30 feet	1,200
≥ 30 feet and < 40 feet	1,800
≥ 40 feet	4,000

ANALYSIS

The site traffic travelling south or west within the neighborhood from the proposed site will access one (1) of the segments in the NTS area. For purposes of the NTS, site traffic using any one of these street segments is estimated to be 5% of the total site generated weekday daily traffic. This is based on the trip distribution percentage assumptions made for these roadways as previously discussed in this report. **Table 15**, below, provides a summary of each roadway segments, various roadway characteristics, and the site related traffic anticipated to utilized these roadways.

TABLE 15– NEIGHBORHOOD TRAFFIC STUDY SUMMARY

Roadway Segment	Pavement Width (ft)	Maximum Desirable Volume (vpd)	Existing Volume (vpd)	Forecasted Volume (vpd)	Site Volume (vpd)	Total Site+ Forecasted Volume (vpd)	% Site
Hart Lane between Far West Boulevard & Greystone Drive	45	4,000	6,196	8,676	785	9,461	8%
Hart Lane between Greystone Drive & Executive Center Drive	45	4,000	4,266	5,973	785	6,758	12%
Wood Hollow Drive between Far West Boulevard & Greystone Drive	45	4,000	6,595	9,235	785	10,020	8%
Wood Hollow Drive between Greystone Drive & Executive Center Drive	45	4,000	4,755	6,658	785	7,443	11%
Greystone Drive between Hart Lane & Wood Hollow Drive	45	4,000	4,853	6,795	785	7,580	10%
Greystone Drive between Wood Hollow Drive & Mopac Southbound Service Drive	45	4,000	5,785	8,100	785	8,885	9%

According to **Table 15**, the percentage of site traffic being added to the roadway is less than 15 percent for all roadway segments.

ROADWAY CAPACITY ANALYSIS

A Roadway Capacity Analysis was conducted for all six (6) roadway segments was also conducted for all phases of the proposed Austin Oaks redevelopment. The posted/assumed speed limits along these roadways are 30 mph and have been assumed to be the free flow speed (FFS) for the purposes of the analysis. The 2010 HCM provides Maximum Service Flow Rate (MSF) in passenger cars per hour per lane (pcphpl) and the associated LOS for Multilane Highway Segments (Exhibit 14-17, Page 14-22 of HCM) for FFS from 45 to 60 mph in five (5) mph increments. **Table 16** describes MSF in relation to LOS for a FFS of only 45 mph for a roadway segment.

TABLE 16– ROADWAY LOS CRITERIA (HCM 2010)

LOS	Maximum Service Flow Rate (pcphpl)
A	≤ 290
B	$> 290 \text{ and } \leq 810$
C	$> 810 \text{ and } \leq 1,170$
D	$> 1,170 \text{ and } \leq 1,550$
E	$> 1,550 \text{ and } \leq 1,900$
F	$> 1,900$

The 24-hour bi-directional tube counts (ADT's) taken along all six (6) segments were used to evaluate the capacity along these segments for the existing conditions. According to the counts, the peak hour was between 5:00 and 6:00 PM for all segments except for Hart Lane between Greystone Drive and Far West Boulevard where the peak hour was between 4:00 and 5:00 PM. Based on the HCM methodology, MSF was determined by dividing the peak hour volume by the total number of lanes in one (1) direction, which on all segments is one-lane. Once the MSF was determined, the corresponding LOS was obtained from **Table 16** above. To perform the capacity analysis for the 2018, 2023, 2028, and 2031 Site+Forecasted conditions, the volumes were derived for each of the scenarios. First, the existing volumes were forecasted to its corresponding years by applying the same growth factor, 2%, used for the TIA; then, the PM Peak Hour site generated traffic volumes were applied with a 5% trip distribution percentage, as previously discussed in this report, and added to the respective forecasted volume to determine the Site+Forecasted trips for each build-out phases. **Table 17** below summarizes the analysis results of all six (6) roadway segments.

TABLE 17– ROADWAY CAPACITY ANALYSIS RESULTS FOR SEGMENTS

Roadway Segment	Analysis Period	Volume (vph)	Maximum Service Flow Rate (vphpl)	LOS
Hart Lane between Far West Boulevard & Greystone Drive	Existing 2014	648	648	B
	Site +Forecasted 2018	778	778	B
	Site +Forecasted 2023	935	935	C
	Site+Forecasted 2028	1,109	1,109	C
	Site+Forecasted 2031	1,254	1,254	D
Hart Lane between Greystone Drive & Executive Center Drive	Existing 2014	467	467	B
	Site +Forecasted 2018	582	582	B
	Site +Forecasted 2023	719	719	B
	Site+Forecasted 2028	871	871	C
	Site+Forecasted 2031	1,000	1,000	C
Wood Hollow Drive between Far West Boulevard & Greystone Drive	Existing 2014	623	623	B
	Site +Forecasted 2018	751	751	B
	Site +Forecasted 2023	906	906	C
	Site+Forecasted 2028	1,076	1,076	C
	Site+Forecasted 2031	1,219	1,219	D
Wood Hollow Drive between Greystone Drive & Executive Center Drive	Existing 2014	472	472	B
	Site +Forecasted 2018	587	587	B
	Site +Forecasted 2023	725	725	B
	Site+Forecasted 2028	877	877	C
	Site+Forecasted 2031	1,007	1,007	C
Greystone Drive between Hart Lane & Wood Hollow Drive	Existing 2014	472	472	B
	Site +Forecasted 2018	587	587	B
	Site +Forecasted 2023	725	725	B
	Site+Forecasted 2028	877	877	C
	Site+Forecasted 2031	1,007	1,007	C
Greystone Drive between Wood Hollow Drive & Mopac Southbound Frontage Road	Existing 2014	545	545	B
	Site +Forecasted 2018	666	666	B
	Site +Forecasted 2023	812	812	C
	Site+Forecasted 2028	973	973	C
	Site+Forecasted 2031	1,110	1,110	C

SIGNAL WARRANT ANALYSIS

A traffic signal warrant analysis has been completed for the intersection of Spicewood Springs Road and Hart Lane. In order to perform the analysis, 24-hour traffic counts were collected on all three (3) existing approaches in August 2015. The 24-hour count data can be found in the Appendix of this report as *Exhibit 5*.

INTERSECTION DESCRIPTION

The intersection of Spicewood Springs Road and Hart Lane exists as a three-legged intersection where Hart Lane is assumed to be the northbound approach and Spicewood Springs Road as eastbound/westbound approach. Spicewood Springs Road has five lane cross-section with raised medians separating eastbound and westbound lanes surrounding the intersection. The posted speed limit along Spicewood Spring Road near the vicinity is 35 mph. According to the 24-hour traffic counts obtained by Bury in August 2015, the eastbound and westbound traffic volumes on Spicewood Springs Road near the study intersection is approximately 11,084 vpd and 11,540 vpd, respectively.

Hart Lane is a north-south roadway that has a two (2) lane cross-section and bike lanes on both sides. The posted speed limit along Hart lane is 30 mph. According to the 24-hour traffic counts obtained by Bury, the northbound traffic volumes on Hart lane near the study intersection is approximately 2,573 vpd.

ANALYSIS

The signal warrant analysis was completed for the Phase 1 - 2018 Forecasted Condition based on the 2011 TMUTCD. This development is planned to be constructed in four (4) phases where the first phase will be opened in 2018, the second phase in 2023, third phase in 2028, and the fourth phase in 2031; therefore, growth rate of 2% was applied to the existing traffic data to calculate volume for the Forecasted condition. Tables 1, and 2 provide a detailed summary of 2015 Existing, and 2018 Forecasted traffic volumes used for the signal warrant analysis, respectively. These tables can be found on the last page within the Appendix of this report as *Exhibit 13*.

The TMUTCD requires that certain warrants be met prior to the installation of a traffic signal. These warrants are summarized as follows:

- | | |
|--------------------------------|---------------------------------------|
| 1. Eight Hour Vehicular Volume | 6. Coordinated Signal System |
| 2. Four Hour Vehicular Volume | 7. Crash Experience |
| 3. Peak Hour | 8. Roadway Network |
| 4. Pedestrian Volume | 9. Intersection Near a Grade Crossing |
| 5. School Crossing | |

Below are the TMUTCD descriptions of all the nine (9) Traffic Signal Warrants. City of Austin also considers sound engineering judgment and recommendations as enough evidence to warrant the necessity of a traffic signal.

1. Warrant 1 – Eight-Hour Vehicular Volume

This warrant involves three (3) conditions (A, B, or a combination of A and B) which can individually satisfy the conditions of Warrant 1. Condition A is the Minimum Vehicular Volume which is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal. Condition B is the Interruption of Continuous Traffic which is intended for application where the traffic volume on a major street is so heavy that traffic on a minor street suffers excessively. The combination of condition A and B is used at locations where Condition A, or B is not satisfied; with the combination analysis, the vehicles per hour given in both of the 80% columns of Condition A and B are utilized from Table 4C-1. The Table with the threshold provided for the Warrant 1 notes that condition C or 70% columns from the table are satisfied if the major street speed exceeds 40 mph or in an isolated community with a population of less than 10,000.

Spicewood Spring Road has a speed limit of 35 mph and it is a community with a population that is more than 10,000 and therefore, Condition C cannot be used. The population for City of Austin was estimated to be 885,400 in 2013.

With the 2018 Forecasted volume, Condition A was not satisfied, but Condition B was satisfied. Per TMUTCD (2011) the need for a signal is considered if Condition A or Condition B is met. For the 2018 Forecasted volume, Condition B with 100% columns in Table 4C-1 exist for both the major street and the higher volume minor street approaches for the highest eight (8) hours. Therefore, Warrant 1, Eight-hour vehicular volume warrant is met for Spicewood Springs Road and Hart Lane intersection for 2018 Forecasted condition.

2. Warrant 2 – Four-Hour Vehicular Volume

This warrant is intended to be applied where the volumes of intersecting traffic is the principal reason to consider installing a traffic control signal. The Warrant 2 is met if each of any four (4) hours of an average day, the plotted points for the major street (total of both approaches) and the corresponding vehicles per hour on the higher volume minor street approach (one direction only) all fall above the appropriate curve in Figure 4C-1 for the existing combination of approach lanes. In this case, the total volumes for the highest four hour volumes for both approaches fall above the curve for the two (2) or more lanes scenario in Figure 4C-1. Therefore, Warrant 2, Four-hour vehicular volume warrant is met for Spicewood Springs Road and Hart Lane intersection for the 2018 Forecasted condition.

3. Warrant 3 – Peak Hour

This warrant is intended for use at a location where traffic conditions are such that for a minimum of one (1) hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street. Warrant 3, Peak hour vehicular volume warrant is met for Spicewood Springs Road and Hart Lane intersection for the 2018 Forecasted condition.

4. Warrant 4 – Pedestrian Volume

This warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

5. Warrant 5 – School Crossing

This warrant is intended for application where the fact that school children cross the major street is the principal reason to consider installing a traffic control signal.

6. Warrant 6 – Coordinated Signal System

This warrant is when progressive movement in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles.

7. Warrant 7 – Crash Experience

This warrant is intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.

8. Warrant 8 – Roadway Network

This warrant is analyzed when installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway.

9. Warrant 9 – Intersection near a Grade Crossing

This warrant is intended for use at a location where none of the conditions described in the other eight (8) traffic warrants are met, but the proximity to the intersection of an at-grade crossing on an intersection approach by a STOP or YIELD sign is the principle reason to consider installing a traffic control signal.

FINDINGS AND RECOMMENDATIONS

Upon completing the analysis for the roadway network, it became evident that with the anticipated future growth of the area and with the proposed development, improvements will be needed in order to mitigate the degradation of specific intersections. The intersections identified below will require traffic improvements to improve the LOS. All other intersections perform at an acceptable LOS and do not require any improvements. The recommended improvements, when constructed, adequately mitigate the traffic created by the proposed development. *Exhibit 4* within the Appendix of this report provide a summary of all improvements, pro-rata share for all proposed mitigation, detailed calculations of the pro-rata share, and exhibit detailing the existing conditions versus with the improvements relative to existing pavement and right-of-way.

Far West Boulevard and Hart Lane

The intersection of Far West Boulevard and Hart Lane currently performs at acceptable LOS until the 2018 Site+Forecasted AM Peak condition at which it operates at a LOS E in the AM Peak Hour. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- Revise the Southbound Approach lane configuration to provide exclusive left, thru, and shared thru-right lanes. This would provide three southbound movements; therefore the Southbound Approach would be revised to only provide one (1) northbound receiving lane. The Northbound Approach would then be revised to provide an exclusive left and shared thru-right lanes.
- Convert the split phasing on the North and Southbound Approach to a permissive phase on the Northbound and a Permissive+Protected phase on the Southbound Approach.

With the addition of these improvements, the LOS for this intersection improves through the 2023 conditions, however the AM begins to fail during the 2028 conditions. All options have been evaluated and no other vehicle specific improvements can be provided at this time due to the physical constraints of the existing roadway and adjacent developments. It is recommended to improve the pedestrian ramps at all four corners, and also upgrade the pedestrian facilities of the traffic signal to provide APS push buttons and pedestrian signal heads.

Far West Boulevard and Wood Hollow Drive

The intersection of Far West Boulevard and Wood Hollow Drive currently operates at an acceptable LOS until the 2028 Forecasted condition at which it operates at a LOS E. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- The addition of second northbound right-turn lane which would ultimately provide a left, thru, right, and right-turn lanes for the Northbound Approach. The eastbound receiving lanes along Far West Boulevard have adequate space to accept a dual-right turning movement.
- Provide left-turn Permissive+Protected phase for the North and Southbound Approaches.

The recommended signal phasing for the northbound and southbound approaches have been incorporated starting with 2028 Site+Forecasted condition; with this mitigation measure the intersection will operate at an acceptable LOS on all conditions. It is also recommended to improve the pedestrian ramps at all four corners, and also upgrade the pedestrian facilities of the traffic signal to provide APS push buttons and pedestrian signal heads. No additional improvements are recommended at this time.

Far West Boulevard and Mopac

The diamond interchange of Far West Boulevard and Mopac currently operates at an acceptable level of service during the AM Peak Hour, but is failing during the PM Peak Hour. This condition continues until the final phase of the development is constructed in 2031. At the 2031 condition, the intersections begin to fail during both the AM and PM Peak Hour. In order to mitigate the failing condition of the intersection, the following improvements are recommended to be implemented in the 2018 phase of development:

- Widen the Northbound Mopac Frontage Road north of the intersection with Far West Boulevard to provide two (2) lanes of traffic to the physical gore of the Entrance Ramp. This will allow two (2) lanes of traffic to continue further north than what is currently provided. This improvement will allow less que-backup from weaving along the Frontage Road which would ultimately allow for more eastbound left-turn movements to occur. .
- The Southbound Mopac Frontage Road north of the intersection with Far West would be widened to provide an exclusive channelized right-turn lane and modify the existing travel lane striping to provide a thru, shared thru-left, and exclusive left turn lanes.

With this improvement, the diamond interchange drastically improves with regards to LOS and performs at an acceptable LOS during all conditions of the analysis. It is also recommended to improve the pedestrian ramps at all corners of the diamond interchange, and also upgrade the pedestrian facilities of the traffic signal to provide APS push buttons and pedestrian signal heads. No additional improvements are recommended at this time.

Spicewood Springs Road and Mopac

The diamond interchange of Spicewood Springs Road and Mopac currently operates at an unacceptable LOS and continues to do so through all conditions of the analysis. The primary reason for the failure of this intersection is the limitation of the bridge. Additional lanes cannot be added since the bridge cannot be replaced at this time. The following improvements are recommended to assist in traffic operations and safety:

- A right-turn acceleration/deceleration lane shall be constructed between Spicewood Springs Road and Executive Center Drive. This will allow for free eastbound right turn movements at Spicewood Springs Road and Mopac Southbound Frontage Road. Providing a free right will significantly reduce this approach delay. This lane would then turn into a right-turn only lane once it has reached Executive Drive.
- Widen the Southbound Mopac Frontage Road to provide an exclusive right-turn lane, and restripe the existing travel lanes to provide thru, thru, left, and left turn lanes. Modification to the existing channelized island will be required. This will significantly reduce delay for this approach.
- Signal timings will be required to be modified to accommodate the new lane configurations and volumes.

With this improvement, the diamond interchange drastically improves with regards to LOS and performs at an acceptable LOS during all conditions of the analysis. It is also recommended to improve the pedestrian ramps at all corners of the diamond interchange, and also upgrade the pedestrian facilities of the traffic signal to provide APS push buttons and pedestrian signal heads. No additional improvements are recommended at this time.

Spicewood Springs Road and Wood Hollow Drive/Private Driveway

The Spicewood Springs Road and Wood Hollow Drive/Private Driveway currently operates at acceptable LOS, however the LOS is unacceptable starting with 2018 Forecasted AM condition. The intersection is starting to fail at 2023 Site+Forecasted condition. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- Revise the northbound lane configuration to provide left, shared thru-right, and right turn lanes. Northbound and Southbound Bicycle lanes will be unaffected and shall remain with this improvement.
- Revise the signal timing to accommodate the new lane configurations and assignments.

With these improvements the intersection continues to operate at LOS F, but with improved delay. No additional improvements are recommended at this time.

Steck Avenue and Mopac

The diamond interchange of Steck Avenue and Mopac currently operates at an unacceptable LOS. This intersection is extremely limited by the existing bridge and upstream and downstream conditions. The only improvement recommended at this time is to optimize the

splits in order to accommodate the new traffic volumes as growth occurs in the area. No additional improvements are recommended at this time.

Greystone Drive and Hart Lane

The intersection of Greystone Drive and Hart Lane currently operates at acceptable LOS and continues to do the same until 2023 Forecasted condition. Therefore, mitigations measures have been evaluated starting with 2023 Site+Forecasted condition. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- It is recommend to convert this intersection to a single-lane roundabout which also accommodates pedestrian and bicycles. The existing geometry, pavement availability, and ROW availability allows for this improvement to be put in place.

With these improvements the intersection performs at an acceptable level of service through all conditions of development. No additional improvements are recommended at this time.

Greystone Drive and Wood Hollow Drive

The intersection of Greystone Drive and Wood Hollow Drive currently operates at acceptable LOS and continues to do the same until 2023 Forecasted condition. Therefore, mitigations measures have been evaluated starting with 2023 Site+Forecasted condition. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- It is recommend to convert this intersection to a single-lane roundabout which also accommodates pedestrian and bicycles. The existing geometry, pavement availability, and ROW availability allows for this improvement to be put in place.

With these improvements the intersection performs at an acceptable level of service through all conditions of development. No additional improvements are recommended at this time.

Executive Center Drive and Wood Hollow Drive

The intersection of Executive Center Drive and Wood Hollow Drive currently operates at an acceptable LOS until the 2018 Site+Forecasted PM Peak condition. As part of this development, this intersection will be converted from a four (4) way stop controlled intersection to a single lane roundabout with right-turn lane bypasses for all approaches. With the addition of this improvement this intersection shall perform at an acceptable level of service until the 2028 condition where it begins to fail predominately in the PM Peak Hour. No additional improvements are recommended at this time.

Executive Center Drive and Hart Lane

The intersection of Executive Center Drive and Hart Lane currently operates at an acceptable LOS until 2028 Site+Forecasted PM peak condition. In order to mitigate the failing condition of the intersection, the following improvements are recommended:

- Separated movements for all approached are recommended. All approached provide adequate pavement width to accommodate separated movements; therefore, the striping will be revised/added for this improvement. Bicycle lanes will remain with the revised striping.

It is also recommended to improve the pedestrian ramps at all corners of the intersection, and also complete the sidewalk gap between Executive Drive and Spicewood Springs Road along Hart Lane. With these improvements the intersection performs at an acceptable level of service through all conditions of development. No additional improvements are recommended at this time.

Spicewood Springs Road and Hart Lane

The intersection of Spicewood Springs Road and Hart Lane is failing in the existing condition and it continues to operate the same with increased delay through to the 2031 Site+Forecasted conditions. This intersection geometry is very unique given the upstream/downstream condition as well as the fact that it is a T-intersection. Signalization of this intersection is the only means in which it will perform at an acceptable LOS. This allows for a higher level of capacity at this intersection. With this recommended improvement, the intersection operates at acceptable LOS D or better through all the phases where it is completely built out in 2031 Site+Forecasted. A signal warrant analysis has been completed for this intersection and is presented later in this report. No additional improvements are recommended at this time.

NTS Results and Recommendations

Based on the results of the Neighborhood Traffic Study (NTS), the maximum desirable volumes are currently being exceeded along the roadway segments which were evaluated. Additionally, without the proposed development and only considering the natural growth of the area and traffic volumes, the roadway segments will continue to exceed the desirable volumes. With the Austin Oaks redevelopment, the volumes along those roadway segments will continue to increase, however the traffic volumes associated with the redevelopment is a small percentage than that of the overall traffic volumes present on the roadways.

Although the volumes along the segments exceed the City of Austin's maximum desirable volumes, it does not mean that the roadways have exceeded its capacity. The results of the Roadway Capacity Analysis show us that roadway segments are performing at an acceptable LOS in the existing conditions as well and all future conditions of the redevelopment. None of the roadway segments analyzed have exceeded capacity.

In order to address the roadway segments exceeding the City of Austin's maximum desirable volumes, the following mitigation measures are recommended to persuade drivers to utilize the major arterials and minimize the use of the neighborhood collectors. Since all these six (6) segments are 2-lane roadways with on-street parking and bicycle lanes, new improvements are limited. The intersection improvements recommended in the previous section will reduce the intersection delays and thus, improving the travel time on the arterial roadway. This will encourage through traffic to return to the arterial roadway system rather than the use of residential streets. The other mitigation measures recommended are as follows:

- Provide adequate striping and signage;
- Install speed limit signs along all street segments;
- Speed cushion installation and
- Upgraded bicycle facilities
- Improvement pedestrian facilities (e.g. sidewalk, curb ramps, mid-block crossings)
- Improved Capital Metro Bus Stop Facilities
- Speed enforcement.

As development moves forward, each NTA Roadway shall be evaluated at the time of development to understand what improvements are necessary and where. Coordination with Austin Transportation Department and Capital Metro will be required on an on-going basis.

Signal Warrant Recommendations

The following results and recommendations are based on the data that has been collected, and standards and criteria for signal warrant analysis set by the TMUTCD.

The signal warrant analysis evaluated the 2018 Forecasted condition for the approach roadways at the Spicewood Springs Road and Hart Lane intersection. Based on the capacity analysis for the intersection for the 2018 Site+Forecasted Condition, it was evident that a traffic signal is required at this intersection to mitigate the failing level of service due to the high delay for the minor approach (Northbound Hart Lane) due to the heavy volume on Spicewood Springs Road. While the delay at this intersection signifies the need for a traffic signal, a signal warrant analysis was completed to understand if the necessary traffic volumes are present in order to meet warrants. Per the results of the Signal Warrant Analysis, warrants will be met beginning with the 2018 Forecasted condition (Phase I); therefore, it will be necessary for the traffic signal to be constructed and operational by the completion of Phase I of the development in 2018.

According to the Signal Warrant Analysis, specifically warrants one (1), two (2) and three (3) were satisfied. Therefore, a traffic signal is warranted and recommended at Spicewood Springs Road and Hart Lane intersection. Please refer to ***Exhibit 13*** within the Appendix of this report for the detailed Signal Warrant Worksheets.

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