

## TRAFFIC FORECASTING

Historic traffic counts were not available for S. Pope Lick Road or Tucker Station Road; however, counts were available for Bluegrass Parkway at station 056L91, which is immediately west of the study area. Based on this data, historic traffic patterns indicate a growth rate of 0.43 percent per year. An average growth rate of 0.5% was used for projecting traffic volumes to the year of opening, 2023 and the design year of 2033. **Appendix D** contains the historic traffic data and output from the KYTC Traffic forecasting spreadsheet.

In addition to the background traffic growth rate, trip generation from the recently approved residential development on S. Pope Lick was also added to the network for the No Build traffic condition. **Figures 4 and 5** show the AM and PM trip generation associated with this development. AM and PM peak hour volumes for 2023 No Build and 2033 No Build traffic volumes are summarized in **Figures 6, 7, 8 and 9**.

Figure 4: AM Peak S. Pope Lick Residential Development Trip Generation

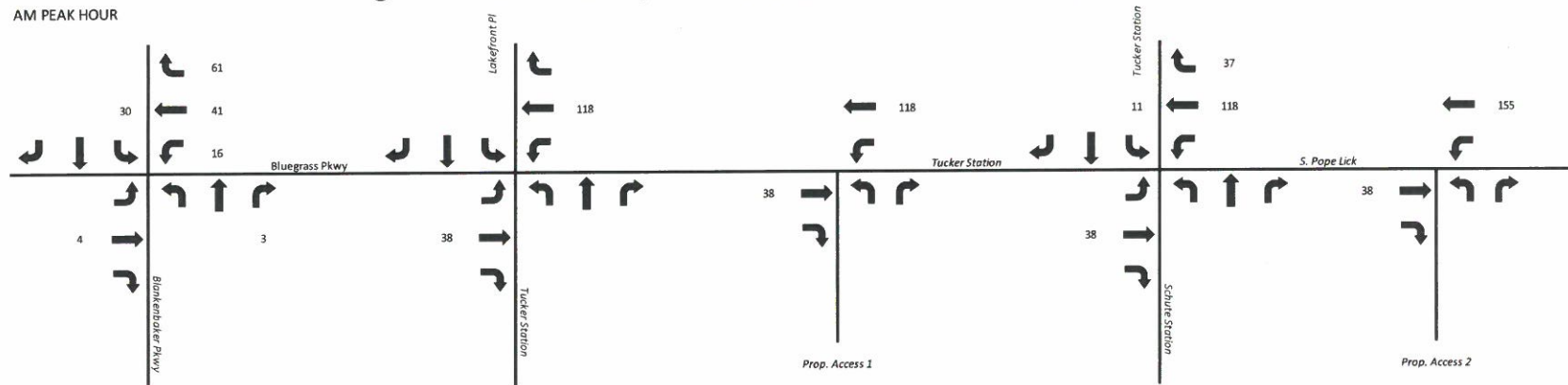


Figure 5: PM Peak S. Pope Lick Residential Development Trip Generation

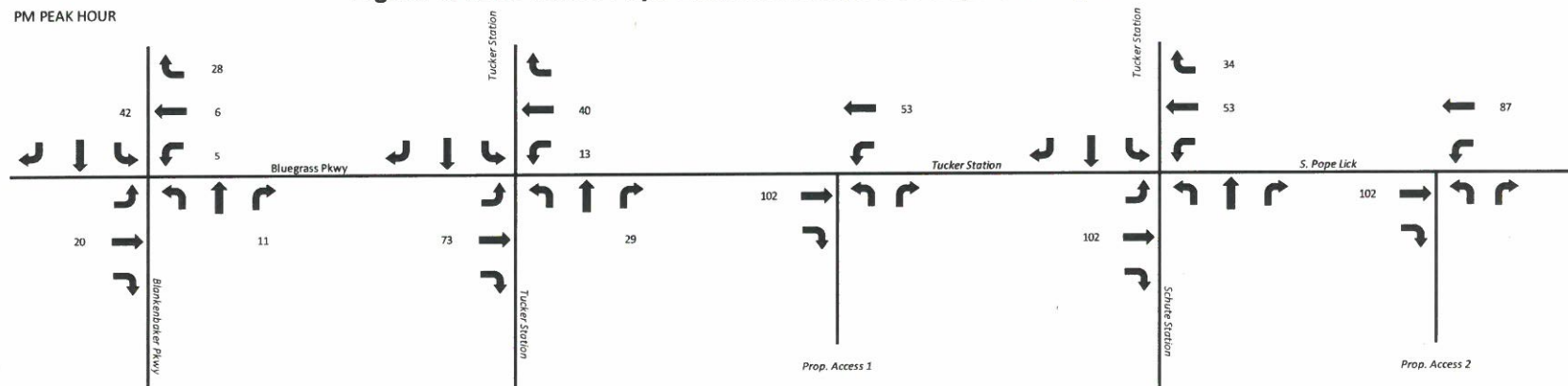




Figure 6: AM Peak 2023 No Build Traffic Volumes

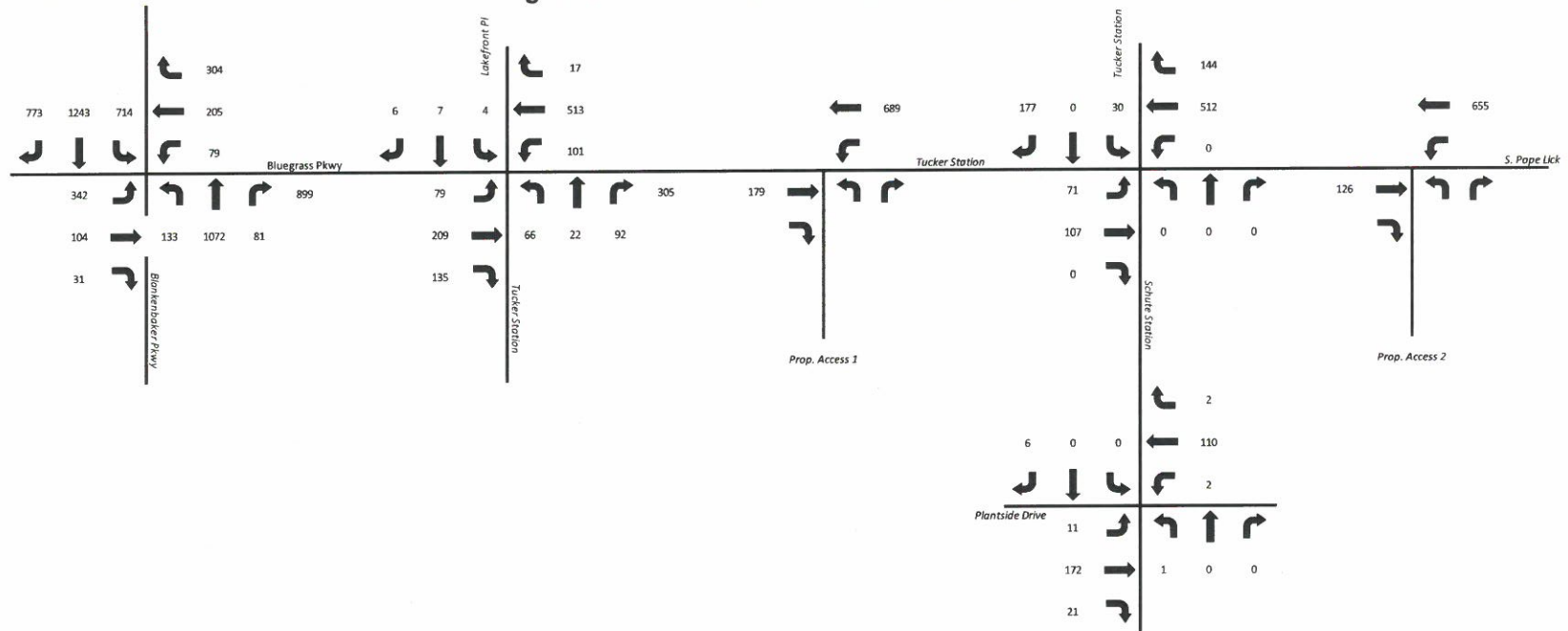


Figure 7: PM Peak 2023 No Build Traffic Volumes

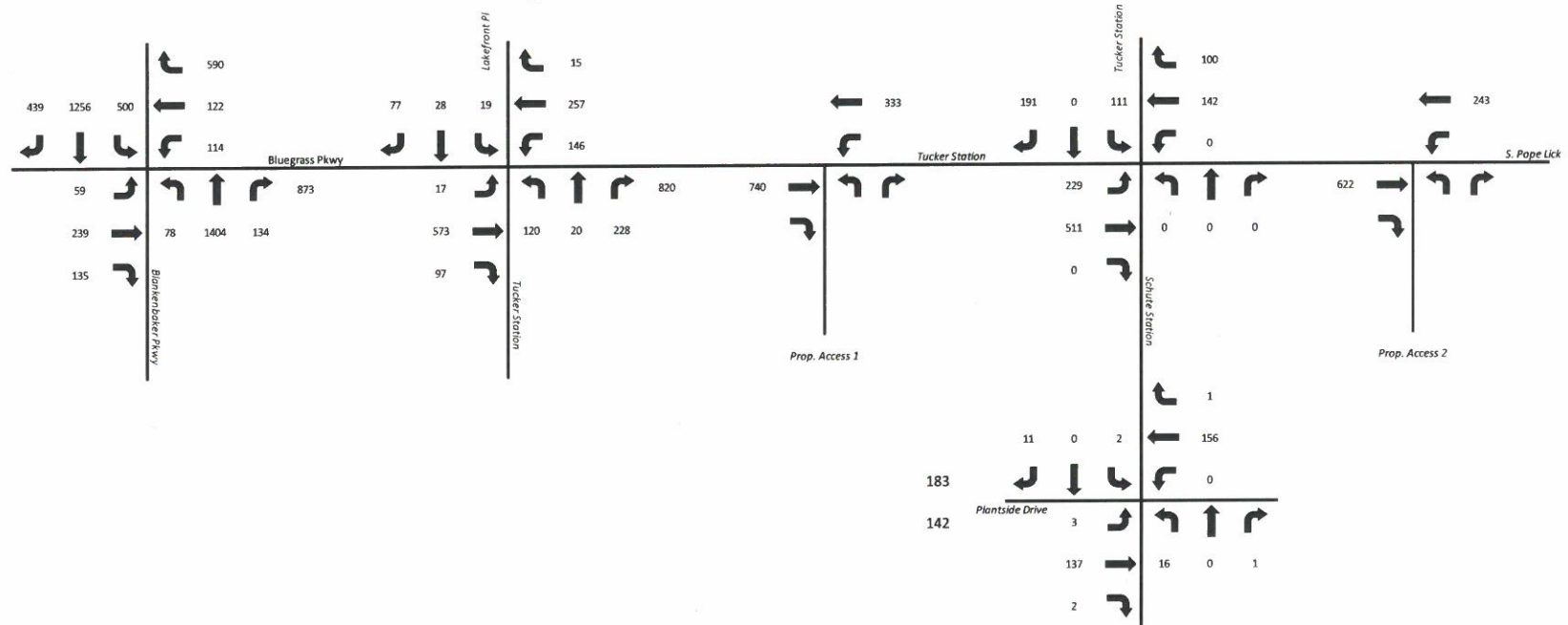


Figure 8: AM Peak 2033 No Build Traffic Volumes

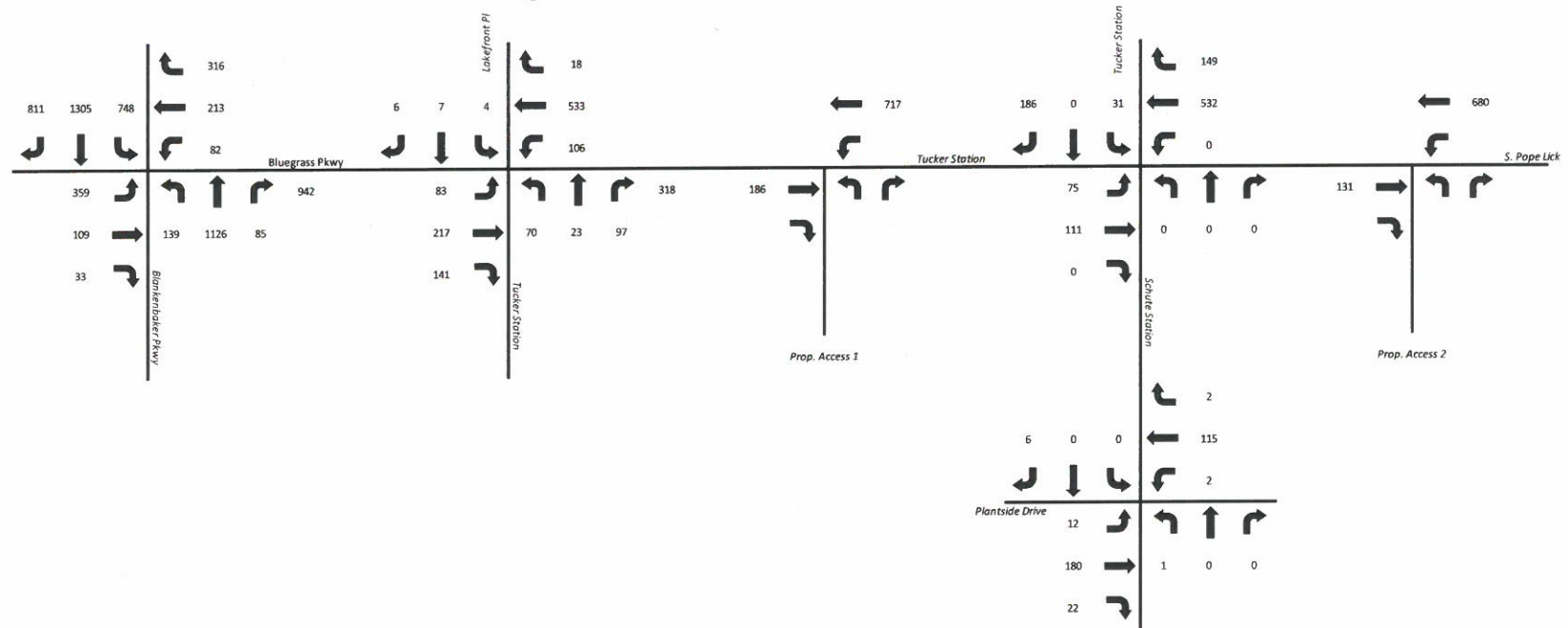
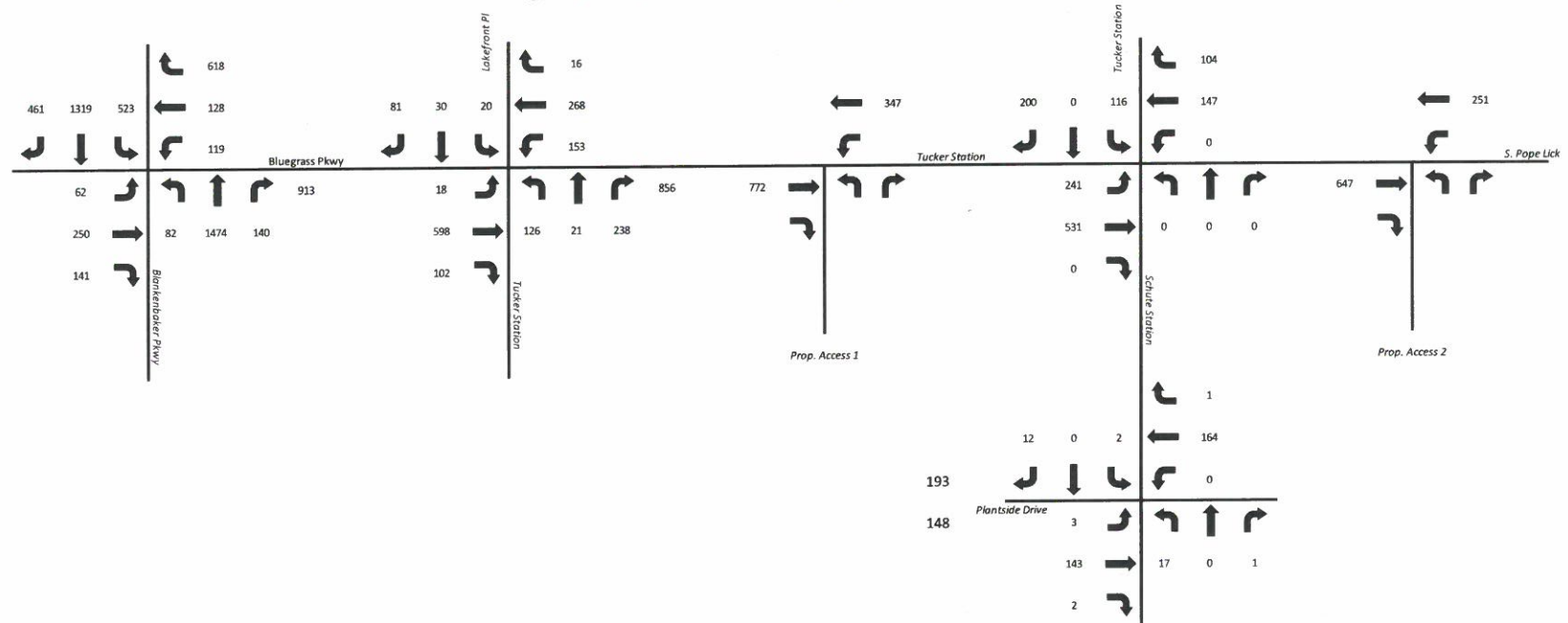


Figure 9: PM Peak 2033 No Build Traffic Volumes



## TRIP GENERATION

Trip Generation was conducted in accordance with the ITE Trip Generation Web Based App, 11<sup>th</sup> edition. Trip Generation utilized **ITE Land Use Code 130 Industrial Park**. This land use provides a higher trip generation than strictly warehousing or distribution land uses in the event some manufacturing or other industrial use was housed in the development. Based on this land use and the 1M s.f. gross floor area, the development is expected to generate 414 and 405 trips per hour during the AM and PM peak hours of the development. **Table 1** summarizes the trip generation for each proposed tract and **Appendix C** contains output from the ITE Trip Generation Manual.

**Table 1: Trip Generation**

Land Use	ITE Code	Ind. Var.	Units	AM Peak			Saturday		
				Total	Entering	Exiting	Total	Entering	Exiting
<b>Total</b>				<b>414</b>	<b>359</b>	<b>55</b>	<b>405</b>	<b>85</b>	<b>320</b>
Tract 1	130	196.5	units	81	70	11	79	17	62
Tract 2	130	210	units	86	75	11	84	18	66
Tract 3	130	146.9	units	60	52	8	59	12	47
Tract 4	130	146.9	units	60	52	8	59	12	47
Tract 5	130	310.5	units	127	110	17	124	26	98

## TRIP DISTRIBUTION METHODOLOGY

Generated trips were distributed onto the roadway network based on recorded travel patterns on Commerce Parkway and the proposed configuration of the development roadway layout. Total roadway volumes at the approaches to the study area were determined and trips distributed consistently with these total volumes. **Figure 10** shows the area wide trip distributions. The final entering and exiting trip distribution is shown in **Figures 11 and 12**. **Figures 13, 14, 15 and 16** show the final build traffic volumes for AM and PM peak hour turning movement for 2023 and 2033.

Figure 10: Area-wide Origin-Destination Trip Distribution

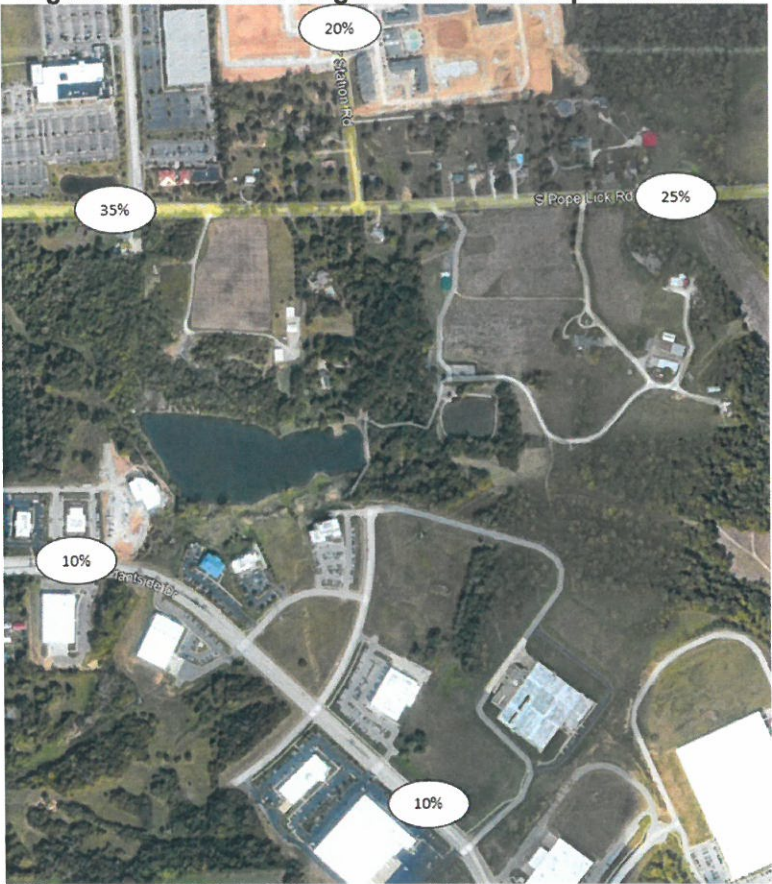




Figure 9: Entering Trip Distribution

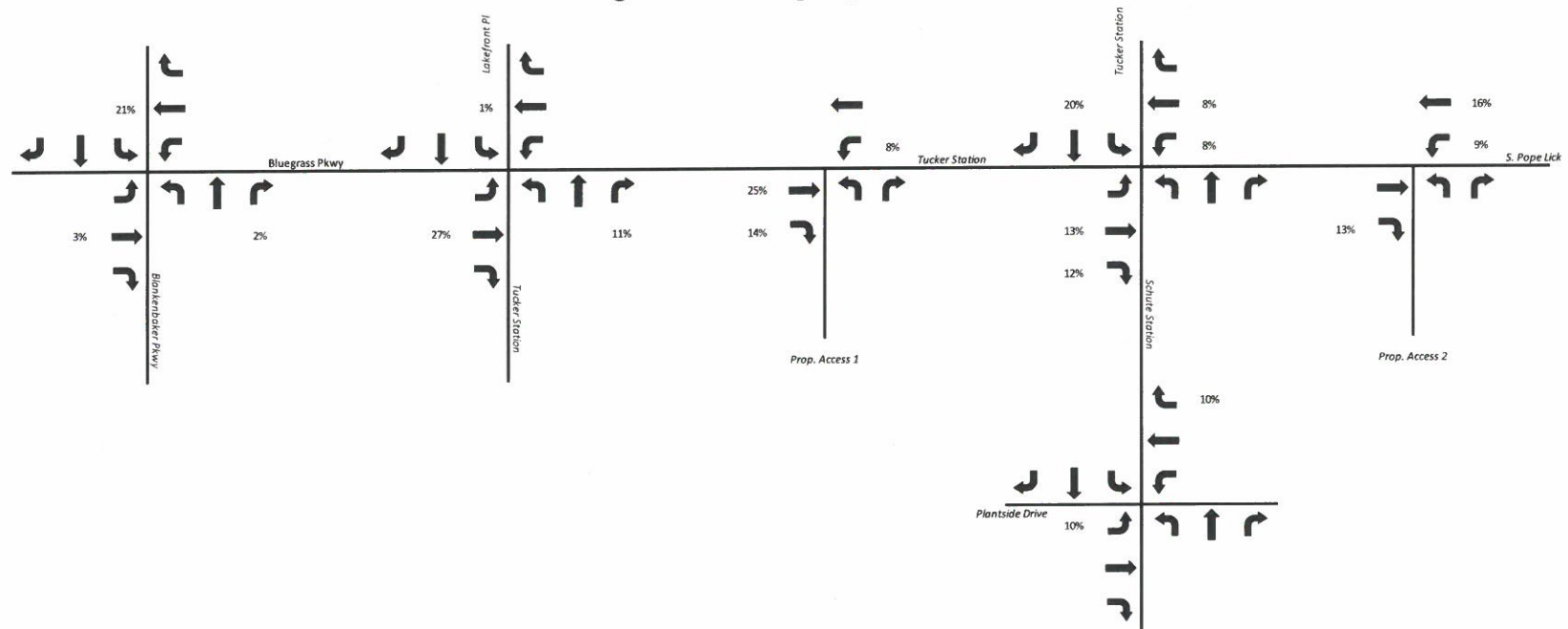


Figure 10: Exiting Trip Distribution

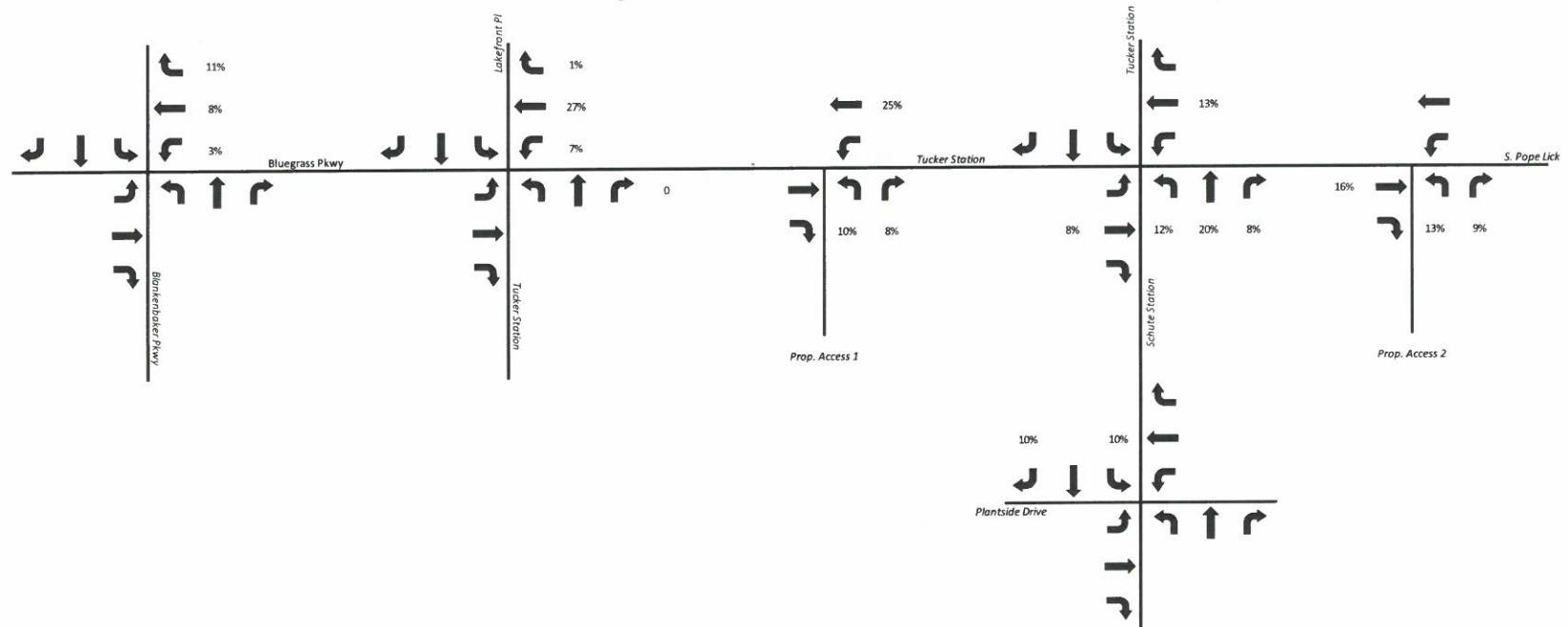


Figure 11: AM Peak Hour 2023 Build

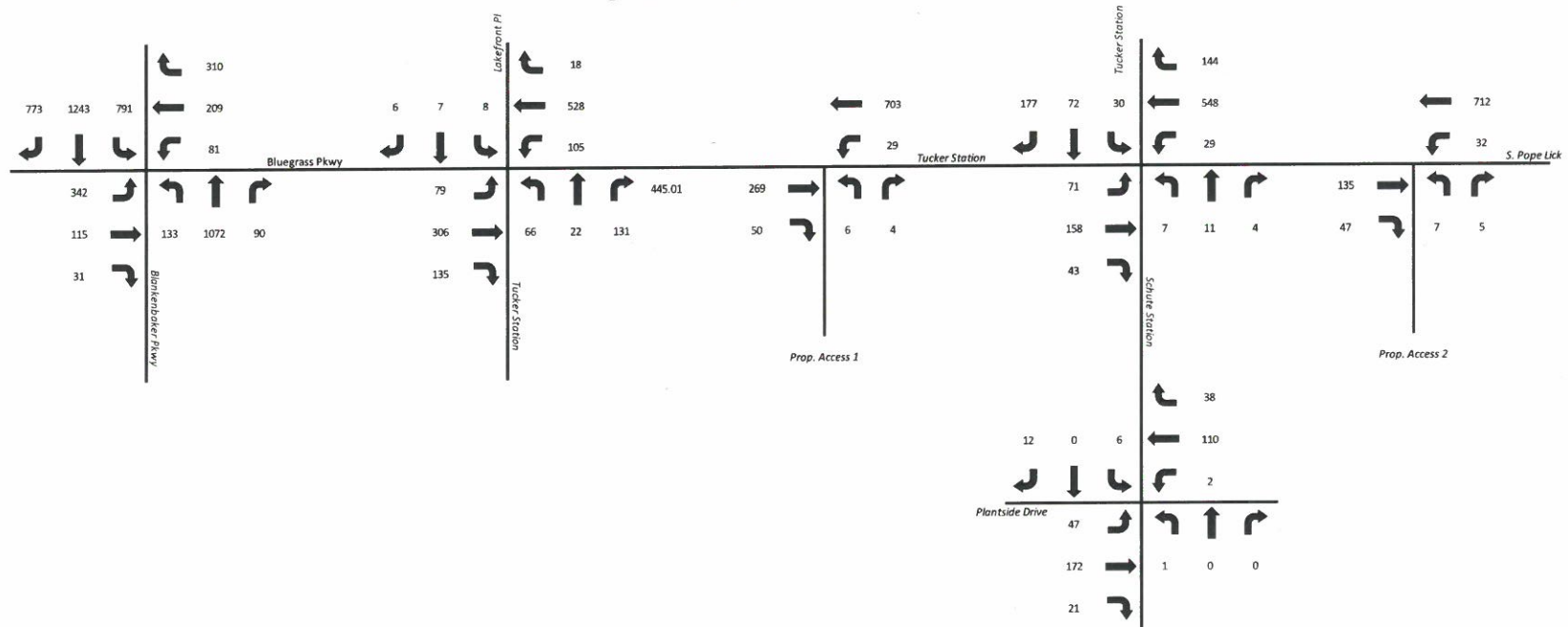


Figure 12: PM Peak Hour 2023 Build

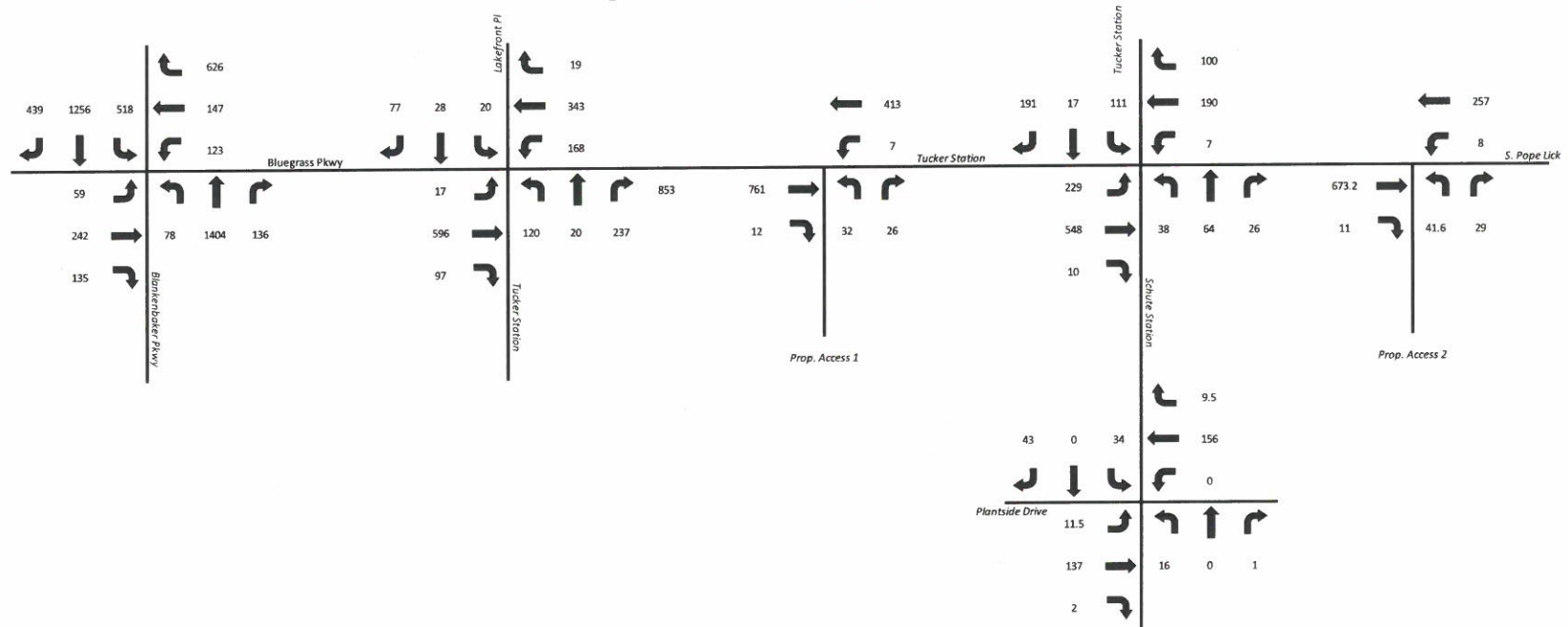


Figure 13: AM Peak Hour 2033 Build

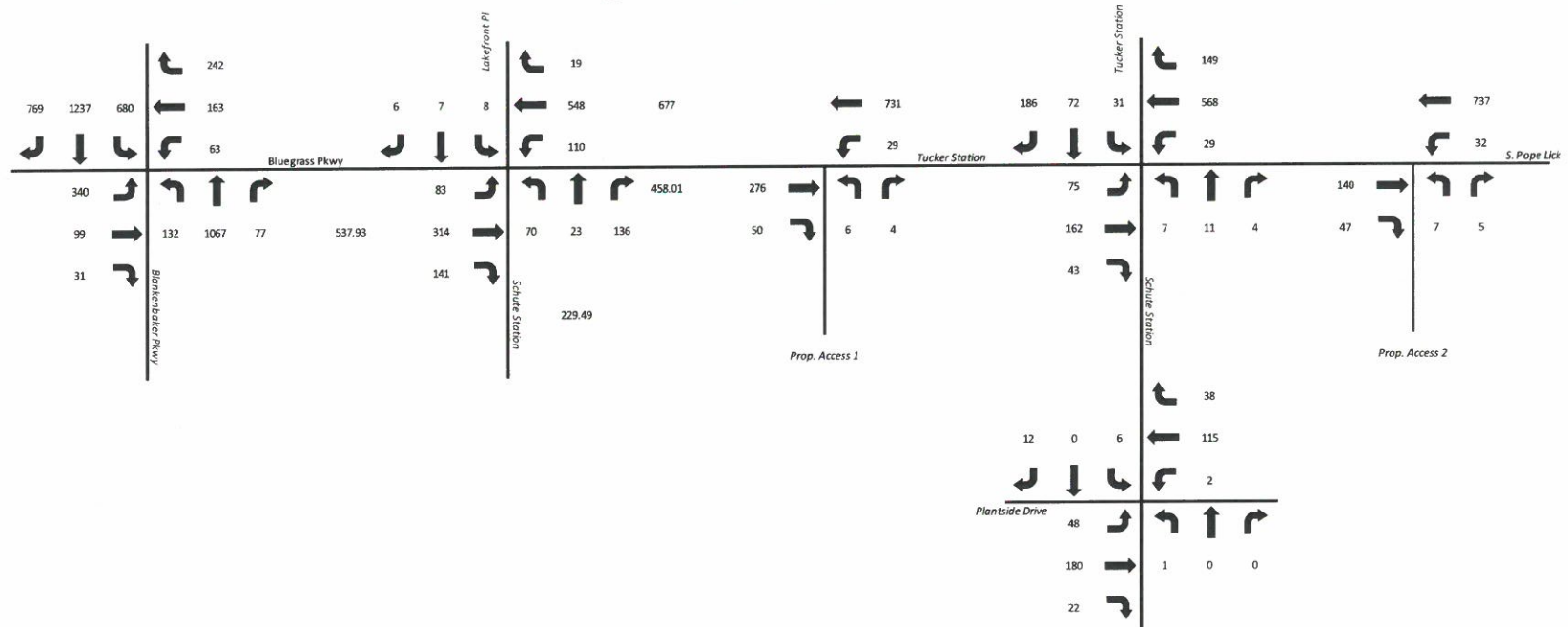
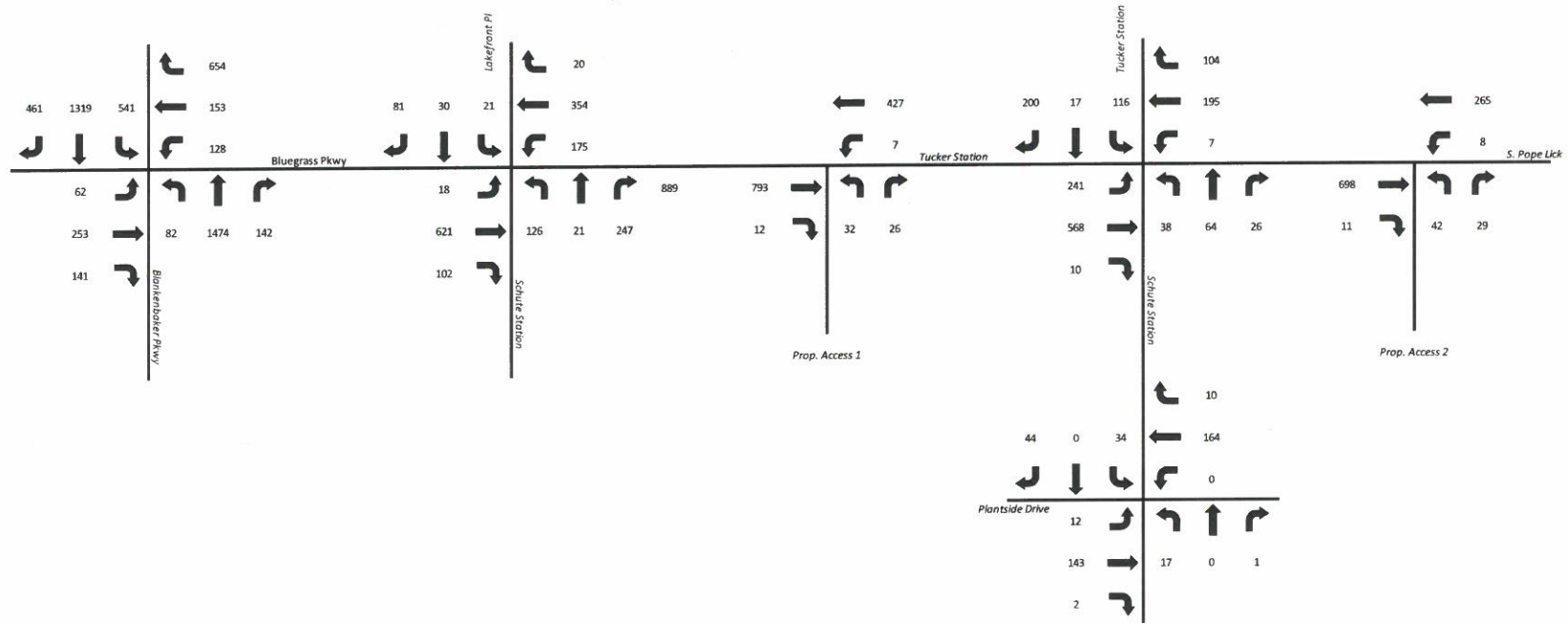


Figure 14: PM Peak Hour 2033 Build





## CAPACITY ANALYSIS

Capacity analysis for the no build and build scenarios was completed for the study intersections during the AM and PM peak hours using HCM methodologies as applied Synchro Capacity Software version 10. **Tables 2 and 3** summarize the AM and PM peak hour LOS, and delay for the No Build and Build scenarios. Full capacity analysis output is provided in **Appendix E**.

As can be seen from the capacity analysis, all access points and the intersection of Schute Station Road and Plantside Drive are shown to operate at acceptable levels of service during all scenarios evaluated. Minimal changes in delay and operations are anticipated at Blankenbaker Parkway and Bluegrass Parkway.

Eastbound Tucker Station Road at S. Pope Lick Road is shown to operate at or over capacity under the 2023 demand for the westbound direction in the AM peak and for the eastbound direction for the PM peak. The proposed auxiliary turn lanes on these approaches decreases approach delay during the PM peak, but still experiences higher delays under the AM peak demand.

At the intersection of Bluegrass Parkway and Tucker Station Road/Lakeside Place, the existing configuration is shown to operate under capacity for both the No Build and Build conditions under the AM conditions. In the PM peak period, the northbound approach is shown to operate at LOS F for both the No Build and Build conditions.

Signalization of the intersections of Tucker Station Road at S. Pope Lick Road and Tucker Station at Bluegrass Parkway is shown to improve operations under all conditions as summarized in **Table 4**.

**Table 2: AM Peak Capacity Analysis Summary**

AM PEAK HOUR		2023 No Build		2023 Build		2033 No Build		2033 Build	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Blankenbaker Pkwy at Bluegrass Pkwy	Intersection	E	57.6	E	57.6	E	61.2	E	64.0
	eastbound (Bluegrass)	E	79.0	F	85.8	E	73.7	E	74.3
	westbound (Bluegrass)	F	95.4	F	91.8	F	157.2	F	162.9
	northbound (Blankenbaker)	D	48.9	E	57.9	D	54.4	D	54.6
	southbound (Blankenbaker)	D	49.8	D	45.3	D	41.7	D	45.5
Bluegrass Pkwy at Tucker Station	Intersection	--	--	--	--	--	--	--	--
	eastbound (Bluegrass)	A	1.8	A	1.4	A	1.8	A	1.5
	westbound (Tucker Station)	A	1.6	A	1.7	A	1.6	A	1.7
	northbound (Tucker Station)	D	27.2	D	32.7	D	33.3	E	42.0
	southbound (Lakeside Pl)	C	23.7	D	32.2	D	25.9	E	36.2
S. Pope Lick Rd at Access Point 1	Intersection			--	--			--	--
	westbound (left turn)			A	0.7			A	0.7
	northbound (Access 1)			C	17.7			C	18.3
S. Pope Lick Road at Tucker Station Road	Intersection	D	31.2	F	85.9	E	38.4	F	99.3
	eastbound (Tucker Station)	B	11.1	B	12.6	B	11.5	B	12.8
	westbound (S. Pope Lick)	E	42.7	F	142.2	F	54.1	F	165.7
	northbound (Shute Station)	--	--	B	10.8	--	--	B	10.8
	southbound (Tuckjer Station)	B	11.7	C	17.6	B	12.2	C	18.3
S. Pope Lick Rd at Access Point 2	Intersection			--	--			--	--
	westbound (left turn)			A	0.7			A	0.7
	northbound (Access 1)			C	15.4			C	15.8
Schute Station at Plantside Drive	Intersection	--	--	--	--	--	--	--	--
	eastbound LT (Plantside)	A	0.5	A	1.6	A	0.5	A	1.6
	westbound LT (Plantside)	A	0.1	A	0.1	A	0.1	A	0.1
	northbound	B	10.7	B	11.8	B	10.9	B	11.9
	southbound	A	8.7	A	9.7	A	8.7	A	9.8

**Table 3: PM Peak Capacity Analysis Summary**

PM PEAK HOUR		2023 No Build		2023 Build		2033 No Build		2033 Build	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Blankenbaker Pkwy at Bluegrass Pkwy	Intersection	F	117.6	F	130.5	F	123.2	F	131.9
	eastbound (Bluegrass)	F	277.1	F	395.4	F	309.9	F	314.5
	westbound (Bluegrass)	F	307.3	F	334.9	F	294.2	F	320.2
	northbound (Blankenbaker)	D	54.9	E	72.7	E	58.3	E	58.4
	southbound (Blankenbaker)	E	61.0	D	37.9	E	70.0	E	74.0
Bluegrass Pkwy at Tucker Station	Intersection	--	--	--	--	--	--	--	--
	eastbound (Bluegrass)	A	0.2	A	0.2	A	0.2	A	0.2
	westbound (Tucker Station)	A	3.5	A	3.2	A	3.5	A	3.3
	northbound (Tucker Station)	F	107.8	F	189.7	F	162.3	F	273.7
	southbound (Lakeside Pl)	E	37.4	F	65.7	F	51.8	F	105.6
S. Pope Lick Rd at Access Point 1	Intersection			--	--			--	--
	westbound (left turn)			A	0.4			A	0.3
	northbound (Access 1)			C	19.1			D	25.4
S. Pope Lick Road at Tucker Station Road	Intersection	F	84.8	F	61.6	F	102.1	F	72.1
	eastbound (Tucker Station)	F	136.4	C	98.6	F	165.9	F	116.7
	westbound (S. Pope Lick)	B	12.8	B	22.6	B	13.3	C	24.3
	northbound (Shute Station)	--	--	D	13.1	--	--	B	13.3
	southbound (Tuckjer Station)	C	16.1	C	26.0	C	16.9	D	28.6
S. Pope Lick Rd at Access Point 2	Intersection			--	--			--	--
	westbound (left turn)			A	0.4			A	0.4
	northbound (Access 1)			C	19.1			C	19.9
Schute Station at Plantside Drive	Intersection	--	--	--	--	--	--	--	--
	eastbound LT (Plantside)	A	0.2	A	0.7	A	0.2	A	0.6
	westbound LT (Plantside)	A	0.0	A	0.0	A	0.0	A	0.0
	northbound	B	10.3	B	10.8	B	10.5	B	10.9
	southbound	A	9.1	B	10.1	A	9.1	B	10.2

**Table 4: Signalized Capacity Analysis Summary**

PM PEAK HOUR		2023 AM		2023 PM		2033 AM		2033 PM	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Bluegrass Pkwy at Tucker Station	Intersection	A	5.6	A	9.4	A	6.7	B	10.2
	eastbound (Bluegrass)	A	4.9	A	9.2	A	5.0	B	10.4
	westbound (Tucker Station)	A	5.3	A	7.2	A	7.4	A	7.3
	northbound (Tucker Station)	A	7.5	B	13.3	A	8.5	B	14.4
	southbound (Lakeside Pl)	A	6.7	A	8.0	A	7.5	A	8.1
S. Pope Lick Road at Tucker Station Road	Intersection	A	7.7	A	9.4	A	8.1	A	10.0
	eastbound (Tucker Station)	A	6.3	B	11.4	A	6.6	B	12.1
	westbound (S. Pope Lick)	A	7.0	A	5.8	A	7.3	A	5.9
	northbound (Shute Station)	A	9.9	A	8.2	A	10.4	A	8.5
	southbound (Tuckjer Station)	B	10.7	A	8.5	A	11.3	A	9.0



## TURN LANE WARRANT ANALYSIS

Auxiliary turn lane warrant analysis was conducted for all proposed access points in accordance with KYTC Auxiliary Turn Lane policy, as applied by the Warrant Calcs Interactive excel spreadsheet provided on the KYTC Division of Design website. Based on this analysis, a left turn lane is warranted at the two proposed access points based on AM peak hour demand. Right turn lanes are not warranted at any access point for either AM and PM peak periods. Output from the warrant analysis is provided in **Appendix F**.

## RECOMMENDATIONS

Dedicated left-turn lanes are recommended to improve operations at the intersection of Tucker Station Road and S. Pope Lick Road. Signalization should be considered for the intersections of Tucker Station Road at Bluegrass Parkway and Tucker Station Road at S. Pope Lick Road.

Left turn auxiliary lanes are recommended at the proposed access points on Tucker Station Road and S. Pope Lick Road.

## APPENDIX A: DEVELOPMENT PLAN





Received Feb. 21, 2022  
Planning & Design  
32-2506-0000



## APPENDIX B: TRAFFIC DATA

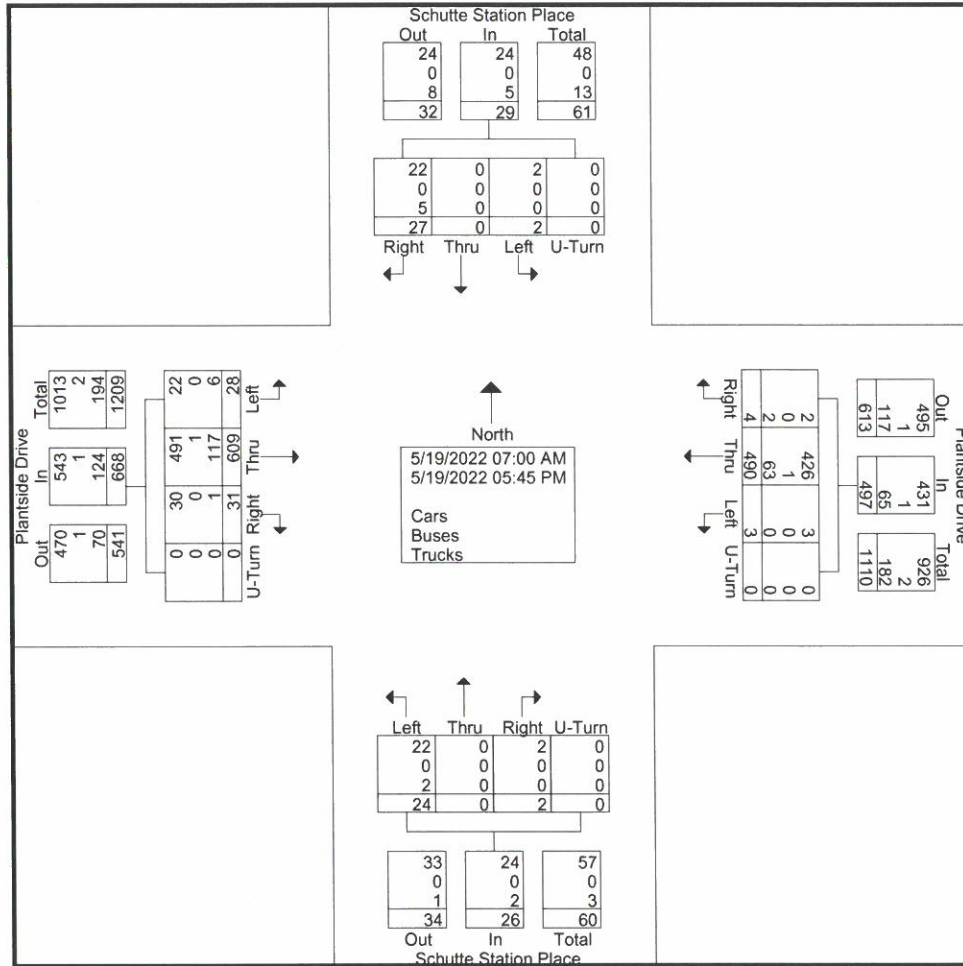
Partly Sunny  
 Schools in Session

File Name : Plantside\_Drive\_at\_Schutte\_Station\_Place\_05-19-2022  
 Site Code : Site 2 - Thursday  
 Start Date : 5/19/2022  
 Page No : 1

Groups Printed- Cars - Buses - Trucks

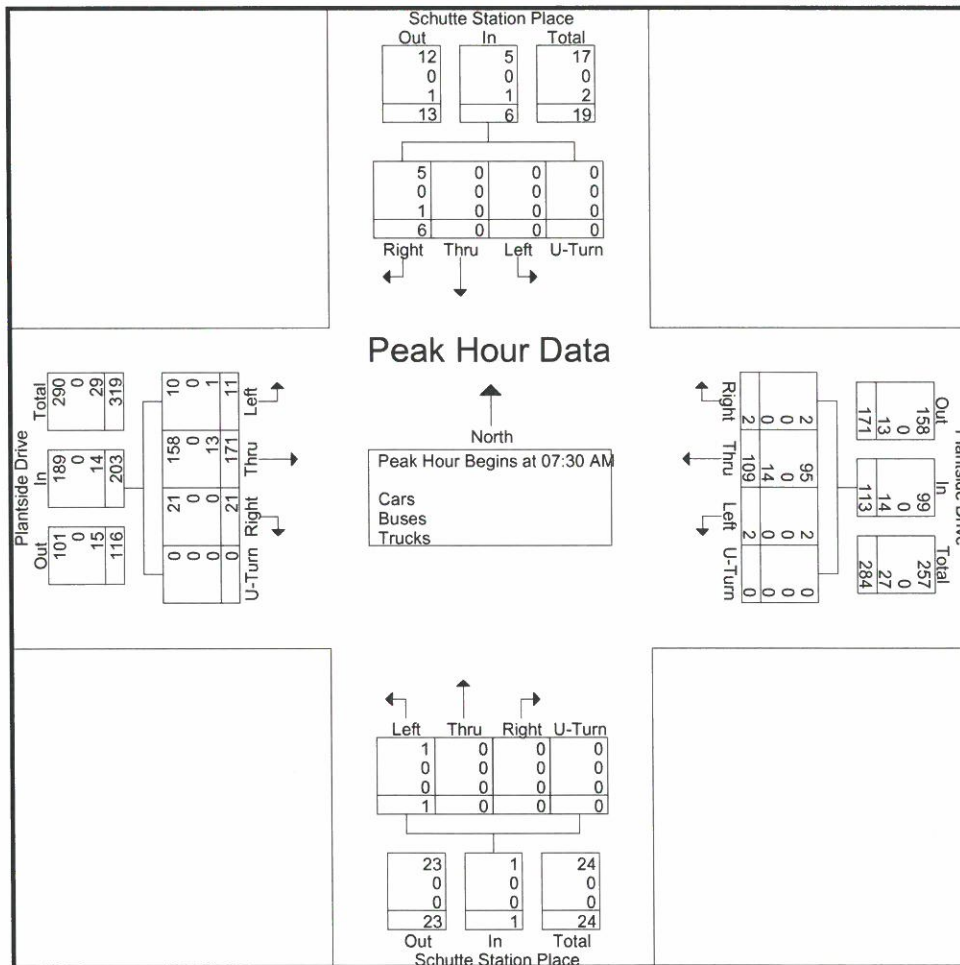
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07:00 AM	0	0	1	0	1	0	23	0	0	23	0	0	0	0	0	5	29	0	0	34	58
07:15 AM	0	0	0	0	0	1	14	0	0	15	1	0	0	0	1	3	28	7	0	38	54
07:30 AM	0	0	4	0	4	0	25	0	0	25	0	0	0	0	0	3	44	4	0	51	80
07:45 AM	0	0	1	0	1	1	27	0	0	28	0	0	0	0	0	0	43	6	0	49	78
Total	0	0	6	0	6	2	89	0	0	91	1	0	0	0	1	11	144	17	0	172	270
08:00 AM	0	0	1	0	1	1	25	2	0	28	0	0	0	0	0	5	38	9	0	52	81
08:15 AM	0	0	0	0	0	0	32	0	0	32	1	0	0	0	1	3	46	2	0	51	84
08:30 AM	0	0	1	0	1	0	17	0	0	17	0	0	0	0	0	1	43	0	0	44	62
08:45 AM	0	0	0	0	0	0	29	1	0	30	0	0	0	0	0	3	37	1	0	41	71
Total	0	0	2	0	2	1	103	3	0	107	1	0	0	0	1	12	164	12	0	188	298
04:00 PM	0	0	0	0	0	0	45	1	0	46	4	0	1	0	5	0	35	1	0	36	87
04:15 PM	2	0	3	0	5	0	35	0	0	35	1	0	0	0	1	1	42	0	0	43	84
04:30 PM	0	0	3	0	3	0	46	0	0	46	5	0	0	0	5	2	31	1	0	34	88
04:45 PM	0	0	5	0	5	0	29	0	0	29	6	0	0	0	6	0	28	0	0	28	68
Total	2	0	11	0	13	0	155	1	0	156	16	0	1	0	17	3	136	2	0	141	327
05:00 PM	0	0	1	0	1	0	53	0	0	53	1	0	1	0	2	0	31	0	0	31	87
05:15 PM	0	0	1	0	1	0	21	0	0	21	1	0	0	0	1	1	39	0	0	40	63
05:30 PM	0	0	3	0	3	0	39	0	0	39	3	0	0	0	3	0	50	0	0	50	95
05:45 PM	0	0	3	0	3	0	30	0	0	30	1	0	0	0	1	1	45	0	0	46	80
Total	0	0	8	0	8	0	143	0	0	143	6	0	1	0	7	2	165	0	0	167	325
Grand Total	2	0	27	0	29	3	490	4	0	497	24	0	2	0	26	28	609	31	0	668	1220
Apprch %	6.9	0	93.1	0		0.6	98.6	0.8	0		92.3	0	7.7	0		4.2	91.2	4.6	0		
Total %	0.2	0	2.2	0	2.4	0.2	40.2	0.3	0	40.7	2	0	0.2	0	2.1	2.3	49.9	2.5	0	54.8	
Cars	2	0	22	0	24	3	426	2	0	431	22	0	2	0	24	22	491	30	0	543	1022
% Cars	100	0	81.5	0	82.8	100	86.9	50	0	86.7	91.7	0	100	0	92.3	78.6	80.6	96.8	0	81.3	83.8
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
% Buses	0	0	0	0	0	0	0.2	0	0	0.2	0	0	0	0	0	0	0.2	0	0	0.1	0.2
Trucks	0	0	5	0	5	0	63	2	0	65	2	0	0	0	2	6	117	1	0	124	196
% Trucks	0	0	18.5	0	17.2	0	12.9	50	0	13.1	8.3	0	0	0	7.7	21.4	19.2	3.2	0	18.6	16.1

File Name : Plantside\_Drive\_at\_Schutte\_Station\_Place\_05-19-2022  
 Site Code : Site 2 - Thursday  
 Start Date : 5/19/2022  
 Page No : 2



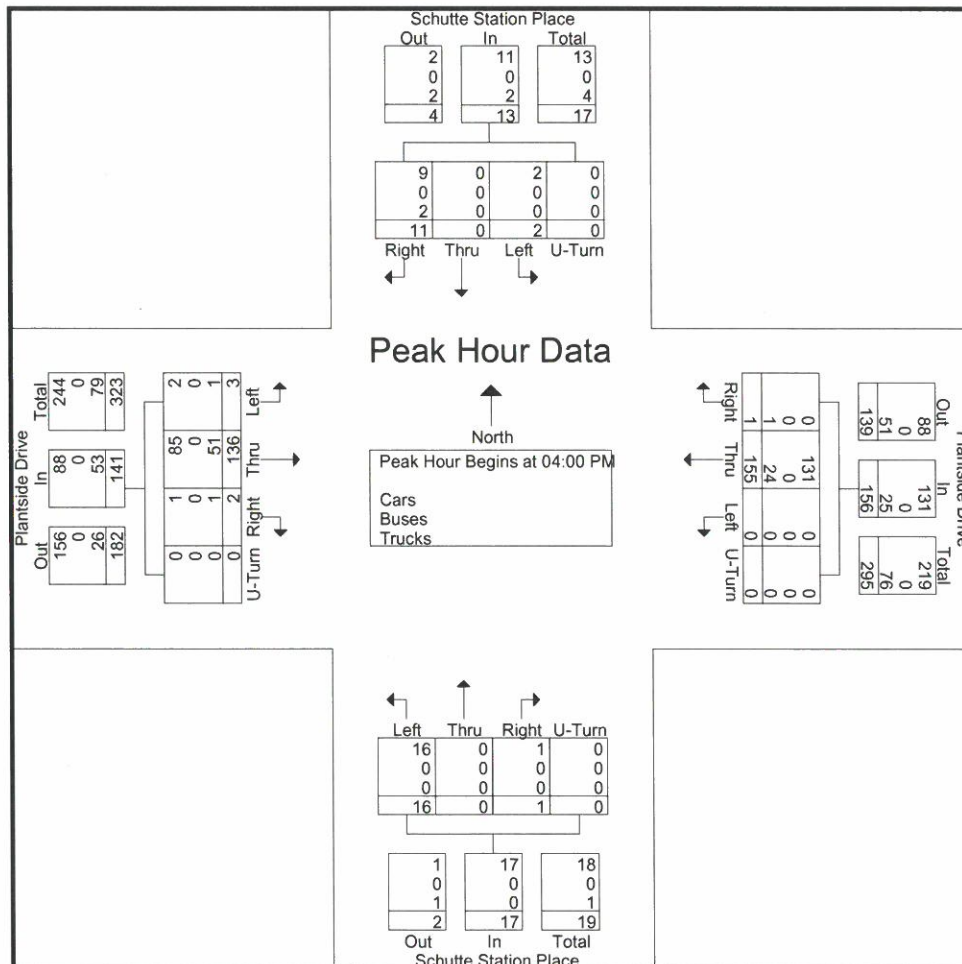
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 Site Code : Site 2 - Thursday  
 Start Date : 5/19/2022  
 Page No : 3

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Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	4	0	4	0	25	0	0	25	0	0	0	0	0	3	44	4	0	51	80
07:45 AM	0	0	1	0	1	1	27	0	0	28	0	0	0	0	0	0	43	6	0	49	78
08:00 AM	0	0	1	0	1	1	25	2	0	28	0	0	0	0	0	5	38	9	0	52	81
08:15 AM	0	0	0	0	0	0	32	0	0	32	1	0	0	0	1	3	46	2	0	51	84
Total Volume	0	0	6	0	6	2	109	2	0	113	1	0	0	0	1	11	171	21	0	203	323
% App. Total	0	0	100	0		1.8	96.5	1.8	0		100	0	0	0		5.4	84.2	10.3	0		
PHF	.000	.000	.375	.000	.375	.500	.852	.250	.000	.883	.250	.000	.000	.000	.250	.550	.929	.583	.000	.976	.961
Cars	0	0	5	0	5	2	95	2	0	99	1	0	0	0	1	10	158	21	0	189	294
% Cars	0	0	83.3	0	83.3	100	87.2	100	0	87.6	100	0	0	0	100	90.9	92.4	100	0	93.1	91.0
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trucks	0	0	1	0	1	0	14	0	0	14	0	0	0	0	0	1	13	0	0	14	29
% Trucks	0	0	16.7	0	16.7	0	12.8	0	0	12.4	0	0	0	0	0	9.1	7.6	0	0	6.9	9.0



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 Site Code : Site 2 - Thursday  
 Start Date : 5/19/2022  
 Page No : 4

	Schutte Station Place From North					Plantside Drive From East					Schutte Station Place From South					Plantside Drive From West					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	45	1	0	46	4	0	1	0	5	0	35	1	0	36	87
04:15 PM	2	0	3	0	5	0	35	0	0	35	1	0	0	0	1	1	42	0	0	43	84
04:30 PM	0	0	3	0	3	0	46	0	0	46	5	0	0	0	5	2	31	1	0	34	88
04:45 PM	0	0	5	0	5	0	29	0	0	29	6	0	0	0	6	0	28	0	0	28	68
Total Volume	2	0	11	0	13	0	155	1	0	156	16	0	1	0	17	3	136	2	0	141	327
% App. Total	15.4	0	84.6	0		0	99.4	0.6	0		94.1	0	5.9	0		2.1	96.5	1.4	0		
PHF	.250	.000	.550	.000	.650	.000	.842	.250	.000	.848	.667	.000	.250	.000	.708	.375	.810	.500	.000	.820	.929
Cars	2	0	9	0	11	0	131	0	0	131	16	0	1	0	17	2	85	1	0	88	247
% Cars	100	0	81.8	0	84.6	0	84.5	0	0	84.0	100	0	100	0	100	66.7	62.5	50.0	0	62.4	75.5
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trucks	0	0	2	0	2	0	24	1	0	25	0	0	0	0	0	1	51	1	0	53	80
% Trucks	0	0	18.2	0	15.4	0	15.5	100	0	16.0	0	0	0	0	0	33.3	37.5	50.0	0	37.6	24.5





Partly Sunny  
 Schools in Session

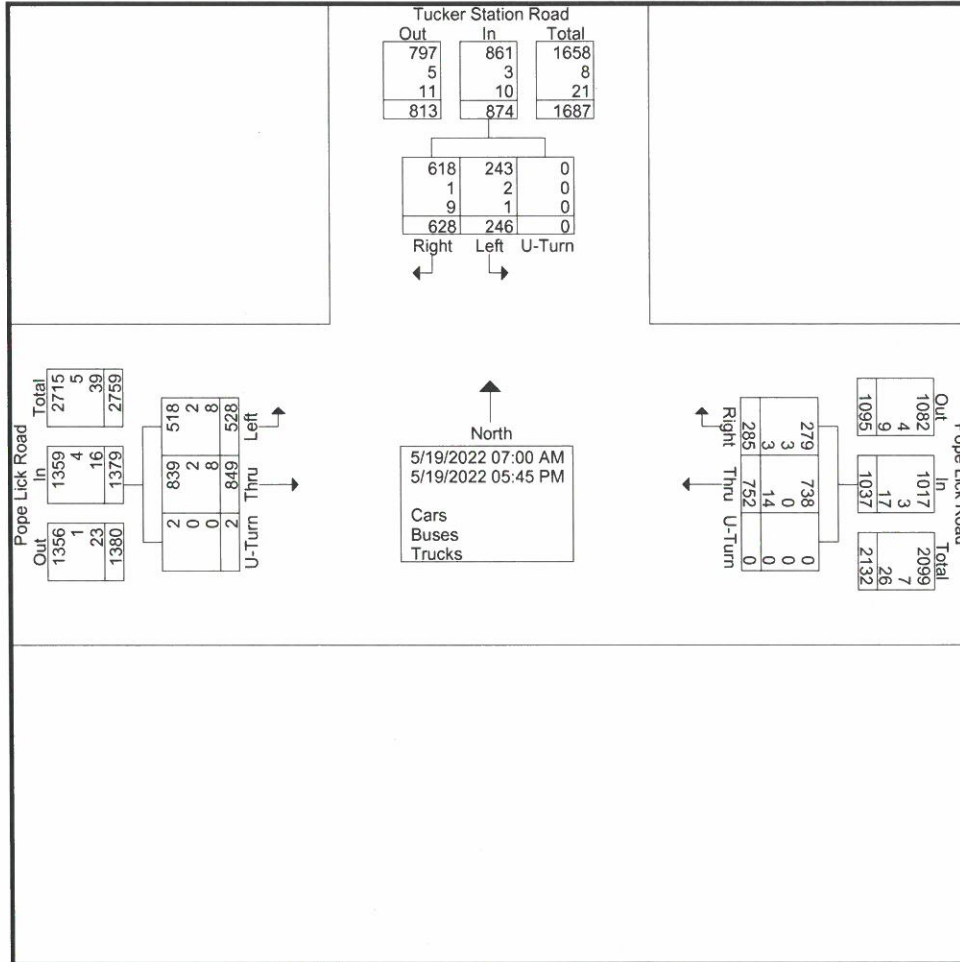
File Name : Tucker\_Station\_Road\_at\_Pope\_Lick\_Road\_05-19-2022  
 Site Code : Site 3 - Thursday  
 Start Date : 5/19/2022  
 Page No : 1

Groups Printed- Cars - Buses - Trucks

	Tucker Station Road From North				Pope Lick Road From East				Pope Lick Road From West				
Start Time	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Int. Total
07:00 AM	6	17	0	23	38	20	0	58	15	8	0	23	104
07:15 AM	6	40	0	46	86	19	0	105	13	13	0	26	177
07:30 AM	7	38	0	45	84	24	0	108	22	17	0	39	192
07:45 AM	3	53	0	56	122	31	0	153	20	21	0	41	250
Total	22	148	0	170	330	94	0	424	70	59	0	129	723
08:00 AM	3	45	0	48	100	32	0	132	16	18	0	34	214
08:15 AM	3	38	0	41	68	18	0	86	15	16	0	31	158
08:30 AM	7	31	0	38	48	18	0	66	23	15	0	38	142
08:45 AM	6	20	0	26	46	11	0	57	14	5	0	19	102
Total	19	134	0	153	262	79	0	341	68	54	0	122	616
04:00 PM	22	42	0	64	20	14	0	34	45	86	0	131	229
04:15 PM	30	36	0	66	16	12	0	28	42	67	0	109	203
04:30 PM	22	36	0	58	17	9	0	26	37	111	1	149	233
04:45 PM	30	47	0	77	14	19	0	33	54	104	0	158	268
Total	104	161	0	265	67	54	0	121	178	368	1	547	933
05:00 PM	31	47	0	78	20	16	0	36	64	121	0	185	299
05:15 PM	20	45	0	65	21	21	0	42	62	93	0	155	262
05:30 PM	29	51	0	80	34	10	0	44	48	89	1	138	262
05:45 PM	21	42	0	63	18	11	0	29	38	65	0	103	195
Total	101	185	0	286	93	58	0	151	212	368	1	581	1018
Grand Total	246	628	0	874	752	285	0	1037	528	849	2	1379	3290
Apprch %	28.1	71.9	0		72.5	27.5	0		38.3	61.6	0.1		
Total %	7.5	19.1	0	26.6	22.9	8.7	0	31.5	16	25.8	0.1	41.9	
Cars	243	618	0	861	738	279	0	1017	518	839	2	1359	3237
% Cars	98.8	98.4	0	98.5	98.1	97.9	0	98.1	98.1	98.8	100	98.5	98.4
Buses	2	1	0	3	0	3	0	3	2	2	0	4	10
% Buses	0.8	0.2	0	0.3	0	1.1	0	0.3	0.4	0.2	0	0.3	0.3
Trucks	1	9	0	10	14	3	0	17	8	8	0	16	43
% Trucks	0.4	1.4	0	1.1	1.9	1.1	0	1.6	1.5	0.9	0	1.2	1.3

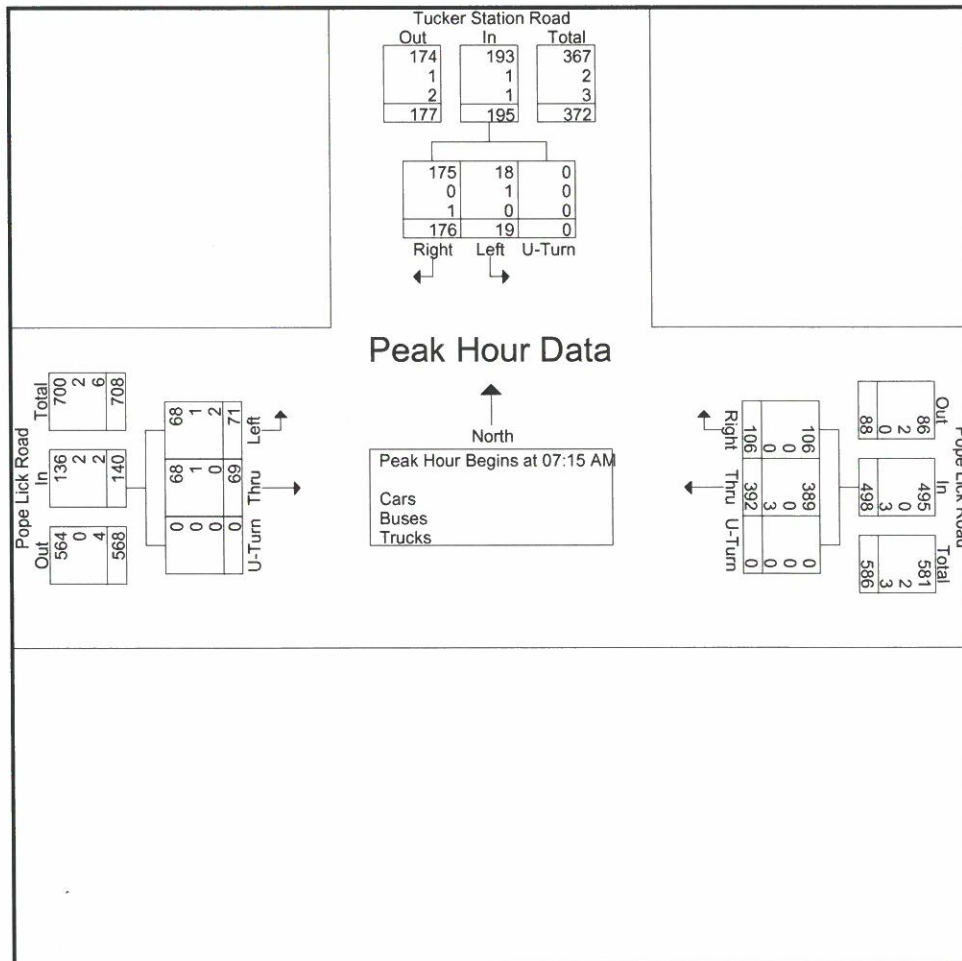


File Name : Tucker\_Station\_Road\_at\_Pope\_Lick\_Road\_05-19-2022  
 Site Code : Site 3 - Thursday  
 Start Date : 5/19/2022  
 Page No : 2



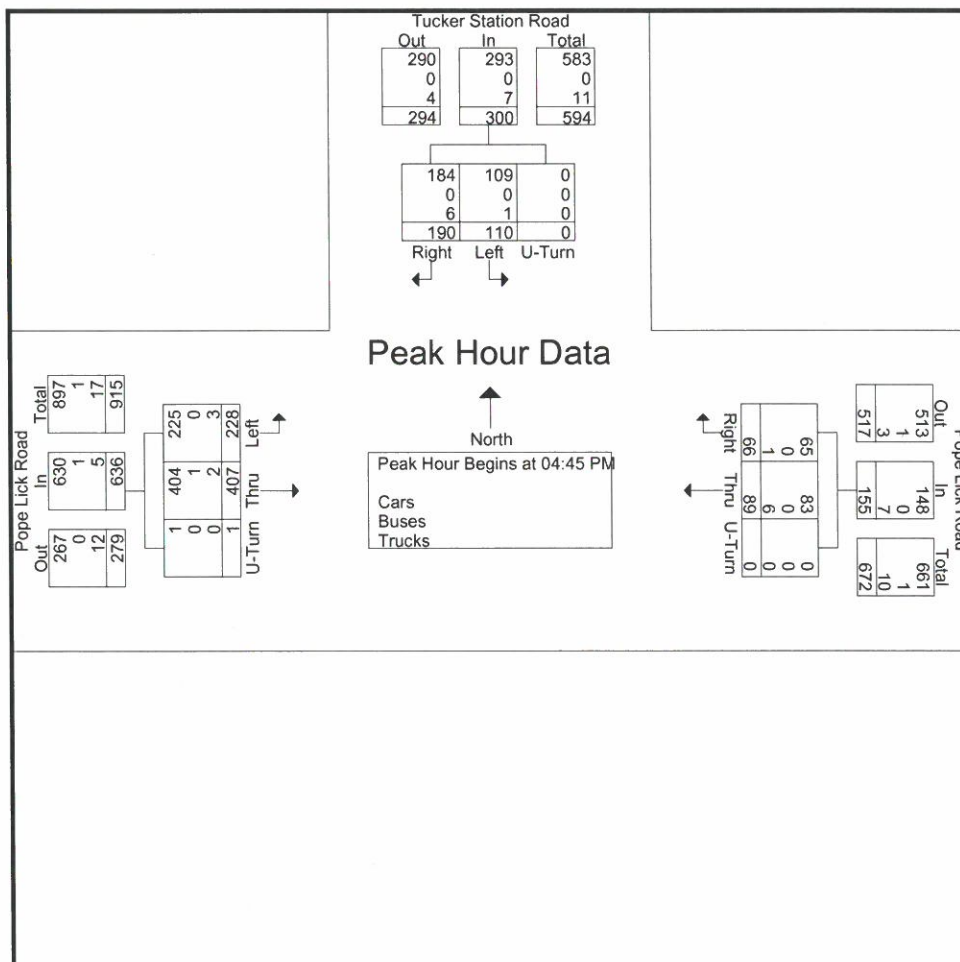
File Name : Tucker\_Station\_Road\_at\_Pope\_Lick\_Road\_05-19-2022  
 Site Code : Site 3 - Thursday  
 Start Date : 5/19/2022  
 Page No : 3

	Tucker Station Road From North				Pope Lick Road From East				Pope Lick Road From West				
Start Time	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	6	40	0	46	86	19	0	105	13	13	0	26	177
07:30 AM	7	38	0	45	84	24	0	108	22	17	0	39	192
07:45 AM	3	53	0	56	122	31	0	153	20	21	0	41	250
08:00 AM	3	45	0	48	100	32	0	132	16	18	0	34	214
Total Volume	19	176	0	195	392	106	0	498	71	69	0	140	833
% App. Total	9.7	90.3	0		78.7	21.3	0		50.7	49.3	0		
PHF	.679	.830	.000	.871	.803	.828	.000	.814	.807	.821	.000	.854	.833
Cars	18	175	0	193	389	106	0	495	68	68	0	136	824
% Cars	94.7	99.4	0	99.0	99.2	100	0	99.4	95.8	98.6	0	97.1	98.9
Buses	1	0	0	1	0	0	0	0	1	1	0	2	3
% Buses	5.3	0	0	0.5	0	0	0	0	1.4	1.4	0	1.4	0.4
Trucks	0	1	0	1	3	0	0	3	2	0	0	2	6
% Trucks	0	0.6	0	0.5	0.8	0	0	0.6	2.8	0	0	1.4	0.7



File Name : Tucker\_Station\_Road\_at\_Pope\_Lick\_Road\_05-19-2022  
 Site Code : Site 3 - Thursday  
 Start Date : 5/19/2022  
 Page No : 4

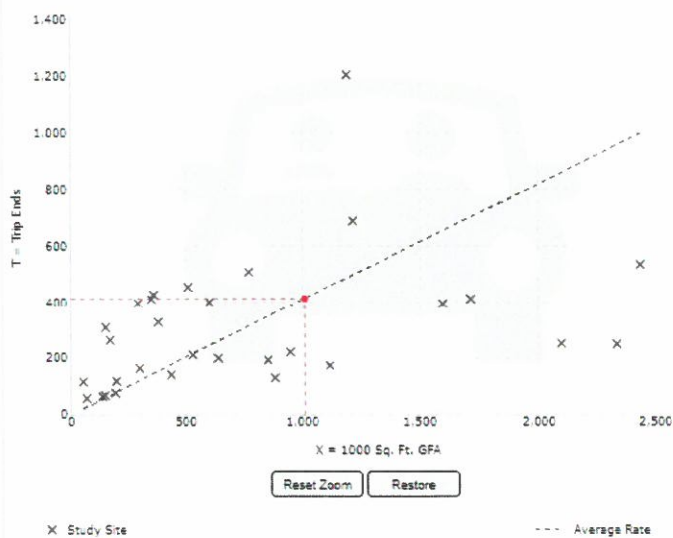
	Tucker Station Road From North				Pope Lick Road From East				Pope Lick Road From West				
Start Time	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:45 PM													
04:45 PM	30	47	0	77	14	19	0	33	54	104	0	158	268
05:00 PM	31	47	0	78	20	16	0	36	64	121	0	185	299
05:15 PM	20	45	0	65	21	21	0	42	62	93	0	155	262
05:30 PM	29	51	0	80	34	10	0	44	48	89	1	138	262
Total Volume	110	190	0	300	89	66	0	155	228	407	1	636	1091
% App. Total	36.7	63.3	0		57.4	42.6	0		35.8	64	0.2		
PHF	.887	.931	.000	.938	.654	.786	.000	.881	.891	.841	.250	.859	.912
Cars	109	184	0	293	83	65	0	148	225	404	1	630	1071
% Cars	99.1	96.8	0	97.7	93.3	98.5	0	95.5	98.7	99.3	100	99.1	98.2
Buses	0	0	0	0	0	0	0	0	0	1	0	1	1
% Buses	0	0	0	0	0	0	0	0	0	0.2	0	0.2	0.1
Trucks	1	6	0	7	6	1	0	7	3	2	0	5	19
% Trucks	0.9	3.2	0	2.3	6.7	1.5	0	4.5	1.3	0.5	0	0.8	1.7



## APPENDIX C: TRIP GENERATION DATA

## ITE Land Use Code 210 Single Family Residential (AM Peak)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

### DATA STATISTICS

Land Use:  
Industrial Park (130) [Click for Description and Data Plot](#)

Independent Variable:  
1000 Sq. Ft. GFA

Time Period:  
Weekday  
AM Peak Hour of Generation

Setting/Location:  
General Urban/Suburban

Trip Type:  
Vehicle

Number of Studies:  
30

Avg. 1000 Sq. Ft. GFA  
757

Average Rate:  
0.41

Range of Rates:  
0.11 - 2.13

Standard Deviation:  
0.37

Fitted Curve Equation:  
Not Given

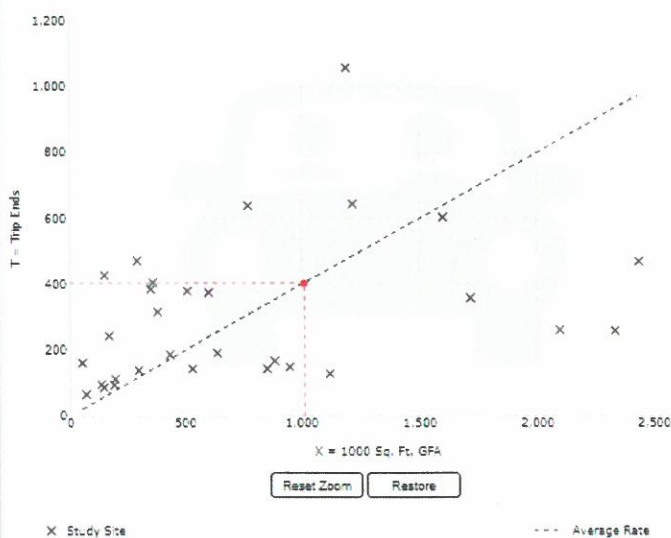
R<sup>2</sup>  
\*\*\*\*

Directional Distribution:  
87% entering, 13% exiting

Calculated Trip Ends:  
Average Rate: 414 (Total); 350 (Entry); 54 (Exit)

## ITE Land Use Code 210 Single Family Residential (PM Peak)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

### DATA STATISTICS

Land Use:  
Industrial Park (130) [Click for Description and Data Plot](#)

Independent Variable:  
1000 Sq. Ft. GFA

Time Period:  
Weekday  
PM Peak Hour of Generation

Setting/Location:  
General Urban/Suburban

Trip Type:  
Vehicle

Number of Studies:  
30

Avg. 1000 Sq. Ft. GFA  
757

Average Rate:  
0.40

Range of Rates:  
0.11 - 2.95

Standard Deviation:  
0.41

Fitted Curve Equation:  
Not Given

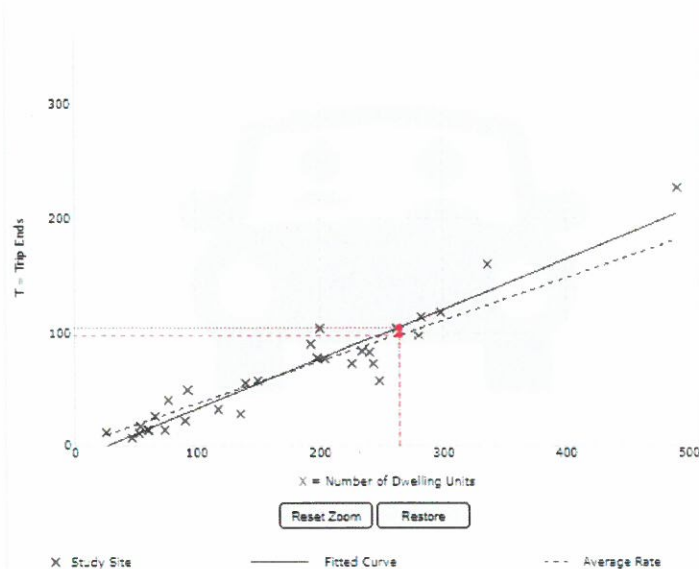
R<sup>2</sup>  
\*\*\*\*

Directional Distribution:  
21% entering, 79% exiting

Calculated Trip Ends:  
Average Rate: 404 (Total); 85 (Entry); 319 (Exit)

## ITE Land Use Code 221 Multi Family Housing (AM Peak)

Data Plot and Equation



### DATA STATISTICS

**Land Use:**  
Multifamily Housing (Mid-Rise) - Not Close to Rail Transit (221) [Click for Description and Data Plots](#)

**Independent Variable:**  
Dwelling Units

**Time Period:**  
Weekday  
Peak Hour of Adjacent Street Traffic  
One Hour Between 7 and 9 a.m.

**Setting/Location:**  
General Urban/Suburban

**Trip Type:**  
Vehicle

**Number of Studies:**  
30

**Avg. Num. of Dwelling Units:**  
173

**Average Rate:**  
0.37

**Range of Rates:**  
0.15 - 0.53

**Standard Deviation:**  
0.09

**Fitted Curve Equation:**  
 $T = 0.44(X) - 11.61$

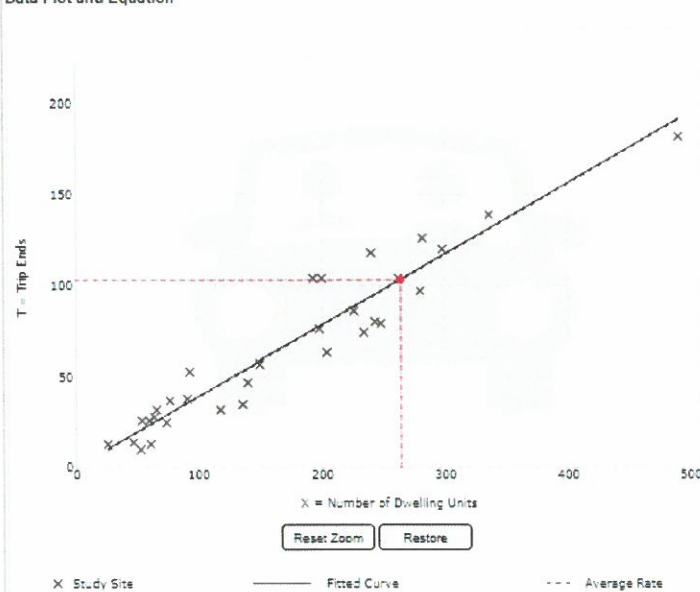
**R<sup>2</sup>:**  
0.91

**Directional Distribution:**  
23% entering, 77% exiting

**Calculated Trip Ends:**  
Average Rate: 98 (Total); 22 (Entry); 76 (Exit)  
Fitted Curve: 105 (Total); 24 (Entry); 81 (Exit)

## ITE Land Use Code 221 Multi Family Housing (PM Peak)

Data Plot and Equation



### DATA STATISTICS

**Land Use:**  
Multifamily Housing (Mid-Rise) - Not Close to Rail Transit (221) [Click for Description and Data Plots](#)

**Independent Variable:**  
Dwelling Units

**Time Period:**  
Weekday  
Peak Hour of Adjacent Street Traffic  
One Hour Between 4 and 6 p.m.

**Setting/Location:**  
General Urban/Suburban

**Trip Type:**  
Vehicle

**Number of Studies:**  
31

**Avg. Num. of Dwelling Units:**  
165

**Average Rate:**  
0.39

**Range of Rates:**  
0.19 - 0.57

**Standard Deviation:**  
0.08

**Fitted Curve Equation:**  
 $T = 0.35(X) + 0.34$

**R<sup>2</sup>:**  
0.91

**Directional Distribution:**  
81% entering, 35% exiting

**Calculated Trip Ends:**  
Average Rate: 103 (Total); 53 (Entry); 40 (Exit)  
Fitted Curve: 102 (Total); 53 (Entry); 40 (Exit)



## APPENDIX D: TRAFFIC FORECASTING REPORT (EXCERPT)

Count Year	2022	Number of Counts	4
Opening Year	2023	Growth Rate	0.43%
Design Year	2043		
Years Back	15		

KYTC Traffic Count Station #1	
STA ID	056L91
Year	AADT
2022	
2021	
2020	
2019	
2018	7155
2017	
2016	
2015	6939
2014	7634
2013	6701

KYTC Traffic Count Station #2	
STA ID	XXXXXX
Paste Count Data Here	

KYTC Traffic Count Station #3	
STA ID	XXXXXX
Paste Count Data Here	

Historical Traffic Volume Summary  
Station Details:

Sta ID:	056L91
Sta Type:	Full Coverage
Map:	<a href="#">MapIt</a>
District:	5
County:	Jefferson
Route:	056-CS-1002H -000
Route Desc:	BLUEGRASS PKWY

Begin MP:	2.4740
Begin Desc:	KY 913 (BLANKENBAKER PKWY)
End MP:	2.9270
End Desc:	TUCKER STATION ROAD
Impact Year:	
Year Added:	2012

Newest Count:

AADT:	7155
Year:	2018
% Single:	
% Combo:	
K Factor:	13
D Factor:	66

Definitions:

Sta. ID - Three digit county number + station number

MP - milepoint

Impact Year - year of significant change to traffic pattern within station segment

AADT - Annual Average Daily Traffic - the annualized average 24-hour volume of vehicles on a segment of roadway

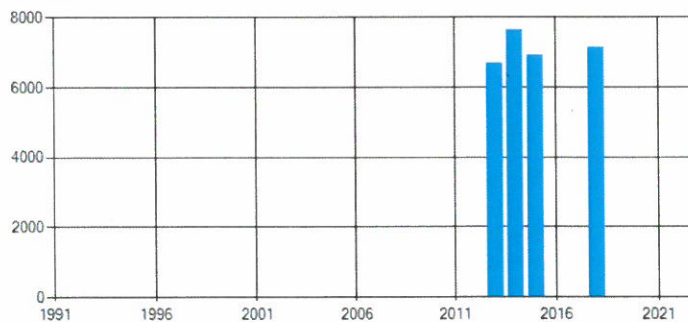
% Single - single unit truck volume as a percentage of the AADT

% Combo - combination truck volume as a percentage of the AADT

K Factor - peak hour volume as a percentage of the AADT

D Factor - percentage of peak hour volume flowing in the peak direction

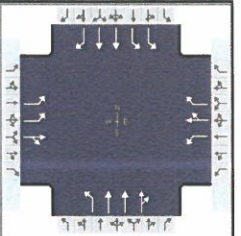
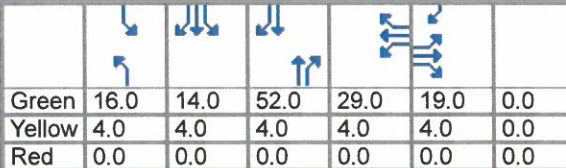
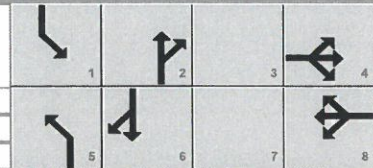
Year	AADT	Year	AADT	Year	AADT
2022		2012		2002	
2021		2011		2001	
2020		2010		2000	
2019		2009		1999	
2018	7155	2008		1998	
2017		2007		1997	
2016		2006		1996	
2015	6939	2005		1995	
2014	7634	2004		1994	
2013	6701	2003		1993	





## APPENDIX E: CAPACITY ANALYSIS OUTPUT

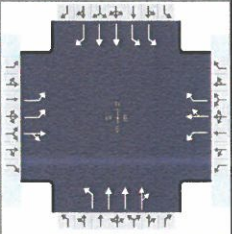
# HC Signalized Intersection Results Summary

General Information						Intersection Information									
Agency						Duration, h		0.250							
Analyst				Analysis Date		2/20/2023		Area Type		Other					
Jurisdiction				Time Period				PHF		0.92					
Urban Street		Blankenbaker Pkwy		Analysis Year		2023		Analysis Period		1> 7:00					
Intersection		Bluegrass Parkway at Bl...		File Name		2023_AM_NB.xus									
Project Description		2023 AM No Build													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h				342	104	31	79	205	304	133	1072	81	714	1243	773
Signal Information															
Cycle, s	150.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	Off												
Force Mode	Fixed	Simult. Gap N/S	On												
				Green	16.0	14.0	52.0	29.0	19.0	0.0					
				Yellow	4.0	4.0	4.0	4.0	4.0	0.0					
				Red	0.0	0.0	0.0	0.0	0.0	0.0					
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					4		8	5	2	1	6				
Case Number					10.0		9.0	2.0	4.0	2.0	3.0				
Phase Duration, s					23.0		33.0	20.0	56.0	38.0	74.0				
Change Period, ( Y+R c ), s					4.0		4.0	4.0	4.0	4.0	4.0				
Max Allow Headway ( MAH ), s					3.1		3.2	3.1	0.0	3.1	0.0				
Queue Clearance Time ( g s ), s					17.5		31.0	13.6		34.9					
Green Extension Time ( g e ), s					0.2		0.0	0.1	0.0	0.0	0.0				
Phase Call Probability					1.00		1.00	1.00		1.00					
Max Out Probability					1.00		1.00	1.00		1.00					
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate ( v ), veh/h				372	147		86	223	330	145	846	407	776	1351	840
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1757	1825		1810	1900	1610	1810	1900	1829	1757	1809	1610
Queue Service Time ( g s ), s				15.5	11.5		6.0	16.1	29.0	11.6	28.1	28.1	32.9	47.7	66.6
Cycle Queue Clearance Time ( g c ), s				15.5	11.5		6.0	16.1	29.0	11.6	28.1	28.1	32.9	47.7	66.6
Green Ratio ( g/C )				0.13	0.13		0.19	0.19	0.19	0.11	0.35	0.35	0.23	0.47	0.59
Capacity ( c ), veh/h				445	231		350	367	311	193	1317	634	797	1688	955
Volume-to-Capacity Ratio ( X )				0.835	0.635		0.245	0.607	1.061	0.749	0.642	0.643	0.974	0.800	0.879
Back of Queue ( Q ), ft/ln ( 95 th percentile)															
Back of Queue ( Q ), veh/ln ( 95 th percentile)				12.6	10.2		5.2	13.2	25.4	10.8	19.6	19.5	24.2	29.2	45.2
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay ( d 1 ), s/veh				64.0	62.2		51.2	55.3	60.5	65.1	41.2	41.2	57.6	34.1	25.9
Incremental Delay ( d 2 ), s/veh				16.7	12.6		1.7	7.3	68.2	23.1	2.4	5.0	26.2	4.1	11.4
Initial Queue Delay ( d 3 ), s/veh				0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( d ), s/veh				80.7	74.8		52.9	62.5	128.7	88.2	43.6	46.1	83.8	38.1	37.3
Level of Service ( LOS )				F	E		D	E	F	F	D	D	F	D	D
Approach Delay, s/veh / LOS				79.0	E		95.4	F		48.9	D		49.8	D	
Intersection Delay, s/veh / LOS				57.6						E					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				2.47	B		2.76	C		2.30	B		2.11	B	
Bicycle LOS Score / LOS				1.34	A		1.54	B		1.26	A		2.94	C	
























## HC Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.250
Analyst		Analysis Date	2/20/2023	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Blankenbaker Pkwy	Analysis Year	2023	Analysis Period	1> 7:00
Intersection	Bluegrass Parkway at Bl...	File Name	2023_AM_PostBuild.xus		
Project Description	2023 AM Post Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( $v$ ), veh/h	342	115	31	81	209	310	133	1072	90	791	1243	773

Signal Information														
Cycle, s	150.0	Reference Phase	2											
Offset, s	0	Reference Point	End	Green	13.0	22.0	47.0	30.0	18.0	0.0				
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.0	4.0	4.0	4.0	4.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	0.0	0.0	0.0	0.0	0.0				

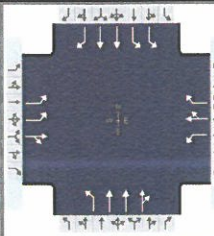
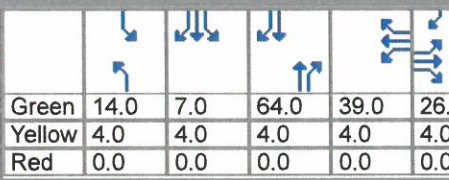
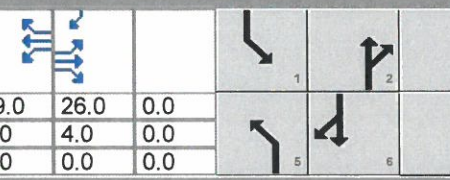
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		10.0		9.0	2.0	4.0	2.0	3.0
Phase Duration, s		22.0		34.0	17.0	51.0	43.0	77.0
Change Period, ( $Y+R_c$ ), s		4.0		4.0	4.0	4.0	4.0	4.0
Max Allow Headway ( $MAH$ ), s		3.1		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time ( $g_s$ ), s		17.6		32.0	13.9		38.0	
Green Extension Time ( $g_e$ ), s		0.1		0.0	0.0	0.0	0.4	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		1.00		1.00	1.00		1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate ( $v$ ), veh/h	372	159		88	227	337	145	854	409	860	1351	840
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1757	1830		1810	1900	1610	1810	1900	1822	1757	1809	1610
Queue Service Time ( $g_s$ ), s	15.6	12.5		6.1	16.3	30.0	11.9	29.8	29.9	36.0	45.9	64.4
Cycle Queue Clearance Time ( $g_c$ ), s	15.6	12.5		6.1	16.3	30.0	11.9	29.8	29.9	36.0	45.9	64.4
Green Ratio ( $g/C$ )	0.12	0.12		0.20	0.20	0.20	0.09	0.31	0.31	0.26	0.49	0.61
Capacity ( $c$ ), veh/h	422	220		362	380	322	157	1191	571	914	1761	977
Volume-to-Capacity Ratio ( $X$ )	0.882	0.723		0.243	0.598	1.046	0.922	0.717	0.717	0.941	0.767	0.860
Back of Queue ( $Q$ ), ft/ln (95 th percentile)												
Back of Queue ( $Q$ ), veh/ln ( 95 th percentile)	13.0	11.3		5.3	13.3	25.3	12.4	20.9	20.9	25.1	27.9	44.4
Queue Storage Ratio ( $RQ$ ) ( 95 th percentile)	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay ( $d_1$ ), s/veh	65.0	63.6		50.5	54.5	60.0	68.0	45.6	45.6	54.4	31.5	24.3
Incremental Delay ( $d_2$ ), s/veh	22.4	18.6		1.6	6.8	62.8	53.6	3.7	7.6	18.5	3.3	9.8
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( $d$ ), s/veh	87.3	82.2		52.0	61.3	122.8	121.6	49.3	53.2	72.9	34.8	34.1
Level of Service (LOS)	F	F		D	E	F	F	D	D	E	C	C
Approach Delay, s/veh / LOS	85.8		F	91.8		F	57.9		E	45.3		D
Intersection Delay, s/veh / LOS	57.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.47	B	2.76	C	2.30	B	2.11	B
Bicycle LOS Score / LOS	1.36	A	1.56	B	1.26	A	3.00	C

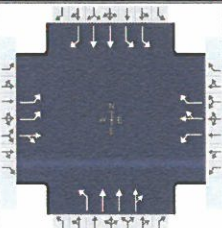
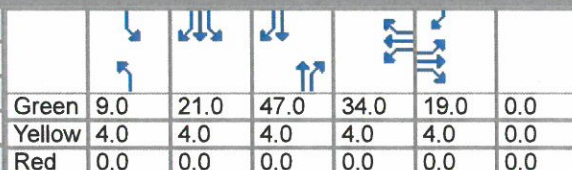
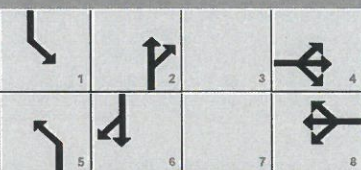


# HCS Signalized Intersection Results Summary

General Information						Intersection Information															
Agency						Duration, h		0.250													
Analyst				Analysis Date		2/20/2023		Area Type		Other											
Jurisdiction				Time Period				PHF		0.92											
Urban Street		Blankenbaker Pkwy		Analysis Year		2023		Analysis Period		1> 7:00											
Intersection		Bluegrass Parkway at Bl...		File Name		2023_PM_NB.xus															
Project Description		2023 PM No Build																			
Demand Information						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h						59	239	135	114	122	590	78	1404	134	500	1256	439				
Signal Information																					
Cycle, s	170.0	Reference Phase	2																		
Offset, s	0	Reference Point	End																		
Uncoordinated	No	Simult. Gap E/W	Off																		
Force Mode	Fixed	Simult. Gap N/S	On																		
						Green	14.0	7.0	64.0	39.0	26.0	0.0									
						Yellow	4.0	4.0	4.0	4.0	4.0	0.0									
						Red	0.0	0.0	0.0	0.0	0.0	0.0									
Timer Results						EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase								4				8		5		2		1		6	
Case Number								10.0				9.0		2.0		4.0		2.0		3.0	
Phase Duration, s								30.0				43.0		18.0		68.0		29.0		79.0	
Change Period, ( Y+R c ), s								4.0				4.0		4.0		4.0		4.0		4.0	
Max Allow Headway ( MAH ), s								3.1				3.3		3.1		0.0		3.1		0.0	
Queue Clearance Time ( g s ), s								28.0				41.0		9.7				27.0			
Green Extension Time ( g e ), s								0.0				0.0		0.0		0.0		0.0		0.0	
Phase Call Probability								1.00				1.00		1.00				1.00			
Max Out Probability								1.00				1.00		0.18				1.00			
Movement Group Results						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement						7	4	14	3	8	18	5	2	12	1	6	16				
Adjusted Flow Rate ( v ), veh/h						64	407		124	133	641	85	1132	540	543	1365	477				
Adjusted Saturation Flow Rate ( s ), veh/h/ln						1757	1784		1810	1900	1610	1810	1900	1812	1757	1809	1610				
Queue Service Time ( g s ), s						2.7	26.0		9.6	9.8	39.0	7.7	45.0	45.0	25.0	57.6	29.1				
Cycle Queue Clearance Time ( g c ), s						2.7	26.0		9.6	9.8	39.0	7.7	45.0	45.0	25.0	57.6	29.1				
Green Ratio ( g/C )						0.15	0.15		0.23	0.23	0.23	0.08	0.38	0.38	0.15	0.44	0.59				
Capacity ( c ), veh/h						537	273		415	436	369	149	1431	682	517	1596	957				
Volume-to-Capacity Ratio ( X )						0.119	1.490		0.298	0.304	1.736	0.569	0.791	0.792	1.052	0.855	0.499				
Back of Queue ( Q ), ft/ln ( 95 th percentile)																					
Back of Queue ( Q ), veh/ln ( 95 th percentile)						2.2	45.8		8.2	8.6	79.2	7.5	29.8	29.7	22.0	35.4	22.9				
Queue Storage Ratio ( RQ ) ( 95 th percentile)						0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Uniform Delay ( d 1 ), s/veh						62.1	72.0		54.2	54.3	65.5	75.1	47.1	47.1	72.5	42.6	19.9				
Incremental Delay ( d 2 ), s/veh						0.5	238.9		1.8	1.8	342.4	14.8	4.5	9.1	53.9	6.1	1.9				
Initial Queue Delay ( d 3 ), s/veh						0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Control Delay ( d ), s/veh						62.6	310.9		56.0	56.1	407.9	89.9	51.6	56.2	126.4	48.7	21.8				
Level of Service ( LOS )						E	F		E	E	F	F	D	E	F	D	C				
Approach Delay, s/veh / LOS						277.1		F	307.3		F	54.9		D	61.0		E				
Intersection Delay, s/veh / LOS						117.6						F									
Multimodal Results						EB			WB			NB			SB						
Pedestrian LOS Score / LOS						2.48	B		2.76	C		2.30	B		2.12	B					
Bicycle LOS Score / LOS						1.26	A		1.97	B		1.45	A		2.46	B					



# HCS Signalized Intersection Results Summary

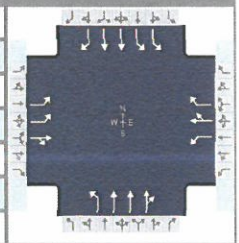
General Information						Intersection Information									
Agency						Duration, h		0.250							
Analyst				Analysis Date		2/20/2023		Area Type		Other					
Jurisdiction				Time Period				PHF		0.92					
Urban Street		Blankenbaker Pkwy		Analysis Year		2023		Analysis Period		1> 7:00					
Intersection		Bluegrass Parkway at Bl...		File Name		2023_PM_PostBuild.xus									
Project Description		2023 PM Post Build													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h				59	242	135	123	147	626	78	1404	136	518	1256	439
Signal Information															
Cycle, s	150.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	Off												
Force Mode	Fixed	Simult. Gap N/S	On												
Green	9.0	21.0	47.0	34.0	19.0	0.0									
Yellow	4.0	4.0	4.0	4.0	4.0	0.0									
Red	0.0	0.0	0.0	0.0	0.0	0.0									
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					4		8	5	2	1	6				
Case Number					10.0		9.0	2.0	4.0	2.0	3.0				
Phase Duration, s					23.0		38.0	13.0	51.0	38.0	76.0				
Change Period, ( Y+R c ), s					4.0		4.0	4.0	4.0	4.0	4.0				
Max Allow Headway ( MAH ), s					3.1		3.3	3.1	0.0	3.1	0.0				
Queue Clearance Time ( g s ), s					21.0		36.0	8.9		24.1					
Green Extension Time ( g e ), s					0.0		0.0	0.0	0.0	1.1	0.0				
Phase Call Probability					1.00		1.00	1.00		1.00					
Max Out Probability					1.00		1.00	1.00		0.02					
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate ( v ), veh/h				64	410		134	160	680	85	1133	541	563	1365	477
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1757	1785		1810	1900	1610	1810	1900	1811	1757	1809	1610
Queue Service Time ( g s ), s				2.4	19.0		9.3	10.7	34.0	6.9	43.8	43.8	22.1	47.3	24.8
Cycle Queue Clearance Time ( g c ), s				2.4	19.0		9.3	10.7	34.0	6.9	43.8	43.8	22.1	47.3	24.8
Green Ratio ( g/C )				0.13	0.13		0.23	0.23	0.23	0.06	0.31	0.31	0.23	0.48	0.61
Capacity ( c ), veh/h				445	226		410	431	365	109	1191	567	797	1736	977
Volume-to-Capacity Ratio ( X )				0.144	1.812		0.326	0.371	1.864	0.781	0.952	0.953	0.707	0.786	0.488
Back of Queue ( Q ), ft/ln ( 95 th percentile)															
Back of Queue ( Q ), veh/ln ( 95 th percentile)				2.0	51.0		7.9	9.2	84.8	7.9	31.3	32.1	15.6	28.8	19.0
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay ( d 1 ), s/veh				58.3	65.5		48.4	49.0	58.0	69.5	50.4	50.4	53.4	32.6	16.5
Incremental Delay ( d 2 ), s/veh				0.7	382.5		2.1	2.4	399.3	41.6	16.8	27.8	5.2	3.7	1.7
Initial Queue Delay ( d 3 ), s/veh				0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( d ), s/veh				58.9	448.0		50.5	51.4	457.3	111.1	67.2	78.2	58.7	36.2	18.2
Level of Service ( LOS)				E	F		D	D	F	F	E	E	E	D	B
Approach Delay, s/veh / LOS				395.4	F		334.9	F		72.7	E		37.9		D
Intersection Delay, s/veh / LOS				130.5						F					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				2.47	B		2.76	C		2.30	B		2.11	B	
Bicycle LOS Score / LOS				1.27	A		2.09	B		1.45	A		2.47	B	



# HCS Signalized Intersection Results Summary

## General Information

Agency		Duration, h	0.250
Analyst		Analysis Date	2/20/2023
Jurisdiction		Time Period	
Urban Street	Blankenbaker Pkwy	Analysis Year	2023
Intersection	Bluegrass Parkway at Bl...	Analysis Period	1> 7:00
Project Description	2033 AM No Build	File Name	2033_AM_NB-2.xus



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	359	109	33	82	213	316	139	1126	85	748	1305	811

## Signal Information

Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		10.0		9.0	2.0	4.0	2.0	3.0
Phase Duration, s		25.0		28.0	19.0	53.0	44.0	78.0
Change Period, ( Y+R <sub>c</sub> ), s		4.0		4.0	4.0	4.0	4.0	4.0
Max Allow Headway ( MAH ), s		3.1		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time ( g <sub>s</sub> ), s		18.1		26.0	14.3		35.1	
Green Extension Time ( g <sub>e</sub> ), s		0.5		0.0	0.0	0.0	1.2	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		1.00		1.00	1.00		0.45	

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate ( v ), veh/h	390	154		89	232	343	151	889	428	813	1418	882
Adjusted Saturation Flow Rate ( s ), veh/h/ln	1757	1824		1810	1900	1610	1810	1900	1829	1757	1809	1610
Queue Service Time ( g <sub>s</sub> ), s	16.1	11.9		6.5	17.5	24.0	12.3	30.8	30.8	33.1	49.0	66.5
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	16.1	11.9		6.5	17.5	24.0	12.3	30.8	30.8	33.1	49.0	66.5
Green Ratio ( g/C )	0.14	0.14		0.16	0.16	0.16	0.10	0.33	0.33	0.27	0.49	0.63
Capacity ( c ), veh/h	492	255		290	304	258	181	1241	597	937	1785	1020
Volume-to-Capacity Ratio ( X )	0.793	0.605		0.308	0.762	1.333	0.835	0.716	0.716	0.868	0.795	0.864
Back of Queue ( Q ), ft/ln ( 95 th percentile)												
Back of Queue ( Q ), veh/ln ( 95 th percentile)	12.7	10.3		5.8	14.9	34.0	11.9	21.4	21.5	22.4	29.6	46.7
Queue Storage Ratio ( RQ ) ( 95 th percentile)	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay ( d <sub>1</sub> ), s/veh	62.4	60.6		55.7	60.3	63.0	66.3	44.4	44.4	52.5	31.7	22.3
Incremental Delay ( d <sub>2</sub> ), s/veh	12.4	10.2		2.7	16.4	174.0	34.4	3.6	7.2	10.7	3.8	9.7
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( d ), s/veh	74.8	70.8		58.4	76.7	237.0	100.7	47.9	51.6	63.2	35.4	32.0
Level of Service ( LOS )	E	E		E	E	F	F	D	D	E	D	C
Approach Delay, s/veh / LOS	73.7	E		157.2	F		54.4	D		41.7	D	
Intersection Delay, s/veh / LOS	61.2						E					

## Multimodal Results

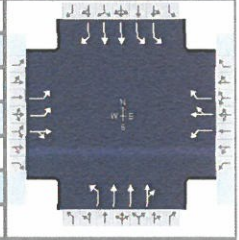
	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.47	B		2.76	C		2.30	B		2.11	B	
Bicycle LOS Score / LOS	1.39	A		1.58	B		1.29	A		3.06	C	



# HCS Signalized Intersection Results Summary

## General Information

Agency		Duration, h	0.250
Analyst		Analysis Date	2/20/2023
Jurisdiction		Area Type	Other
Urban Street	Blankenbaker Pkwy	Time Period	PHF
Intersection	Bluegrass Parkway at Bl...	Analysis Year	2023
Project Description	2033 AM Post Build	Analysis Period	1> 7:00
		File Name	2033_AM_PostBuild.xus



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	359	120	33	84	217	322	139	1126	94	825	1305	811

## Signal Information

Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	On

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		10.0		9.0	2.0	4.0	2.0	3.0
Phase Duration, s		25.0		28.0	19.0	53.0	44.0	78.0
Change Period, ( Y+R <sub>c</sub> ), s		4.0		4.0	4.0	4.0	4.0	4.0
Max Allow Headway ( MAH ), s		3.1		3.2	3.1	0.0	3.1	0.0
Queue Clearance Time ( g <sub>s</sub> ), s		18.1		26.0	14.3		39.7	
Green Extension Time ( g <sub>e</sub> ), s		0.5		0.0	0.0	0.0	0.1	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		1.00		1.00	1.00		1.00	

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate ( v ), veh/h	390	166		91	236	350	151	896	430	897	1418	882
Adjusted Saturation Flow Rate ( s ), veh/h/ln	1757	1829		1810	1900	1610	1810	1900	1822	1757	1809	1610
Queue Service Time ( g <sub>s</sub> ), s	16.1	12.9		6.7	17.9	24.0	12.3	31.2	31.2	37.7	49.0	66.5
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	16.1	12.9		6.7	17.9	24.0	12.3	31.2	31.2	37.7	49.0	66.5
Green Ratio ( g/C )	0.14	0.14		0.16	0.16	0.16	0.10	0.33	0.33	0.27	0.49	0.63
Capacity ( c ), veh/h	492	256		290	304	258	181	1241	595	937	1785	1020
Volume-to-Capacity Ratio ( X )	0.793	0.649		0.315	0.776	1.359	0.835	0.722	0.722	0.957	0.795	0.864
Back of Queue ( Q ), ft/ln ( 95 th percentile)												
Back of Queue ( Q ), veh/ln ( 95 th percentile)	12.7	11.1		5.9	15.3	35.2	11.9	21.7	21.7	26.4	29.6	46.7
Queue Storage Ratio ( RQ ) ( 95 th percentile)	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay ( d <sub>1</sub> ), s/veh	62.4	61.0		55.7	60.4	63.0	66.3	44.5	44.5	54.2	31.7	22.3
Incremental Delay ( d <sub>2</sub> ), s/veh	12.4	12.1		2.8	17.5	184.5	34.4	3.7	7.4	20.7	3.8	9.7
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( d ), s/veh	74.8	73.1		58.6	77.9	247.5	100.7	48.2	51.9	74.8	35.4	32.0
Level of Service ( LOS )	E	E		E	E	F	F	D	D	E	D	C
Approach Delay, s/veh / LOS	74.3	E		162.9	F		54.6	D		45.5	D	
Intersection Delay, s/veh / LOS	64.0						E					

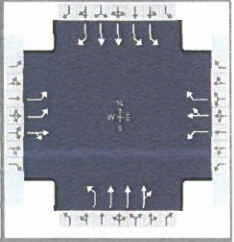
## Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.47	B		2.76	C		2.30	B		2.11	B	
Bicycle LOS Score / LOS	1.41	A		1.60	B		1.30	A		3.12	C	



# HCS Signalized Intersection Results Summary

General Information				Intersection Information		
Agency				Duration, h	0.250	
Analyst		Analysis Date	2/20/2023	Area Type	Other	
Jurisdiction		Time Period		PHF	0.92	
Urban Street	Blankenbaker Pkwy	Analysis Year	2023	Analysis Period	1> 7:00	
Intersection	Bluegrass Parkway at Bl...	File Name	2033_PM_NB-2.xus			
Project Description	2033 PM Post Build					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	62	250	141	119	128	618	82	1474	140	523	1319	461

Signal Information											
Cycle, s	160.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	Off	Green	13.0	6.0	58.0	39.0	24.0	0.0	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	4.0	4.0	0.0	
				Red	0.0	0.0	0.0	0.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		10.0		9.0	2.0	4.0	2.0	3.0
Phase Duration, s		28.0		43.0	17.0	62.0	27.0	72.0
Change Period, ( Y+R <sub>c</sub> ), s		4.0		4.0	4.0	4.0	4.0	4.0
Max Allow Headway ( MAH ), s		3.1		3.3	3.1	0.0	3.1	0.0
Queue Clearance Time ( g <sub>s</sub> ), s		26.0		41.0	9.6		25.0	
Green Extension Time ( g <sub>e</sub> ), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		1.00		1.00	0.69		1.00	

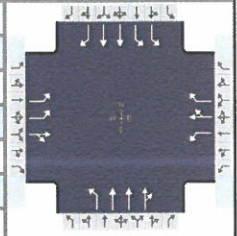
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate ( v ), veh/h	67	425		129	139	672	89	1187	567	568	1434	501
Adjusted Saturation Flow Rate ( s ), veh/h/ln	1757	1784		1810	1900	1610	1810	1900	1812	1757	1809	1610
Queue Service Time ( g <sub>s</sub> ), s	2.7	24.0		9.3	9.6	39.0	7.6	46.3	46.5	23.0	60.4	30.7
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	2.7	24.0		9.3	9.6	39.0	7.6	46.3	46.5	23.0	60.4	30.7
Green Ratio ( g/C )	0.15	0.15		0.24	0.24	0.24	0.08	0.36	0.36	0.14	0.42	0.58
Capacity ( c ), veh/h	527	268		441	463	392	147	1378	657	505	1537	926
Volume-to-Capacity Ratio ( X )	0.128	1.588		0.293	0.300	1.712	0.606	0.862	0.863	1.125	0.932	0.541
Back of Queue ( Q ), ft/ln ( 95 th percentile)												
Back of Queue ( Q ), veh/ln ( 95 th percentile)	2.2	49.1		7.9	8.4	80.4	7.6	31.1	31.3	23.6	38.0	23.7
Queue Storage Ratio ( RQ ) ( 95 th percentile)	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay ( d <sub>1</sub> ), s/veh	58.9	68.0		49.3	49.4	60.5	71.0	47.3	47.3	68.5	43.8	21.0
Incremental Delay ( d <sub>2</sub> ), s/veh	0.5	281.7		1.7	1.7	330.9	17.2	7.3	14.1	79.2	11.7	2.3
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( d ), s/veh	59.4	349.7		51.0	51.0	391.4	88.2	54.6	61.4	147.7	55.5	23.2
Level of Service ( LOS )	E	F		D	D	F	F	D	E	F	E	C
Approach Delay, s/veh / LOS	309.9	F		294.2	F		58.3	E		70.0	E	
Intersection Delay, s/veh / LOS	123.2						F					

Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.47	B		2.76	C		2.30	B		2.12	B	
Bicycle LOS Score / LOS	1.30	A		2.04	B		1.50	B		2.55	C	



# HC Signalized Intersection Results Summary

General Information				Intersection Information	
Agency		Analysis Date	2/20/2023	Duration, h	0.250
Analyst		Time Period		Area Type	Other
Jurisdiction		Analysis Year	2023	PHF	0.92
Urban Street	Blankenbaker Pkwy	File Name	2033_PM_PostBuild.xus	Analysis Period	1 > 7:00
Intersection	Bluegrass Parkway at Bl...				
Project Description	2033 PM Post Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	59	218	134	108	116	559	78	1397	122	456	1250	437

Signal Information											
Cycle, s	160.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	Off	Green	13.0	6.0	58.0	39.0	24.0	0.0	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	4.0	4.0	4.0	0.0	
				Red	0.0	0.0	0.0	0.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		10.0		9.0	2.0	4.0	2.0	3.0
Phase Duration, s		28.0		43.0	17.0	62.0	27.0	72.0
Change Period, (Y+R <sub>c</sub> ), s		4.0		4.0	4.0	4.0	4.0	4.0
Max Allow Headway (MAH), s		3.2		3.3	3.1	0.0	3.1	0.0
Queue Clearance Time (g <sub>s</sub> ), s		26.0		41.0	9.2		24.5	
Green Extension Time (g <sub>e</sub> ), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		1.00		1.00	0.40		1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	64	383		117	126	608	85	1116	535	496	1359	475
Adjusted Saturation Flow Rate (s), veh/h/ln	1757	1778		1810	1900	1610	1810	1900	1819	1757	1809	1610
Queue Service Time (g <sub>s</sub> ), s	2.5	24.0		8.4	8.6	39.0	7.2	42.4	42.5	22.5	55.3	28.5
Cycle Queue Clearance Time (g <sub>c</sub> ), s	2.5	24.0		8.4	8.6	39.0	7.2	42.4	42.5	22.5	55.3	28.5
Green Ratio (g/C)	0.15	0.15		0.24	0.24	0.24	0.08	0.36	0.36	0.14	0.42	0.58
Capacity (c), veh/h	527	267		441	463	392	147	1378	659	505	1537	926
Volume-to-Capacity Ratio (X)	0.122	1.434		0.266	0.272	1.548	0.577	0.810	0.811	0.981	0.884	0.513
Back of Queue (Q), ft/ln (95 th percentile)												
Back of Queue (Q), veh/ln (95 th percentile)	2.1	41.0		7.2	7.7	67.4	7.2	28.4	28.5	18.4	34.4	22.1
Queue Storage Ratio (RQ) (95 th percentile)	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d <sub>1</sub> ), s/veh	58.9	68.0		48.9	49.0	60.5	70.8	46.0	46.1	68.3	42.4	20.5
Incremental Delay (d <sub>2</sub> ), s/veh	0.5	215.7		1.5	1.4	259.0	15.4	5.3	10.4	35.7	7.7	2.0
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	59.3	283.7		50.4	50.5	319.5	86.3	51.3	56.5	103.9	50.1	22.5
Level of Service (LOS)	E	F		D	D	F	F	D	E	F	D	C
Approach Delay, s/veh / LOS	251.5	F		242.5	F		54.6	D		55.9	E	
Intersection Delay, s/veh / LOS	101.4						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.47	B	2.76	C	2.30	B	2.12	B
Bicycle LOS Score / LOS	1.22	A	1.89	B	1.44	A	2.41	B



# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	BG Parkway at Tucker Station
Agency/Co.	AKE	Jurisdiction	Jefferson County
Date Performed	1/11/2023	East/West Street	BG Parkway
Analysis Year	2023	North/South Street	Tucker Station
Time Analyzed	2033 AM No Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Industrial		

## Lanes

Major Street: East-West

## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		0	1	1		0	1	0
Configuration		L	T	R		L		TR		LT		R			LTR	
Volume (veh/h)		79	170	134		100	393	17		66	22	92		4	7	6
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No								No							
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		86				109				96		100			18	
Capacity, c (veh/h)		1109				1223				180		855			211	
v/c Ratio		0.08				0.09				0.53		0.12			0.09	
95% Queue Length, Q <sub>95</sub> (veh)		0.3				0.3				2.7		0.4			0.3	
Control Delay (s/veh)		8.5				8.2				45.5		9.8			23.7	
Level of Service (LOS)		A				A				E		A			C	
Approach Delay (s/veh)	1.8				1.6				27.2				23.7			
Approach LOS	A				A				D				C			

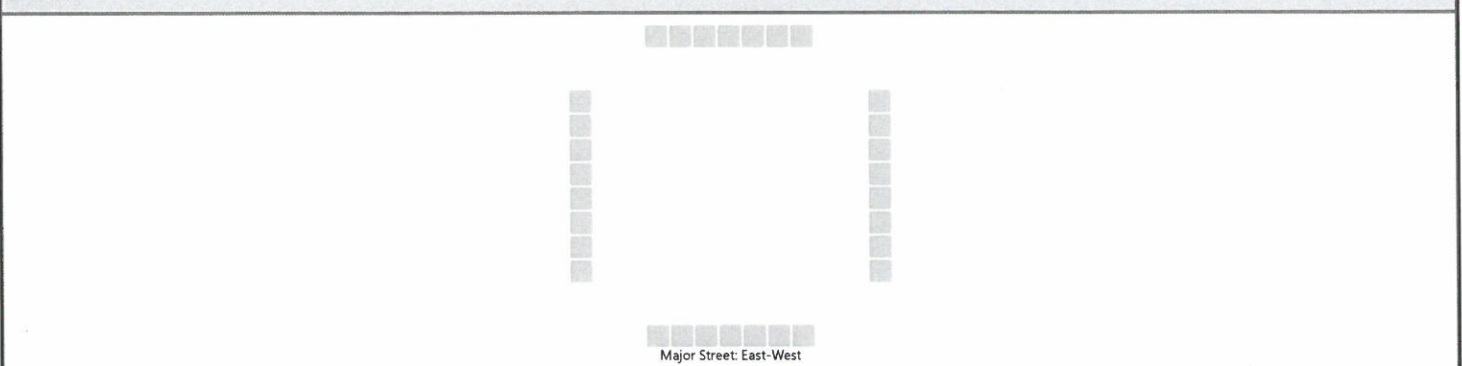


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	BG Parkway at Tucker Station
Agency/Co.	AKE	Jurisdiction	Jefferson County
Date Performed	1/11/2023	East/West Street	BG Parkway
Analysis Year	2023	North/South Street	Tucker Station
Time Analyzed	2033 AM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Industrial		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		0	1	1		0	1	0
Configuration		L	T	R		L		TR		LT		R			LTR	
Volume (veh/h)		79	256	134		103	405	18		66	22	128		8	7	6
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No								No							
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		86				112				96		139			23	
Capacity, c (veh/h)		1096				1130				149		758			155	
v/c Ratio		0.08				0.10				0.64		0.18			0.15	
95% Queue Length, Q <sub>95</sub> (veh)		0.3				0.3				3.5		0.7			0.5	
Control Delay (s/veh)		8.6				8.5				64.6		10.8			32.2	
Level of Service (LOS)		A				A				F		B			D	
Approach Delay (s/veh)	1.4				1.7				32.7				32.2			
Approach LOS	A				A				D				D			

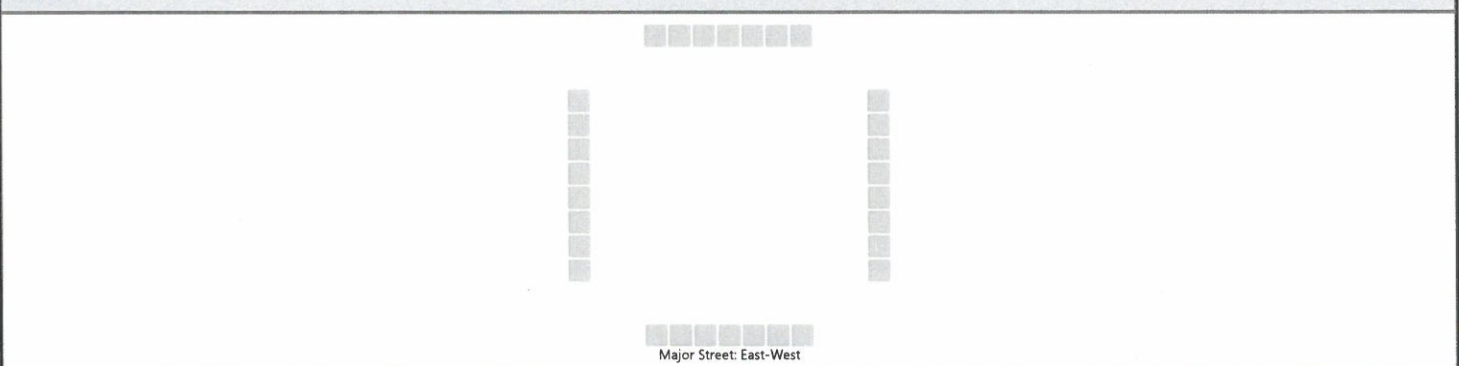


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	BG Parkway at Tucker Station
Agency/Co.	AKE	Jurisdiction	Jefferson County
Date Performed	1/11/2023	East/West Street	BG Parkway
Analysis Year	2023	North/South Street	Tucker Station
Time Analyzed	2033 PM No Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Industrial		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		0	1	1		0	1	0
Configuration		L	T	R		L		TR		LT		R			LTR	
Volume (veh/h)		17	498	97		132	216	15		119	20	198		19	28	77
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No								No							
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		18				143				151		215			135	
Capacity, c (veh/h)		1309				934				119		539			241	
v/c Ratio		0.01				0.15				1.26		0.40			0.56	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.5				9.8		1.9			3.1	
Control Delay (s/veh)		7.8				9.6				238.5		16.1			37.4	
Level of Service (LOS)		A				A				F		C			E	
Approach Delay (s/veh)	0.2				3.5				107.8				37.4			
Approach LOS	A				A				F				E			



# HCS Two-Way Stop-Control Report

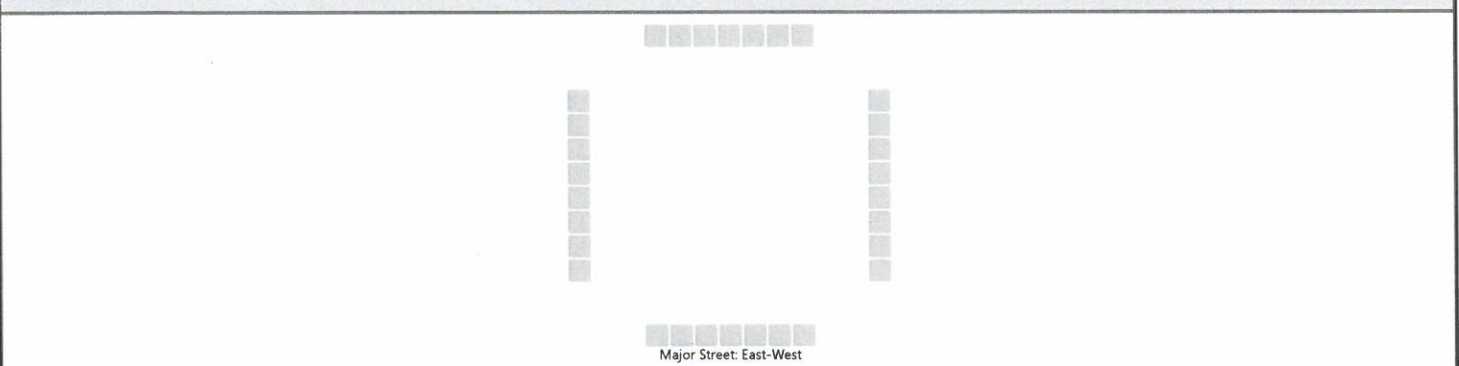
## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	1/11/2023
Analysis Year	2023
Time Analyzed	2023 PM Build
Intersection Orientation	East-West
Project Description	Xebec Industrial

## Site Information

Intersection	BG Parkway at Tucker Station
Jurisdiction	Jefferson County
East/West Street	BG Parkway
North/South Street	Tucker Station
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		0	1	1		0	1	0
Configuration		L	T	R		L		TR		LT		R			LTR	
Volume (veh/h)		17	518	97		150	288	18		119	20	207		20	28	77
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No								No							
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		18				163				151		225			136	
Capacity, c (veh/h)		1221				917				88		524			184	
v/c Ratio		0.02				0.18				1.72		0.43			0.74	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.6				12.4		2.1			4.7	
Control Delay (s/veh)		8.0				9.8				447.0		16.9			65.7	
Level of Service (LOS)		A				A				F		C			F	
Approach Delay (s/veh)	0.2				3.2				189.7				65.7			
Approach LOS	A				A				F				F			



# HCS Two-Way Stop-Control Report

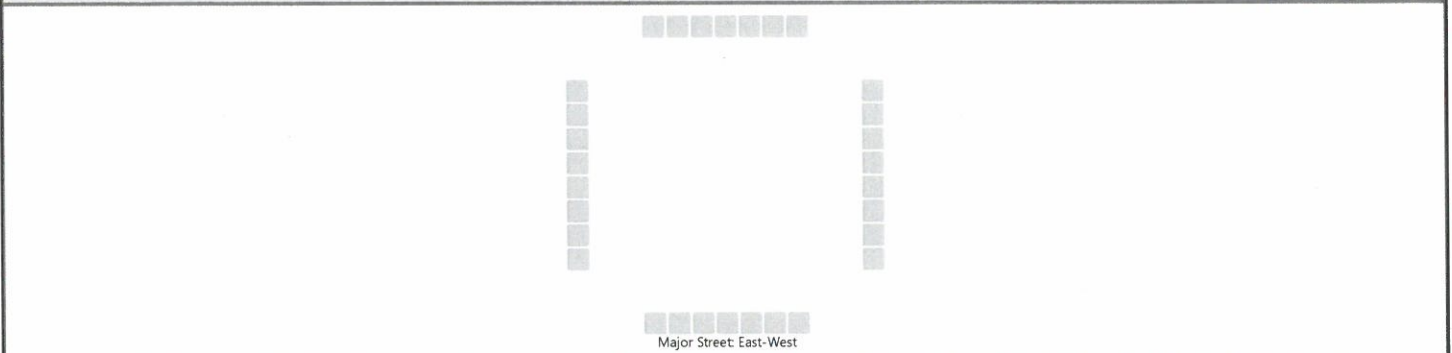
## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	1/11/2023
Analysis Year	2023
Time Analyzed	2033 AM No Build
Intersection Orientation	East-West
Project Description	Xebec Industrial

## Site Information

Intersection	BG Parkway at Tucker Station
Jurisdiction	Jefferson County
East/West Street	BG Parkway
North/South Street	Tucker Station
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		0	1	1		0	1	0
Configuration		L	T	R		L		TR		LT		R			LTR	
Volume (veh/h)		83	179	141		106	415	18		70	23	97		4	7	6
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No								No							
Median Type   Storage					Undivided											

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		90				115				101		105				18
Capacity, c (veh/h)		1086				1206				163		844				191
v/c Ratio		0.08				0.10				0.62		0.12				0.10
95% Queue Length, Q <sub>95</sub> (veh)		0.3				0.3				3.4		0.4				0.3
Control Delay (s/veh)		8.6				8.3				57.7		9.9				25.9
Level of Service (LOS)		A				A				F		A				D
Approach Delay (s/veh)	1.8				1.6				33.3				25.9			
Approach LOS	A				A				D				D			

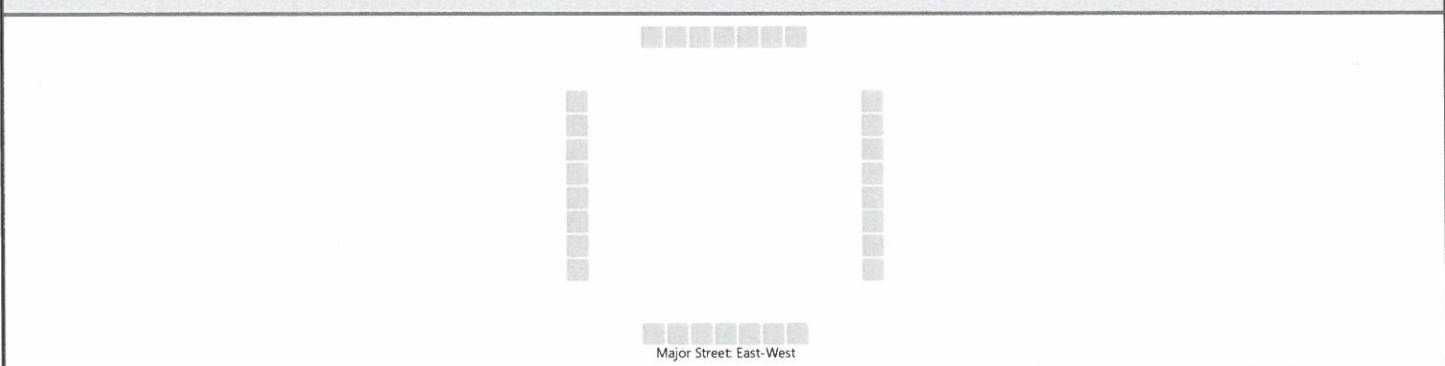


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	BG Parkway at Tucker Station
Agency/Co.	AKE	Jurisdiction	Jefferson County
Date Performed	1/11/2023	East/West Street	BG Parkway
Analysis Year	2023	North/South Street	Tucker Station
Time Analyzed	2033 AM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Industrial		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		0	1	1		0	1	0
Configuration		L	T	R		L		TR		LT		R			LTR	
Volume (veh/h)		83	265	141		109	427	19		70	23	133		8	7	6
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No								No							
Median Type   Storage					Undivided											

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		90				118				101		145				23
Capacity, c (veh/h)		1073				1113				134		749				138
v/c Ratio		0.08				0.11				0.75		0.19				0.17
95% Queue Length, Q <sub>95</sub> (veh)		0.3				0.4				4.4		0.7				0.6
Control Delay (s/veh)		8.7				8.6				86.4		11.0				36.2
Level of Service (LOS)		A				A				F		B				E
Approach Delay (s/veh)	1.5				1.7				42.0				36.2			
Approach LOS	A				A				E				E			

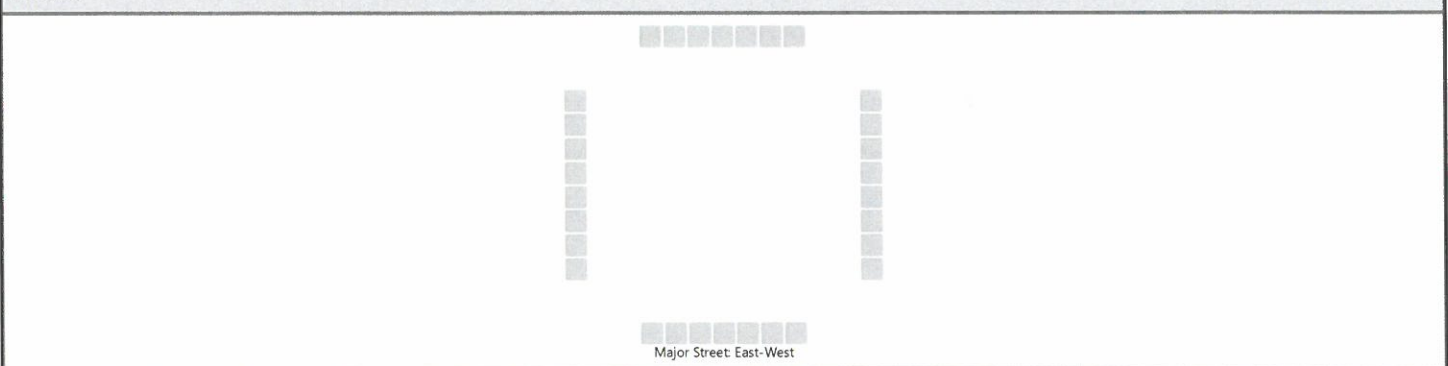


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	BG Parkway at Tucker Station
Agency/Co.	AKE	Jurisdiction	Jefferson County
Date Performed	1/11/2023	East/West Street	BG Parkway
Analysis Year	2023	North/South Street	Tucker Station
Time Analyzed	2033 PM No Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Industrial		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		0	1	1		0	1	0
Configuration		L	T	R		L		TR		LT		R			LTR	
Volume (veh/h)		18	525	102		139	228	16		126	21	209		20	30	81
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No								No							
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		20				151				160		227				142
Capacity, c (veh/h)		1293				906				102		519				210
v/c Ratio		0.02				0.17				1.56		0.44				0.68
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.6				12.1		2.2				4.2
Control Delay (s/veh)		7.8				9.8				368.6		17.2				51.8
Level of Service (LOS)		A				A				F		C				F
Approach Delay (s/veh)	0.2				3.5				162.3				51.8			
Approach LOS	A				A				F				F			

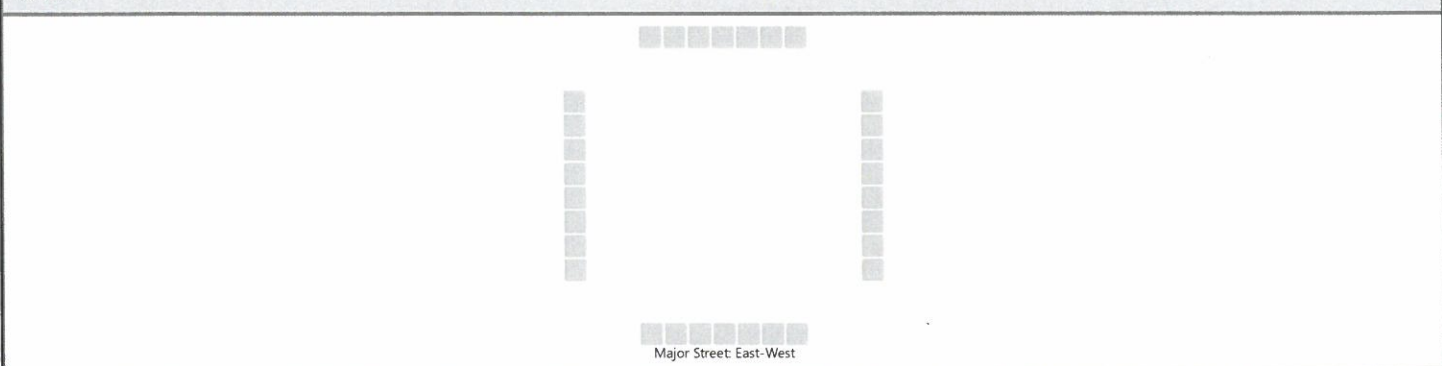


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	BG Parkway at Tucker Station
Agency/Co.	AKE	Jurisdiction	Jefferson County
Date Performed	1/11/2023	East/West Street	BG Parkway
Analysis Year	2023	North/South Street	Tucker Station
Time Analyzed	2033 PM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Industrial		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		0	1	1		0	1	0
Configuration		L	T	R		L		TR		LT		R			LTR	
Volume (veh/h)		18	545	102		157	300	19		126	21	218		21	30	81
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No								No							
Median Type   Storage					Undivided											

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

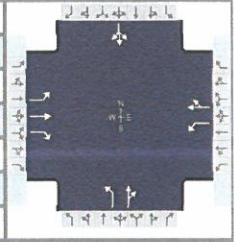
Flow Rate, v (veh/h)		20				171				160		237				143
Capacity, c (veh/h)		1207				890				74		504				158
v/c Ratio		0.02				0.19				2.16		0.47				0.91
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.7				14.8		2.5				6.5
Control Delay (s/veh)		8.0				10.0				652.4		18.3				105.6
Level of Service (LOS)		A				B				F		C				F
Approach Delay (s/veh)	0.2				3.3				273.7				105.6			
Approach LOS	A				A				F				F			



# HCS Signalized Intersection Results Summary

## General Information

Agency		Duration, h	0.250
Analyst		Analysis Date	2/20/2023
Jurisdiction		Area Type	Other
Urban Street	Bluegrass Parkway	Time Period	PHF
Intersection	Bluegrass Parkway at T...	Analysis Year	2023
Project Description	2023 AM Build	Analysis Period	1> 7:00
		File Name	2023_AM_BuildSig.xus

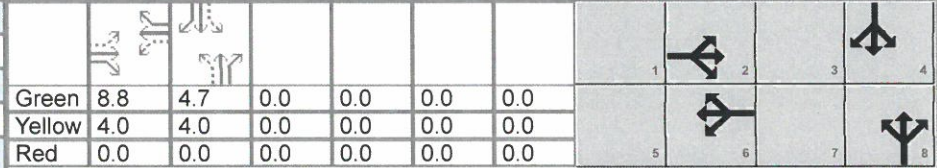


## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	79	256	134	103	405	18	66	22	128	8	7	6

## Signal Information

Cycle, s	21.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		5.0		6.0		6.0		8.0
Phase Duration, s		12.8		12.8		8.7		8.7
Change Period, ( Y+R <sub>c</sub> ), s		4.0		4.0		4.0		4.0
Max Allow Headway ( MAH ), s		3.2		3.2		3.2		3.2
Queue Clearance Time ( g <sub>s</sub> ), s		7.8		6.1		3.8		2.2
Green Extension Time ( g <sub>e</sub> ), s		1.0		1.4		0.1		0.2
Phase Call Probability		1.00		1.00		0.79		0.79
Max Out Probability		1.00		0.62		1.00		0.63

## Movement Group Results

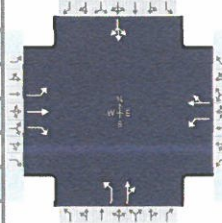
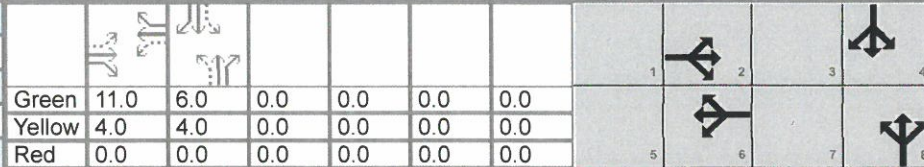
	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h	86	278	146	112	460		72	163			23	
Adjusted Saturation Flow Rate ( s ), veh/h/ln	947	1900	1610	1118	1886		1422	1647			1647	
Queue Service Time ( g <sub>s</sub> ), s	1.7	2.2	1.3	1.7	4.1		0.9	1.8			0.0	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	5.8	2.2	1.3	3.8	4.1		1.1	1.8			0.2	
Green Ratio ( g/C )	0.41	0.41	0.41	0.41	0.41		0.22	0.22			0.22	
Capacity ( c ), veh/h	541	777	659	679	771		632	361			592	
Volume-to-Capacity Ratio ( X )	0.159	0.358	0.221	0.165	0.596		0.114	0.452			0.039	
Back of Queue ( Q ), ft/ln ( 95 th percentile)												
Back of Queue ( Q ), veh/ln ( 95 th percentile)	0.3	0.3	0.1	0.2	0.6		0.2	0.6			0.1	
Queue Storage Ratio ( RQ ) ( 95 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00			0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh	7.2	4.4	4.1	5.7	5.0		7.1	7.3			6.6	
Incremental Delay ( d <sub>2</sub> ), s/veh	0.1	0.1	0.1	0.0	0.3		0.0	0.3			0.0	
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Control Delay ( d ), s/veh	7.3	4.5	4.2	5.8	5.2		7.1	7.6			6.7	
Level of Service ( LOS )	A	A	A	A	A		A	A			A	
Approach Delay, s/veh / LOS	4.9		A	5.3		A	7.5		A	6.7		A
Intersection Delay, s/veh / LOS	5.6						A					

## Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.85		B	1.63		B	1.87		B	2.06		B
Bicycle LOS Score / LOS	1.33		A	1.43		A	0.87		A	0.53		A

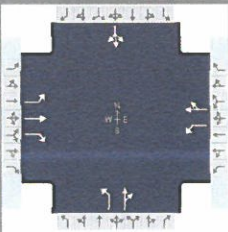
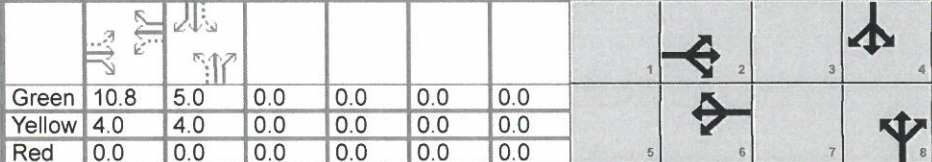


# HCS Signalized Intersection Results Summary

General Information						Intersection Information															
Agency						Duration, h		0.250													
Analyst				Analysis Date		2/20/2023		Area Type		Other											
Jurisdiction				Time Period				PHF		0.92											
Urban Street		Bluegrass Parkway		Analysis Year		2023		Analysis Period		1> 7:00											
Intersection		Bluegrass Parkway at T...		File Name		2023_PM_BuildSig.xus															
Project Description		2023 PM Build																			
Demand Information						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h						17	596	97	168	343	19	120	20	237	20	28	77				
Signal Information																					
Cycle, s	25.0	Reference Phase	2																		
Offset, s	0	Reference Point	End																		
Uncoordinated	Yes	Simult. Gap E/W	On	Green	11.0		6.0	0.0	0.0	0.0	0.0	0.0									
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0		4.0	0.0	0.0	0.0	0.0	0.0									
				Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
Timer Results						EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase								2				6				8				4	
Case Number								5.0				6.0				6.0				8.0	
Phase Duration, s								15.0				15.0				10.0				10.0	
Change Period, ( Y+R c ), s								4.0				4.0				4.0				4.0	
Max Allow Headway ( MAH ), s								3.3				3.3				3.3				3.3	
Queue Clearance Time ( g s ), s								9.2				13.0				8.0				6.1	
Green Extension Time ( g e ), s								0.8				0.0				0.0				0.0	
Phase Call Probability								1.00				1.00				0.98				0.98	
Max Out Probability								1.00				1.00				1.00				1.00	
Movement Group Results						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement						5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h						18	648	105	183	393		130	279			136					
Adjusted Saturation Flow Rate ( s ), veh/h/ln						1006	1900	1610	796	1882		1299	1630			1282					
Queue Service Time ( g s ), s						0.3	7.2	1.0	3.8	3.7		1.9	3.9			0.1					
Cycle Queue Clearance Time ( g c ), s						4.0	7.2	1.0	11.0	3.7		6.0	3.9			4.1					
Green Ratio ( g/C )						0.44	0.44	0.44	0.44	0.44		0.24	0.24			0.24					
Capacity ( c ), veh/h						582	836	708	408	828		389	391			475					
Volume-to-Capacity Ratio ( X )						0.032	0.775	0.149	0.448	0.475		0.335	0.714			0.286					
Back of Queue ( Q ), ft/ln ( 95 th percentile)																					
Back of Queue ( Q ), veh/ln ( 95 th percentile)						0.1	3.1	0.2	1.3	0.8		0.9	2.3			0.6					
Queue Storage Ratio ( RQ ) ( 95 th percentile)						0.00	0.00	0.00	0.00	0.00		0.00	0.00			0.00					
Uniform Delay ( d 1 ), s/veh						6.4	5.9	4.2	11.3	5.0		11.7	8.7			7.9					
Incremental Delay ( d 2 ), s/veh						0.0	4.2	0.0	0.3	0.2		0.2	5.2			0.1					
Initial Queue Delay ( d 3 ), s/veh						0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0					
Control Delay ( d ), s/veh						6.4	10.1	4.2	11.6	5.1		11.9	14.0			8.0					
Level of Service ( LOS)						A	B	A	B	A		B	B			A					
Approach Delay, s/veh / LOS						9.2	A		7.2	A		13.3	B		8.0	A					
Intersection Delay, s/veh / LOS						9.4						A									
Multimodal Results						EB			WB			NB			SB						
Pedestrian LOS Score / LOS						1.85	B		1.63	B		1.88	B		2.07	B					
Bicycle LOS Score / LOS						1.76	B		1.44	A		1.16	A		0.71	A					



# HCS Signalized Intersection Results Summary

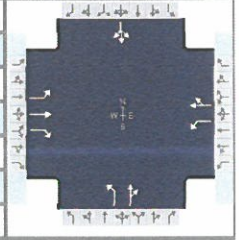
General Information						Intersection Information									
Agency						Duration, h		0.250							
Analyst				Analysis Date		2/20/2023		Area Type		Other					
Jurisdiction				Time Period				PHF		0.92					
Urban Street		Bluegrass Parkway		Analysis Year		2023		Analysis Period		1> 7:00					
Intersection		Bluegrass Parkway at T...		File Name		2033_AM_BuildSig.xus									
Project Description		2033 AM Build													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h				83	314	141	110	548	19	70	23	136	8	7	6
Signal Information															
Cycle, s	23.9	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	Yes	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
				Green	10.8	5.0	0.0	0.0	0.0	0.0					
				Yellow	4.0	4.0	0.0	0.0	0.0	0.0					
				Red	0.0	0.0	0.0	0.0	0.0	0.0					
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					2		6		8		4				
Case Number					5.0		6.0		6.0		8.0				
Phase Duration, s					14.8		14.8		9.0		9.0				
Change Period, ( Y+R <sub>c</sub> ), s					4.0		4.0		4.0		4.0				
Max Allow Headway ( MAH ), s					3.3		3.3		3.2		3.2				
Queue Clearance Time ( g <sub>s</sub> ), s					10.7		8.3		4.2		2.2				
Green Extension Time ( g <sub>e</sub> ), s					0.2		1.1		0.1		0.2				
Phase Call Probability					1.00		1.00		0.83		0.83				
Max Out Probability					1.00		1.00		1.00		0.65				
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h				90	341	153	120	616		76	173		23		
Adjusted Saturation Flow Rate ( s ), veh/h/ln				819	1900	1610	1056	1889		1422	1647		1645		
Queue Service Time ( g <sub>s</sub> ), s				2.4	2.8	1.4	2.0	6.3		1.1	2.2		0.0		
Cycle Queue Clearance Time ( g <sub>c</sub> ), s				8.7	2.8	1.4	4.9	6.3		1.3	2.2		0.2		
Green Ratio ( g/C )				0.45	0.45	0.45	0.45	0.45		0.21	0.21		0.21		
Capacity ( c ), veh/h				458	864	732	656	859		586	346		554		
Volume-to-Capacity Ratio ( X )				0.197	0.395	0.209	0.182	0.718		0.130	0.500		0.041		
Back of Queue ( Q ), ft/ln ( 95 th percentile)															
Back of Queue ( Q ), veh/ln ( 95 th percentile)				0.4	0.4	0.2	0.3	1.9		0.3	0.8		0.1		
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00		
Uniform Delay ( d <sub>1</sub> ), s/veh				8.8	4.3	3.9	5.9	5.3		8.1	8.3		7.5		
Incremental Delay ( d <sub>2</sub> ), s/veh				0.1	0.1	0.1	0.0	2.4		0.0	0.4		0.0		
Initial Queue Delay ( d <sub>3</sub> ), s/veh				0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0		
Control Delay ( d ), s/veh				8.9	4.4	4.0	6.0	7.7		8.1	8.7		7.5		
Level of Service ( LOS )				A	A	A	A	A		A	A		A		
Approach Delay, s/veh / LOS				5.0	A		7.4	A		8.5	A		7.5	A	
Intersection Delay, s/veh / LOS				6.7						A					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				1.85	B		1.62	B		1.88	B		2.07	B	
Bicycle LOS Score / LOS				1.45	A		1.70	B		0.90	A		0.53	A	



# HCS Signalized Intersection Results Summary

## General Information

Agency		Duration, h	0.250
Analyst		Analysis Date	2/20/2023
Jurisdiction		Time Period	
Urban Street	Bluegrass Parkway	Analysis Year	2023
Intersection	Bluegrass Parkway at T...	Analysis Period	1> 7:00
Project Description	2033 PM Build	File Name	2033_PM_BuildSig.xus



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	18	621	102	175	354	20	126	21	247	21	30	81

## Signal Information

Cycle, s	25.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		5.0		6.0		6.0		8.0
Phase Duration, s		15.0		15.0		10.0		10.0
Change Period, ( Y+R <sub>c</sub> ), s		4.0		4.0		4.0		4.0
Max Allow Headway ( MAH ), s		3.3		3.3		3.3		3.3
Queue Clearance Time ( g <sub>s</sub> ), s		9.7		13.0		8.0		6.3
Green Extension Time ( g <sub>e</sub> ), s		0.7		0.0		0.0		0.0
Phase Call Probability		1.00		1.00		0.98		0.98
Max Out Probability		1.00		1.00		1.00		1.00

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h	20	675	111	190	407		137	291			143	
Adjusted Saturation Flow Rate ( s ), veh/h/ln	994	1900	1610	776	1882		1291	1630			1218	
Queue Service Time ( g <sub>s</sub> ), s	0.4	7.7	1.0	3.3	3.9		1.7	4.1			0.2	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	4.2	7.7	1.0	11.0	3.9		6.0	4.1			4.3	
Green Ratio ( g/C )	0.44	0.44	0.44	0.44	0.44		0.24	0.24			0.24	
Capacity ( c ), veh/h	572	836	708	390	828		376	391			459	
Volume-to-Capacity Ratio ( X )	0.034	0.807	0.156	0.488	0.491		0.364	0.745			0.312	
Back of Queue ( Q ), ft/ln ( 95 th percentile)												
Back of Queue ( Q ), veh/ln ( 95 th percentile)	0.1	3.7	0.2	1.4	0.8		1.0	2.7			0.6	
Queue Storage Ratio ( RQ ) ( 95 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00			0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh	6.5	6.1	4.2	11.6	5.0		12.0	8.8			7.9	
Incremental Delay ( d <sub>2</sub> ), s/veh	0.0	5.5	0.0	0.4	0.2		0.2	6.7			0.1	
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Control Delay ( d ), s/veh	6.5	11.6	4.2	12.0	5.2		12.2	15.5			8.1	
Level of Service ( LOS )	A	B	A	B	A		B	B			A	
Approach Delay, s/veh / LOS	10.4	B		7.3	A		14.4	B		8.1	A	
Intersection Delay, s/veh / LOS	10.2						B					

## Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.85	B		1.63	B		1.88	B		2.07	B	
Bicycle LOS Score / LOS	1.82	B		1.47	A		1.19	A		0.72	A	

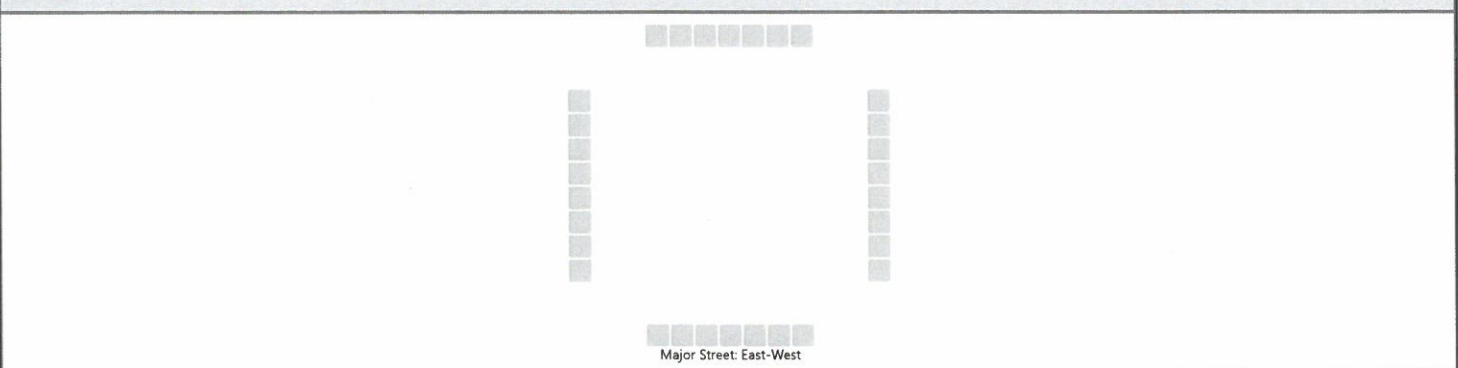


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Prop Access #1 Tucker Station
Agency/Co.	AKE	Jurisdiction	Jefferson County
Date Performed	2/20/2023	East/West Street	Tucker Station Rd
Analysis Year	2023	North/South Street	Prop. Access 1
Time Analyzed	2023 AM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume (veh/h)			269	50		29	703			6		4				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type   Storage																

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						32				7		4				
Capacity, c (veh/h)						1207				209		719				
v/c Ratio						0.03				0.03		0.01				
95% Queue Length, Q <sub>95</sub> (veh)						0.1				0.1		0.0				
Control Delay (s/veh)						8.1	0.4			22.8		10.0				
Level of Service (LOS)						A	A			C		B				
Approach Delay (s/veh)							0.7				17.7					
Approach LOS							A				C					



# HCS Two-Way Stop-Control Report

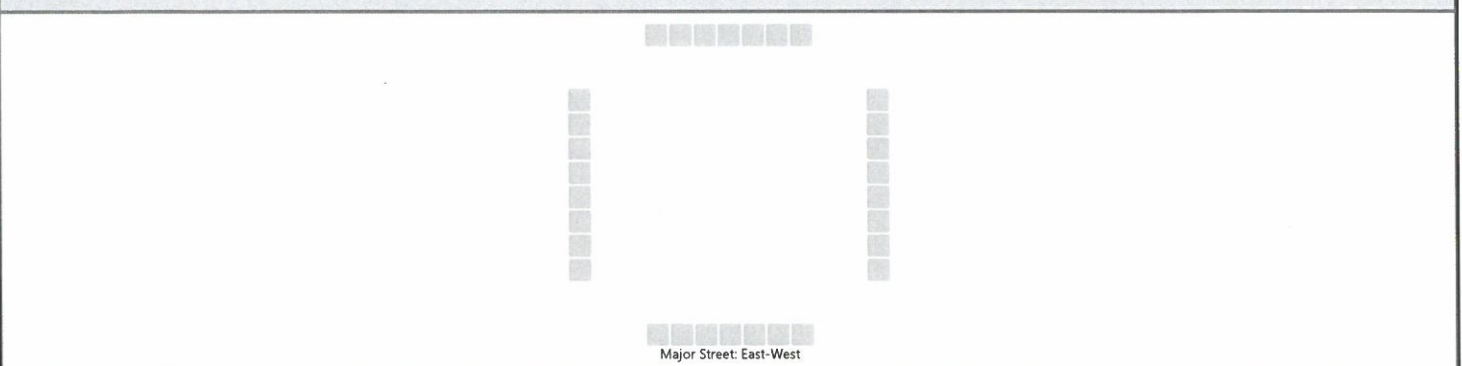
## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	2/20/2023
Analysis Year	2023
Time Analyzed	2023 PM Build
Intersection Orientation	East-West
Project Description	Xebec Development

## Site Information

Intersection	Prop Access 2 Tucker Station
Jurisdiction	Jefferson County
East/West Street	Tucker Station Rd
North/South Street	Prop. Access 2
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume (veh/h)			673	11		8	257			42		29				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type   Storage																

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						9				46		32				
Capacity, c (veh/h)						859				253		416				
v/c Ratio						0.01				0.18		0.08				
95% Queue Length, Q <sub>95</sub> (veh)						0.0				0.6		0.2				
Control Delay (s/veh)						9.2	0.1			22.3		14.4				
Level of Service (LOS)						A	A			C		B				
Approach Delay (s/veh)						0.4				19.1						
Approach LOS						A				C						

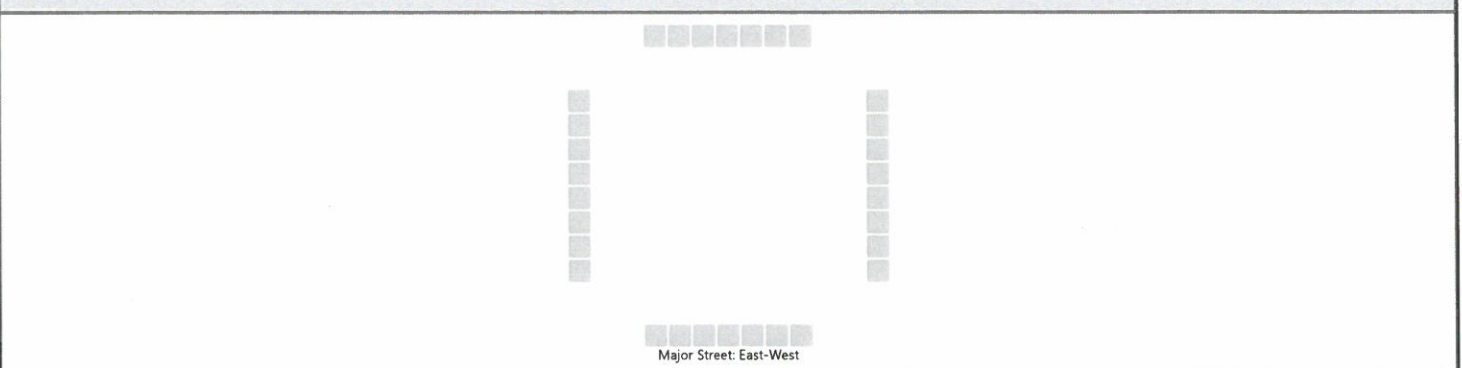


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Prop Access #1 Tucker Station
Agency/Co.	AKE	Jurisdiction	Jefferson County
Date Performed	2/20/2023	East/West Street	Tucker Station Rd
Analysis Year	2023	North/South Street	Prop. Access 1
Time Analyzed	2033 AM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume (veh/h)			276	50		29	731			6		4				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type   Storage																

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						32				7		4				
Capacity, c (veh/h)						1199				198		712				
v/c Ratio						0.03				0.03		0.01				
95% Queue Length, Q <sub>95</sub> (veh)						0.1				0.1		0.0				
Control Delay (s/veh)						8.1	0.4			23.8		10.1				
Level of Service (LOS)						A	A			C		B				
Approach Delay (s/veh)							0.7				18.3					
Approach LOS							A				C					

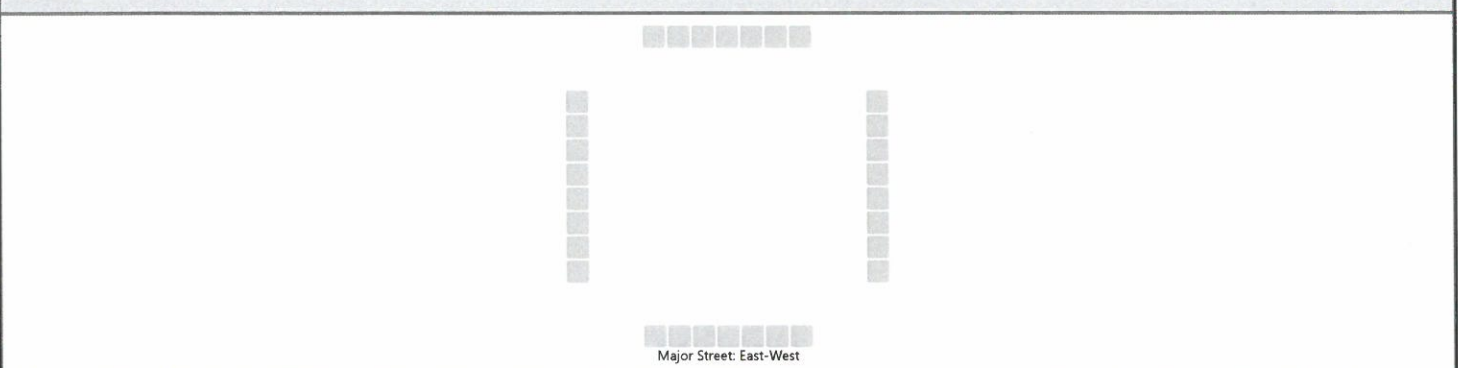


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Prop Access #1 Tucker Station
Agency/Co.	AKE	Jurisdiction	Jefferson County
Date Performed	2/20/2023	East/West Street	Tucker Station Rd
Analysis Year	2023	North/South Street	Prop. Access 1
Time Analyzed	2033 PM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume (veh/h)			793	12		7	427			32		26				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized									No							
Median Type   Storage					Undivided											

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						8				35		28				
Capacity, c (veh/h)						767				163		350				
v/c Ratio						0.01				0.21		0.08				
95% Queue Length, Q <sub>95</sub> (veh)						0.0				0.8		0.3				
Control Delay (s/veh)						9.7	0.1			32.9		16.2				
Level of Service (LOS)						A	A			D		C				
Approach Delay (s/veh)					0.3				25.4							
Approach LOS					A				D							



# HCS All-Way Stop Control Report

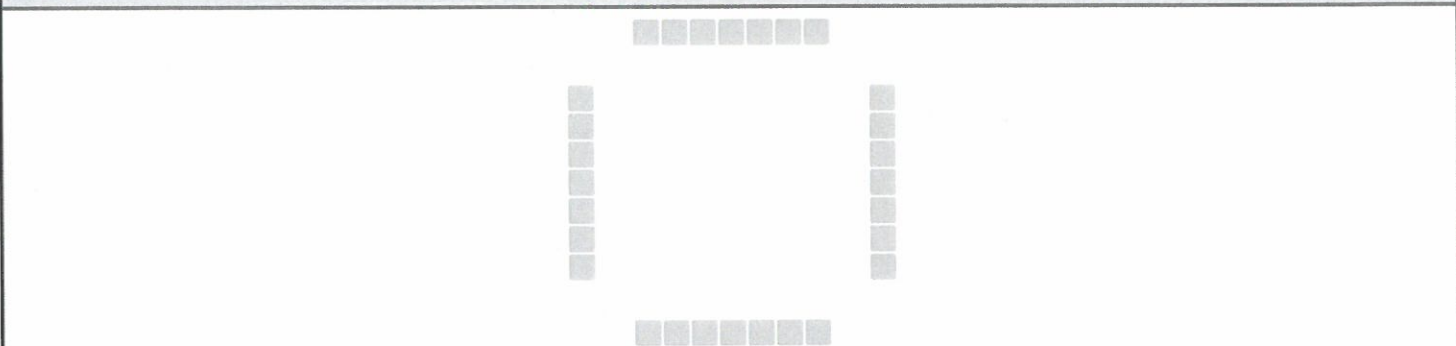
## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	2/20/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	2023 AM No Build
Project Description	Xebec Development

## Site Information

Intersection	Tucker Station at S. Pope Lick
Jurisdiction	Jefferson
East/West Street	S. Pope Lick
North/South Street	Tucker Station
Peak Hour Factor	0.92

## Lanes



## Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	71	107			512	144				30		177
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LT			TR						LR		
Flow Rate, v (veh/h)	193			713						225		
Percent Heavy Vehicles	2			2						2		

## Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20						3.20		
Initial Degree of Utilization, x	0.172			0.634						0.200		
Final Departure Headway, hd (s)	5.64			4.79						5.66		
Final Degree of Utilization, x	0.303			0.948						0.354		
Move-Up Time, m (s)	2.0			2.0						2.0		
Service Time, ts (s)	3.64			2.79						3.66		

## Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	193			713						225		
Capacity	639			752						636		
95% Queue Length, Q <sub>95</sub> (veh)	1.3			14.1						1.6		
Control Delay (s/veh)	11.1			42.7						11.7		
Level of Service, LOS	B			E						B		
Approach Delay (s/veh)	11.1			42.7						11.7		
Approach LOS	B			E						B		
Intersection Delay, s/veh   LOS	31.2						D					

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# HCS All-Way Stop Control Report

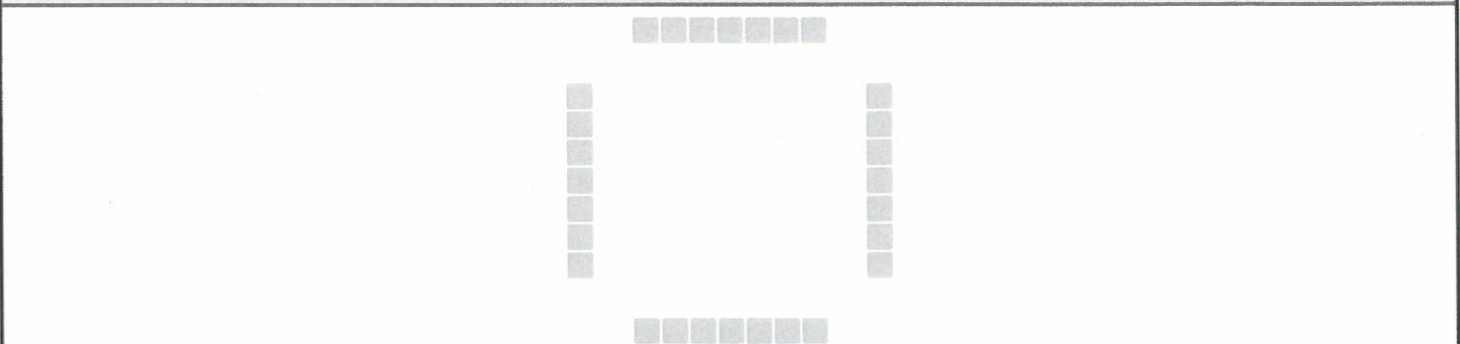
## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	2/20/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	2023 AM Build
Project Description	Xebec Development

## Site Information

Intersection	Tucker Station at S. Pope Lick
Jurisdiction	Jefferson
East/West Street	S. Pope Lick
North/South Street	Tucker Station
Peak Hour Factor	0.92

## Lanes



## Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	71	158	43	29	548	144	7	11	4	30	72	177
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		L	TR		LTR		
Flow Rate, v (veh/h)	77	218		32	752		8	16		303		
Percent Heavy Vehicles	2	2		2	2		2	2		2		

## Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20		
Initial Degree of Utilization, x	0.069	0.194		0.028	0.669		0.007	0.014		0.270		
Final Departure Headway, hd (s)	7.06	6.42		6.66	6.01		8.31	7.64		6.62		
Final Degree of Utilization, x	0.151	0.389		0.058	1.255		0.018	0.035		0.558		
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.0		
Service Time, ts (s)	4.76	4.12		4.36	3.71		6.01	5.34		4.62		

## Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	77	218		32	752		8	16		303		
Capacity	510	561		541	599		433	471		544		
95% Queue Length, Q <sub>95</sub> (veh)	0.5	1.8		0.2	28.9		0.1	0.1		3.4		
Control Delay (s/veh)	11.0	13.2		9.8	147.7		11.2	10.6		17.6		
Level of Service, LOS	B	B		A	F		B	B		C		
Approach Delay (s/veh)	12.6			142.2			10.8			17.6		
Approach LOS	B			F			B			C		
Intersection Delay, s/veh   LOS	85.9						F					

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22-ZONE-0098



# HCS All-Way Stop Control Report

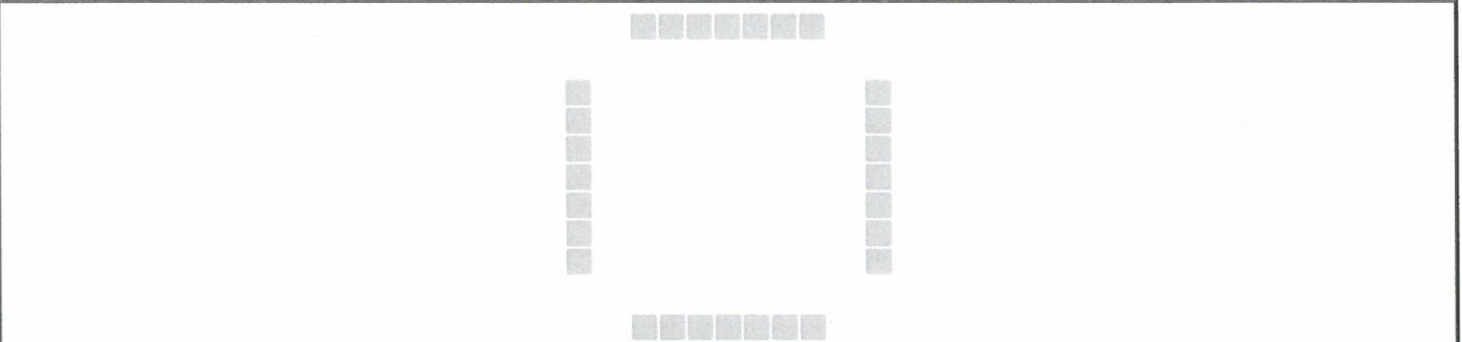
## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	2/20/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	2023 PM No Build
Project Description	Xebec Development

## Site Information

Intersection	Tucker Station at S. Pope Lick
Jurisdiction	Jefferson
East/West Street	S. Pope Lick
North/South Street	Tucker Station
Peak Hour Factor	0.92

## Lanes



## Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	229	511			142	100				111		191
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LT			TR						LR		
Flow Rate, v (veh/h)	804			263						328		
Percent Heavy Vehicles	2			2						2		

## Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20						3.20		
Initial Degree of Utilization, x	0.715			0.234						0.292		
Final Departure Headway, hd (s)	5.51			5.73						6.01		
Final Degree of Utilization, x	1.231			0.419						0.548		
Move-Up Time, m (s)	2.0			2.0						2.0		
Service Time, ts (s)	3.51			3.73						4.01		

## Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	804			263					328		
Capacity	653			628					599		
95% Queue Length, Q <sub>95</sub> (veh)	29.2			2.1					3.3		
Control Delay (s/veh)	136.4			12.8					16.1		
Level of Service, LOS	F			B					C		
Approach Delay (s/veh)	136.4			12.8						16.1	
Approach LOS	F			B						C	
Intersection Delay, s/veh   LOS	84.8						F				

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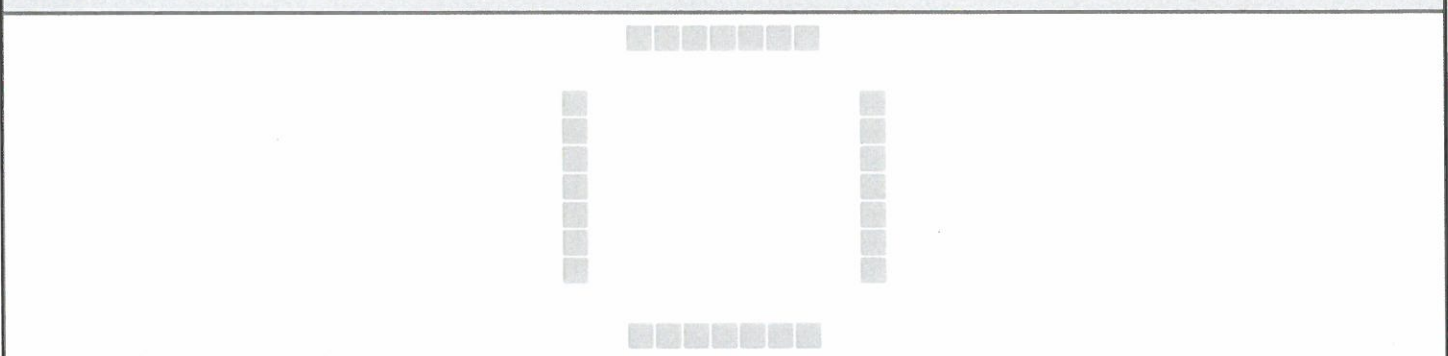


# HCS All-Way Stop Control Report

## General Information

Analyst	AJK	Intersection	Tucker Station at S. Pope Lick
Agency/Co.	AKE	Jurisdiction	Jefferson
Date Performed	2/20/2023	East/West Street	S. Pope Lick
Analysis Year	2023	North/South Street	Tucker Station
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	2023 PM Build		
Project Description	Xebec Development		

## Lanes



## Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	229	548	10	7	190	100	38	64	26	111	17	191
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		L	TR		LTR		
Flow Rate, v (veh/h)	249	607		8	315		41	98		347		
Percent Heavy Vehicles	2	2		2	2		2	2		2		

## Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20		
Initial Degree of Utilization, x	0.221	0.539		0.007	0.280		0.037	0.087		0.308		
Final Departure Headway, hd (s)	7.65	7.12		8.17	7.43		8.92	8.23		7.33		
Final Degree of Utilization, x	0.529	1.200		0.017	0.650		0.102	0.224		0.706		
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.0		
Service Time, ts (s)	5.35	4.82		5.87	5.13		6.62	5.93		5.33		

## Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	249	607		8	315		41	98		347		
Capacity	471	505		441	485		403	437		491		
95% Queue Length, Q <sub>95</sub> (veh)	3.0	22.7		0.1	4.6		0.3	0.8		5.5		
Control Delay (s/veh)	18.6	131.5		11.0	22.9		12.6	13.3		26.0		
Level of Service, LOS	C	F		B	C		B	B		D		
Approach Delay (s/veh)	98.6			22.6			13.1			26.0		
Approach LOS	F			C			B			D		
Intersection Delay, s/veh   LOS	61.6						F					

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# HCS All-Way Stop Control Report

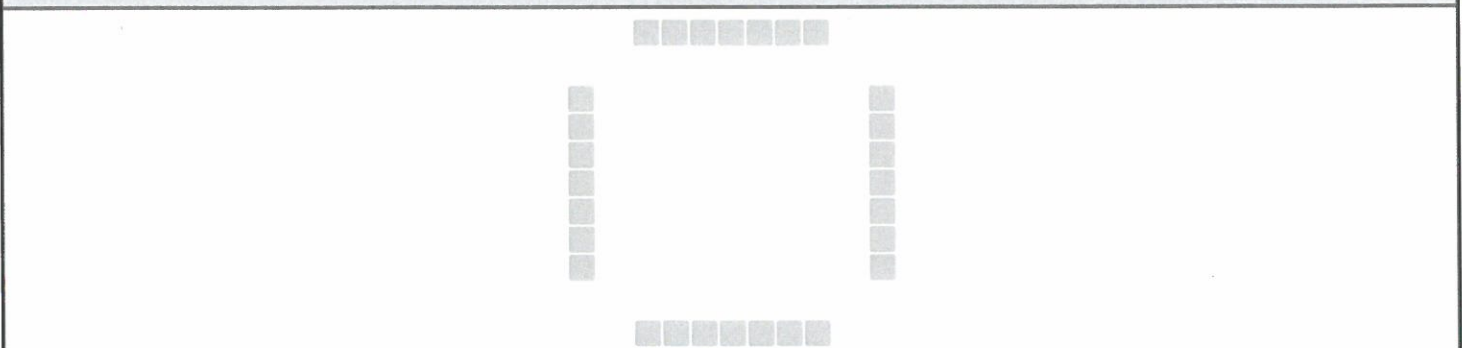
## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	2/20/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	2033 AM No Build
Project Description	Xebec Development

## Site Information

Intersection	Tucker Station at S. Pope Lick
Jurisdiction	Jefferson
East/West Street	S. Pope Lick
North/South Street	Tucker Station
Peak Hour Factor	0.92

## Lanes



## Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	75	111			532	149				31		186
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LT			TR						LR		
Flow Rate, v (veh/h)	202			740						236		
Percent Heavy Vehicles	2			2						2		

## Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20						3.20		
Initial Degree of Utilization, x	0.180			0.658						0.210		
Final Departure Headway, hd (s)	5.74			4.85						5.77		
Final Degree of Utilization, x	0.323			0.998						0.378		
Move-Up Time, m (s)	2.0			2.0						2.0		
Service Time, ts (s)	3.74			2.85						3.77		

## Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	202			740						236		
Capacity	627			742						624		
95% Queue Length, Q <sub>95</sub> (veh)	1.4			16.6						1.8		
Control Delay (s/veh)	11.5			54.1						12.2		
Level of Service, LOS	B			F						B		
Approach Delay (s/veh)	11.5			54.1						12.2		
Approach LOS	B			F						B		
Intersection Delay, s/veh   LOS	38.4						E					

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# HCS All-Way Stop Control Report

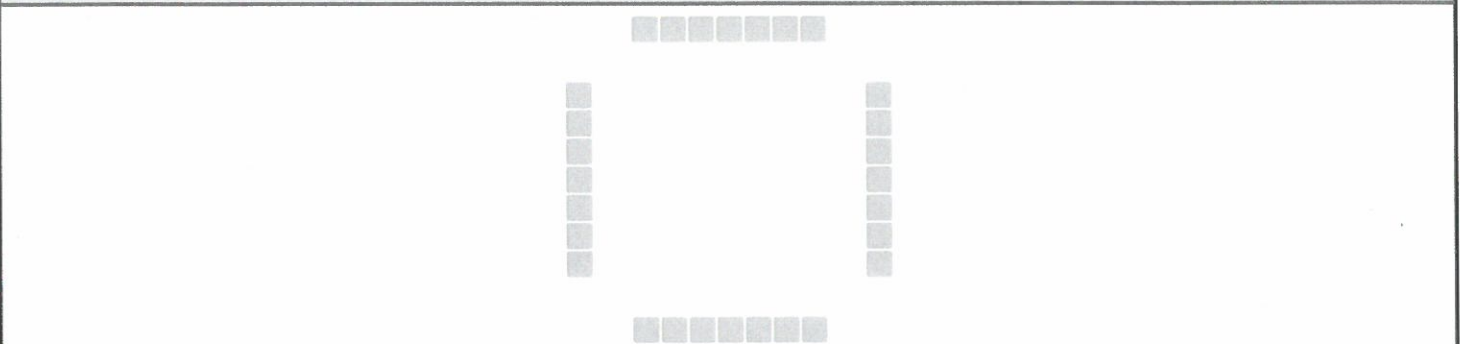
## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	2/20/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	2033 AM Build
Project Description	Xebec Development

## Site Information

Intersection	Tucker Station at S. Pope Lick
Jurisdiction	Jefferson
East/West Street	S. Pope Lick
North/South Street	Tucker Station
Peak Hour Factor	0.92

## Lanes



## Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	75	162	43	29	568	149	7	11	4	31	72	186
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		L	TR		LTR		
Flow Rate, v (veh/h)	82	223		32	779		8	16		314		
Percent Heavy Vehicles	2	2		2	2		2	2		2		

## Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20		
Initial Degree of Utilization, x	0.072	0.198		0.028	0.693		0.007	0.014		0.279		
Final Departure Headway, hd (s)	7.12	6.47		6.72	6.07		8.37	7.69		6.63		
Final Degree of Utilization, x	0.161	0.401		0.059	1.314		0.018	0.035		0.579		
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.0		
Service Time, ts (s)	4.82	4.17		4.42	3.77		6.07	5.39		4.63		

## Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	82	223		32	779		8	16		314		
Capacity	506	556		536	593		430	468		543		
95% Queue Length, Q <sub>95</sub> (veh)	0.6	1.9		0.2	32.3		0.1	0.1		3.7		
Control Delay (s/veh)	11.2	13.4		9.8	172.0		11.2	10.7		18.3		
Level of Service, LOS	B	B		A	F		B	B		C		
Approach Delay (s/veh)	12.8			165.7			10.8			18.3		
Approach LOS	B			F			B			C		
Intersection Delay, s/veh   LOS	99.3						F					



# HCS All-Way Stop Control Report

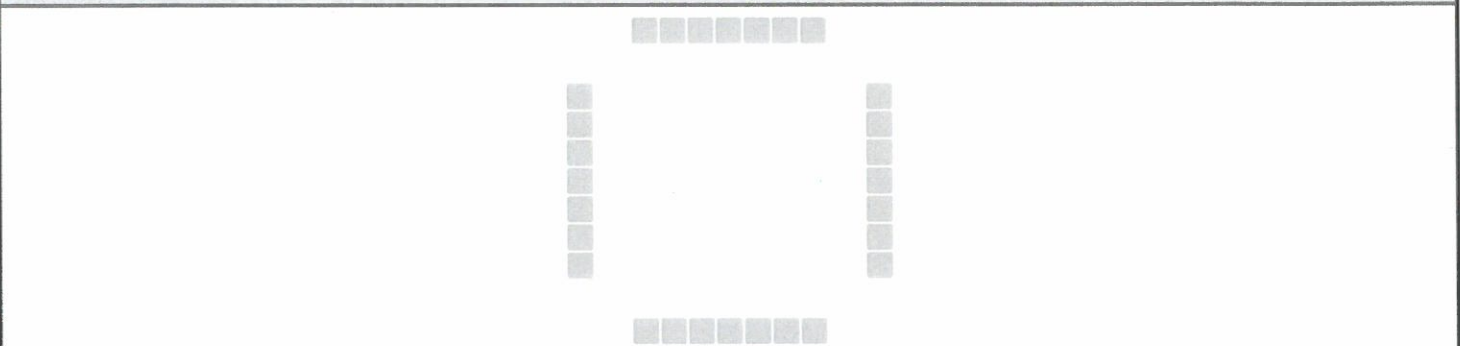
## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	2/20/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	2033 PM No Build
Project Description	Xebec Development

## Site Information

Intersection	Tucker Station at S. Pope Lick
Jurisdiction	Jefferson
East/West Street	S. Pope Lick
North/South Street	Tucker Station
Peak Hour Factor	0.92

## Lanes



## Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	241	531			147	104				116		200
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LT			TR						LR		
Flow Rate, v (veh/h)	839			273						343		
Percent Heavy Vehicles	2			2						2		

## Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20						3.20		
Initial Degree of Utilization, x	0.746			0.243						0.305		
Final Departure Headway, hd (s)	5.59			5.80						6.04		
Final Degree of Utilization, x	1.303			0.439						0.576		
Move-Up Time, m (s)	2.0			2.0						2.0		
Service Time, ts (s)	3.59			3.80						4.04		

## Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	839			273						343		
Capacity	644			621						596		
95% Queue Length, Q <sub>95</sub> (veh)	33.7			2.2						3.7		
Control Delay (s/veh)	165.9			13.3						16.9		
Level of Service, LOS	F			B						C		
Approach Delay (s/veh)	165.9			13.3						16.9		
Approach LOS	F			B						C		
Intersection Delay, s/veh   LOS	102.1						F					

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# HCS All-Way Stop Control Report

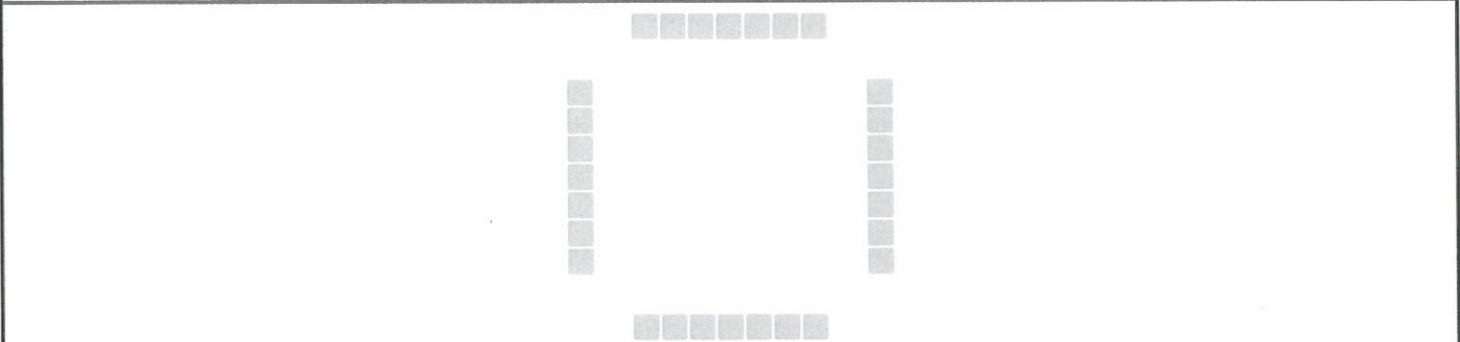
## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	2/20/2023
Analysis Year	2023
Analysis Time Period (hrs)	0.25
Time Analyzed	2033 PM Build
Project Description	Xebec Development

## Site Information

Intersection	Tucker Station at S. Pope Lick
Jurisdiction	Jefferson
East/West Street	S. Pope Lick
North/South Street	Tucker Station
Peak Hour Factor	0.92

## Lanes



## Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	241	568	10	7	195	104	38	64	26	116	17	200
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		L	TR		LTR		
Flow Rate, v (veh/h)	262	628		8	325		41	98		362		
Percent Heavy Vehicles	2	2		2	2		2	2		2		

## Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20		
Initial Degree of Utilization, x	0.233	0.558		0.007	0.289		0.037	0.087		0.322		
Final Departure Headway, hd (s)	7.77	7.25		8.26	7.52		9.03	8.34		7.37		
Final Degree of Utilization, x	0.565	1.265		0.017	0.679		0.104	0.227		0.741		
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.0		
Service Time, ts (s)	5.47	4.95		5.96	5.22		6.73	6.04		5.37		

## Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	262	628		8	325		41	98		362		
Capacity	463	497		436	479		399	432		488		
95% Queue Length, Q <sub>95</sub> (veh)	3.4	25.6		0.1	5.0		0.3	0.9		6.2		
Control Delay (s/veh)	20.1	157.0		11.1	24.7		12.8	13.5		28.6		
Level of Service, LOS	C	F		B	C		B	B		D		
Approach Delay (s/veh)	116.7			24.3			13.3			28.6		
Approach LOS	F			C			B			D		
Intersection Delay, s/veh   LOS	72.1						F					

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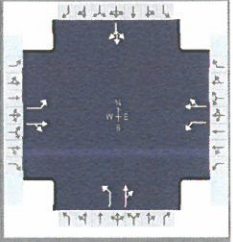
22-ZONE-0098



# HCS Signalized Intersection Results Summary

## General Information

Agency		Duration, h	0.250
Analyst		Analysis Date	2/20/2023
Jurisdiction		Area Type	Other
Urban Street	Tucker Station	Time Period	PHF
Intersection	S. Pope Lick at Tucker...	Analysis Year	2023
Project Description	2023 AM Build	Analysis Period	1> 7:00
		File Name	2023_AM_BuildSig.xus



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	71	158	43	29	548	144	7	11	4	30	72	177

## Signal Information

Cycle, s	28.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		6.0		8.0
Phase Duration, s		18.0		18.0		10.5		10.5
Change Period, ( Y+R <sub>c</sub> ), s		4.0		4.0		4.0		4.0
Max Allow Headway ( MAH ), s		3.3		3.3		3.3		3.3
Queue Clearance Time ( g <sub>s</sub> ), s		15.1		12.1		7.0		6.9
Green Extension Time ( g <sub>e</sub> ), s		0.0		1.9		0.0		0.2
Phase Call Probability		1.00		1.00		0.93		0.93
Max Out Probability		1.00		0.04		1.00		1.00

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h	77	218		32	752		8	16			303	
Adjusted Saturation Flow Rate ( s ), veh/h/ln	722	1830		1181	1831		1126	1813			1672	
Queue Service Time ( g <sub>s</sub> ), s	2.9	2.0		0.5	10.1		0.2	0.2			2.3	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	13.1	2.0		2.4	10.1		5.0	0.2			4.9	
Green Ratio ( g/C )	0.49	0.49		0.49	0.49		0.23	0.23			0.23	
Capacity ( c ), veh/h	351	899		753	900		318	414			521	
Volume-to-Capacity Ratio ( X )	0.220	0.243		0.042	0.835		0.024	0.039			0.582	
Back of Queue ( Q ), ft/ln ( 95 th percentile)												
Back of Queue ( Q ), veh/ln ( 95 th percentile)	0.6	0.4		0.1	2.5		0.1	0.1			2.1	
Queue Storage Ratio ( RQ ) ( 95 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00			0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh	11.9	4.2		4.9	6.3		12.7	8.6			10.4	
Incremental Delay ( d <sub>2</sub> ), s/veh	0.1	0.1		0.0	0.8		0.0	0.0			0.4	
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Control Delay ( d ), s/veh	12.0	4.2		4.9	7.1		12.8	8.6			10.7	
Level of Service ( LOS )	B	A		A	A		B	A			B	
Approach Delay, s/veh / LOS	6.3	A		7.0	A		9.9	A		10.7	B	
Intersection Delay, s/veh / LOS	7.7						A					

## Multimodal Results

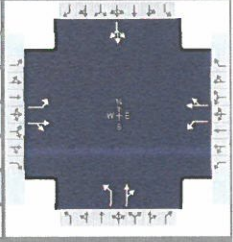
	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.85	B		1.62	B		1.88	B		1.88	B	
Bicycle LOS Score / LOS	0.98	A		1.78	B		0.53	A		0.99	A	



# HCS Signalized Intersection Results Summary

## General Information

Agency		Duration, h	0.250
Analyst		Analysis Date	2/20/2023
Jurisdiction		Time Period	PHF
Urban Street	Tucker Station	Analysis Year	2023
Intersection	S. Pope Lick at Tucker...	Analysis Period	1> 7:00
Project Description	2023 PM Build	File Name	2023_PM_BuildSig.xus



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	229	548	10	7	190	100	38	64	26	111	17	191

## Signal Information

Cycle, s	25.2	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		6.0		8.0
Phase Duration, s		14.0		14.0		11.1		11.1
Change Period, ( Y+R <sub>c</sub> ), s		4.0		4.0		4.0		4.0
Max Allow Headway ( MAH ), s		3.2		3.2		3.3		3.3
Queue Clearance Time ( g <sub>s</sub> ), s		10.7		9.3		8.0		7.2
Green Extension Time ( g <sub>e</sub> ), s		0.0		0.7		0.0		0.2
Phase Call Probability		1.00		1.00		0.97		0.97
Max Out Probability		1.00		0.02		1.00		1.00

## Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h	249	607		8	315		41	98			347	
Adjusted Saturation Flow Rate ( s ), veh/h/ln	1081	1894		827	1789		1173	1806			1544	
Queue Service Time ( g <sub>s</sub> ), s	5.5	7.1		0.2	3.2		0.8	1.0			3.9	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	8.7	7.1		7.3	3.2		6.0	1.0			5.2	
Green Ratio ( g/C )	0.40	0.40		0.40	0.40		0.28	0.28			0.28	
Capacity ( c ), veh/h	579	756		382	714		378	512			630	
Volume-to-Capacity Ratio ( X )	0.430	0.802		0.020	0.441		0.109	0.191			0.550	
Back of Queue ( Q ), ft/ln ( 95 th percentile)												
Back of Queue ( Q ), veh/ln ( 95 th percentile)	1.2	3.9		0.0	0.8		0.3	0.4			1.6	
Queue Storage Ratio ( RQ ) ( 95 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00			0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh	8.7	6.7		9.9	5.5		11.1	6.8			8.3	
Incremental Delay ( d <sub>2</sub> ), s/veh	0.2	5.8		0.0	0.2		0.0	0.1			0.3	
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Control Delay ( d ), s/veh	8.9	12.5		9.9	5.7		11.1	6.9			8.5	
Level of Service ( LOS )	A	B		A	A		B	A			A	
Approach Delay, s/veh / LOS	11.4	B		5.8	A		8.2	A		8.5	A	
Intersection Delay, s/veh / LOS	9.4						A					

## Multimodal Results

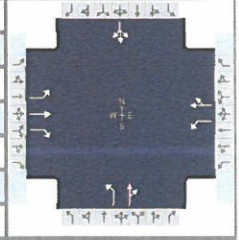
	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.86	B		1.63	B		1.87	B		1.87	B	
Bicycle LOS Score / LOS	1.90	B		1.02	A		0.72	A		1.06	A	



# HCS Signalized Intersection Results Summary

## General Information

Agency		Duration, h	0.250
Analyst		Analysis Date	2/20/2023
Jurisdiction		Time Period	
Urban Street	Bluegrass Parkway	Analysis Year	2023
Intersection	Bluegrass Parkway at T...	Analysis Period	1> 7:00
Project Description	2033 AM Build	File Name	2033_AM_BuildSig.xus



## Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	79	256	134	103	405	18	66	22	128	8	7	6

## Signal Information

Cycle, s	21.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

## Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		5.0		6.0		6.0		8.0
Phase Duration, s		12.8		12.8		8.7		8.7
Change Period, (Y+R <sub>c</sub> ), s		4.0		4.0		4.0		4.0
Max Allow Headway (MAH), s		3.2		3.2		3.2		3.2
Queue Clearance Time (g <sub>s</sub> ), s		7.8		6.1		3.8		2.2
Green Extension Time (g <sub>e</sub> ), s		1.0		1.4		0.1		0.2
Phase Call Probability		1.00		1.00		0.79		0.79
Max Out Probability		1.00		0.62		1.00		0.63

## Movement Group Results

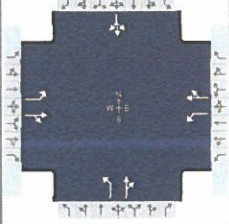
	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	86	278	146	112	460		72	163			23	
Adjusted Saturation Flow Rate (s), veh/h/ln	947	1900	1610	1118	1886		1422	1647			1647	
Queue Service Time (g <sub>s</sub> ), s	1.7	2.2	1.3	1.7	4.1		0.9	1.8			0.0	
Cycle Queue Clearance Time (g <sub>c</sub> ), s	5.8	2.2	1.3	3.8	4.1		1.1	1.8			0.2	
Green Ratio (g/C)	0.41	0.41	0.41	0.41	0.41		0.22	0.22			0.22	
Capacity (c), veh/h	541	777	659	679	771		632	361			592	
Volume-to-Capacity Ratio (X)	0.159	0.358	0.221	0.165	0.596		0.114	0.452			0.039	
Back of Queue (Q), ft/ln (95 th percentile)												
Back of Queue (Q), veh/ln (95 th percentile)	0.3	0.3	0.1	0.2	0.6		0.2	0.6			0.1	
Queue Storage Ratio (RQ) (95 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00			0.00	
Uniform Delay (d <sub>1</sub> ), s/veh	7.2	4.4	4.1	5.7	5.0		7.1	7.3			6.6	
Incremental Delay (d <sub>2</sub> ), s/veh	0.1	0.1	0.1	0.0	0.3		0.0	0.3			0.0	
Initial Queue Delay (d <sub>3</sub> ), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Control Delay (d), s/veh	7.3	4.5	4.2	5.8	5.2		7.1	7.6			6.7	
Level of Service (LOS)	A	A	A	A	A		A	A			A	
Approach Delay, s/veh / LOS	4.9		A	5.3		A	7.5		A	6.7		A
Intersection Delay, s/veh / LOS	5.6						A					

## Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.85		B	1.63		B	1.87		B	2.06		B
Bicycle LOS Score / LOS	1.33		A	1.43		A	0.87		A	0.53		A



# HCS Signalized Intersection Results Summary

General Information						Intersection Information	
Agency					Duration, h	0.250	
Analyst		Analysis Date	2/20/2023	Area Type	Other		
Jurisdiction		Time Period		PHF	0.92		
Urban Street	Tucker Station	Analysis Year	2023	Analysis Period	1> 7:00		
Intersection	S. Pope Lick at Tucker...	File Name	2033_PM_BuildSig.xus				
Project Description	2033 PM Build						

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h	241	568	10	7	195	104	38	64	26	116	17	200

Signal Information											
Cycle, s	26.4	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	Yes	Simult. Gap E/W	On	Green	10.7	7.6	0.0	0.0	0.0	0.0	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0	
				Red	0.0	0.0	0.0	0.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		6.0		8.0
Phase Duration, s		14.7		14.7		11.6		11.6
Change Period, ( Y+R <sub>c</sub> ), s		4.0		4.0		4.0		4.0
Max Allow Headway ( MAH ), s		3.2		3.2		3.3		3.3
Queue Clearance Time ( g <sub>s</sub> ), s		11.6		10.0		8.6		7.7
Green Extension Time ( g <sub>e</sub> ), s		0.0		0.7		0.0		0.2
Phase Call Probability		1.00		1.00		0.97		0.97
Max Out Probability		1.00		0.03		1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h	262	628		8	325		41	98			362	
Adjusted Saturation Flow Rate ( s ), veh/h/ln	1072	1894		810	1788		1163	1806			1543	
Queue Service Time ( g <sub>s</sub> ), s	6.2	7.8		0.2	3.5		0.9	1.1			4.3	
Cycle Queue Clearance Time ( g <sub>c</sub> ), s	9.6	7.8		8.0	3.5		6.6	1.1			5.7	
Green Ratio ( g/C )	0.41	0.41		0.41	0.41		0.29	0.29			0.29	
Capacity ( c ), veh/h	568	771		364	728		360	524			631	
Volume-to-Capacity Ratio ( X )	0.461	0.815		0.021	0.446		0.115	0.187			0.573	
Back of Queue ( Q ), ft/ln ( 95 th percentile)												
Back of Queue ( Q ), veh/ln ( 95 th percentile)	1.4	4.5		0.0	0.9		0.3	0.4			1.9	
Queue Storage Ratio ( RQ ) ( 95 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00			0.00	
Uniform Delay ( d <sub>1</sub> ), s/veh	9.2	6.9		10.5	5.7		11.7	7.0			8.6	
Incremental Delay ( d <sub>2</sub> ), s/veh	0.2	6.3		0.0	0.2		0.1	0.1			0.4	
Initial Queue Delay ( d <sub>3</sub> ), s/veh	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Control Delay ( d ), s/veh	9.4	13.2		10.5	5.8		11.8	7.1			9.0	
Level of Service ( LOS )	A	B		B	A		B	A			A	
Approach Delay, s/veh / LOS	12.1	B		5.9	A		8.5	A		9.0	A	
Intersection Delay, s/veh / LOS	10.0						A					

Multimodal Results	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	1.86	B		1.63	B		1.87	B		1.87	B	
Bicycle LOS Score / LOS	1.96	B		1.04	A		0.72	A		1.08	A	

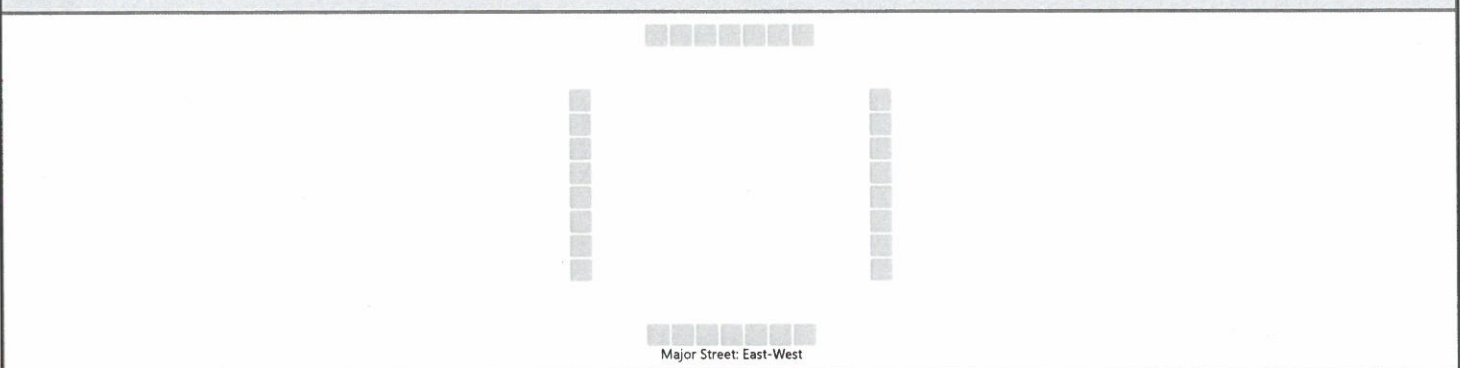


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Prop Access 2 at Tucker Station
Agency/Co.	AKE	Jurisdiction	Jefferson County
Date Performed	2/20/2023	East/West Street	S. Pope Lick
Analysis Year	2023	North/South Street	Prop. Access 2
Time Analyzed	2023 AM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume (veh/h)			135	47		32	712			7		5				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type   Storage																

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						35				8		5				
Capacity, c (veh/h)						1369				251		869				
v/c Ratio						0.03				0.03		0.01				
95% Queue Length, Q <sub>95</sub> (veh)						0.1				0.1		0.0				
Control Delay (s/veh)						7.7	0.3			19.8		9.2				
Level of Service (LOS)						A	A			C		A				
Approach Delay (s/veh)							0.7				15.4					
Approach LOS							A				C					



# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	2/20/2023
Analysis Year	2023
Time Analyzed	2023 PM Build
Intersection Orientation	East-West
Project Description	Xebec Development

## Site Information

Intersection	Prop Access 2 Tucker Station
Jurisdiction	Jefferson County
East/West Street	S. Pope Lick
North/South Street	Prop. Access 2
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



Major Street: East-West

## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume (veh/h)			673	11		8	257			42		29				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized									No							
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						9				46		32				
Capacity, c (veh/h)						859				253		416				
v/c Ratio						0.01				0.18		0.08				
95% Queue Length, Q <sub>95</sub> (veh)						0.0				0.6		0.2				
Control Delay (s/veh)						9.2	0.1			22.3		14.4				
Level of Service (LOS)						A	A			C		B				
Approach Delay (s/veh)					0.4				19.1							
Approach LOS					A				C							

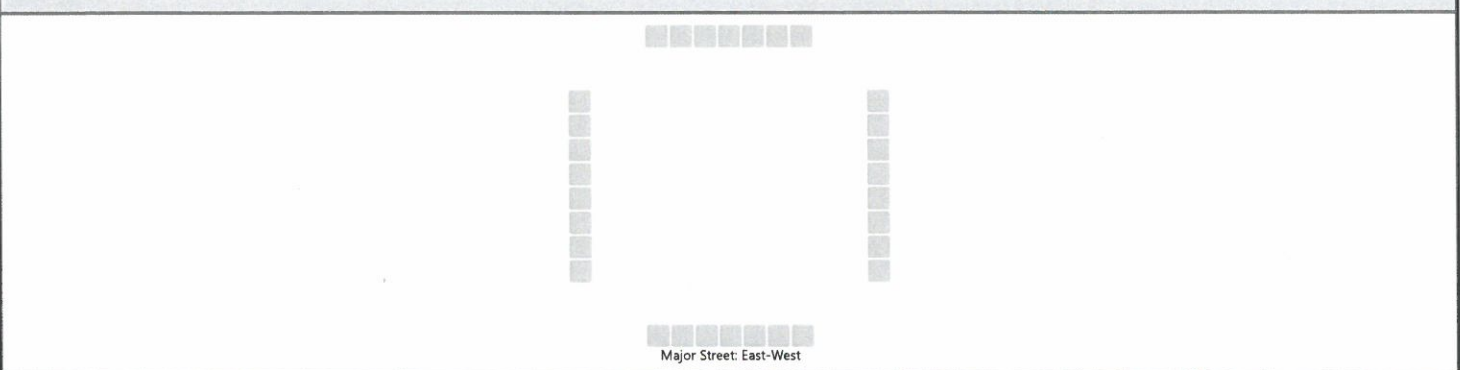


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Prop Access 2 Tucker Station
Agency/Co.	AKE	Jurisdiction	Jefferson County
Date Performed	2/20/2023	East/West Street	S. Pope Lick
Analysis Year	2023	North/South Street	Prop. Access 2
Time Analyzed	2033 AM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume (veh/h)			140	47		32	737			7		5				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type   Storage																

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						35				8		5				
Capacity, c (veh/h)						1362				240		863				
v/c Ratio						0.03				0.03		0.01				
95% Queue Length, Q <sub>95</sub> (veh)						0.1				0.1		0.0				
Control Delay (s/veh)						7.7	0.4			20.5		9.2				
Level of Service (LOS)						A	A			C		A				
Approach Delay (s/veh)							0.7				15.8					
Approach LOS							A				C					



# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	2/20/2023
Analysis Year	2023
Time Analyzed	2033 PM Build
Intersection Orientation	East-West
Project Description	Xebec Development

## Site Information

Intersection	Prop Access 2 Tucker Station
Jurisdiction	Jefferson County
East/West Street	S. Pope Lick
North/South Street	Prop. Access 2
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume (veh/h)			698	11		8	265			42		29				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type   Storage																

## Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						9				46		32				
Capacity, c (veh/h)						840				241		402				
v/c Ratio						0.01				0.19		0.08				
95% Queue Length, Q <sub>95</sub> (veh)						0.0				0.7		0.3				
Control Delay (s/veh)						9.3	0.1			23.4		14.7				
Level of Service (LOS)						A	A			C		B				
Approach Delay (s/veh)							0.4				19.9					
Approach LOS							A				C					

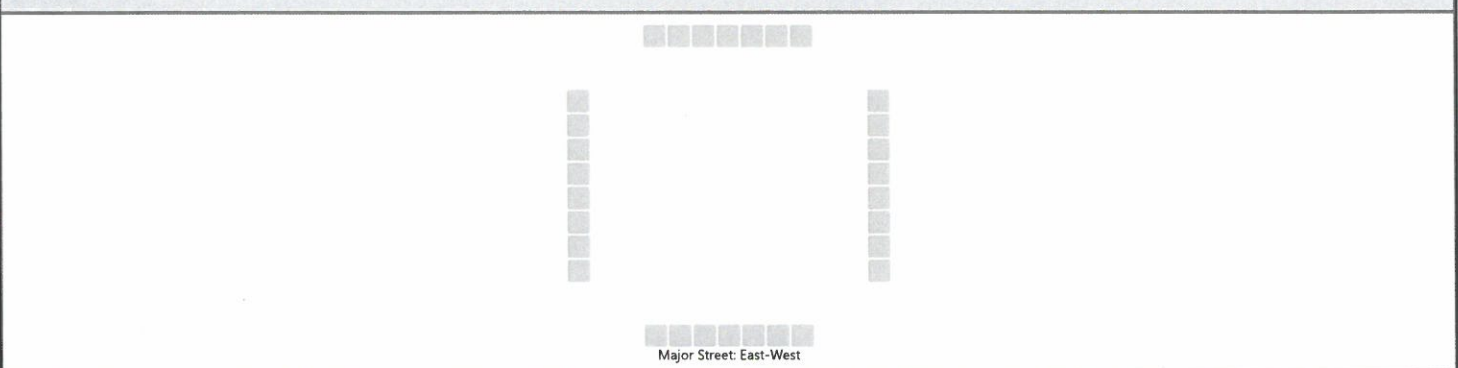


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Schutte Station at Plantside Dr
Agency/Co.	AKE	Jurisdiction	Jefferson Co
Date Performed	2/20/2023	East/West Street	Plantside Dr.
Analysis Year	2023	North/South Street	Schutte Station
Time Analyzed	2023 AM No Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume (veh/h)		11	172	21		2	110	2		1	0	0		0	0	6
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type   Storage																

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		12				2					1					7
Capacity, c (veh/h)		1456				1351					630					988
v/c Ratio		0.01				0.00					0.00					0.01
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.0					0.0
Control Delay (s/veh)		7.5	0.1			7.7	0.0				10.7					8.7
Level of Service (LOS)		A	A			A	A				B					A
Approach Delay (s/veh)	0.5				0.1				10.7				8.7			
Approach LOS	A				A				B				A			

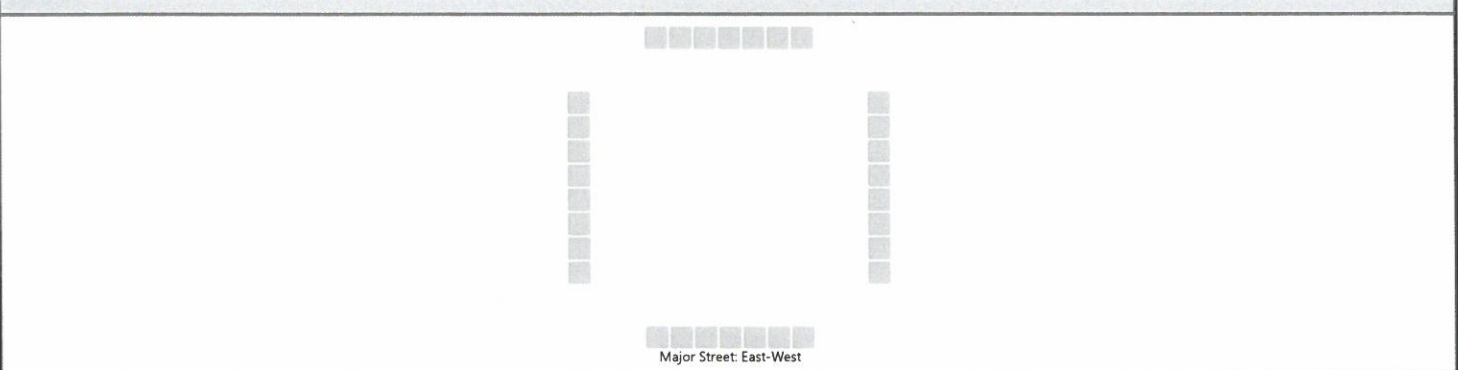


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Schutte Station at Plantside Dr
Agency/Co.	AKE	Jurisdiction	Jefferson Co
Date Performed	2/20/2023	East/West Street	Plantside Dr.
Analysis Year	2023	North/South Street	Schutte Station
Time Analyzed	2023 AM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume (veh/h)		47	172	21		2	110	38		1	0	0		6	0	12
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type   Storage																

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		51				2					1				20	
Capacity, c (veh/h)		1408				1351					534				778	
v/c Ratio		0.04				0.00					0.00				0.03	
95% Queue Length, Q <sub>95</sub> (veh)		0.1				0.0					0.0				0.1	
Control Delay (s/veh)		7.7	0.2			7.7	0.0				11.8				9.7	
Level of Service (LOS)		A	A			A	A				B				A	
Approach Delay (s/veh)	1.6				0.1				11.8				9.7			
Approach LOS	A				A				B				A			



# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK
Agency/Co.	AKE
Date Performed	2/20/2023
Analysis Year	2023
Time Analyzed	2023 PM No Build
Intersection Orientation	East-West
Project Description	Xebec Development

## Site Information

Intersection	Schutte Station at Plantside Dr
Jurisdiction	Jefferson Co
East/West Street	Plantside Dr.
North/South Street	Schutte Station
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

## Lanes



Major Street: East-West

## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume (veh/h)		3	137	2		0	156	1		16	0	1		2	0	11
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		3				0					18					14
Capacity, c (veh/h)		1397				1420					692					897
v/c Ratio		0.00				0.00					0.03					0.02
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.1					0.0
Control Delay (s/veh)		7.6	0.0			7.5	0.0				10.3					9.1
Level of Service (LOS)		A	A			A	A				B					A
Approach Delay (s/veh)	0.2				0.0				10.3				9.1			
Approach LOS	A				A				B				A			



# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Schutte Station at Plantside Dr
Agency/Co.	AKE	Jurisdiction	Jefferson Co
Date Performed	2/20/2023	East/West Street	Plantside Dr.
Analysis Year	2023	North/South Street	Schutte Station
Time Analyzed	2023 PM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes

Major Street: East-West

## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume (veh/h)		12	137	2		0	156	10		16	0	1		34	0	43
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type   Storage					Undivided											

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		13				0				18				84		
Capacity, c (veh/h)		1385				1420				642				785		
v/c Ratio		0.01				0.00				0.03				0.11		
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0				0.1				0.4		
Control Delay (s/veh)		7.6	0.1			7.5	0.0			10.8				10.1		
Level of Service (LOS)		A	A			A	A			B				B		
Approach Delay (s/veh)	0.7				0.0				10.8				10.1			
Approach LOS	A				A				B				B			

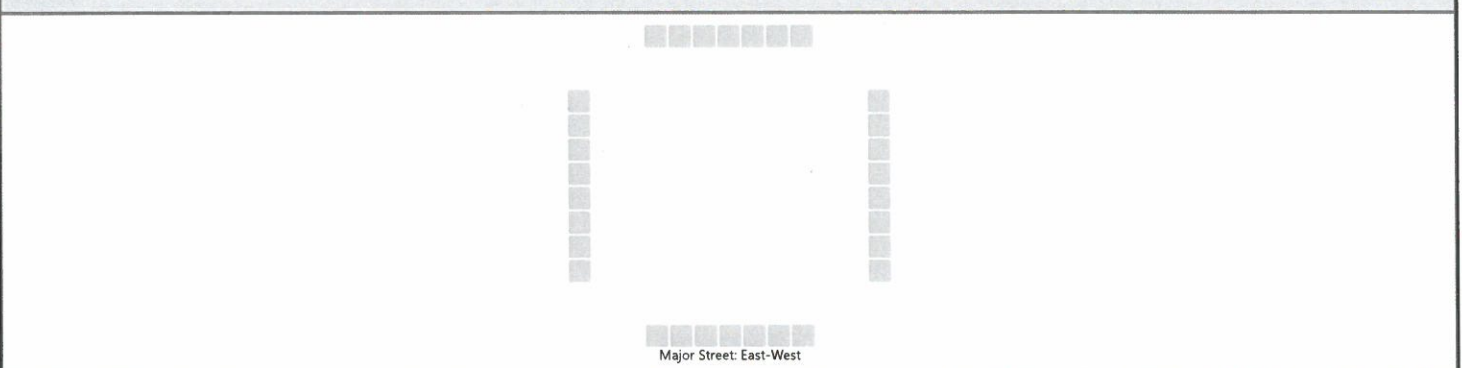


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Schutte Station at Plantside Dr
Agency/Co.	AKE	Jurisdiction	Jefferson Co
Date Performed	2/20/2023	East/West Street	Plantside Dr.
Analysis Year	2023	North/South Street	Schutte Station
Time Analyzed	2033 AM No Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume (veh/h)		12	180	22		2	115	2		1	0	0		0	0	6
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type   Storage																

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		13				2					1				7	
Capacity, c (veh/h)		1449				1340					615				984	
v/c Ratio		0.01				0.00					0.00				0.01	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.0				0.0	
Control Delay (s/veh)		7.5	0.1			7.7	0.0				10.9				8.7	
Level of Service (LOS)		A	A			A	A				B				A	
Approach Delay (s/veh)	0.5				0.1				10.9				8.7			
Approach LOS	A				A				B				A			

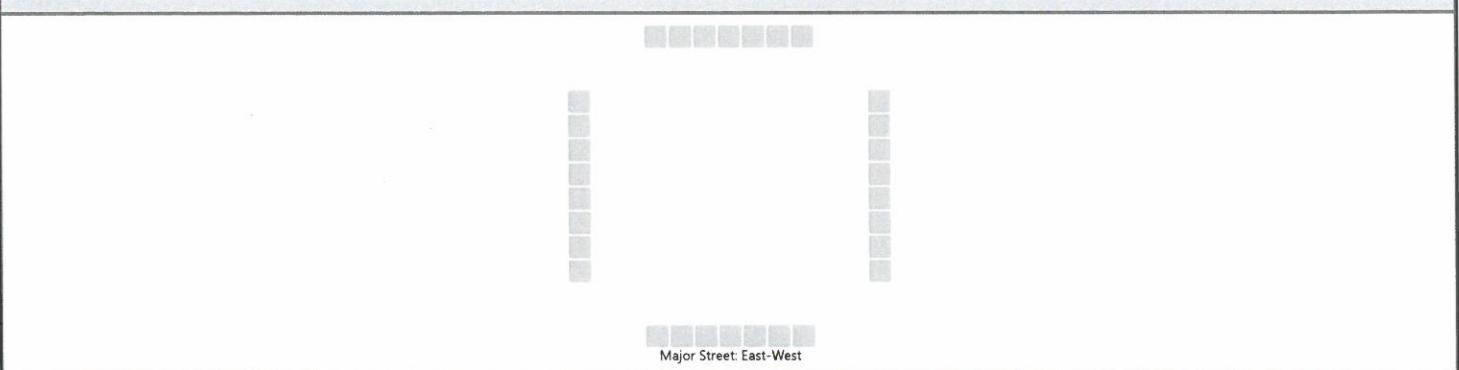


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Schutte Station at Plantside Dr
Agency/Co.	AKE	Jurisdiction	Jefferson Co
Date Performed	2/20/2023	East/West Street	Plantside Dr.
Analysis Year	2023	North/South Street	Schutte Station
Time Analyzed	2033 AM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume (veh/h)		48	180	22		2	115	38		1	0	0		6	0	12
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type   Storage					Undivided											

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		52				2					1					20
Capacity, c (veh/h)		1402				1340					521					769
v/c Ratio		0.04				0.00					0.00					0.03
95% Queue Length, Q <sub>95</sub> (veh)		0.1				0.0					0.0					0.1
Control Delay (s/veh)		7.7	0.2			7.7	0.0				11.9					9.8
Level of Service (LOS)		A	A			A	A				B					A
Approach Delay (s/veh)	1.6				0.1				11.9				9.8			
Approach LOS	A				A				B				A			

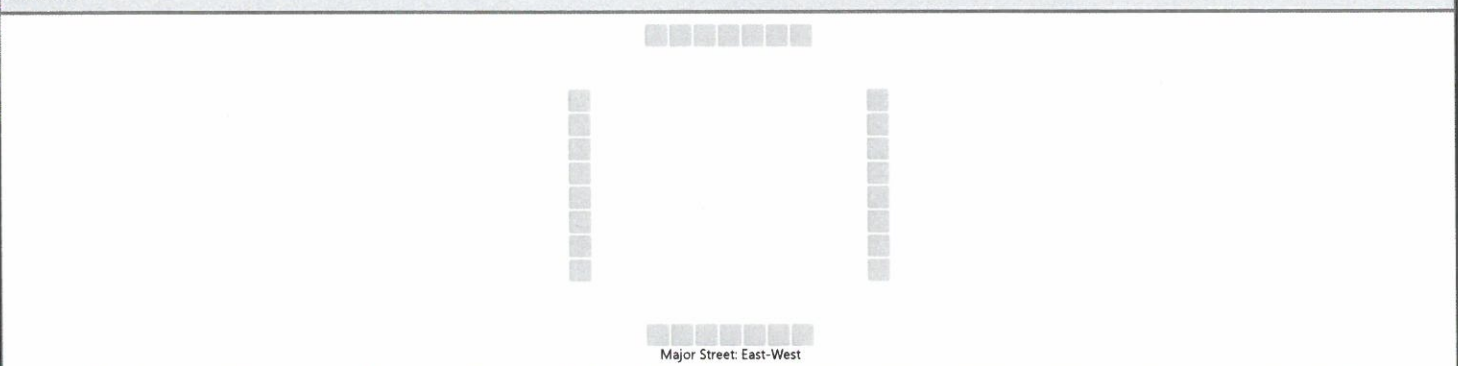


# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Schutte Station at Plantside Dr
Agency/Co.	AKE	Jurisdiction	Jefferson Co
Date Performed	2/20/2023	East/West Street	Plantside Dr.
Analysis Year	2023	North/South Street	Schutte Station
Time Analyzed	2033 PM No Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes



## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume (veh/h)		3	143	2		0	164	1		17	0	1		2	0	12
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		3				0					20					15
Capacity, c (veh/h)		1386				1412					678					893
v/c Ratio		0.00				0.00					0.03					0.02
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.1					0.1
Control Delay (s/veh)		7.6	0.0			7.5	0.0				10.5					9.1
Level of Service (LOS)		A	A			A	A				B					A
Approach Delay (s/veh)	0.2				0.0				10.5				9.1			
Approach LOS	A				A				B				A			



# HCS Two-Way Stop-Control Report

## General Information

Analyst	AJK	Intersection	Schutte Station at Plantside Dr
Agency/Co.	AKE	Jurisdiction	Jefferson Co
Date Performed	2/20/2023	East/West Street	Plantside Dr.
Analysis Year	2023	North/South Street	Schutte Station
Time Analyzed	2033 PM Build	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Xebec Development		

## Lanes



Major Street: East-West

## Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		0	1	0		0	1	0
Configuration		LT		TR		LT		TR			LTR				LTR	
Volume (veh/h)		12	143	2		0	164	10		17	0	1		34	0	44
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type   Storage	Undivided															

## Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.16				4.16				7.56	6.56	6.96		7.56	6.56	6.96
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

## Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		13				0					20				85	
Capacity, c (veh/h)		1375				1412					630				776	
v/c Ratio		0.01				0.00					0.03				0.11	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.1				0.4	
Control Delay (s/veh)		7.6	0.1			7.5	0.0				10.9				10.2	
Level of Service (LOS)		A	A			A	A				B				B	
Approach Delay (s/veh)	0.6				0.0				10.9				10.2			
Approach LOS	A				A				B				B			



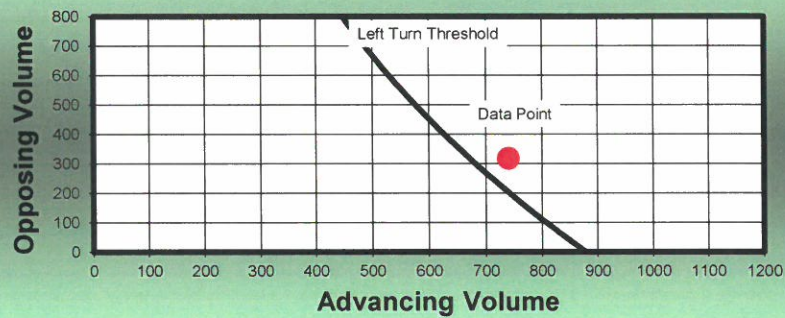
## APPENDIX F: AUXILLIARY TURN LANE WARRANTS

## Access Point 1 (AM Peak) Westbound Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	29	Speed Limit (mph)	35
Advancing Volume (vph)	732	No. of through lanes	1
Opposing Volume (vph)	319	Percent Heavy Vehicles (decimal percent)	0.05

### Left Turn Lane Warrants



**Left Turn Lane WARRANTED**

Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

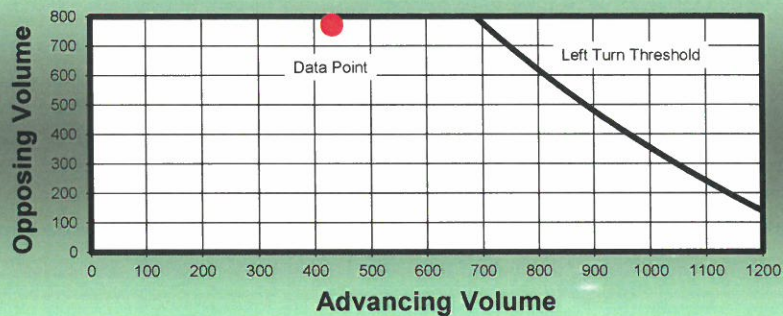


## Access Point 1 (PM Peak) Westbound Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	7	Speed Limit (mph)	35
Advancing Volume (vph)	420	No. of through lanes	1
Opposing Volume (vph)	773	Percent Heavy Vehicles (decimal percent)	0.05

### Left Turn Lane Warrants



Left Turn Lane NOT Warranted

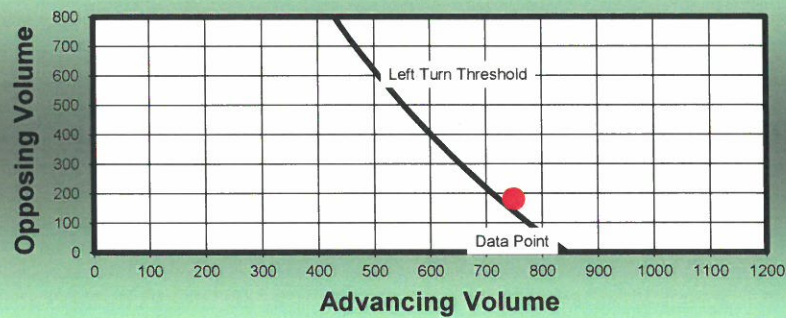
Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

## Access Point 2 (AM Peak) Westbound Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	32	Speed Limit (mph)	35
Advancing Volume (vph)	744	No. of through lanes	1
Opposing Volume (vph)	182	Percent Heavy Vehicles (decimal percent)	0.05

### Left Turn Lane Warrants



**Left Turn Lane WARRANTED**

Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

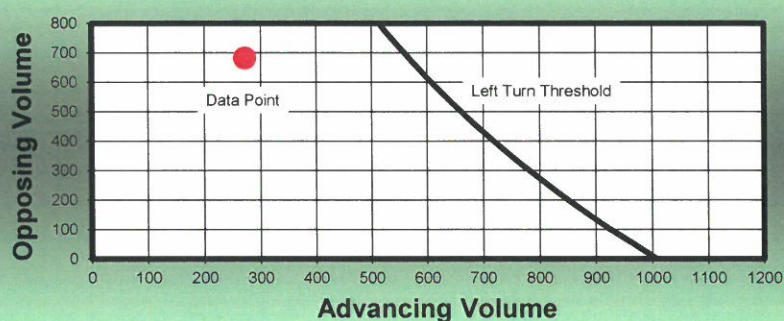


## Access Point 2 (PM Peak) Westbound Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	8	Speed Limit (mph)	35
Advancing Volume (vph)	265	No. of through lanes	1
Opposing Volume (vph)	684	Percent Heavy Vehicles (decimal percent)	0.05

### Left Turn Lane Warrants



**Left Turn Lane NOT Warranted**

Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

## Access Point 1 (AM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph) 47

Speed Limit (mph) 35

Advancing Volume (vph) 187



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.



## Access Point 1 (PM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph)

11

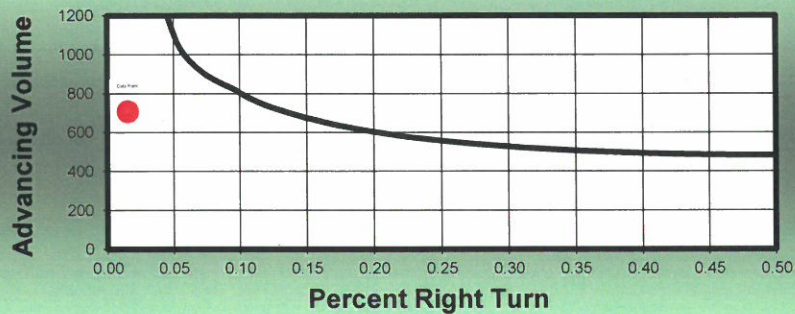
Speed Limit (mph)

35

Advancing Volume (vph)

709

### Right Turn Lane Warrants



Right Turn Lane NOT Warranted

Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

## Access Point 2 (AM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph)

47

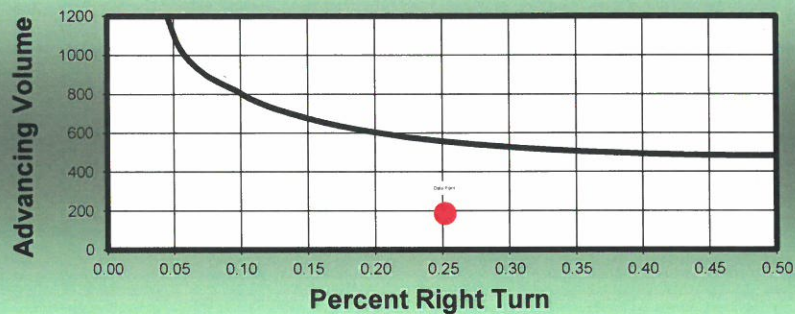
Speed Limit (mph)

35

Advancing Volume (vph)

187

### Right Turn Lane Warrants



Right Turn Lane NOT Warranted

Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.



## Access Point 2 (PM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph)

11

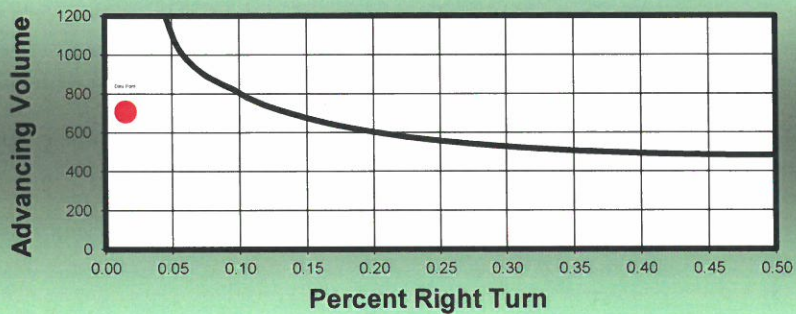
Speed Limit (mph)

35

Advancing Volume (vph)

709

### Right Turn Lane Warrants



Right Turn Lane NOT Warranted

Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

# Traffic Impact Study Report

## XEBEC Tucker Station

Louisville, Jefferson Co., KY

**Prepared For:**

Sabak, Wilson & Lingo, Inc.

**Prepared By:**



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June 13, 2022



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## APPENDICES

Appendix A: Development Plan
Appendix B: Traffic Data
Appendix C: Trip Generation Data
Appendix D: KYTC Traffic Forecasting Report
Appendix E: Capacity Analysis Output
Appendix F: Auxilliary Turn Lane Warrants

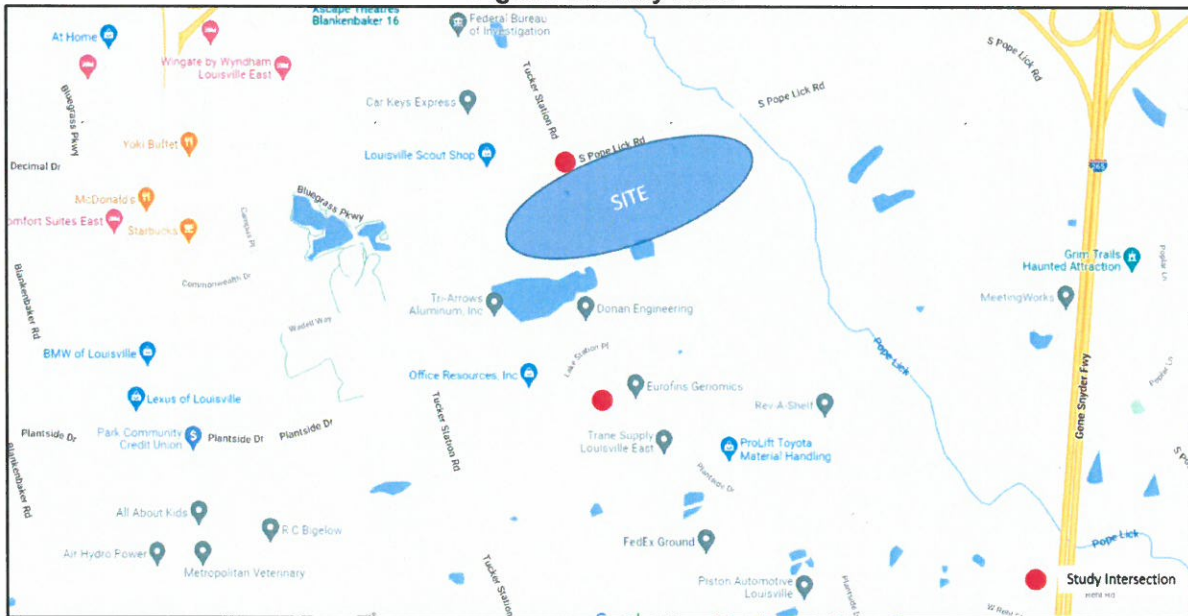
## INTRODUCTION

The purpose of this document is to summarize the scope and terms for a Traffic Impact Study of a proposed industrial development in Jefferson County, KY. The development is to be located on the south side of S. Pope Lick Road and Tucker Station Road and is to consist of 5 warehousing buildings totaling 1,010,800 s.f of gross floor area. Five access points along Tucker Station Road and S. Pope Lick Road is proposed with a connection to the south to Plantside Drive via Schutte Station Place. This study will evaluate the proposed access points, as well as the intersections listed below. **Figure 1** shows the proposed site and study intersections. **Appendix A** contains a site plan of the proposed development.

- Schutte Station at Plantside Drive
- Tucker Station at S. Pope Lick Road

The scope of this study is based on a review of existing travel patterns in the area and discussions with Louisville Metro Planning and Design Services.

**Figure 1: Study Area**



## EXISTING CONDITIONS

S. Pope Lick Road is a two-lane roadway with a posted speed of 35 mph. The intersections of S. Pope Lick Road at Tucker Station Road is a T' intersection with all-way stop control. No Auxiliary turn lanes are present at the intersection.

AM and PM turning movement counts were collected on Thursday May 19, 2022 between 7-9 a.m. and 4-6 p.m. at the study intersections. Full turn movement count data is provided in **Appendix B**. AM and PM peak hour traffic volumes are summarized in **Figures 2 and 3**.



Figure 2: AM Peak Hour Turning Movement Counts

AM PEAK HOUR

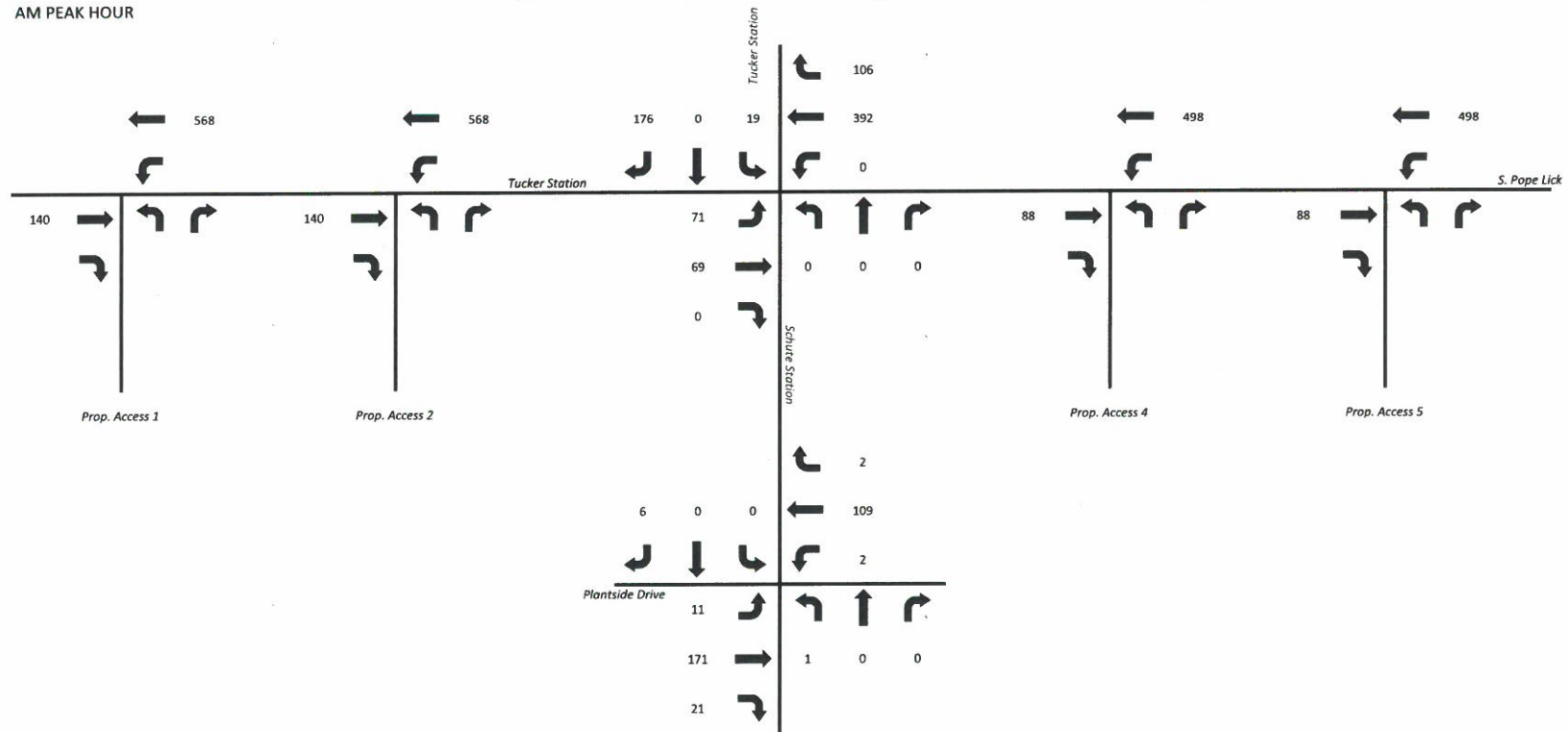
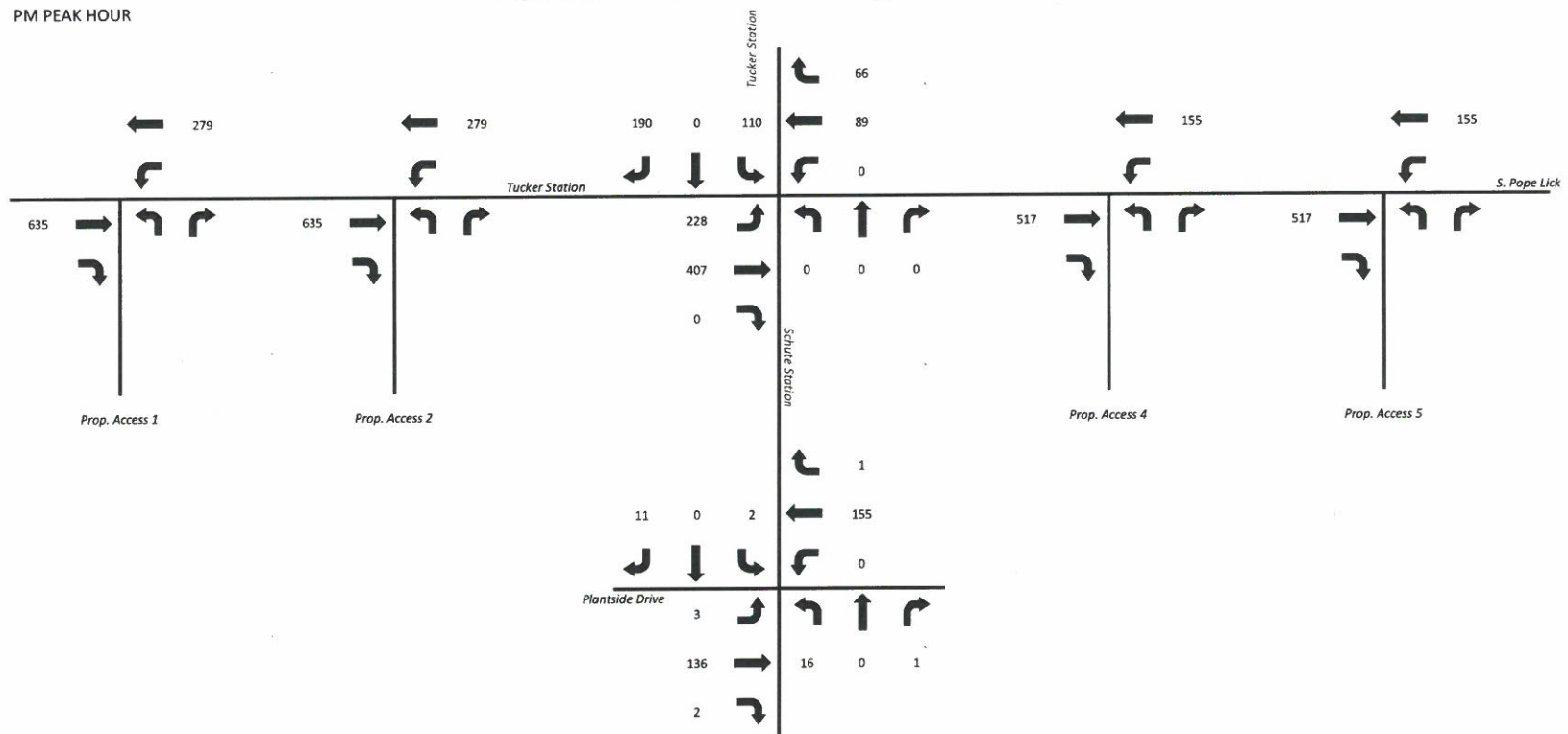


Figure 3: PM Peak Hour Turning Movement Counts

PM PEAK HOUR





## TRAFFIC FORECASTING

Historic traffic counts were not available for S. Pope Lick Road or Tucker Station Road; however, counts were available for Bluegrass Parkway at station 056L91, which is immediately west of the study area. Based on this data, historic traffic patterns indicate a growth rate of 0.43 percent per year. An average growth rate of 0.5% was used for projecting traffic volumes to the year of opening, 2023 and the design year of 2033. **Appendix D** contains the historic traffic data and output from the KYTC Traffic forecasting spreadsheet. AM and PM peak hour volumes for 2023 No Build and 2033 No Build traffic volumes are summarized in **Figures 4, 5, 6 and 7**.

## TRIP GENERATION

Trip Generation was conducted in accordance with the ITE Trip Generation Web Based App, 11<sup>th</sup> edition. Trip Generation utilized **ITE Land Use Code 130 Industrial Park**. This land use provides a higher trip generation than strictly warehousing or distribution land uses in the event some manufacturing or other industrial use was housed in the development. Based on this land use and the 1M s.f. gross floor area, the development is expected to generate 414 and 405 trips per hour during the AM and PM peak hours of the development. **Table 1** summarizes the trip generation for each proposed tract and **Appendix C** contains output from the ITE Trip Generation Manual.

**Table 1: Trip Generation**

Land Use	ITE Code	Ind. Var.	Units	AM Peak			Saturday		
				Total	Entering	Exiting	Total	Entering	Exiting
<b>Total</b>				<b>414</b>	<b>359</b>	<b>55</b>	<b>405</b>	<b>85</b>	<b>320</b>
Tract 1	130	196.5	units	81	70	11	79	17	62
Tract 2	130	210	units	86	75	11	84	18	66
Tract 3	130	146.9	units	60	52	8	59	12	47
Tract 4	130	146.9	units	60	52	8	59	12	47
Tract 5	130	310.5	units	127	110	17	124	26	98

## TRIP DISTRIBUTION METHODOLOGY

Generated trips were distributed onto the roadway network based on recorded travel patterns on Commerce Parkway and the proposed configuration of the development roadway layout. Total roadway volumes at the approaches to the study area were determined and trips distributed consistently with these total volumes. **Figure 8** shows the area wide trip distributions. The final entering and exiting trip distribution is shown in **Figures 9 and 10**. **Figures 11, 12, 13 and 14** show the final build traffic volumes for AM and PM peak hour turning movement for 2023 and 2033.

Diagram illustrating the intersection of Tucker Station and Schure Station during the AM Peak Hour. The diagram shows traffic flow, vehicle counts, and proposed access points.

**Approach Data (Vehicle Counts):**

Approach	Left Turn	Through/Right Turn	Total
Tucker Station Northbound	177	0	177
Tucker Station Southbound	19	0	19
Schure Station Eastbound	0	0	0
Schure Station Westbound	0	0	0
Prop. Access 1 (Eastbound)	141	0	141
Prop. Access 2 (Eastbound)	141	0	141
Prop. Access 4 (Eastbound)	88	0	88
Prop. Access 5 (Eastbound)	88	0	88

**Proposed Access Points:**

- Prop. Access 1: Eastbound approach on the left side of the intersection.
- Prop. Access 2: Eastbound approach on the right side of the intersection.
- Prop. Access 4: Eastbound approach on the left side of the intersection.
- Prop. Access 5: Eastbound approach on the right side of the intersection.



Figure 5: PM Peak 2023 No Build Traffic Volumes

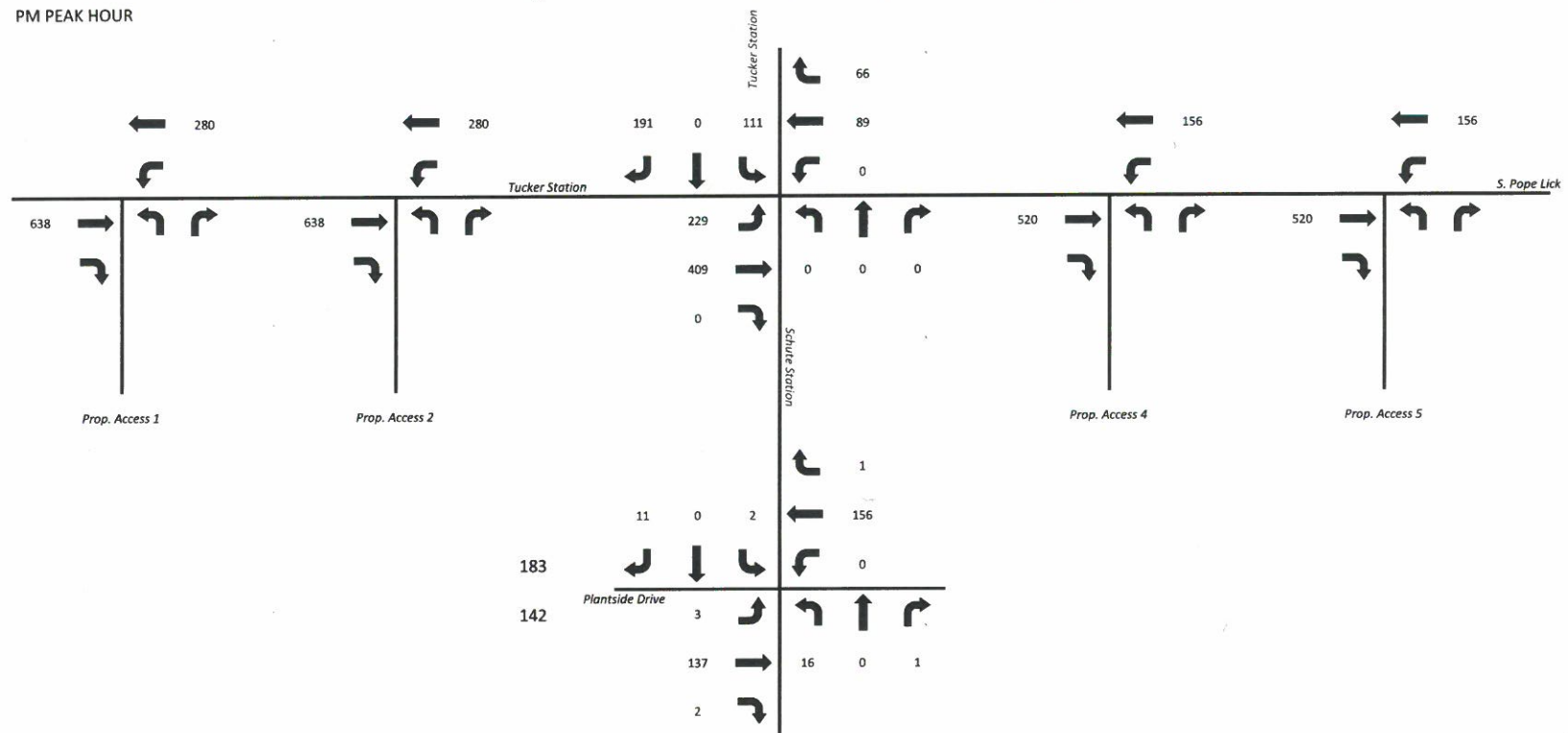


Figure 6: AM Peak 2033 No Build Traffic Volumes

AM PEAK HOUR

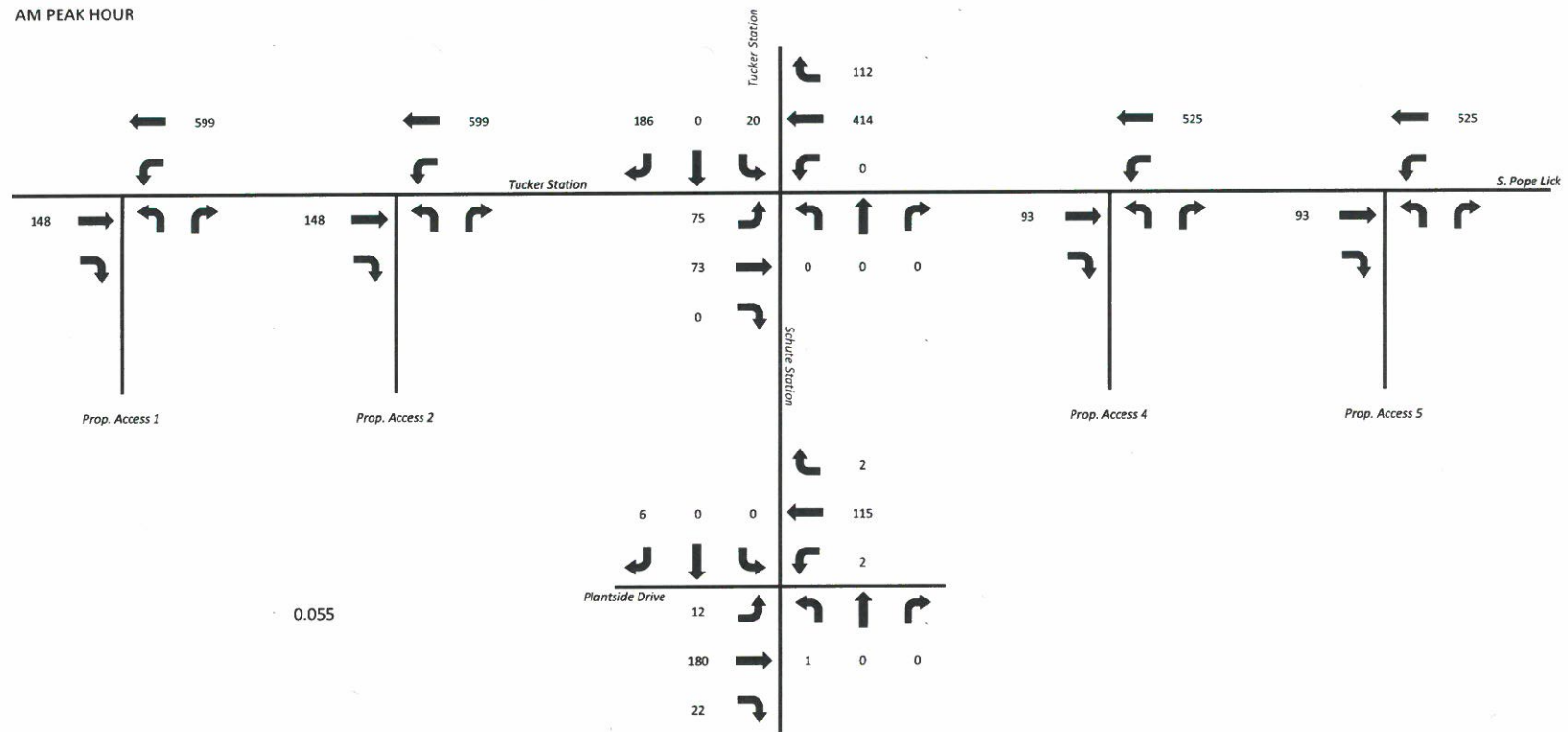
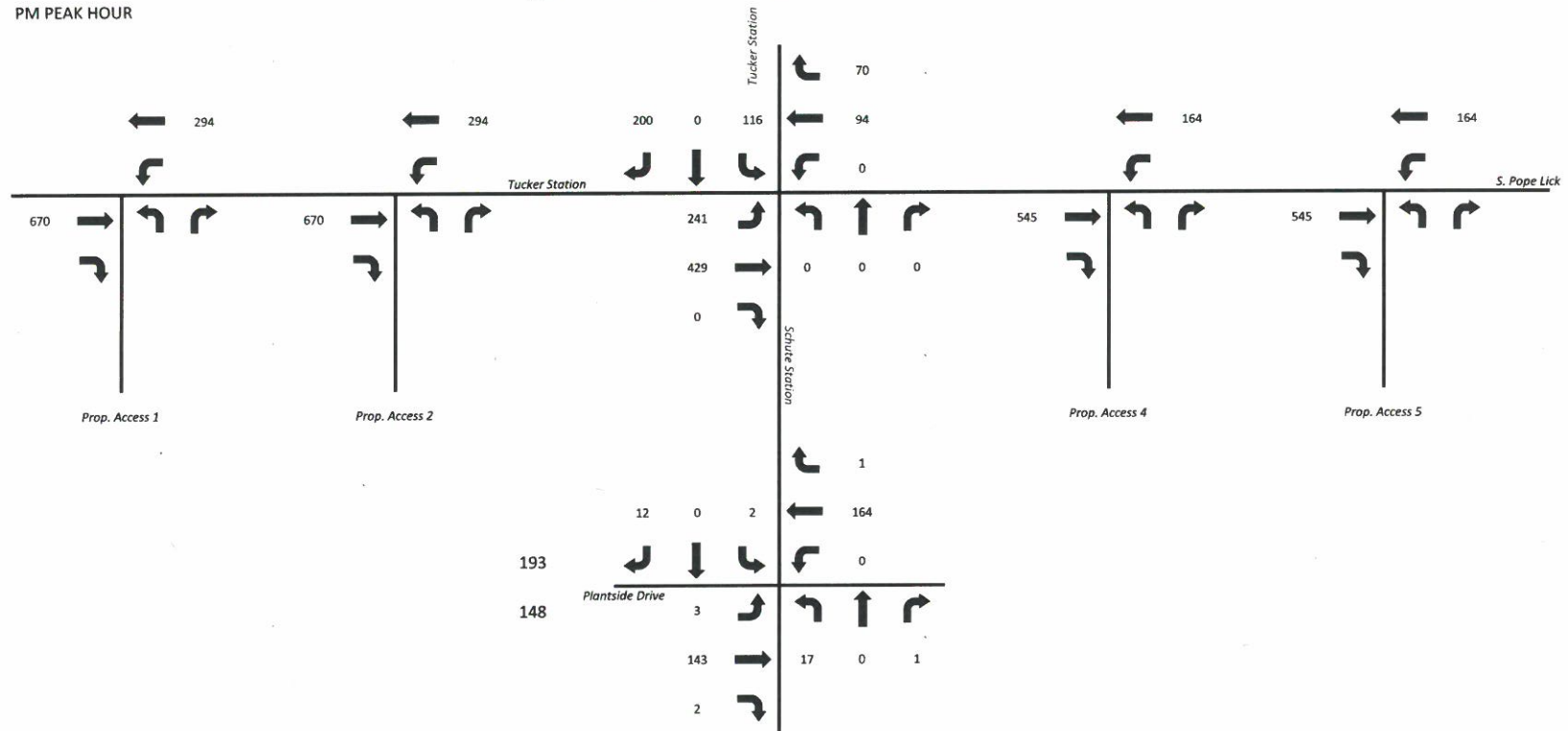




Figure 7: PM Peak 2033 No Build Traffic Volumes

PM PEAK HOUR



**Figure 8: Area-wide Origin-Destination Trip Distribution**





Figure 9: Entering Trip Distribution

Entering

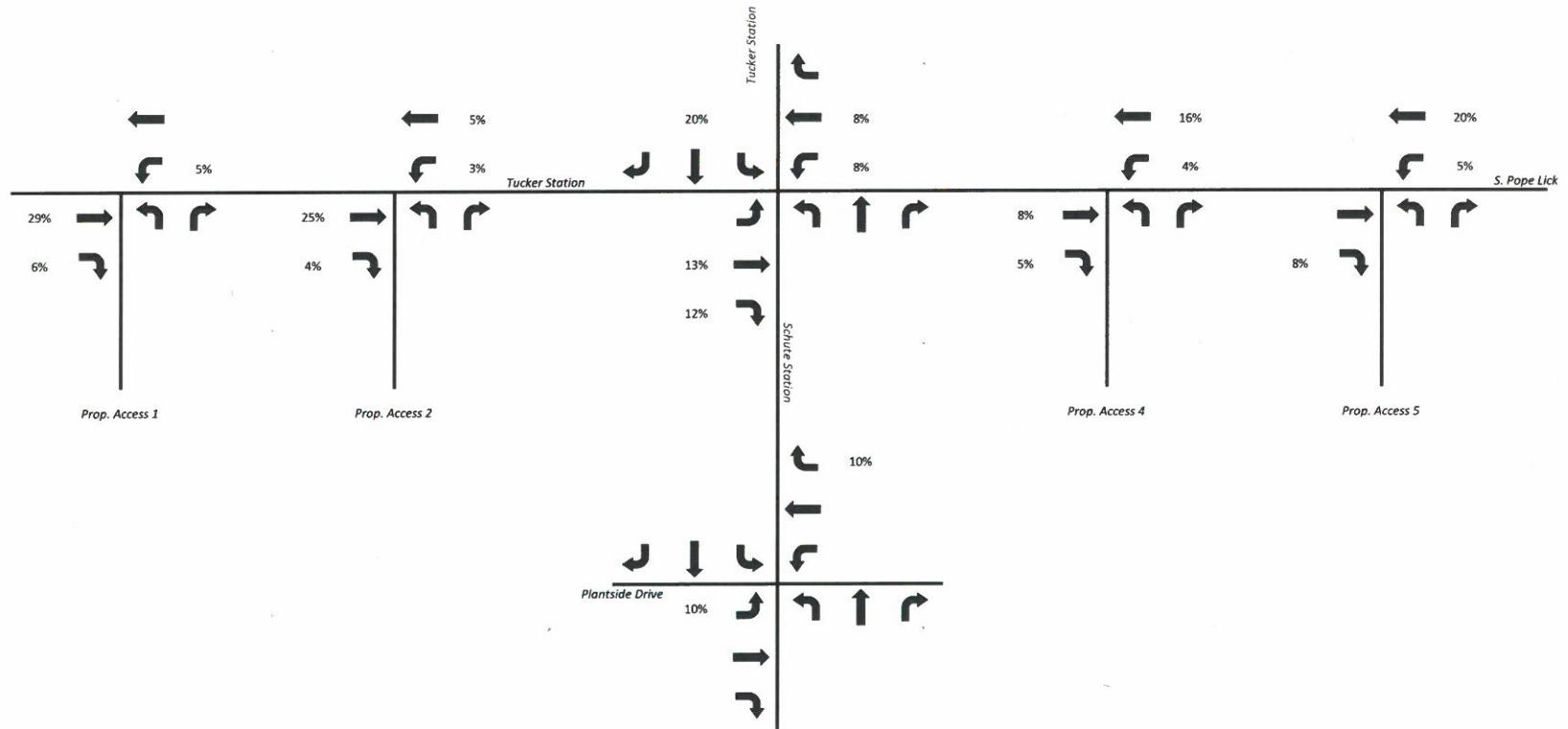


Figure 10: Exiting Trip Distribution

Exiting

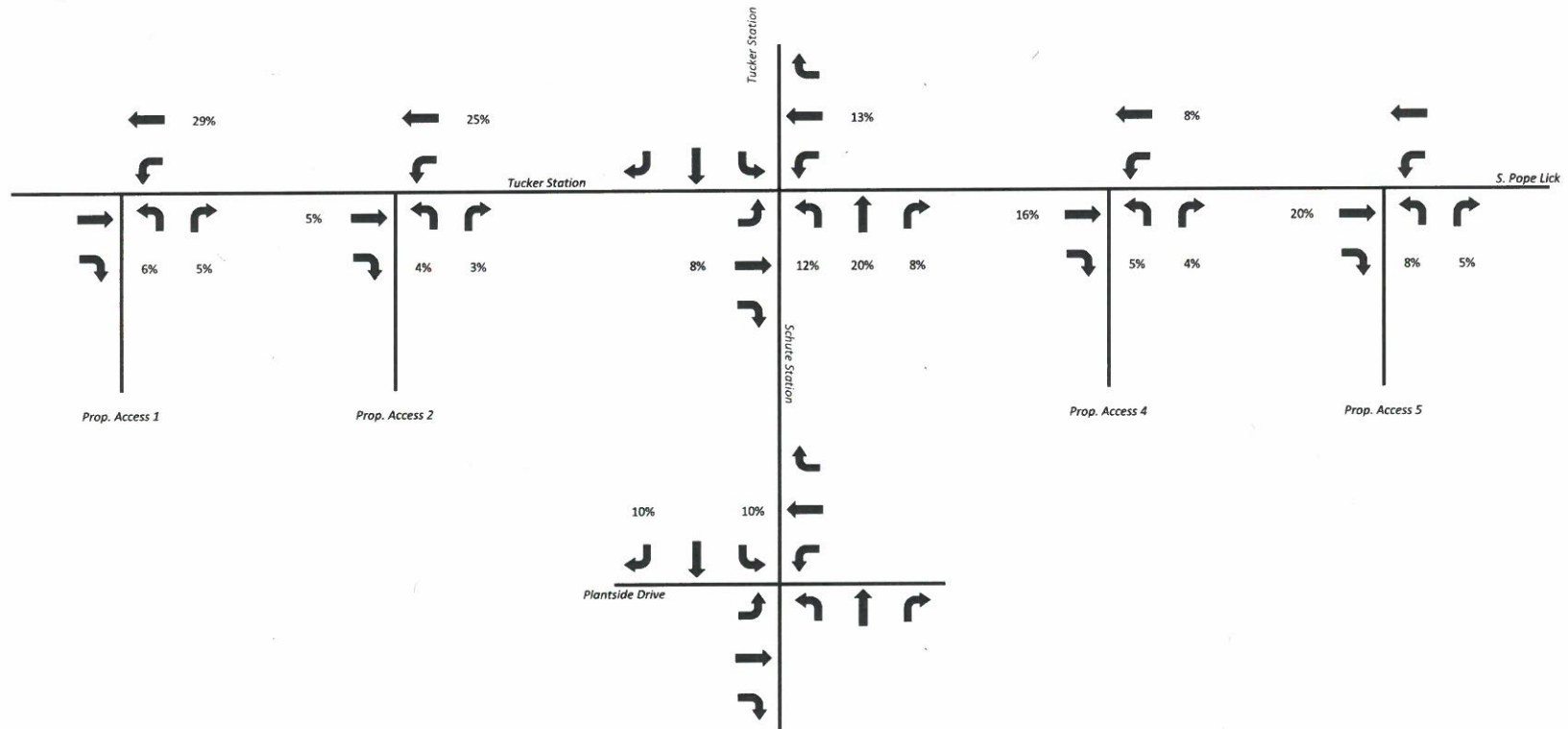




Figure 11: AM Peak Hour 2023 Build

2023 Build AM PEAK HOUR

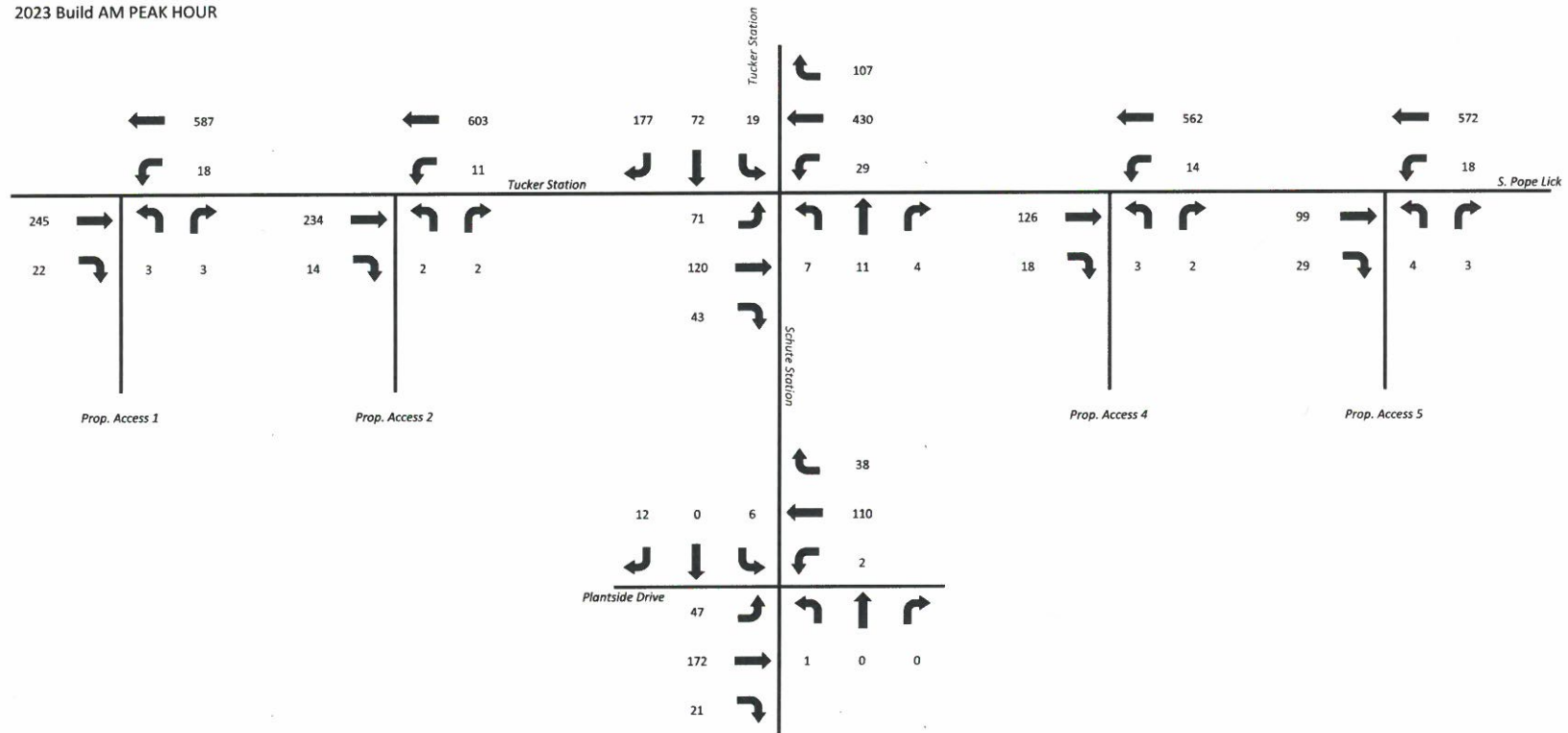


Figure 12: PM Peak Hour 2023 Build

2023 Build PM PEAK HOUR

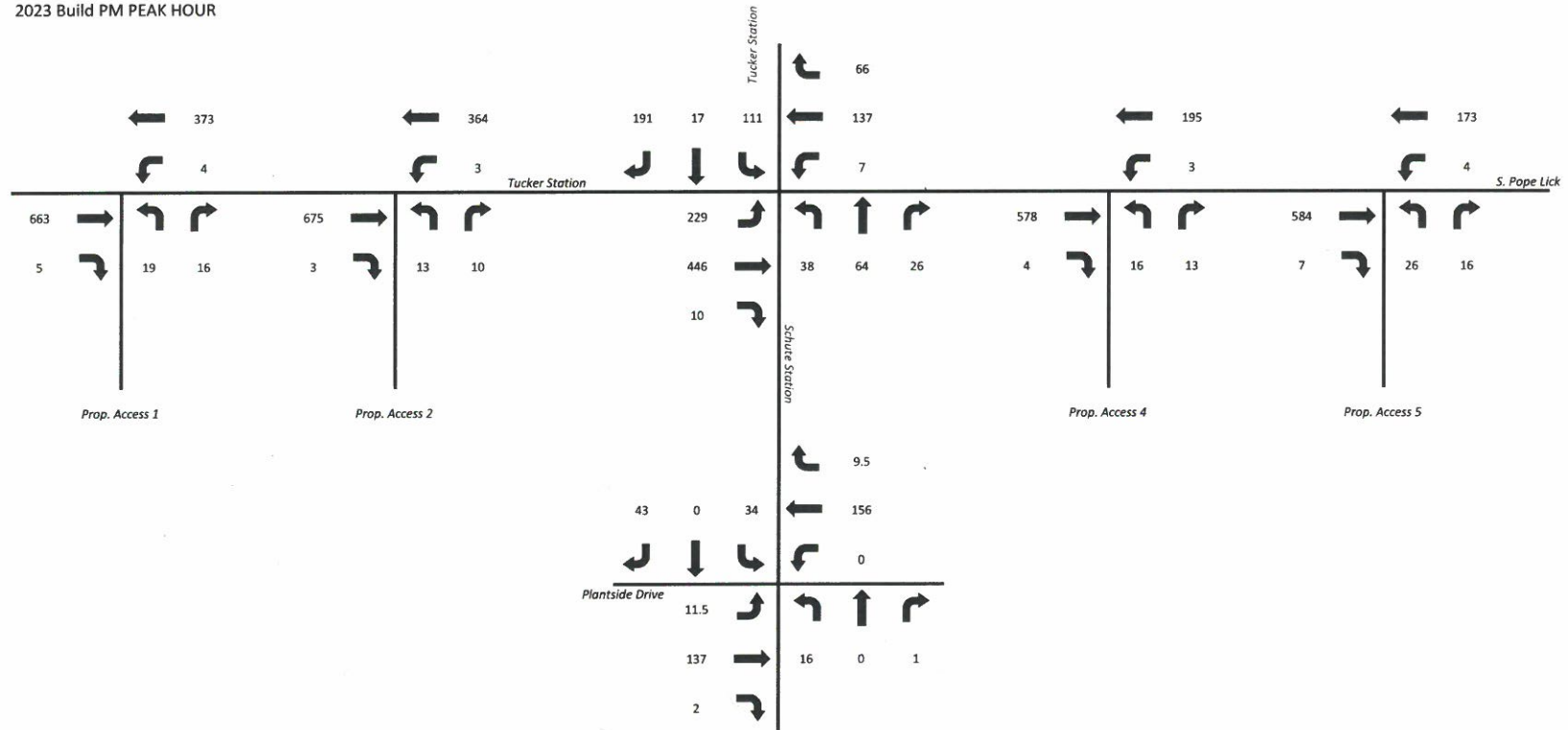




Figure 13: AM Peak Hour 2033 Build

2033 Build AM PEAK HOUR

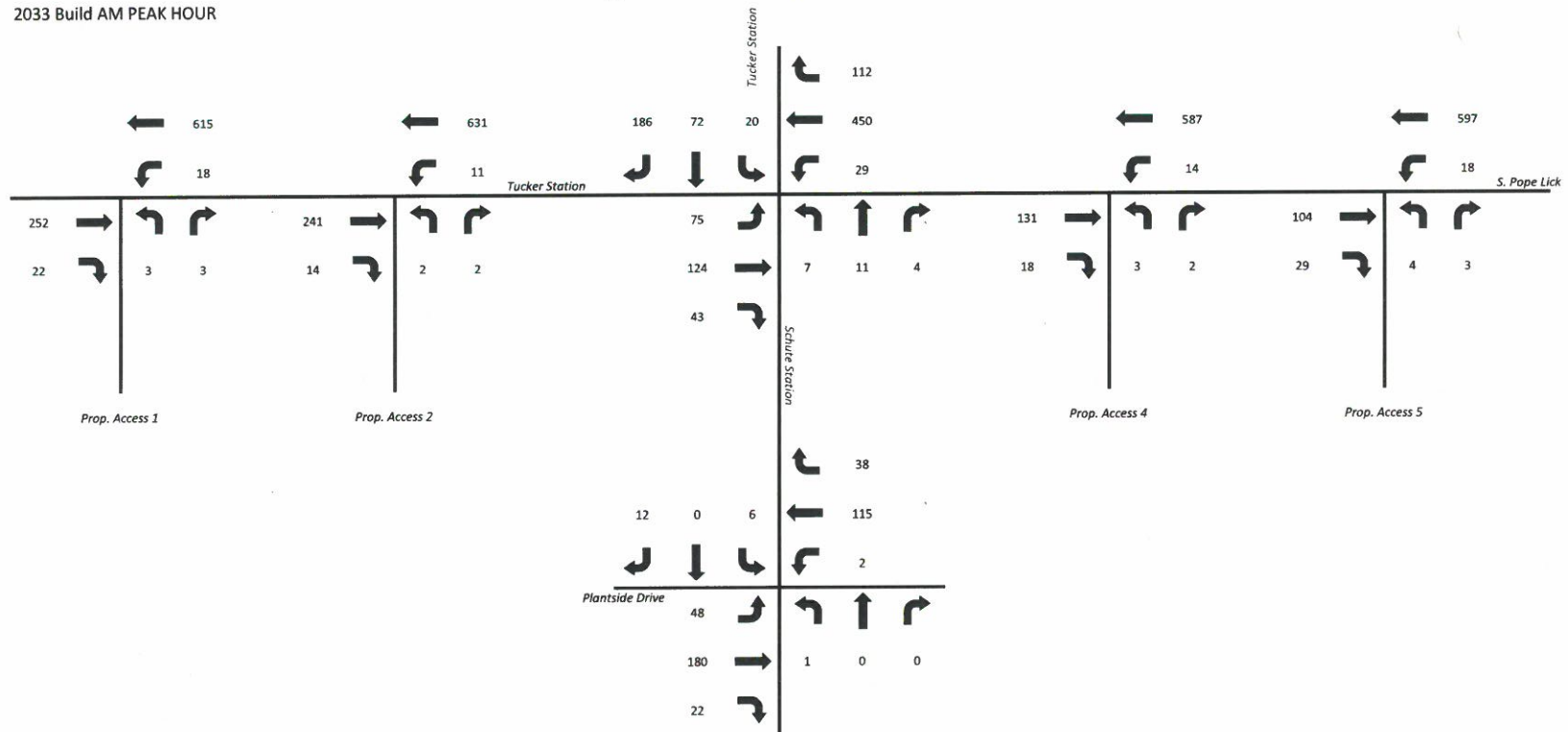
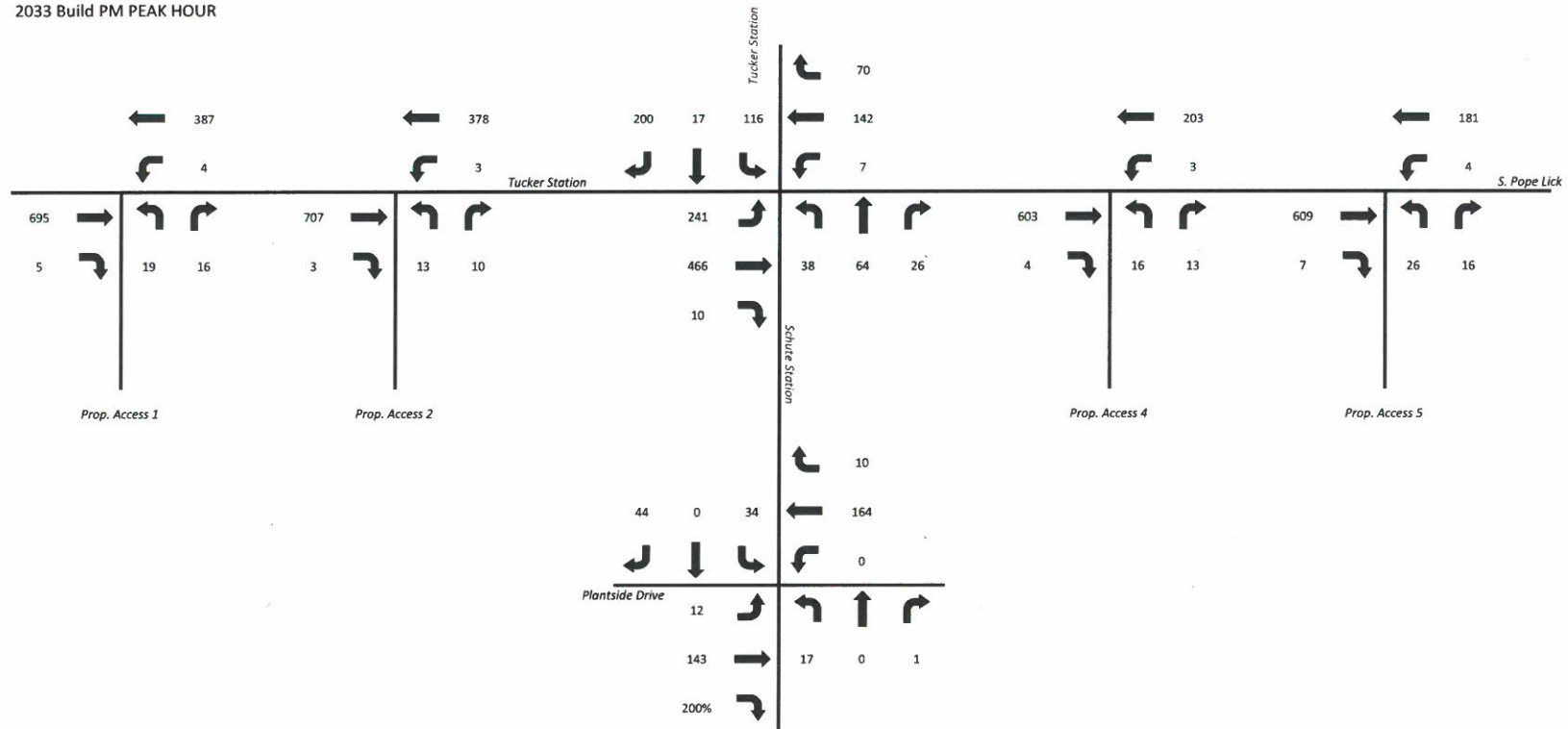


Figure 14: PM Peak Hour 2033 Build

2033 Build PM PEAK HOUR





## CAPACITY ANALYSIS

Capacity analysis for the no build and build scenarios was completed for the study intersections during the AM and PM peak hours using HCM methodologies as applied Synchro Capacity Software version 10. **Table 2** summarizes the LOS, and delay for the No Build and Build scenarios. Full capacity analysis output is provided in **Appendix E**.

As can be seen from the capacity analysis, all access points and the intersection of Schute Station Road and PLantside Drive are shown to operate at acceptable levels of service during all scenarios evaluated. Eastbound Tucker Station Road at S. Pope Lick Road is anticipated to operate at or near capacity under the 2023 demand, as well as all no build and build scenario during the PM peak period. The additional traffic through the intersection will push this intersection over capacity, with the eastbound approach operating at LOS F under the Build Condition. Providing dedicated left turn lanes for all approaches at this intersection, improves the LOS to 'D' with minimal delay of 24.6 seconds during the 2033 Build scenario. The eastbound approach is shown to operate at LOS E with 38.6 seconds of delay which is improved over the no build PM peak period.

## TURN LANE WARRANT ANALYSIS

Auxiliary turn lane warrant analysis was conducted for all proposed access points in accordance with KYTC Auxiliary Turn Lane policy, as applied by the Warrant Calcs Interactive excel spreadsheet provided on the KYTC Division of Design website. Based on this analysis, neither a left nor right turn lane is warranted at any access point, during the 2033 AM and PM peak periods. Output from the warrant analysis is provided in **Appendix F**.

## RECOMMENDATIONS

Dedicated left-turn lanes are recommended to improve operations at the intersection of Tucker Station Road and S. Pope Lick Road.

**Table 2: Capacity Analysis Summary**

AM PEAK HOUR		2023 No Build		2023 Build		2033 No Build		2033 Build	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
S. Pope Lick Road at Tucker Station Road	Intersection	B	14.5	D	25.9	C	16.0	D	31.9
	eastbound (Tucker Station)	A	9.8	B	12.9	B	10.1	B	13.6
	westbound (S. Pope Lick)	C	17.4	E	37.4	C	19.8	E	48.0
	northbound (Shute Station)	A	0.0	B	10.4	A	0.0	B	10.6
	southbound (Tuckjer Station)	B	10.2	B	14.2	B	10.6	C	15.1
Schute Station at Plantside Drive	Intersection	-	-	-	-	-	-	-	-
	eastbound LT (Plantside)	A	7.5	A	7.6	A	7.5	A	7.7
	westbound LT (Plantside)	A	7.7	A	7.7	A	7.7	A	7.6
	northbound	B	10.8	B	11.9	B	10.9	B	11.7
	southbound	A	8.7	A	9.7	A	8.7	A	9.8
S. Pope Lick Rd at Access Point 1	Intersection	-	-	-	-	-	-	-	-
	westbound (left turn)	-	-	A	0.4	-	-	A	0.4
	northbound (Access 1)	-	-	B	13.9	-	-	B	14.3
S. Pope Lick Rd at Access Point 2	Intersection	-	-	-	-	-	-	-	-
	westbound (left turn)	-	-	A	0.3	-	-	A	0.3
	northbound (Access 1)	-	-	B	13.6	-	-	B	14.0
S. Pope Lick Rd at Access Point 4	Intersection	-	-	-	-	-	-	-	-
	westbound (left turn)	-	-	A	0.3	-	-	A	0.3
	northbound (Access 1)	-	-	B	12.7	-	-	B	13.0
S. Pope Lick Rd at Access Point 5	Intersection	-	-	-	-	-	-	-	-
	westbound (left turn)	-	-	A	0.4	-	-	A	0.4
	northbound (Access 1)	-	-	B	12.6	-	-	B	12.8
PM PEAK HOUR		2023 No Build		2023 Build		2033 No Build		2033 Build	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
S. Pope Lick Road at Tucker Station Road	Intersection	E	44.0	F	91.3	F	55.6	F	109.8
	eastbound (Tucker Station)	F	65.6	F	162.7	F	85.1	F	196.8
	westbound (S. Pope Lick)	B	10.8	B	14.6	B	11.0	C	15.1
	northbound (Shute Station)	A	0.0	B	13.3	A	0.0	B	13.5
	southbound (Tuckjer Station)	C	15.3	C	20.0	C	16.0	C	21.4
Schute Station at Plantside Drive	Intersection	-	-	-	-	-	-	-	-
	eastbound LT (Plantside)	A	7.6	A	7.6	A	7.6	A	7.6
	westbound LT (Plantside)	A	0.0	A	0.0	A	0.0	A	0.0
	northbound	B	10.4	B	11.2	B	10.5	B	11.3
	southbound	A	9.0	B	10.1	A	9.1	B	10.2
S. Pope Lick Rd at Access Point 1	Intersection	-	-	-	-	-	-	-	-
	westbound (left turn)	-	-	A	0.1	-	-	A	0.1
	northbound (Access 1)	-	-	C	19.7	-	-	C	20.8
S. Pope Lick Rd at Access Point 2	Intersection	-	-	-	-	-	-	-	-
	westbound (left turn)	-	-	A	0.1	-	-	A	0.1
	northbound (Access 1)	-	-	C	19.1	-	-	C	20.1
S. Pope Lick Rd at Access Point 4	Intersection	-	-	-	-	-	-	-	-
	westbound (left turn)	-	-	A	0.2	-	-	A	0.2
	northbound (Access 1)	-	-	C	15.2	-	-	C	15.7
S. Pope Lick Rd at Access Point 5	Intersection	-	-	-	-	-	-	-	-
	westbound (left turn)	-	-	A	0.2	-	-	A	0.2
	northbound (Access 1)	-	-	C	15.8	-	-	C	16.4



## APPENDIX A: DEVELOPMENT PLAN







## APPENDIX B: TRAFFIC DATA

# Cammins Consulting Services, LLC

swcummins@ccsdata.com 859-361-2589

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Partly Sunny  
Schools in Session

File Name : Plantside\_Drive\_at\_Schutte\_Station\_Place\_05-19-2022

Site Code : Site 2 - Thursday

Start Date : 5/19/2022

Page No : 1

## Groups Printed- Cars - Buses - Trucks

Start Time	Schutte Station Place From North					Plantside Drive From East					Schutte Station Place From South					Plantside Drive From West					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
07:00 AM	0	0	1	0	1	0	23	0	0	23	0	0	0	0	0	5	29	0	0	34	58
07:15 AM	0	0	0	0	0	1	14	0	0	15	1	0	0	0	1	3	28	7	0	38	54
07:30 AM	0	0	4	0	4	0	25	0	0	25	0	0	0	0	0	3	44	4	0	51	80
07:45 AM	0	0	1	0	1	1	27	0	0	28	0	0	0	0	0	0	43	6	0	49	78
Total	0	0	6	0	6	2	89	0	0	91	1	0	0	0	1	11	144	17	0	172	270
08:00 AM	0	0	1	0	1	1	25	2	0	28	0	0	0	0	0	5	38	9	0	52	81
08:15 AM	0	0	0	0	0	0	32	0	0	32	1	0	0	0	1	3	46	2	0	51	84
08:30 AM	0	0	1	0	1	0	17	0	0	17	0	0	0	0	0	1	43	0	0	44	62
08:45 AM	0	0	0	0	0	0	29	1	0	30	0	0	0	0	0	3	37	1	0	41	71
Total	0	0	2	0	2	1	103	3	0	107	1	0	0	0	1	12	164	12	0	188	298
04:00 PM	0	0	0	0	0	0	45	1	0	46	4	0	1	0	5	0	35	1	0	36	87
04:15 PM	2	0	3	0	5	0	35	0	0	35	1	0	0	0	1	1	42	0	0	43	84
04:30 PM	0	0	3	0	3	0	46	0	0	46	5	0	0	0	5	2	31	1	0	34	88
04:45 PM	0	0	5	0	5	0	29	0	0	29	6	0	0	0	6	0	28	0	0	28	68
Total	2	0	11	0	13	0	155	1	0	156	16	0	1	0	17	3	136	2	0	141	327
05:00 PM	0	0	1	0	1	0	53	0	0	53	1	0	1	0	2	0	31	0	0	31	87
05:15 PM	0	0	1	0	1	0	21	0	0	21	1	0	0	0	1	1	39	0	0	40	63
05:30 PM	0	0	3	0	3	0	39	0	0	39	3	0	0	0	3	0	50	0	0	50	95
05:45 PM	0	0	3	0	3	0	30	0	0	30	1	0	0	0	1	1	45	0	0	46	80
Total	0	0	8	0	8	0	143	0	0	143	6	0	1	0	7	2	165	0	0	167	325
Grand Total	2	0	27	0	29	3	490	4	0	497	24	0	2	0	26	28	609	31	0	668	1220
Apprch %	6.9	0	93.1	0		0.6	98.6	0.8	0		92.3	0	7.7	0		4.2	91.2	4.6	0		
Total %	0.2	0	2.2	0	2.4	0.2	40.2	0.3	0	40.7	2	0	0.2	0	2.1	2.3	49.9	2.5	0	54.8	
Cars	2	0	22	0	24	3	426	2	0	431	22	0	2	0	24	22	491	30	0	543	1022
% Cars	100	0	81.5	0	82.8	100	86.9	50	0	86.7	91.7	0	100	0	92.3	78.6	80.6	96.8	0	81.3	83.8
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
% Buses	0	0	0	0	0	0	0.2	0	0	0.2	0	0	0	0	0	0	0.2	0	0	0.1	0.2
Trucks	0	0	5	0	5	0	63	2	0	65	2	0	0	0	2	6	117	1	0	124	196
% Trucks	0	0	18.5	0	17.2	0	12.9	50	0	13.1	8.3	0	0	0	7.7	21.4	19.2	3.2	0	18.6	16.1



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swcummins@ccsdata.com 859-361-2589

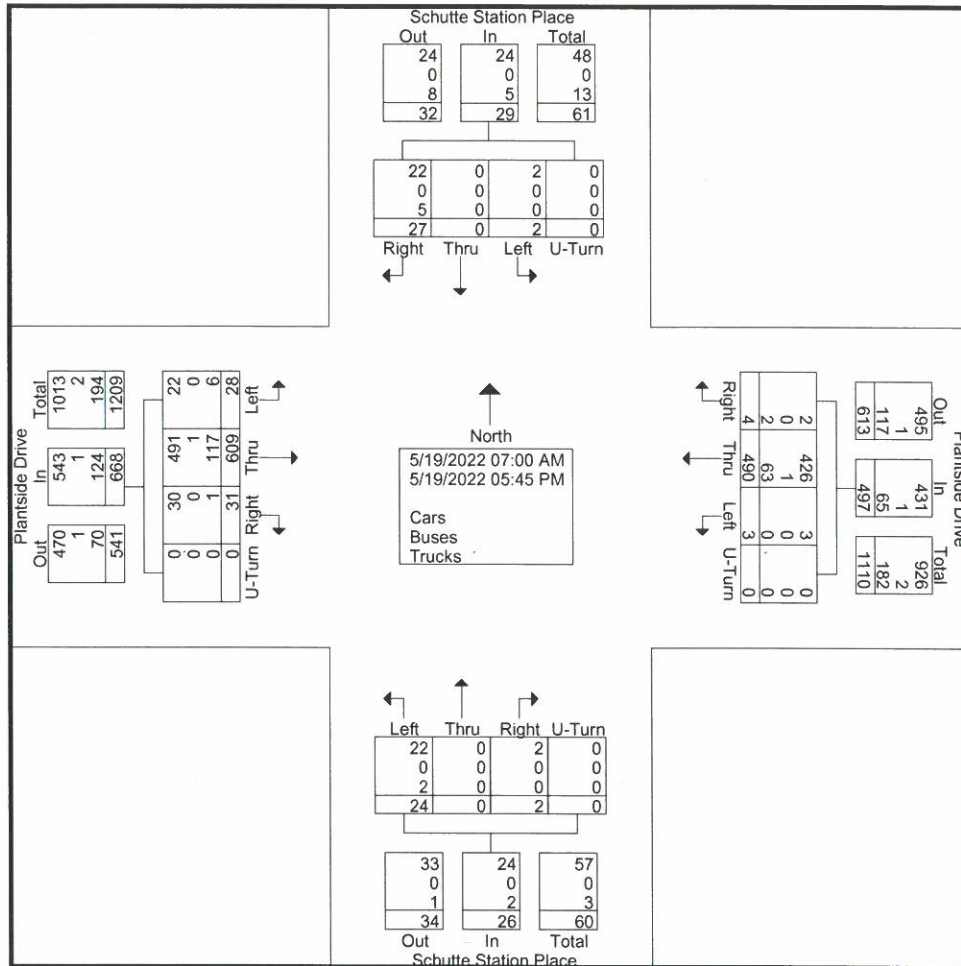
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File Name : Plantside\_Drive\_at\_Schutte\_Station\_Place\_05-19-2022

Site Code : Site 2 - Thursday

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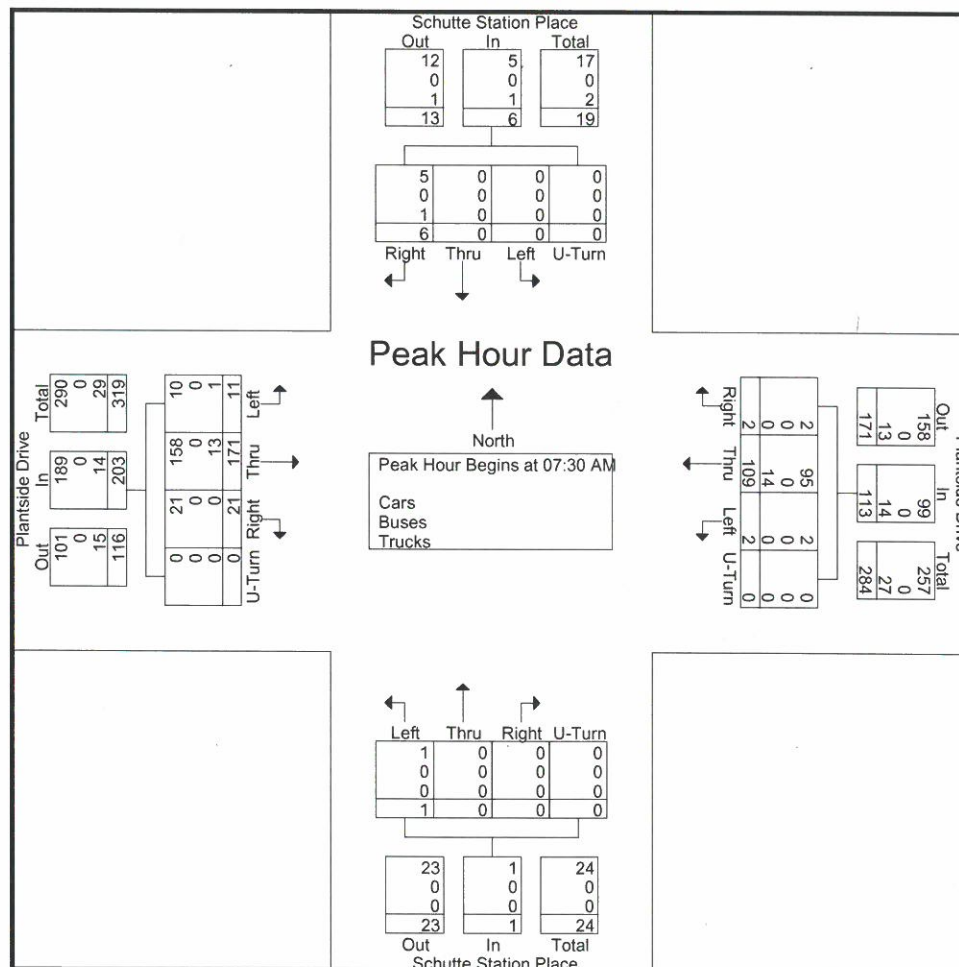
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Site Code : Site 2 - Thursday

Start Date : 5/19/2022

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Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	4	0	4	0	25	0	0	25	0	0	0	0	0	3	44	4	0	51	80
07:45 AM	0	0	1	0	1	1	27	0	0	28	0	0	0	0	0	0	43	6	0	49	78
08:00 AM	0	0	1	0	1	1	25	2	0	28	0	0	0	0	0	5	38	9	0	52	81
08:15 AM	0	0	0	0	0	0	32	0	0	32	1	0	0	0	1	3	46	2	0	51	84
Total Volume	0	0	6	0	6	2	109	2	0	113	1	0	0	0	1	11	171	21	0	203	323
% App. Total	0	0	100	0		1.8	96.5	1.8	0		100	0	0	0		5.4	84.2	10.3	0		
PHF	.000	.000	.375	.000	.375	.500	.852	.250	.000	.883	.250	.000	.000	.000	.250	.550	.929	.583	.000	.976	.961
Cars	0	0	5	0	5	2	95	2	0	99	1	0	0	0	1	10	158	21	0	189	294
% Cars	0	0	83.3	0	83.3	100	87.2	100	0	87.6	100	0	0	0	100	90.9	92.4	100	0	93.1	91.0
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trucks	0	0	1	0	1	0	14	0	0	14	0	0	0	0	0	1	13	0	0	14	29
% Trucks	0	0	16.7	0	16.7	0	12.8	0	0	12.4	0	0	0	0	0	9.1	7.6	0	0	6.9	9.0





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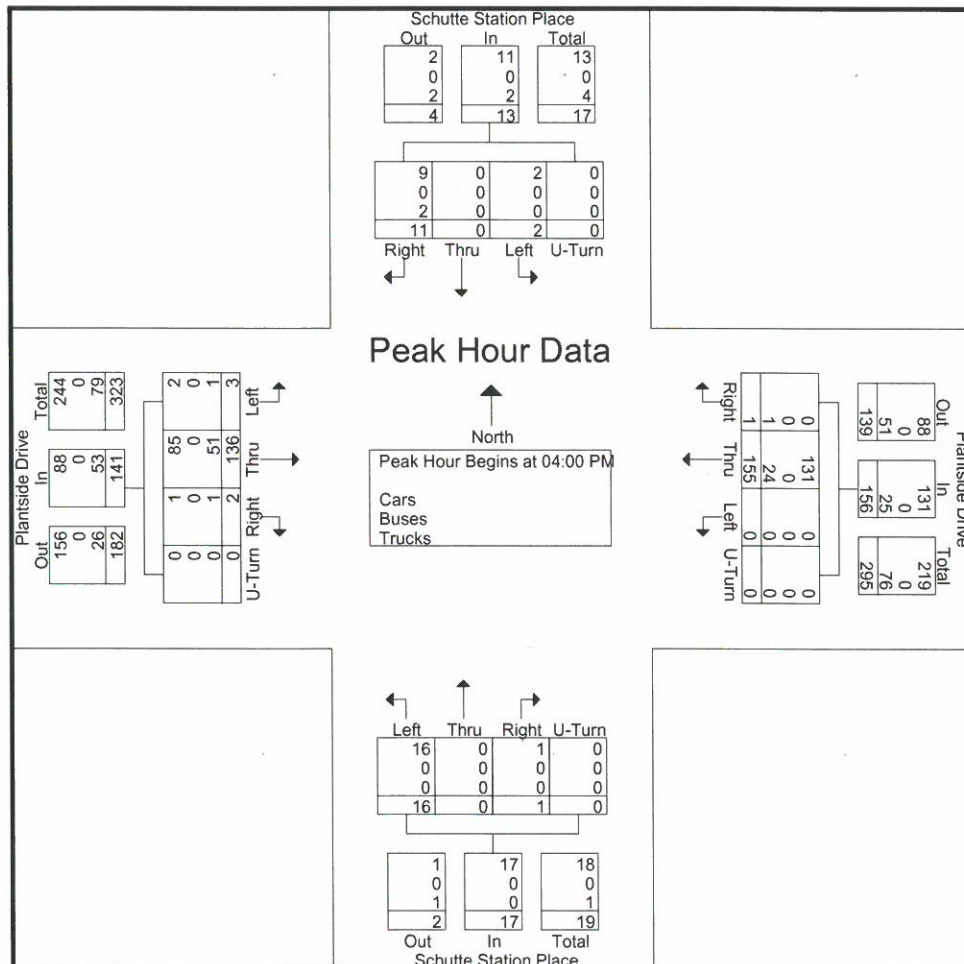
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Site Code : Site 2 - Thursday

Start Date : 5/19/2022

Page No : 4

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Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	45	1	0	46	4	0	1	0	5	0	35	1	0	36	87
04:15 PM	2	0	3	0	5	0	35	0	0	35	1	0	0	0	1	1	42	0	0	43	84
04:30 PM	0	0	3	0	3	0	46	0	0	46	5	0	0	0	5	2	31	1	0	34	88
04:45 PM	0	0	5	0	5	0	29	0	0	29	6	0	0	0	6	0	28	0	0	28	68
Total Volume	2	0	11	0	13	0	155	1	0	156	16	0	1	0	17	3	136	2	0	141	327
% App. Total	15.4	0	84.6	0		0	99.4	0.6	0		94.1	0	5.9	0		2.1	96.5	1.4	0		
PHF	.250	.000	.550	.000	.650	.000	.842	.250	.000	.848	.667	.000	.250	.000	.708	.375	.810	.500	.000	.820	.929
Cars	2	0	9	0	11	0	131	0	0	131	16	0	1	0	17	2	85	1	0	88	247
% Cars	100	0	81.8	0	84.6	0	84.5	0	0	84.0	100	0	100	0	100	66.7	62.5	50.0	0	62.4	75.5
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trucks	0	0	2	0	2	0	24	1	0	25	0	0	0	0	0	1	51	1	0	53	80
% Trucks	0	0	18.2	0	15.4	0	15.5	100	0	16.0	0	0	0	0	0	33.3	37.5	50.0	0	37.6	24.5



Partly Sunny  
 Schools in Session

File Name : Tucker\_Station\_Road\_at\_Pope\_Lick\_Road\_05-19-2022  
 Site Code : Site 3 - Thursday  
 Start Date : 5/19/2022  
 Page No : 1

Groups Printed- Cars - Buses - Trucks

Start Time	Tucker Station Road From North				Pope Lick Road From East				Pope Lick Road From West				Int. Total
	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	
07:00 AM	6	17	0	23	38	20	0	58	15	8	0	23	104
07:15 AM	6	40	0	46	86	19	0	105	13	13	0	26	177
07:30 AM	7	38	0	45	84	24	0	108	22	17	0	39	192
07:45 AM	3	53	0	56	122	31	0	153	20	21	0	41	250
Total	22	148	0	170	330	94	0	424	70	59	0	129	723
08:00 AM	3	45	0	48	100	32	0	132	16	18	0	34	214
08:15 AM	3	38	0	41	68	18	0	86	15	16	0	31	158
08:30 AM	7	31	0	38	48	18	0	66	23	15	0	38	142
08:45 AM	6	20	0	26	46	11	0	57	14	5	0	19	102
Total	19	134	0	153	262	79	0	341	68	54	0	122	616
04:00 PM	22	42	0	64	20	14	0	34	45	86	0	131	229
04:15 PM	30	36	0	66	16	12	0	28	42	67	0	109	203
04:30 PM	22	36	0	58	17	9	0	26	37	111	1	149	233
04:45 PM	30	47	0	77	14	19	0	33	54	104	0	158	268
Total	104	161	0	265	67	54	0	121	178	368	1	547	933
05:00 PM	31	47	0	78	20	16	0	36	64	121	0	185	299
05:15 PM	20	45	0	65	21	21	0	42	62	93	0	155	262
05:30 PM	29	51	0	80	34	10	0	44	48	89	1	138	262
05:45 PM	21	42	0	63	18	11	0	29	38	65	0	103	195
Total	101	185	0	286	93	58	0	151	212	368	1	581	1018
Grand Total	246	628	0	874	752	285	0	1037	528	849	2	1379	3290
Apprch %	28.1	71.9	0		72.5	27.5	0		38.3	61.6	0.1		
Total %	7.5	19.1	0	26.6	22.9	8.7	0	31.5	16	25.8	0.1	41.9	
Cars	243	618	0	861	738	279	0	1017	518	839	2	1359	3237
% Cars	98.8	98.4	0	98.5	98.1	97.9	0	98.1	98.1	98.8	100	98.5	98.4
Buses	2	1	0	3	0	3	0	3	2	2	0	4	10
% Buses	0.8	0.2	0	0.3	0	1.1	0	0.3	0.4	0.2	0	0.3	0.3
Trucks	1	9	0	10	14	3	0	17	8	8	0	16	43
% Trucks	0.4	1.4	0	1.1	1.9	1.1	0	1.6	1.5	0.9	0	1.2	1.3



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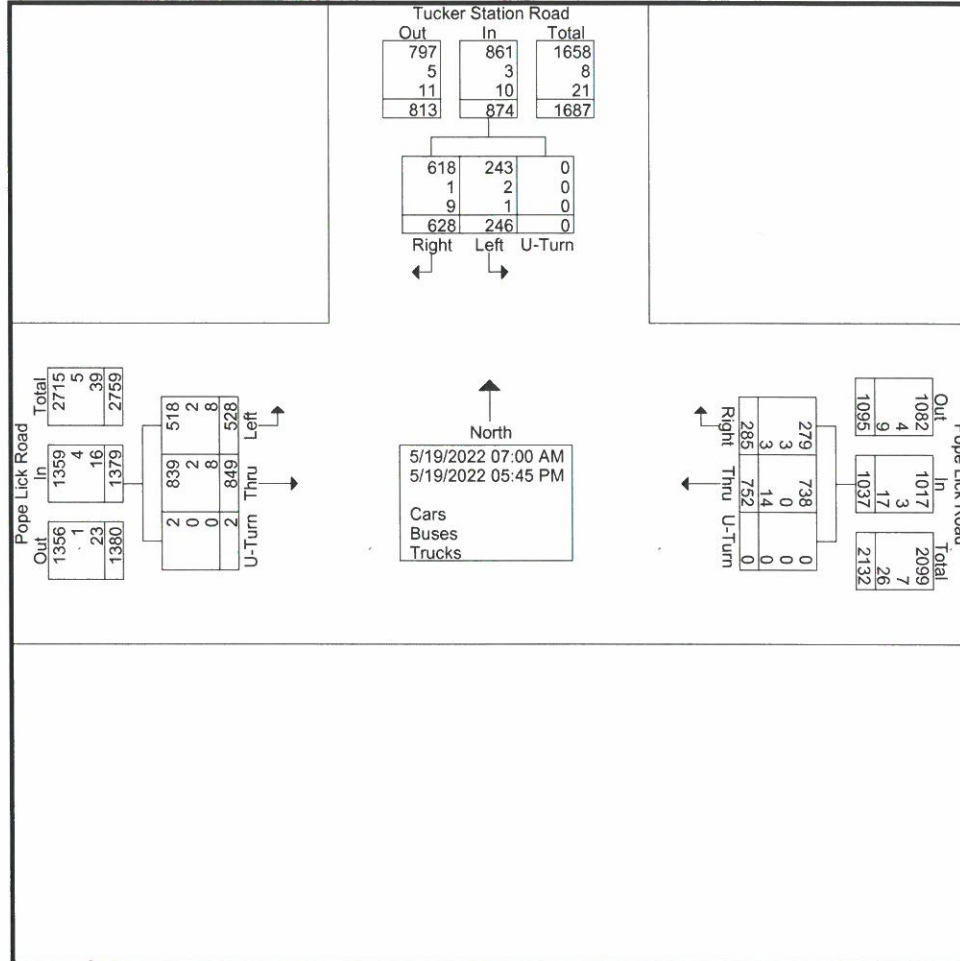
"2022 ... Data Collection simplified"

File Name : Tucker\_Station\_Road\_at\_Pope\_Lick\_Road\_05-19-2022

Site Code : Site 3 - Thursday

Start Date : 5/19/2022

Page No : 2



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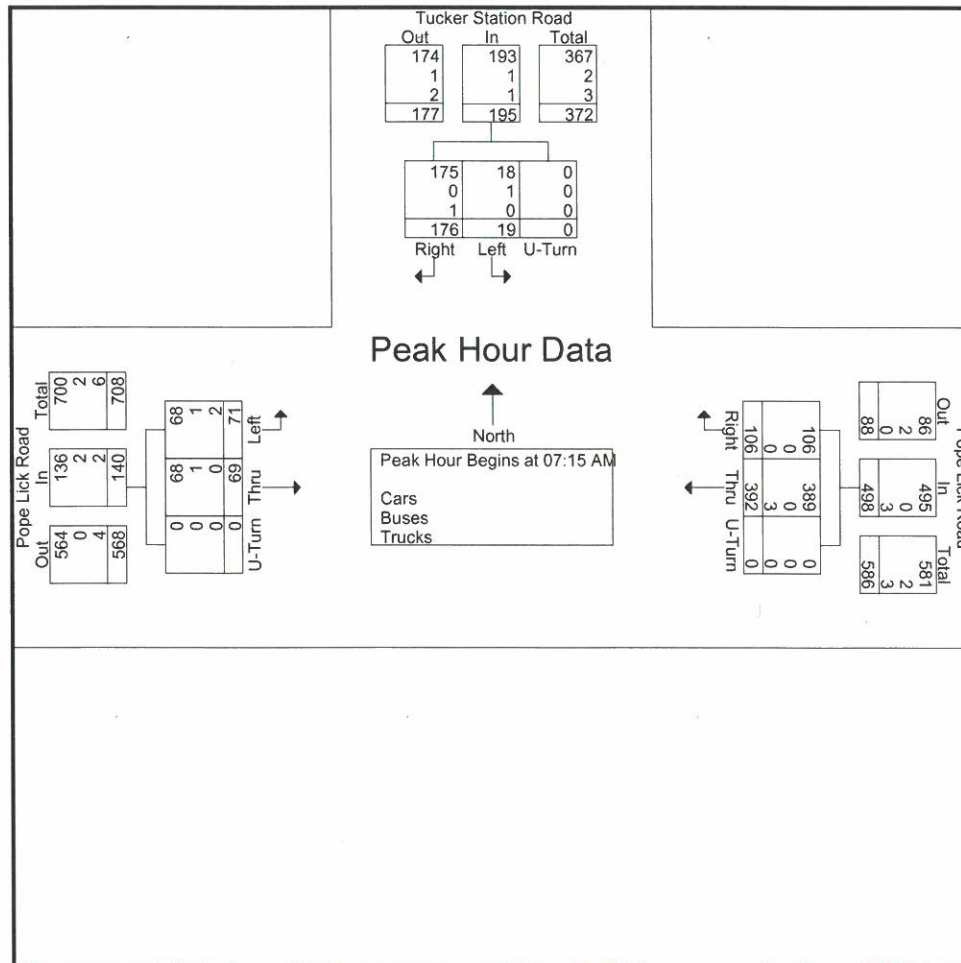
File Name : Tucker\_Station\_Road\_at\_Pope\_Lick\_Road\_05-19-2022

Site Code : Site 3 - Thursday

Start Date : 5/19/2022

Page No : 3

	Tucker Station Road From North				Pope Lick Road From East				Pope Lick Road From West				
Start Time	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	6	40	0	46	86	19	0	105	13	13	0	26	177
07:30 AM	7	38	0	45	84	24	0	108	22	17	0	39	192
07:45 AM	3	53	0	56	122	31	0	153	20	21	0	41	250
08:00 AM	3	45	0	48	100	32	0	132	16	18	0	34	214
Total Volume	19	176	0	195	392	106	0	498	71	69	0	140	833
% App. Total	9.7	90.3	0		78.7	21.3	0		50.7	49.3	0		
PHF	.679	.830	.000	.871	.803	.828	.000	.814	.807	.821	.000	.854	.833
Cars	18	175	0	193	389	106	0	495	68	68	0	136	824
% Cars	94.7	99.4	0	99.0	99.2	100	0	99.4	95.8	98.6	0	97.1	98.9
Buses	1	0	0	1	0	0	0	0	1	1	0	2	3
% Buses	5.3	0	0	0.5	0	0	0	0	1.4	1.4	0	1.4	0.4
Trucks	0	1	0	1	3	0	0	3	2	0	0	2	6
% Trucks	0	0.6	0	0.5	0.8	0	0	0.6	2.8	0	0	1.4	0.7





# Cummins Consulting Services, LLC

swcummins@ccsdata.com 859-361-2589

"2022 ... Data Collection simplified"

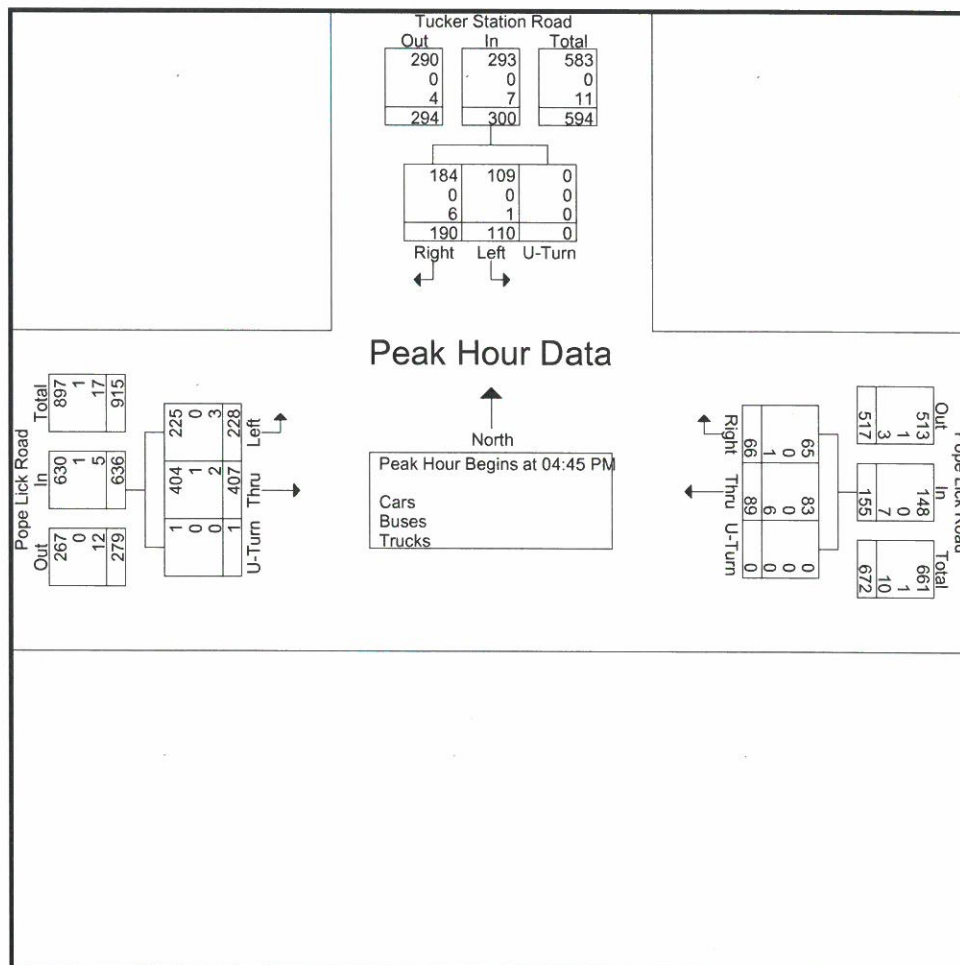
File Name : Tucker\_Station\_Road\_at\_Pope\_Lick\_Road\_05-19-2022

Site Code : Site 3 - Thursday

Start Date : 5/19/2022

Page No : 4

	Tucker Station Road From North				Pope Lick Road From East				Pope Lick Road From West				
Start Time	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:45 PM													
04:45 PM	30	47	0	77	14	19	0	33	54	104	0	158	268
05:00 PM	31	47	0	78	20	16	0	36	64	121	0	185	299
05:15 PM	20	45	0	65	21	21	0	42	62	93	0	155	262
05:30 PM	29	51	0	80	34	10	0	44	48	89	1	138	262
Total Volume	110	190	0	300	89	66	0	155	228	407	1	636	1091
% App. Total	36.7	63.3	0		57.4	42.6	0		35.8	64	0.2		
PHF	.887	.931	.000	.938	.654	.786	.000	.881	.891	.841	.250	.859	.912
Cars	109	184	0	293	83	65	0	148	225	404	1	630	1071
% Cars	99.1	96.8	0	97.7	93.3	98.5	0	95.5	98.7	99.3	100	99.1	98.2
Buses	0	0	0	0	0	0	0	0	0	1	0	1	1
% Buses	0	0	0	0	0	0	0	0	0	0.2	0	0.2	0.1
Trucks	1	6	0	7	6	1	0	7	3	2	0	5	19
% Trucks	0.9	3.2	0	2.3	6.7	1.5	0	4.5	1.3	0.5	0	0.8	1.7

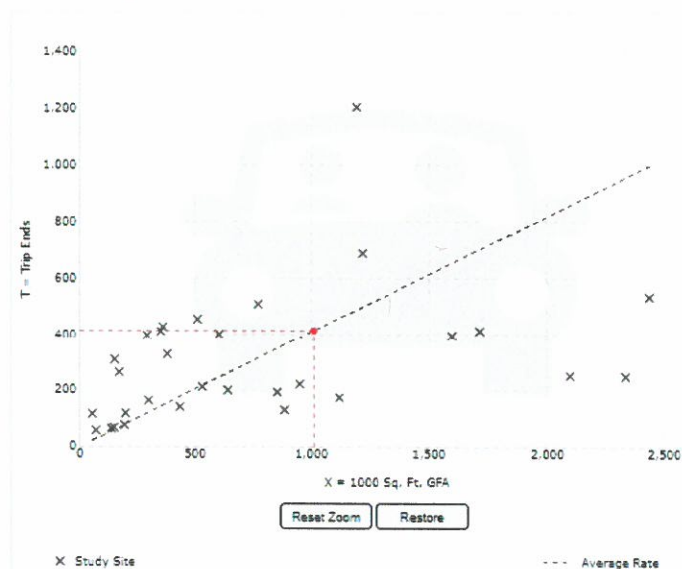


## APPENDIX C: TRIP GENERATION DATA



## ITE Land Use Code 210 Single Family Residential (AM Peak)

Data Plot and Equation



### DATA STATISTICS

Land Use:  
Industrial Park (130) [Click for Description and Data Plot](#)

Independent Variable:  
1000 Sq. Ft. GFA

Time Period:  
Weekday  
AM Peak Hour of Generator

Setting/Location:  
General Urban/Suburban

Trip Type:  
Vehicle

Number of Studies:  
30

Avg. 1000 Sq. Ft. GFA:  
757

Average Rate:  
0.41

Range of Rates:  
0.11 - 2.13

Standard Deviation:  
0.37

Fitted Curve Equation:  
Not Given

R<sup>2</sup>:  
----

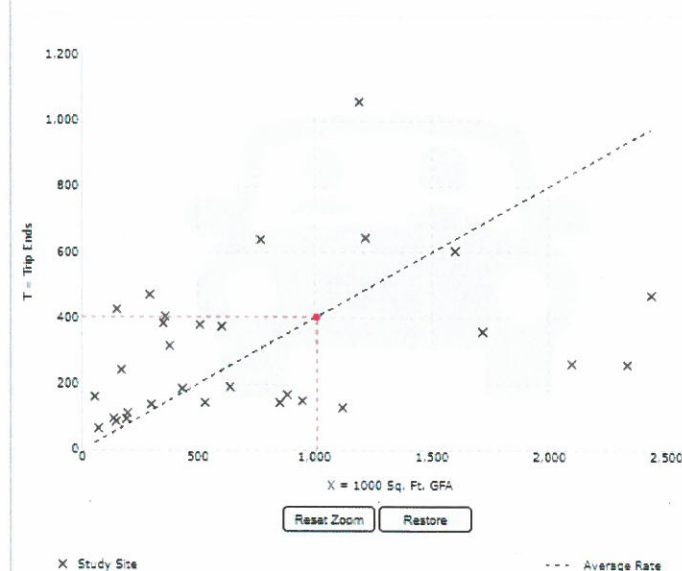
Directional Distribution:  
87% entering, 13% exiting

Calculated Trip Ends:  
Average Rate: 414 (Total), 350 (Entry), 54 (Exit)

Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

## ITE Land Use Code 210 Single Family Residential (PM Peak)

Data Plot and Equation



### DATA STATISTICS

Land Use:  
Industrial Park (130) [Click for Description and Data Plot](#)

Independent Variable:  
1000 Sq. Ft. GFA

Time Period:  
Weekday  
PM Peak Hour of Generator

Setting/Location:  
General Urban/Suburban

Trip Type:  
Vehicle

Number of Studies:  
30

Avg. 1000 Sq. Ft. GFA:  
757

Average Rate:  
0.40

Range of Rates:  
0.11 - 2.65

Standard Deviation:  
0.41

Fitted Curve Equation:  
Not Given

R<sup>2</sup>:  
----

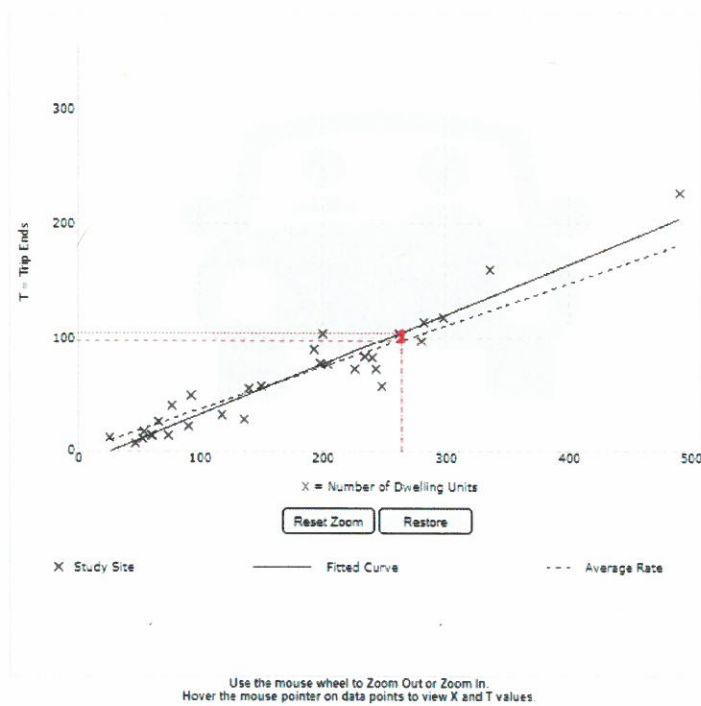
Directional Distribution:  
21% entering, 79% exiting

Calculated Trip Ends:  
Average Rate: 404 (Total), 85 (Entry), 319 (Exit)

Use the mouse wheel to Zoom Out or Zoom In.  
Hover the mouse pointer on data points to view X and T values.

## ITE Land Use Code 221 Multi Family Housing (AM Peak)

Data Plot and Equation



### DATA STATISTICS

**Land Use:**  
Multifamily Housing (Mid-Rise) - Not Close to Rail Transit (221) [Click for Description and Data Plots](#)

**Independent Variable:**  
Dwelling Units

**Time Period:**  
Weekday  
Peak Hour of Adjacent Street Traffic  
One Hour Between 7 and 9 a.m.

**Setting/Location:**  
General Urban/Suburban

**Trip Type:**  
Vehicle

**Number of Studies:**  
30

**Avg. Num. of Dwelling Units:**  
173

**Average Rate:**  
0.37

**Range of Rates:**  
0.15 - 0.53

**Standard Deviation:**  
0.09

**Fitted Curve Equation:**  
 $T = 0.44(X) + 11.61$

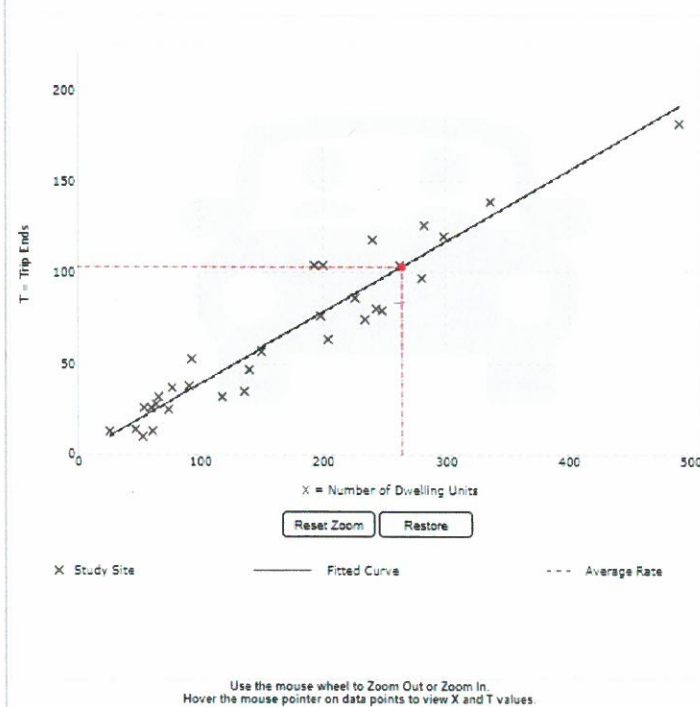
**R<sup>2</sup>:**  
0.91

**Directional Distribution:**  
23% entering, 77% exiting

**Calculated Trip Ends:**  
Average Rate: 98 (Total), 22 (Entry), 76 (Exit)  
Fitted Curve: 105 (Total), 24 (Entry), 81 (Exit)

## ITE Land Use Code 221 Multi Family Housing (PM Peak)

Data Plot and Equation



### DATA STATISTICS

**Land Use:**  
Multifamily Housing (Mid-Rise) - Not Close to Rail Transit (221) [Click for Description and Data Plots](#)

**Independent Variable:**  
Dwelling Units

**Time Period:**  
Weekday  
Peak Hour of Adjacent Street Traffic  
One Hour Between 4 and 6 p.m.

**Setting/Location:**  
General Urban/Suburban

**Trip Type:**  
Vehicle

**Number of Studies:**  
31

**Avg. Num. of Dwelling Units:**  
169

**Average Rate:**  
0.39

**Range of Rates:**  
0.19 - 0.57

**Standard Deviation:**  
0.08

**Fitted Curve Equation:**  
 $T = 0.39(X) + 0.34$

**R<sup>2</sup>:**  
0.91

**Directional Distribution:**  
61% entering, 39% exiting

**Calculated Trip Ends:**  
Average Rate: 103 (Total), 63 (Entry), 40 (Exit)  
Fitted Curve: 103 (Total), 63 (Entry), 40 (Exit)



## **APPENDIX D: TRAFFIC FORECASTING REPORT (EXCERPT)**

Count Year	2022	Number of Counts	4
Opening Year	2023	Growth Rate	0.43%
Design Year	2043		
Years Back	15		

KYTC Traffic Count Station #1		KYTC Traffic Count Station #2		KYTC Traffic Count Station #3	
STA ID	056L91	STA ID	XXXXXX	STA ID	XXXXXX
Year	AADT	Paste Count Data Here		Paste Count Data Here	
2022					
2021					
2020					
2019					
2018	7155				
2017					
2016					
2015	6939				
2014	7634				
2013	6701				

#### Historical Traffic Volume Summary Station Details:

Sta ID:	056L91
Sta Type:	Full Coverage
Map:	<a href="#">MapIt</a>
District:	5
County:	Jefferson
Route:	056-CS-1002H -000
Route Desc:	BLUEGRASS PKWY

Begin MP:	2.4740
Begin Desc:	KY 913 (BLANKENBAKER PKWY)
End MP:	2.9270
End Desc:	TUCKER STATION ROAD
Impact Year:	
Year Added:	2012

#### Newest Count:

AADT:	7155
Year:	2018
% Single:	
% Combo:	
K Factor:	13
D Factor:	66

#### Definitions:

Sta. ID - Three digit county number + station number

MP - milepoint

Impact Year - year of significant change to traffic pattern within station segment

AADT - Annual Average Daily Traffic - the annualized average 24-hour volume of vehicles on a segment of roadway

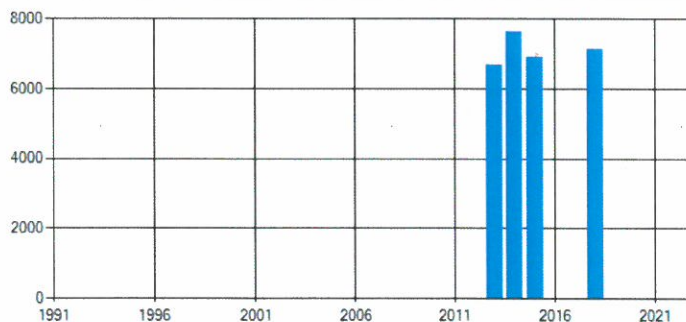
% Single - single unit truck volume as a percentage of the AADT

% Combo - combination truck volume as a percentage of the AADT

K Factor - peak hour volume as a percentage of the AADT

D Factor - percentage of peak hour volume flowing in the peak direction

Year	AADT	Year	AADT	Year	AADT
2022		2012		2002	
2021		2011		2001	
2020		2010		2000	
2019		2009		1999	
2018	7155	2008		1998	
2017		2007		1997	
2016		2006		1996	
2015	6939	2005		1995	
2014	7634	2004		1994	
2013	6701	2003		1993	





















## APPENDIX E: CAPACITY ANALYSIS OUTPUT

# HCM Unsignalized Intersection Capacity Analysis 3: Schute Station Rd & Tucker Station Rd & S. Pope Lick

09/06/2022



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	71	69	0	0	394	107	0	0	0	19	0	177
Future Volume (vph)	71	69	0	0	394	107	0	0	0	19	0	177
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	77	75	0	0	428	116	0	0	0	21	0	192
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	152	544	0	213								
Volume Left (vph)	77	0	0	21								
Volume Right (vph)	0	116	0	192								
Hadj (s)	0.14	-0.09	0.00	-0.49								
Departure Headway (s)	5.3	4.6	6.0	5.1								
Degree Utilization, x	0.22	0.70	0.00	0.30								
Capacity (veh/h)	634	762	526	641								
Control Delay (s)	9.8	17.4	9.0	10.2								
Approach Delay (s)	9.8	17.4	0.0	10.2								
Approach LOS	A	C	A	B								
Intersection Summary												
Delay			14.5									
Level of Service			B									
Intersection Capacity Utilization			56.8%		ICU Level of Service					B		
Analysis Period (min)			15									



# HCM Unsignalized Intersection Capacity Analysis

















## 6: Plantside Drive & Schute Station Rd

09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	172	21	2	110	2	1	0	0	0	0	6
Future Volume (Veh/h)	11	172	21	2	110	2	1	0	0	0	0	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	187	23	2	120	2	1	0	0	0	0	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	122			210			294	348	105	242	359	61
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	122			210			294	348	105	242	359	61
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	100	100	99
cM capacity (veh/h)	1463			1358			627	568	929	686	561	991
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	12	125	85	2	80	42	1	7				
Volume Left	12	0	0	2	0	0	1	0				
Volume Right	0	0	23	0	0	2	0	7				
cSH	1463	1700	1700	1358	1700	1700	627	991				
Volume to Capacity	0.01	0.07	0.05	0.00	0.05	0.02	0.00	0.01				
Queue Length 95th (ft)	1	0	0	0	0	0	0	1				
Control Delay (s)	7.5	0.0	0.0	7.7	0.0	0.0	10.8	8.7				
Lane LOS	A			A			B	A				
Approach Delay (s)	0.4			0.1			10.8	8.7				
Approach LOS							B	A				
Intersection Summary												
Average Delay			0.5									
Intersection Capacity Utilization			17.3%			ICU Level of Service			A			
Analysis Period (min)			15									

# HCM Unsignalized Intersection Capacity Analysis 3: Schute Station Rd & Tucker Station Rd & S. Pope Lick




















09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	229	409	0	0	89	66	0	0	0	111	0	191
Future Volume (vph)	229	409	0	0	89	66	0	0	0	111	0	191
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	249	445	0	0	97	72	0	0	0	121	0	208
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	694	169	0	329								
Volume Left (vph)	249	0	0	121								
Volume Right (vph)	0	72	0	208								
Hadj (s)	0.11	-0.22	0.00	-0.27								
Departure Headway (s)	5.3	5.7	6.9	5.8								
Degree Utilization, x	1.03	0.27	0.00	0.53								
Capacity (veh/h)	670	607	486	601								
Control Delay (s)	65.6	10.8	9.9	15.3								
Approach Delay (s)	65.6	10.8	0.0	15.3								
Approach LOS	F	B	A	C								
Intersection Summary												
Delay				44.0								
Level of Service				E								
Intersection Capacity Utilization				70.8%	ICU Level of Service	C						
Analysis Period (min)				15								



















# HCM Unsignalized Intersection Capacity Analysis 6: Plantside Drive & Schute Station Rd

09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	137	2	0	156	1	16	0	1	2	0	11
Future Volume (Veh/h)	3	137	2	0	156	1	16	0	1	2	0	11
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	149	2	0	170	1	17	0	1	2	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	171			151			253	327	76	252	328	86
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	171			151			253	327	76	252	328	86
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	100	100	100	100	99
cM capacity (veh/h)	1404			1428			670	589	970	679	589	956
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	3	99	52	0	113	58	18	14				
Volume Left	3	0	0	0	0	0	17	2				
Volume Right	0	0	2	0	0	1	1	12				
cSH	1404	1700	1700	1700	1700	1700	682	904				
Volume to Capacity	0.00	0.06	0.03	0.00	0.07	0.03	0.03	0.02				
Queue Length 95th (ft)	0	0	0	0	0	0	2	1				
Control Delay (s)	7.6	0.0	0.0	0.0	0.0	0.0	10.4	9.0				
Lane LOS	A							B	A			
Approach Delay (s)	0.1				0.0			10.4	9.0			
Approach LOS							B	A				
Intersection Summary												
Average Delay			0.9									
Intersection Capacity Utilization			15.1%			ICU Level of Service			A			
Analysis Period (min)			15									

# HCM Unsignalized Intersection Capacity Analysis 3: Schute Station Rd & Tucker Station Rd & S. Pope Lick



















09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	75	73	0	0	414	112	0	0	0	20	0	186
Future Volume (vph)	75	73	0	0	414	112	0	0	0	20	0	186
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	82	79	0	0	450	122	0	0	0	22	0	202
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	161	572	0	224								
Volume Left (vph)	82	0	0	22								
Volume Right (vph)	0	122	0	202								
Hadj (s)	0.14	-0.09	0.00	-0.49								
Departure Headway (s)	5.4	4.7	6.1	5.2								
Degree Utilization, x	0.24	0.74	0.00	0.32								
Capacity (veh/h)	623	754	519	628								
Control Delay (s)	10.1	19.8	9.1	10.6								
Approach Delay (s)	10.1	19.8	0.0	10.6								
Approach LOS	B	C	A	B								
Intersection Summary												
Delay				16.0								
Level of Service				C								
Intersection Capacity Utilization				59.2%	ICU Level of Service			B				
Analysis Period (min)				15								



















# HCM Unsignalized Intersection Capacity Analysis 6: Plantside Drive & Schute Station Rd

09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	180	22	2	115	2	1	0	0	0	0	6
Future Volume (Veh/h)	12	180	22	2	115	2	1	0	0	0	0	6
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	196	24	2	125	2	1	0	0	0	0	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	127			220			308	365	110	254	376	64
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	127			220			308	365	110	254	376	64
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	100	100	99
cM capacity (veh/h)	1457			1346			613	556	922	673	548	988
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	13	131	89	2	83	44	1	7				
Volume Left	13	0	0	2	0	0	1	0				
Volume Right	0	0	24	0	0	2	0	7				
cSH	1457	1700	1700	1346	1700	1700	613	988				
Volume to Capacity	0.01	0.08	0.05	0.00	0.05	0.03	0.00	0.01				
Queue Length 95th (ft)	1	0	0	0	0	0	0	1				
Control Delay (s)	7.5	0.0	0.0	7.7	0.0	0.0	10.9	8.7				
Lane LOS	A			A			B	A				
Approach Delay (s)	0.4			0.1			10.9	8.7				
Approach LOS							B	A				
Intersection Summary												
Average Delay				0.5								
Intersection Capacity Utilization				17.3%	ICU Level of Service				A			
Analysis Period (min)				15								

# HCM Unsignalized Intersection Capacity Analysis 3: Schute Station Rd & Tucker Station Rd & S. Pope Lick



















09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	241	429	0	0	94	70	0	0	0	116	0	200
Future Volume (vph)	241	429	0	0	94	70	0	0	0	116	0	200
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	262	466	0	0	102	76	0	0	0	126	0	217
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	728	178	0	343								
Volume Left (vph)	262	0	0	126								
Volume Right (vph)	0	76	0	217								
Hadj (s)	0.11	-0.22	0.00	-0.27								
Departure Headway (s)	5.4	5.8	7.0	5.8								
Degree Utilization, x	1.09	0.28	0.00	0.56								
Capacity (veh/h)	655	600	479	600								
Control Delay (s)	85.1	11.0	10.0	16.0								
Approach Delay (s)	85.1	11.0	0.0	16.0								
Approach LOS	F	B	A	C								
Intersection Summary												
Delay			55.6									
Level of Service			F									
Intersection Capacity Utilization			73.9%		ICU Level of Service					D		
Analysis Period (min)			15									



















# HCM Unsignalized Intersection Capacity Analysis 6: Plantside Drive & Schute Station Rd

09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	142	2	0	164	1	17	0	1	2	0	12
Future Volume (Veh/h)	3	142	2	0	164	1	17	0	1	2	0	12
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	154	2	0	178	1	18	0	1	2	0	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	179			156			263	340	78	262	340	90
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	179			156			263	340	78	262	340	90
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	100	100	100	100	99
cM capacity (veh/h)	1394			1422			658	579	967	667	579	951
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	3	103	53	0	119	60	19	15				
Volume Left	3	0	0	0	0	0	18	2				
Volume Right	0	0	2	0	0	1	1	13				
cSH	1394	1700	1700	1700	1700	1700	670	900				
Volume to Capacity	0.00	0.06	0.03	0.00	0.07	0.04	0.03	0.02				
Queue Length 95th (ft)	0	0	0	0	0	0	2	1				
Control Delay (s)	7.6	0.0	0.0	0.0	0.0	0.0	10.5	9.1				
Lane LOS	A						B	A				
Approach Delay (s)	0.1			0.0			10.5	9.1				
Approach LOS							B	A				
Intersection Summary												
Average Delay				1.0								
Intersection Capacity Utilization				15.8%	ICU Level of Service			A				
Analysis Period (min)				15								

# HCM Unsignalized Intersection Capacity Analysis 3: Schute Station Rd & Tucker Station Rd & S. Pope Lick



















09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop			Stop			Stop			Stop		
Traffic Volume (vph)	71	120	43	29	430	107	7	11	4	19	72	177
Future Volume (vph)	71	120	43	29	430	107	7	11	4	19	72	177
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	77	130	47	32	467	116	8	12	4	21	78	192
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	254	615	24	291								
Volume Left (vph)	77	32	8	21								
Volume Right (vph)	47	116	4	192								
Hadj (s)	-0.02	-0.07	0.00	-0.35								
Departure Headway (s)	5.9	5.3	7.0	5.9								
Degree Utilization, x	0.41	0.90	0.05	0.48								
Capacity (veh/h)	585	674	446	577								
Control Delay (s)	12.9	37.4	10.4	14.2								
Approach Delay (s)	12.9	37.4	10.4	14.2								
Approach LOS	B	E	B	B								
Intersection Summary												
Delay				25.9								
Level of Service				D								
Intersection Capacity Utilization				61.4%	ICU Level of Service	B						
Analysis Period (min)				15								



# HCM Unsignalized Intersection Capacity Analysis 6: Plantside Drive & Schute Station Rd

09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	172	21	2	110	28	1	0	0	6	0	12
Future Volume (Veh/h)	47	172	21	2	110	28	1	0	0	6	0	12
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	51	187	23	2	120	30	1	0	0	7	0	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	150			210			378	454	105	334	451	75
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	150			210			378	454	105	334	451	75
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	99	100	99
cM capacity (veh/h)	1429			1358			532	482	929	578	484	971
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	51	125	85	2	80	70	1	20				
Volume Left	51	0	0	2	0	0	1	7				
Volume Right	0	0	23	0	0	30	0	13				
cSH	1429	1700	1700	1358	1700	1700	532	785				
Volume to Capacity	0.04	0.07	0.05	0.00	0.05	0.04	0.00	0.03				
Queue Length 95th (ft)	3	0	0	0	0	0	0	2				
Control Delay (s)	7.6	0.0	0.0	7.7	0.0	0.0	11.8	9.7				
Lane LOS	A			A			B	A				
Approach Delay (s)	1.5			0.1			11.8	9.7				
Approach LOS							B	A				
Intersection Summary												
Average Delay				1.4								
Intersection Capacity Utilization				22.1%	ICU Level of Service			A				
Analysis Period (min)				15								



# HCM Unsignalized Intersection Capacity Analysis

## 9: Access 1 & Tucker Station Rd

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (veh/h)	245	22	18	587	3	3
Future Volume (Veh/h)	245	22	18	587	3	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	266	24	20	638	3	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				500		
pX, platoon unblocked						
vC, conflicting volume			290		956	278
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			290		956	278
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	100
cM capacity (veh/h)			1272		282	761
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	290	658	6			
Volume Left	0	20	3			
Volume Right	24	0	3			
cSH	1700	1272	411			
Volume to Capacity	0.17	0.02	0.01			
Queue Length 95th (ft)	0	1	1			
Control Delay (s)	0.0	0.4	13.9			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.4	13.9			
Approach LOS			B			
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		55.4%	ICU Level of Service		B	
Analysis Period (min)		15				



# HCM Unsignalized Intersection Capacity Analysis 11: Access 2 & Tucker Station Rd

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	
Traffic Volume (veh/h)	234	14	11	603	2	2
Future Volume (Veh/h)	234	14	11	603	2	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	254	15	12	655	2	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				721		
pX, platoon unblocked						
vC, conflicting volume			269		940	262
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			269		940	262
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	100
cM capacity (veh/h)			1295		290	777
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	269	667	4			
Volume Left	0	12	2			
Volume Right	15	0	2			
cSH	1700	1295	422			
Volume to Capacity	0.16	0.01	0.01			
Queue Length 95th (ft)	0	1	1			
Control Delay (s)	0.0	0.3	13.6			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.3	13.6			
Approach LOS			B			
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			50.5%	ICU Level of Service		A
Analysis Period (min)			15			



# HCM Unsignalized Intersection Capacity Analysis

## 13: Access 4 & S. Pope Lick

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	
Traffic Volume (veh/h)	126	18	14	562	3	2
Future Volume (Veh/h)	126	18	14	562	3	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	137	20	15	611	3	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				570		
pX, platoon unblocked						
vC, conflicting volume			157		788	147
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			157		788	147
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	100
cM capacity (veh/h)			1423		356	900
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	157	626	5			
Volume Left	0	15	3			
Volume Right	20	0	2			
cSH	1700	1423	470			
Volume to Capacity	0.09	0.01	0.01			
Queue Length 95th (ft)	0	1	1			
Control Delay (s)	0.0	0.3	12.7			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.3	12.7			
Approach LOS			B			
Intersection Summary						
Average Delay		0.3				
Intersection Capacity Utilization		50.8%		ICU Level of Service	A	
Analysis Period (min)		15				



# HCM Unsignalized Intersection Capacity Analysis

















## 15: Access 5 & S. Pope Lick

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶	
Traffic Volume (veh/h)	99	29	18	572	4	3
Future Volume (Veh/h)	99	29	18	572	4	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	108	32	20	622	4	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			140		786	124
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			140		786	124
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	100
cM capacity (veh/h)			1443		356	927
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	140	642	7			
Volume Left	0	20	4			
Volume Right	32	0	3			
cSH	1700	1443	484			
Volume to Capacity	0.08	0.01	0.01			
Queue Length 95th (ft)	0	1	1			
Control Delay (s)	0.0	0.4	12.6			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.4	12.6			
Approach LOS			B			
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		51.4%	ICU Level of Service	A		
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis 3: Schute Station Rd & Tucker Station Rd & S. Pope Lick



















09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	229	446	10	7	137	66	38	64	26	111	17	191
Future Volume (vph)	229	446	10	7	137	66	38	64	26	111	17	191
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	249	485	11	8	149	72	41	70	28	121	18	208
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	745	229	139	347								
Volume Left (vph)	249	8	41	121								
Volume Right (vph)	11	72	28	208								
Hadj (s)	0.09	-0.15	-0.03	-0.26								
Departure Headway (s)	6.2	6.7	7.4	6.5								
Degree Utilization, x	1.29	0.43	0.28	0.63								
Capacity (veh/h)	564	499	443	533								
Control Delay (s)	162.7	14.6	13.3	20.0								
Approach Delay (s)	162.7	14.6	13.3	20.0								
Approach LOS	F	B	B	C								
Intersection Summary												
Delay			91.3									
Level of Service			F									
Intersection Capacity Utilization			83.8%	ICU Level of Service		E						
Analysis Period (min)			15									



# HCM Unsignalized Intersection Capacity Analysis 6: Plantside Drive & Schute Station Rd

09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	137	2	0	156	10	16	0	1	34	0	43
Future Volume (Veh/h)	12	137	2	0	156	10	16	0	1	34	0	43
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	149	2	0	170	11	17	0	1	37	0	47
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	181			151			308	357	76	277	352	90
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol.	181			151			308	357	76	277	352	90
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			97	100	100	94	100	95
cM capacity (veh/h)	1392			1428			586	562	970	648	566	949
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	13	99	52	0	113	68	18	84				
Volume Left	13	0	0	0	0	0	17	37				
Volume Right	0	0	2	0	0	11	1	47				
cSH	1392	1700	1700	1700	1700	1700	600	788				
Volume to Capacity	0.01	0.06	0.03	0.00	0.07	0.04	0.03	0.11				
Queue Length 95th (ft)	1	0	0	0	0	0	2	9				
Control Delay (s)	7.6	0.0	0.0	0.0	0.0	0.0	11.2	10.1				
Lane LOS	A						B	B				
Approach Delay (s)	0.6			0.0			11.2	10.1				
Approach LOS							B	B				
Intersection Summary												
Average Delay	2.6											
Intersection Capacity Utilization	20.8%			ICU Level of Service			A					
Analysis Period (min)	15											



# HCM Unsignalized Intersection Capacity Analysis 9: Access 1 & Tucker Station Rd

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (veh/h)	663	5	4	373	19	16
Future Volume (Veh/h)	663	5	4	373	19	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	721	5	4	405	21	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				500		
pX, platoon unblocked						
vC, conflicting volume			726		1136	724
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			726		1136	724
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		91	96
cM capacity (veh/h)			877		222	426
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	726	409	38			
Volume Left	0	4	21			
Volume Right	5	0	17			
cSH	1700	877	283			
Volume to Capacity	0.43	0.00	0.13			
Queue Length 95th (ft)	0	0	11			
Control Delay (s)	0.0	0.1	19.7			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.1	19.7			
Approach LOS			C			
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization		45.2%		ICU Level of Service		A
Analysis Period (min)		15				



# HCM Unsignalized Intersection Capacity Analysis 11: Access 2 & Tucker Station Rd

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (veh/h)	675	3	3	364	13	10
Future Volume (Veh/h)	675	3	3	364	13	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	734	3	3	396	14	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage veh						
Upstream signal (ft)	721					
pX, platoon unblocked						
vC, conflicting volume			737		1138	736
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			737		1138	736
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		94	97
cM capacity (veh/h)			869		222	419
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	737	399	25			
Volume Left	0	3	14			
Volume Right	3	0	11			
cSH	1700	869	280			
Volume to Capacity	0.43	0.00	0.09			
Queue Length 95th (ft)	0	0	7			
Control Delay (s)	0.0	0.1	19.1			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.1	19.1			
Approach LOS			C			
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			45.7%	ICU Level of Service	A	
Analysis Period (min)			15			



# HCM Unsignalized Intersection Capacity Analysis 13: Access 4 & S. Pope Lick

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (veh/h)	578	4	3	195	16	13
Future Volume (Veh/h)	578	4	3	195	16	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	628	4	3	212	17	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				570		
pX, platoon unblocked						
vC, conflicting volume			632		848	630
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			632		848	630
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	97
cM capacity (veh/h)			951		331	482
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	632	215	31			
Volume Left	0	3	17			
Volume Right	4	0	14			
cSH	1700	951	385			
Volume to Capacity	0.37	0.00	0.08			
Queue Length 95th (ft)	0	0	7			
Control Delay (s)	0.0	0.2	15.2			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.2	15.2			
Approach LOS			C			
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization		40.7%		ICU Level of Service		A
Analysis Period (min)		15				



# HCM Unsignalized Intersection Capacity Analysis

















## 15: Access 5 & S. Pope Lick

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶	
Traffic Volume (veh/h)	584	7	4	173	26	16
Future Volume (Veh/h)	584	7	4	173	26	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	635	8	4	188	28	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			643		835	639
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			643		835	639
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		92	96
cM capacity (veh/h)			942		336	476
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	643	192	45			
Volume Left	0	4	28			
Volume Right	8	0	17			
cSH	1700	942	378			
Volume to Capacity	0.38	0.00	0.12			
Queue Length 95th (ft)	0	0	10			
Control Delay (s)	0.0	0.2	15.8			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.2	15.8			
Approach LOS			C			
Intersection Summary						
Average Delay		0.9				
Intersection Capacity Utilization		41.2%	ICU Level of Service	A		
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis 3: Schute Station Rd & Tucker Station Rd & S. Pope Lick



















09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	75	124	43	29	450	112	7	11	4	20	72	186
Future Volume (vph)	75	124	43	29	450	112	7	11	4	20	72	186
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	82	135	47	32	489	122	8	12	4	22	78	202
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	264	643	24	302								
Volume Left (vph)	82	32	8	22								
Volume Right (vph)	47	122	4	202								
Hadj (s)	-0.01	-0.07	0.00	-0.35								
Departure Headway (s)	6.0	5.4	7.3	6.1								
Degree Utilization, x	0.44	0.96	0.05	0.51								
Capacity (veh/h)	581	656	439	576								
Control Delay (s)	13.6	48.0	10.6	15.1								
Approach Delay (s)	13.6	48.0	10.6	15.1								
Approach LOS	B	E	B	C								
Intersection Summary												
Delay			31.9									
Level of Service			D									
Intersection Capacity Utilization			64.8%		ICU Level of Service					C		
Analysis Period (min)			15									



# HCM Unsignalized Intersection Capacity Analysis 6: Plantside Drive & Schute Station Rd

09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	160	22	2	115	38	1	0	0	6	0	12
Future Volume (Veh/h)	48	160	22	2	115	38	1	0	0	6	0	12
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	174	24	2	125	41	1	0	0	7	0	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	166			198			370	460	99	340	452	83
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	166			198			370	460	99	340	452	83
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	99	100	99
cM capacity (veh/h)	1410			1372			538	477	937	572	483	960
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	52	116	82	2	83	83	1	20				
Volume Left	52	0	0	2	0	0	1	7				
Volume Right	0	0	24	0	0	41	0	13				
cSH	1410	1700	1700	1372	1700	1700	538	776				
Volume to Capacity	0.04	0.07	0.05	0.00	0.05	0.05	0.00	0.03				
Queue Length 95th (ft)	3	0	0	0	0	0	0	2				
Control Delay (s)	7.7	0.0	0.0	7.6	0.0	0.0	11.7	9.8				
Lane LOS	A			A			B	A				
Approach Delay (s)	1.6			0.1			11.7	9.8				
Approach LOS							B	A				
Intersection Summary												
Average Delay				1.4								
Intersection Capacity Utilization				21.8%	ICU Level of Service			A				
Analysis Period (min)				15								



# HCM Unsignalized Intersection Capacity Analysis

## 9: Access 1 & Tucker Station Rd

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	
Traffic Volume (veh/h)	252	22	18	615	3	3
Future Volume (Veh/h)	252	22	18	615	3	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	274	24	20	668	3	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				500		
pX, platoon unblocked						
vC, conflicting volume			298		994	286
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			298		994	286
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	100
cM capacity (veh/h)			1263		267	753
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	298	688	6			
Volume Left	0	20	3			
Volume Right	24	0	3			
cSH	1700	1263	395			
Volume to Capacity	0.18	0.02	0.02			
Queue Length 95th (ft)	0	1	1			
Control Delay (s)	0.0	0.4	14.3			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.4	14.3			
Approach LOS			B			
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		56.9%	ICU Level of Service	B		
Analysis Period (min)		15				



# HCM Unsignalized Intersection Capacity Analysis 11: Access 2 & Tucker Station Rd

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	
Traffic Volume (veh/h)	241	14	11	631	2	2
Future Volume (Veh/h)	241	14	11	631	2	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	262	15	12	686	2	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				721		
pX, platoon unblocked						
vC, conflicting volume			277		980	270
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			277		980	270
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	100
cM capacity (veh/h)			1286		275	769
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	277	698	4			
Volume Left	0	12	2			
Volume Right	15	0	2			
cSH	1700	1286	405			
Volume to Capacity	0.16	0.01	0.01			
Queue Length 95th (ft)	0	1	1			
Control Delay (s)	0.0	0.3	14.0			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.3	14.0			
Approach LOS			B			
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		52.0%	ICU Level of Service	A		
Analysis Period (min)		15				



# HCM Unsignalized Intersection Capacity Analysis 13: Access 4 & S. Pope Lick

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (veh/h)	131	18	14	587	3	2
Future Volume (Veh/h)	131	18	14	587	3	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	142	20	15	638	3	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				570		
pX, platoon unblocked						
vC, conflicting volume			162		820	152
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			162		820	152
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	100
cM capacity (veh/h)			1417		341	894
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	162	653	5			
Volume Left	0	15	3			
Volume Right	20	0	2			
cSH	1700	1417	453			
Volume to Capacity	0.10	0.01	0.01			
Queue Length 95th (ft)	0	1	1			
Control Delay (s)	0.0	0.3	13.0			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.3	13.0			
Approach LOS			B			
Intersection Summary						
Average Delay		0.3				
Intersection Capacity Utilization		52.1%	ICU Level of Service	A		
Analysis Period (min)		15				



















# HCM Unsignalized Intersection Capacity Analysis 15: Access 5 & S. Pope Lick

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↘	
Traffic Volume (veh/h)	104	29	18	597	4	3
Future Volume (Veh/h)	104	29	18	597	4	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	113	32	20	649	4	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			145		818	129
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			145		818	129
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	100
cM capacity (veh/h)			1437		341	921
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	145	669	7			
Volume Left	0	20	4			
Volume Right	32	0	3			
cSH	1700	1437	467			
Volume to Capacity	0.09	0.01	0.01			
Queue Length 95th (ft)	0	1	1			
Control Delay (s)	0.0	0.4	12.8			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.4	12.8			
Approach LOS			B			
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		53.0%	ICU Level of Service	A		
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis 3: Schute Station Rd & Tucker Station Rd & S. Pope Lick



















09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	241	466	10	7	142	70	38	64	26	116	17	200
Future Volume (vph)	241	466	10	7	142	70	38	64	26	116	17	200
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	262	507	11	8	154	76	41	70	28	126	18	217
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	780	238	139	361								
Volume Left (vph)	262	8	41	126								
Volume Right (vph)	11	76	28	217								
Hadj (s)	0.09	-0.15	-0.03	-0.26								
Departure Headway (s)	6.3	6.8	7.5	6.6								
Degree Utilization, x	1.37	0.45	0.29	0.66								
Capacity (veh/h)	571	496	436	530								
Control Delay (s)	196.8	15.1	13.5	21.4								
Approach Delay (s)	196.8	15.1	13.5	21.4								
Approach LOS	F	C	B	C								
Intersection Summary												
Delay			109.8									
Level of Service			F									
Intersection Capacity Utilization			86.9%		ICU Level of Service				E			
Analysis Period (min)			15									



# HCM Unsignalized Intersection Capacity Analysis 6: Plantside Drive & Schute Station Rd

09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	143	2	0	164	10	17	0	1	34	0	44
Future Volume (Veh/h)	12	143	2	0	164	10	17	0	1	34	0	44
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	155	2	0	178	11	18	0	1	37	0	48
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	189			157			319	371	78	288	366	94
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	189			157			319	371	78	288	366	94
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			97	100	100	94	100	95
cM capacity (veh/h)	1382			1420			575	552	966	637	555	944
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	13	103	54	0	119	70	19	85				
Volume Left	13	0	0	0	0	0	18	37				
Volume Right	0	0	2	0	0	11	1	48				
cSH	1382	1700	1700	1700	1700	1700	588	780				
Volume to Capacity	0.01	0.06	0.03	0.00	0.07	0.04	0.03	0.11				
Queue Length 95th (ft)	1	0	0	0	0	0	3	9				
Control Delay (s)	7.6	0.0	0.0	0.0	0.0	0.0	11.3	10.2				
Lane LOS	A						B	B				
Approach Delay (s)	0.6			0.0			11.3	10.2				
Approach LOS							B	B				
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			20.8%		ICU Level of Service			A				
Analysis Period (min)			15									



# HCM Unsignalized Intersection Capacity Analysis 9: Access 1 & Tucker Station Rd

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (veh/h)	695	5	4	387	19	16
Future Volume (Veh/h)	695	5	4	387	19	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	755	5	4	421	21	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)				500		
pX, platoon unblocked						
vC, conflicting volume			760		1186	758
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			760		1186	758
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		90	96
cM capacity (veh/h)			852		207	407
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	760	425	38			
Volume Left	0	4	21			
Volume Right	5	0	17			
cSH	1700	852	266			
Volume to Capacity	0.45	0.00	0.14			
Queue Length 95th (ft)	0	0	12			
Control Delay (s)	0.0	0.1	20.8			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.1	20.8			
Approach LOS			C			
Intersection Summary						
Average Delay		0.7				
Intersection Capacity Utilization		46.9%	ICU Level of Service	A		
Analysis Period (min)		15				



# HCM Unsignalized Intersection Capacity Analysis 11: Access 2 & Tucker Station Rd

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↰	↱
Traffic Volume (veh/h)	707	3	3	378	13	10
Future Volume (Veh/h)	707	3	3	378	13	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	768	3	3	411	14	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				721		
pX, platoon unblocked						
vC, conflicting volume			771		1186	770
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			771		1186	770
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		93	97
cM capacity (veh/h)			844		208	401
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	771	414	25			
Volume Left	0	3	14			
Volume Right	3	0	11			
cSH	1700	844	263			
Volume to Capacity	0.45	0.00	0.09			
Queue Length 95th (ft)	0	0	8			
Control Delay (s)	0.0	0.1	20.1			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.1	20.1			
Approach LOS			C			
Intersection Summary						
Average Delay		0.5				
Intersection Capacity Utilization		47.4%	ICU Level of Service	A		
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis

## 13: Access 4 & S. Pope Lick

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↘
Traffic Volume (veh/h)	603	4	3	203	16	13
Future Volume (Veh/h)	603	4	3	203	16	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	655	4	3	221	17	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				570		
pX, platoon unblocked						
vC, conflicting volume			659		884	657
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			659		884	657
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	97
cM capacity (veh/h)			929		315	465
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	659	224	31			
Volume Left	0	3	17			
Volume Right	4	0	14			
cSH	1700	929	369			
Volume to Capacity	0.39	0.00	0.08			
Queue Length 95th (ft)	0	0	7			
Control Delay (s)	0.0	0.2	15.7			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.2	15.7			
Approach LOS			C			
Intersection Summary						
Average Delay		0.6				
Intersection Capacity Utilization		42.0%	ICU Level of Service	A		
Analysis Period (min)		15				



# HCM Unsignalized Intersection Capacity Analysis





















## 15: Access 5 & S. Pope Lick

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↘↙	
Traffic Volume (veh/h)	609	7	4	181	26	16
Future Volume (Veh/h)	609	7	4	181	26	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	662	8	4	197	28	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			670		871	666
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			670		871	666
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		91	96
cM capacity (veh/h)			920		320	459
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	670	201	45			
Volume Left	0	4	28			
Volume Right	8	0	17			
cSH	1700	920	362			
Volume to Capacity	0.39	0.00	0.12			
Queue Length 95th (ft)	0	0	11			
Control Delay (s)	0.0	0.2	16.4			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.2	16.4			
Approach LOS			C			
Intersection Summary						
Average Delay		0.9				
Intersection Capacity Utilization		42.5%	ICU Level of Service	A		
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis 3: Schute Station Rd & Tucker Station Rd & S. Pope Lick



















09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	241	466	10	7	142	70	38	64	26	116	17	200
Future Volume (vph)	241	466	10	7	142	70	38	64	26	116	17	200
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	262	507	11	8	154	76	41	70	28	126	18	217
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	262	518	8	230	41	98	126	235				
Volume Left (vph)	262	0	8	0	41	0	126	0				
Volume Right (vph)	0	11	0	76	0	28	0	217				
Hadj (s)	0.53	0.02	0.53	-0.20	0.53	-0.17	0.53	-0.61				
Departure Headway (s)	7.1	6.6	7.8	7.1	8.4	7.7	7.9	6.8				
Degree Utilization, x	0.51	0.94	0.02	0.45	0.10	0.21	0.28	0.44				
Capacity (veh/h)	498	536	439	489	413	450	439	514				
Control Delay (s)	16.1	50.0	9.8	14.7	11.1	11.5	12.8	13.9				
Approach Delay (s)	38.6		14.5		11.4		13.5					
Approach LOS	E		B		B		B					
Intersection Summary												
Delay			26.4									
Level of Service			D									
Intersection Capacity Utilization			58.4%	ICU Level of Service		B						
Analysis Period (min)			15									



# HCM Unsignalized Intersection Capacity Analysis 6: Plantside Drive & Schute Station Rd

09/06/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	143	2	0	164	10	17	0	1	34	0	44
Future Volume (Veh/h)	12	143	2	0	164	10	17	0	1	34	0	44
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	155	2	0	178	11	18	0	1	37	0	48
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	189			157			319	371	78	288	366	94
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	189			157			319	371	78	288	366	94
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			97	100	100	94	100	95
cM capacity (veh/h)	1382			1420			575	552	966	637	555	944
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	13	103	54	0	119	70	19	85				
Volume Left	13	0	0	0	0	0	18	37				
Volume Right	0	0	2	0	0	11	1	48				
cSH	1382	1700	1700	1700	1700	1700	588	780				
Volume to Capacity	0.01	0.06	0.03	0.00	0.07	0.04	0.03	0.11				
Queue Length 95th (ft)	1	0	0	0	0	0	3	9				
Control Delay (s)	7.6	0.0	0.0	0.0	0.0	0.0	11.3	10.2				
Lane LOS	A						B	B				
Approach Delay (s)	0.6			0.0			11.3	10.2				
Approach LOS							B	B				
Intersection Summary												
Average Delay	2.5											
Intersection Capacity Utilization	20.8%			ICU Level of Service			A					
Analysis Period (min)	15											



# HCM Unsignalized Intersection Capacity Analysis 9: Access 1 & Tucker Station Rd

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↘
Traffic Volume (veh/h)	695	5	4	387	19	16
Future Volume (Veh/h)	695	5	4	387	19	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	755	5	4	421	21	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				500		
pX, platoon unblocked						
vC, conflicting volume			760		1186	758
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			760		1186	758
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		90	96
cM capacity (veh/h)			852		207	407
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	760	425	38			
Volume Left	0	4	21			
Volume Right	5	0	17			
cSH	1700	852	266			
Volume to Capacity	0.45	0.00	0.14			
Queue Length 95th (ft)	0	0	12			
Control Delay (s)	0.0	0.1	20.8			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.1	20.8			
Approach LOS			C			
Intersection Summary						
Average Delay		0.7				
Intersection Capacity Utilization		46.9%	ICU Level of Service	A		
Analysis Period (min)		15				



# HCM Unsignalized Intersection Capacity Analysis 11: Access 2 & Tucker Station Rd

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	↘
Traffic Volume (veh/h)	707	3	3	378	13	10
Future Volume (Veh/h)	707	3	3	378	13	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	768	3	3	411	14	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				721		
pX, platoon unblocked						
vC, conflicting volume			771		1186	770
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			771		1186	770
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		93	97
cM capacity (veh/h)			844		208	401
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	771	414	25			
Volume Left	0	3	14			
Volume Right	3	0	11			
cSH	1700	844	263			
Volume to Capacity	0.45	0.00	0.09			
Queue Length 95th (ft)	0	0	8			
Control Delay (s)	0.0	0.1	20.1			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.1	20.1			
Approach LOS			C			
Intersection Summary						
Average Delay		0.5				
Intersection Capacity Utilization		47.4%	ICU Level of Service	A		
Analysis Period (min)		15				

# HCM Unsignalized Intersection Capacity Analysis

## 13: Access 4 & S. Pope Lick

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↗	
Traffic Volume (veh/h)	603	4	3	203	16	13
Future Volume (Veh/h)	603	4	3	203	16	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	655	4	3	221	17	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)				570		
pX, platoon unblocked						
vC, conflicting volume			659		884	657
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			659		884	657
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	97
cM capacity (veh/h)			929		315	465
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	659	224	31			
Volume Left	0	3	17			
Volume Right	4	0	14			
cSH	1700	929	369			
Volume to Capacity	0.39	0.00	0.08			
Queue Length 95th (ft)	0	0	7			
Control Delay (s)	0.0	0.2	15.7			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.2	15.7			
Approach LOS			C			
Intersection Summary						
Average Delay		0.6				
Intersection Capacity Utilization		42.0%	ICU Level of Service	A		
Analysis Period (min)		15				



# HCM Unsignalized Intersection Capacity Analysis 15: Access 5 & S. Pope Lick

09/06/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↰	↗	
Traffic Volume (veh/h)	609	7	4	181	26	16
Future Volume (Veh/h)	609	7	4	181	26	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	662	8	4	197	28	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			670		871	666
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			670		871	666
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		91	96
cM capacity (veh/h)			920		320	459
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	670	201	45			
Volume Left	0	4	28			
Volume Right	8	0	17			
cSH	1700	920	362			
Volume to Capacity	0.39	0.00	0.12			
Queue Length 95th (ft)	0	0	11			
Control Delay (s)	0.0	0.2	16.4			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.2	16.4			
Approach LOS			C			
Intersection Summary						
Average Delay		0.9				
Intersection Capacity Utilization		42.5%		ICU Level of Service	A	
Analysis Period (min)		15				

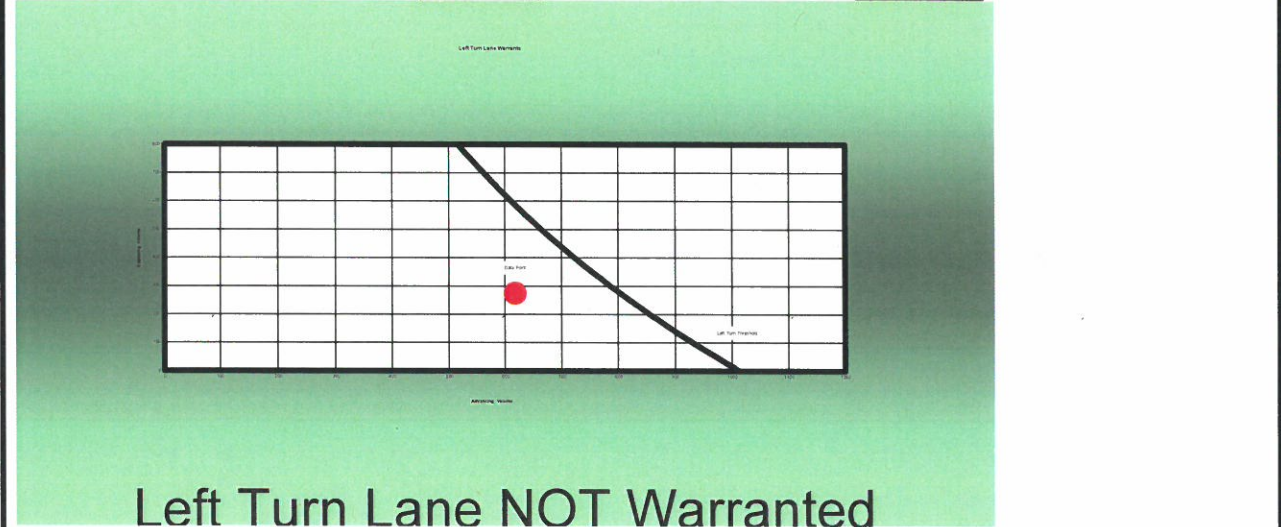
## **APPENDIX F: AUXILLIARY TURN LANE WARRANTS**



**Access Point 1 (AM Peak)**  
**Westbound Left Turn Lane Warrants**

## Input Fields

Left Turn Volume (vph)	18	Speed Limit (mph)	35
Advancing Volume (vph)	615	No. of through lanes	2
Opposing Volume (vph)	274	Percent Heavy Vehicles (decimal percent)	0.05

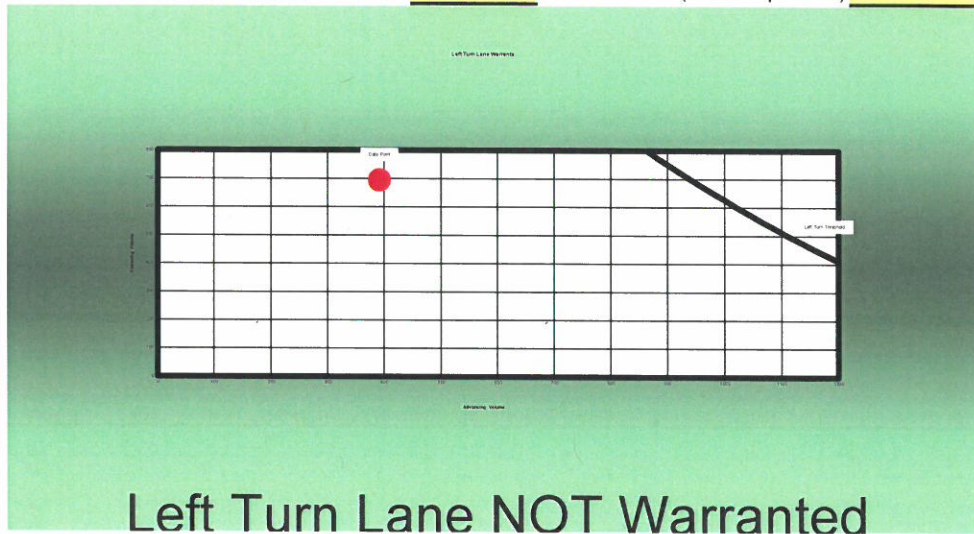


Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

## Access Point 1 (PM Peak) Westbound Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	4	Speed Limit (mph)	35
Advancing Volume (vph)	387	No. of through lanes	2
Opposing Volume (vph)	695	Percent Heavy Vehicles (decimal percent)	0.05



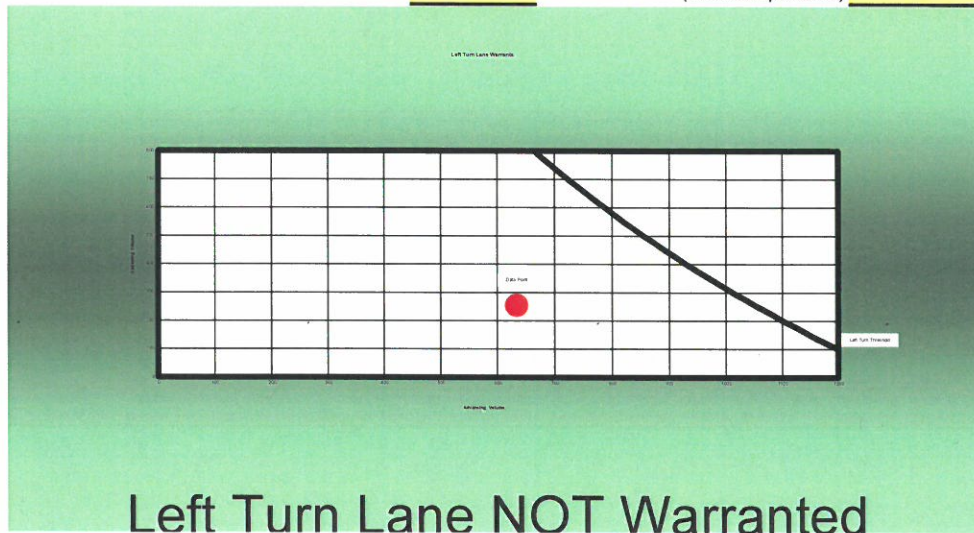
Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.



## Access Point 2 (AM Peak) Westbound Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	11	Speed Limit (mph)	35
Advancing Volume (vph)	631	No. of through lanes	2
Opposing Volume (vph)	255	Percent Heavy Vehicles (decimal percent)	0.05

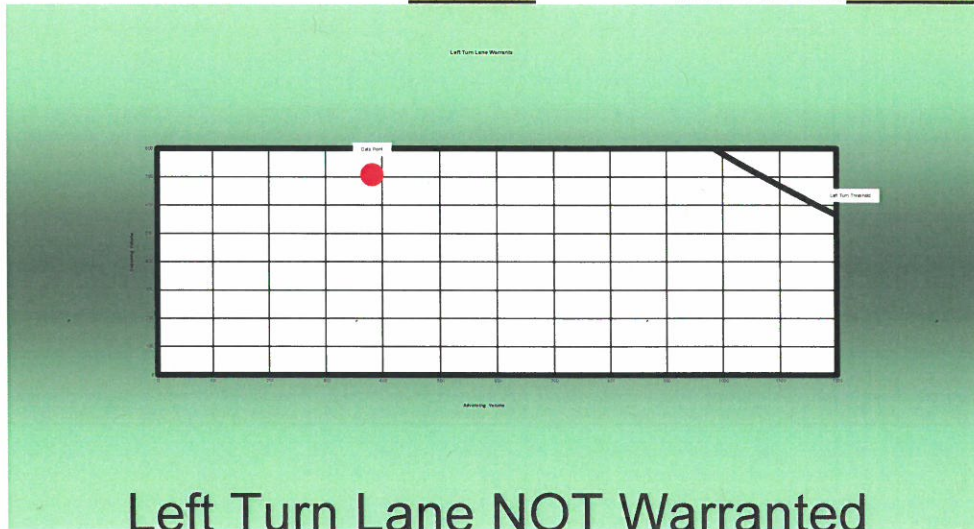


Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

## Access Point 2 (PM Peak) Westbound Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	3	Speed Limit (mph)	35
Advancing Volume (vph)	378	No. of through lanes	2
Opposing Volume (vph)	707	Percent Heavy Vehicles (decimal percent)	0.05



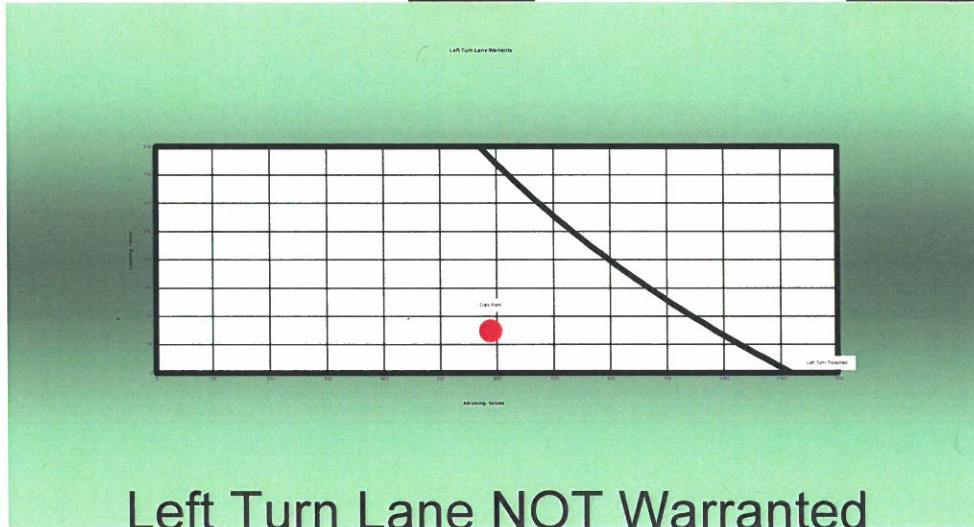
Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.



## Access Point 4 (AM Peak) Westbound Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	14	Speed Limit (mph)	35
Advancing Volume (vph)	587	No. of through lanes	2
Opposing Volume (vph)	149	Percent Heavy Vehicles (decimal percent)	0.05

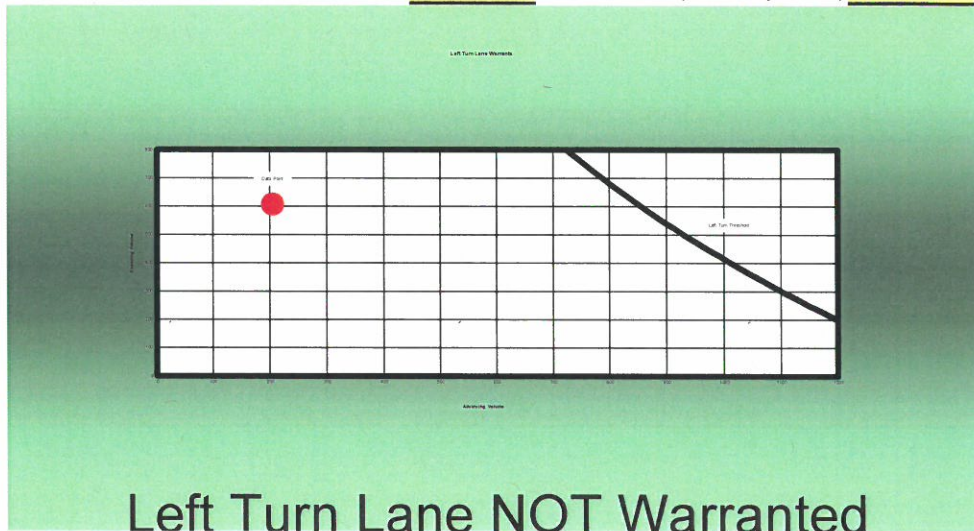


Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

## Access Point 4 (PM Peak) Westbound Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	3	Speed Limit (mph)	35
Advancing Volume (vph)	203	No. of through lanes	2
Opposing Volume (vph)	607	Percent Heavy Vehicles (decimal percent)	0.05



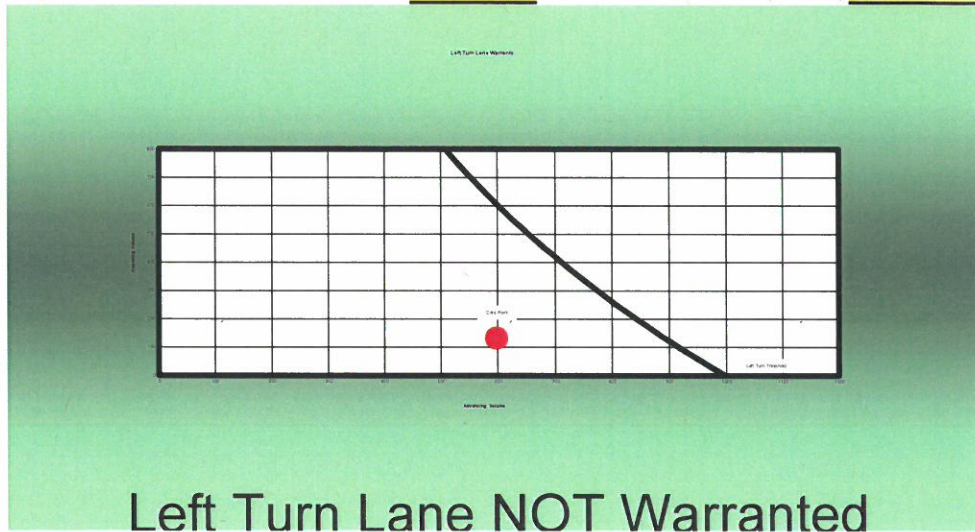
Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.



## Access Point 5 (AM Peak) Westbound Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	18	Speed Limit (mph)	35
Advancing Volume (vph)	597	No. of through lanes	2
Opposing Volume (vph)	133	Percent Heavy Vehicles (decimal percent)	0.05

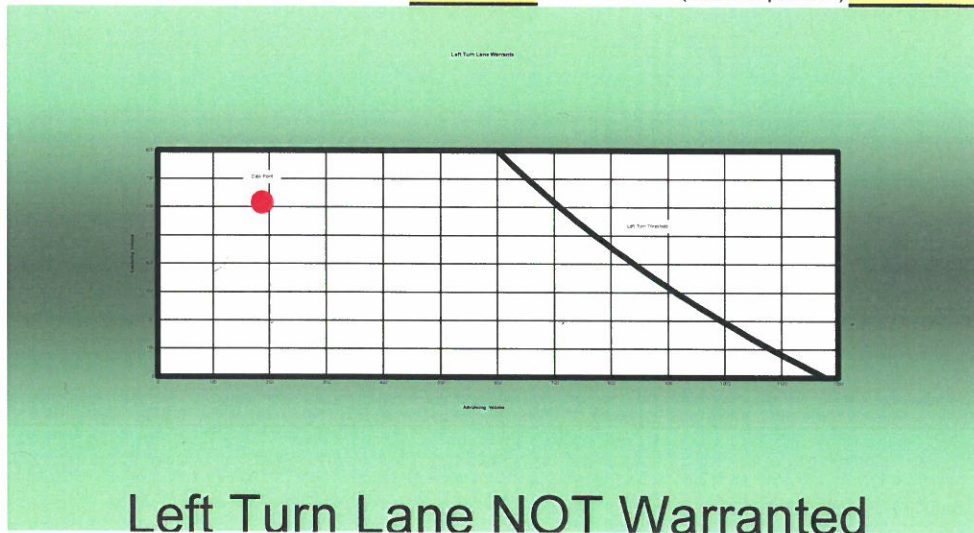


Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

## Access Point 5 (PM Peak) Westbound Left Turn Lane Warrants

### Input Fields

Left Turn Volume (vph)	4	Speed Limit (mph)	35
Advancing Volume (vph)	185	No. of through lanes	2
Opposing Volume (vph)	616	Percent Heavy Vehicles (decimal percent)	0.05



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.



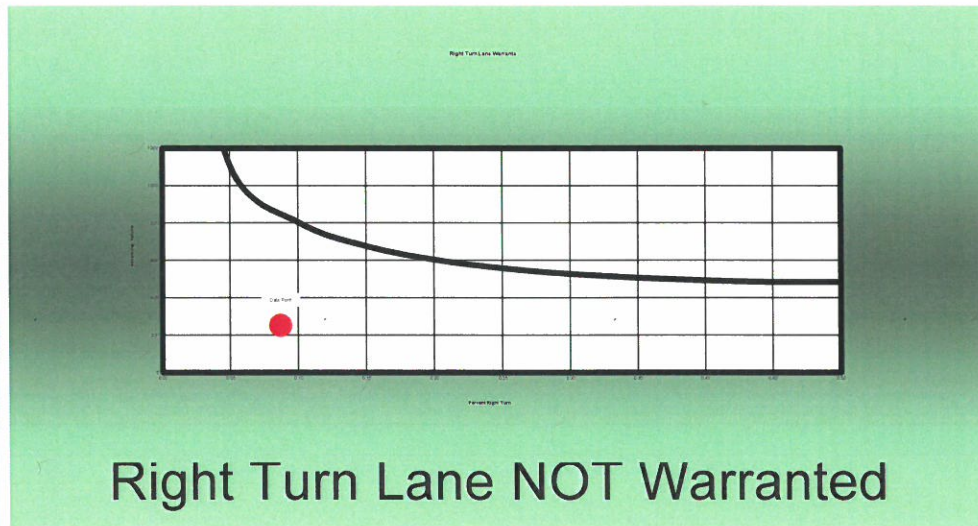
## Access Point 1 (AM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph) 22

Speed Limit (mph) 35

Advancing Volume (vph) 252



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

## Access Point 1 (PM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph)

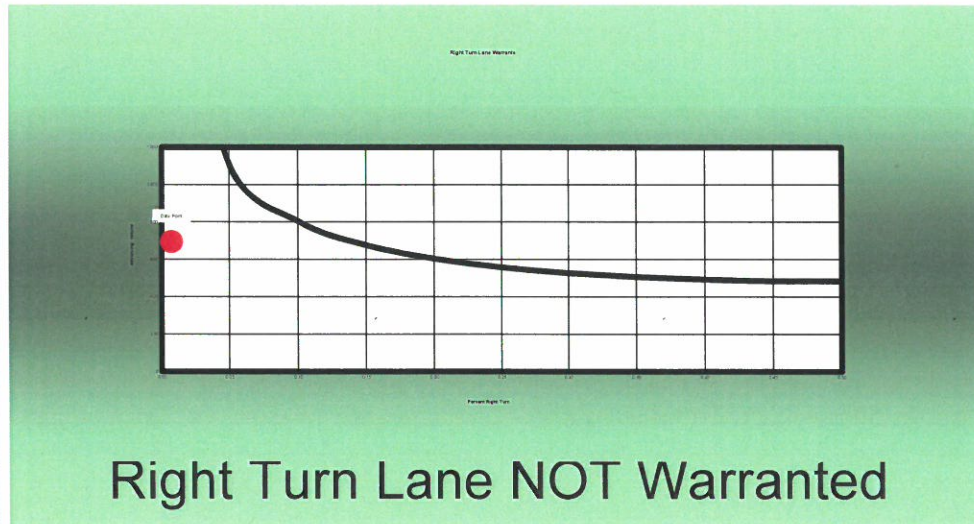
5

Speed Limit (mph)

35

Advancing Volume (vph)

695



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.



## Access Point 2 (AM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph)

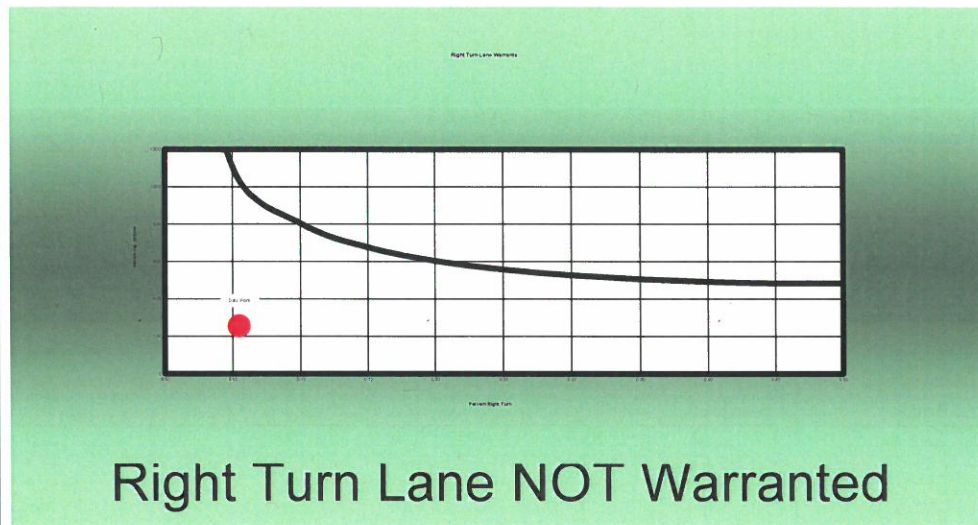
14

Speed Limit (mph)

35

Advancing Volume (vph)

255



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

## Access Point 2 (PM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph)

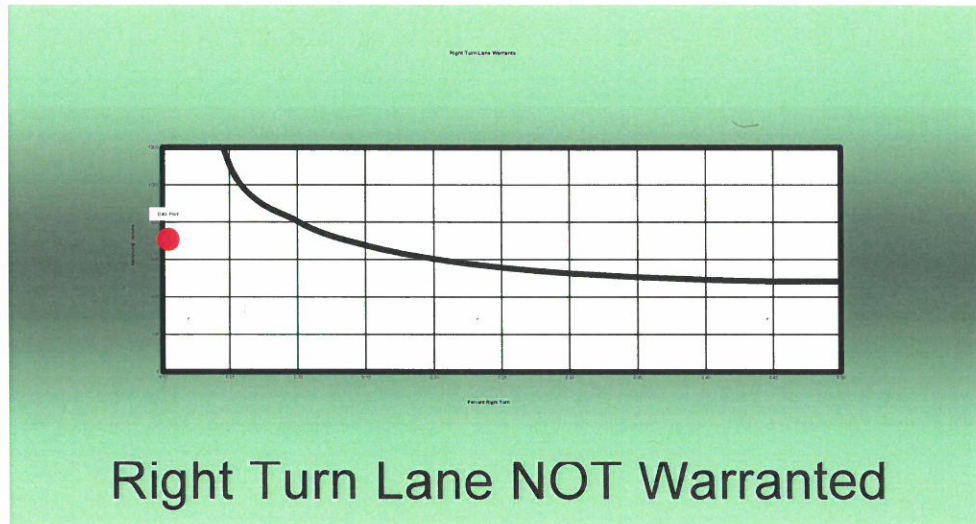
3

Speed Limit (mph)

35

Advancing Volume (vph)

707



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.



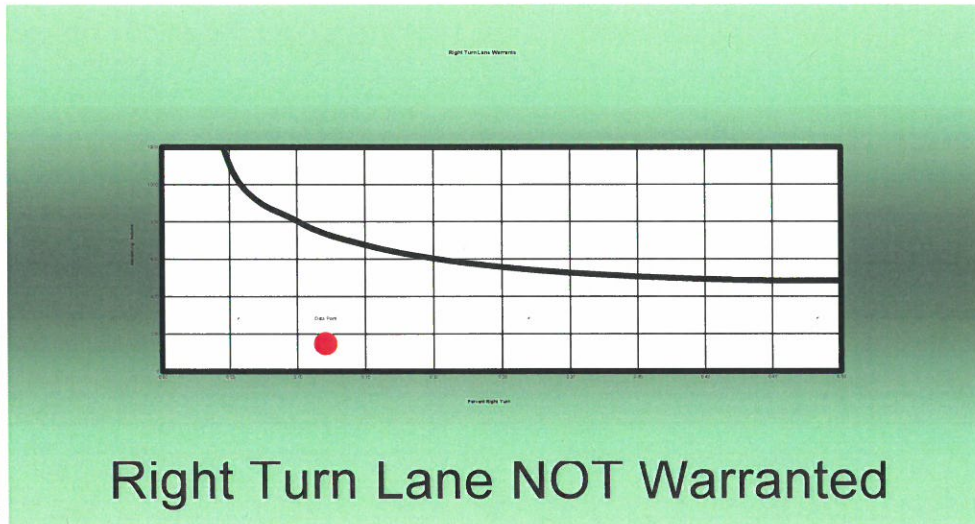
## Access Point 4 (AM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph) 18

Speed Limit (mph) 35

Advancing Volume (vph) 149



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

## Access Point 4 (PM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph)

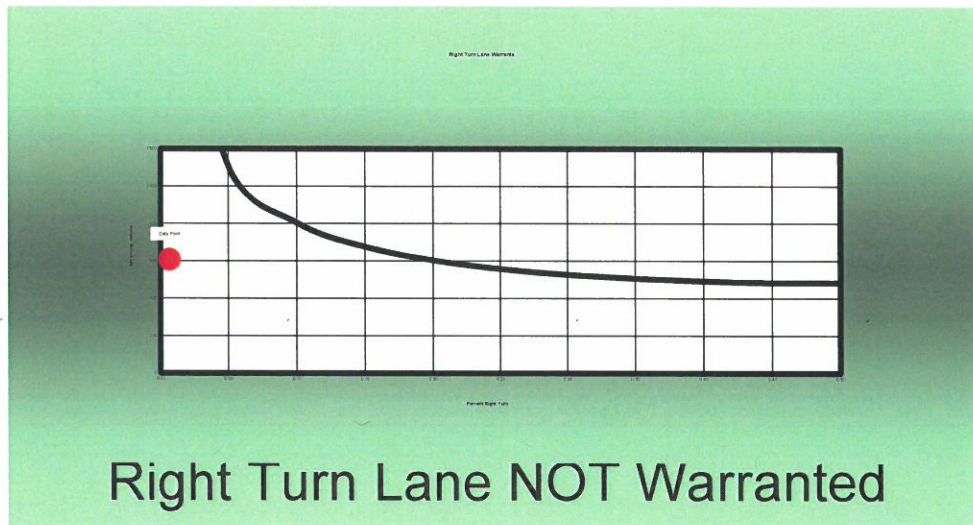
4

Speed Limit (mph)

35

Advancing Volume (vph)

607



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.



## Access Point 5 (AM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph)

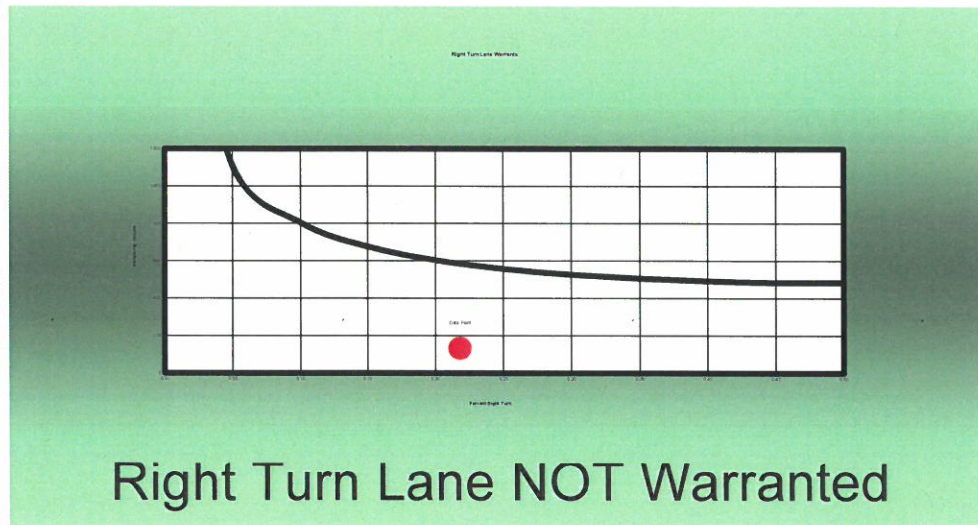
29

Speed Limit (mph)

35

Advancing Volume (vph)

133



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

## Access Point 5 (PM Peak) Eastbound Right Turn Lane Warrants

### Input Fields

Right Turn Volume (vph)

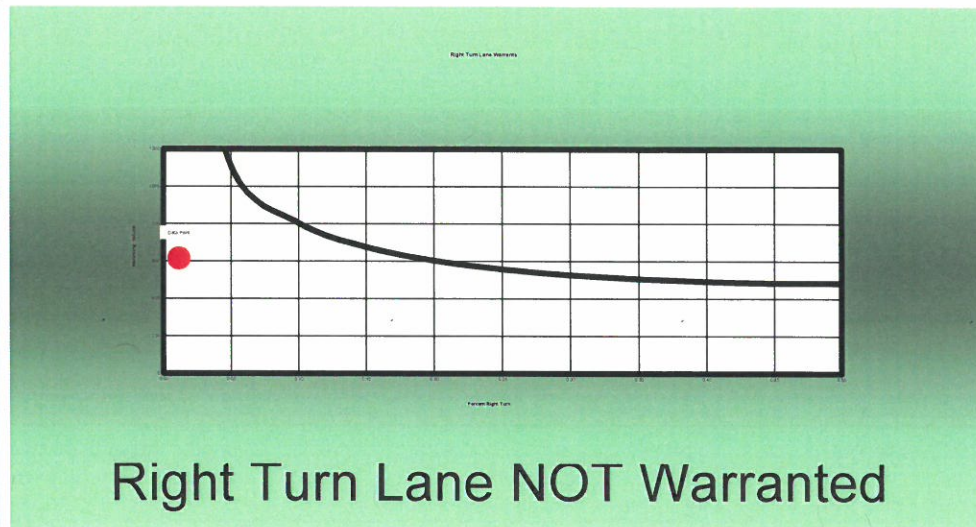
7

Speed Limit (mph)

35

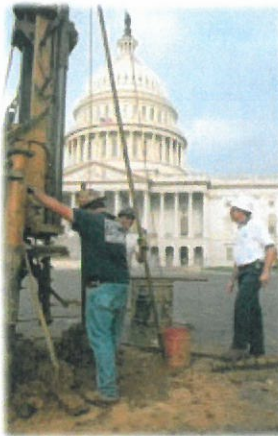
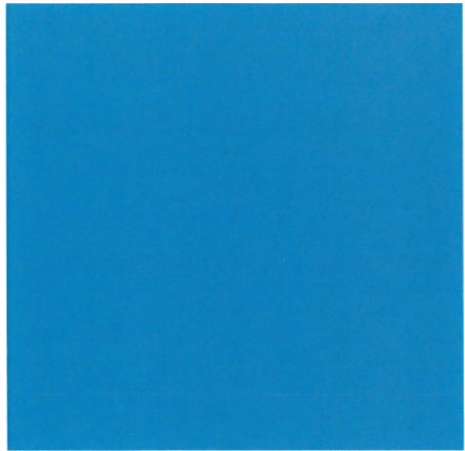
Advancing Volume (vph)

616



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.





# ECS Southeast, LLP

Geotechnical Engineering Report

Tucker Station Road Property

Tucker Station Road  
Louisville, Jefferson County, Kentucky 40299

ECS Project Number 61:2606

December 22, 2021

Received August 15, 2022 Planning & Design



22-ZONE-0098



**ECS SOUTHEAST, LLP**

Geotechnical • Construction Materials • Environmental • Facilities

"Setting the Standard for Service"

December 22, 2021

Xebec Realty  
2100 Ross Avenue, Suite 895  
Dallas, Texas 75201

Attention: Mr. Jake Spring, Vice President of Acquisitions

ECS Project No. 61:2606

Reference: Geotechnical Engineering Report  
**Tucker Station Road Property**  
Tucker Station Road  
Louisville, Jefferson County, Kentucky 40299

Dear Mr. Spring:

ECS Southeast, LLP (ECS) has completed the subsurface exploration and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with ECS Proposal No. 61:P2474, dated September 22, 2021.

This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration, laboratory testing conducted, and our geotechnical related design and construction recommendations.

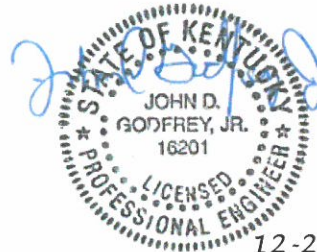
It has been our pleasure to be of service to Xebec Realty during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase and would like to provide our services during construction operations as well to confirm the interpreted subsurface conditions utilized in this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact the writers.

Respectfully submitted,

**ECS Southeast, LLP**

**Bashir Hasanzadeh, Ph.D.**  
Project Engineer

[Bhasanzadeh@ecslimited.com](mailto:Bhasanzadeh@ecslimited.com)



12-22-2021

**John D. Godfrey Jr., P.E.**  
Principal Engineer



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## EXECUTIVE SUMMARY

**This Executive Summary presents a very brief overview of the geotechnical conditions at this site that are expected to affect design and construction. The following conditions were characteristic of the encountered site and subsurface conditions:**

- The site is an approximately 108 acres of land on Tucker Station Road in Louisville, Kentucky and consists of wooded areas, agricultural fields, several buildings (residential houses) and outbuildings, access roads and driveways, a creek/swale, an existing stockpile of construction debris (mainly crushed asphalt), and an existing pond. The site is undulating but generally sloped downward to the south of the site with a maximum elevation difference of approximately 20 to 30 feet within the proposed building footprints.
- Surface materials generally consisted of approximately 1 to 21 inches of topsoil. The thicker areas of topsoil were located within the agriculturally disturbed areas. In Borings B-37, B-45, and B-46, surface materials consisted of 8 to 18 inches of gravel (crushed stone).
- Existing fill was encountered below surface materials in nine (9) borings and generally consisted of silty clay with trace to some crushed stone, crushed asphalt, and organics which extended to depths of approximately 0.5 to greater than 8.5 feet below existing grades in our boring locations. In Boring B-37, fill extended to refusal (possible boulder) at approximately 8.5 feet below existing grades. In Boring B-53, fill extended to boring termination at 5.5 feet below existing grade.
- Fill or surface materials were underlain by native soils. In forty-three (43) borings, native soil consisted of brown to tan to orange brown, low to moderate plasticity, soft to hard, dry to very moist, silty LEAN CLAY with trace to little black oxide nodules. In seven (7) borings, lean clay was extended to refusal or boring termination.
- In forty-eight (48) borings, surface materials, fill, or lean clay were underlain by tan to orange brown with gray mottling, high plasticity, stiff to hard, dry to very moist, silty FAT CLAY with trace to little black oxide nodules which extended to refusal or boring termination.
- In forty-seven (47) borings, refusal was encountered between approximately 1.9 and 11.6 feet below existing grades. Refusal was not encountered prior to boring termination at approximately 8 or 5.5 feet below existing grades at the remainder of borings.
- Refusal materials were cored in four (4) borings and were consisted of light to medium gray to yellow gray, completely weathered to unweathered, thin to massive bedded, soft to hard limestone with interbedded shale in two borings.
- Groundwater was encountered in Boring B-21 in soil-rock interface at approximately 4.5 feet below existing grades. Groundwater was not encountered in the remainder of borings at the time of drilling.

### GEOTECHNICAL CONCERNS:

- |                               |                      |                          |
|-------------------------------|----------------------|--------------------------|
| – Shallow Refusal             | – Existing Utilities | – Degradable Soils       |
| – Deep Fills                  | – Plastic Clays      | – Reuse of On-Site Soils |
| – Existing Fill/Possible Fill | – Pond and Creek     | – Subgrade Improvement   |
| – Existing Constructions      | – Agricultural Use   | – Weather Considerations |
| – Existing Pavements          | – Trees              |                          |

### DESIGN & CONSTRUCTION RECOMMENDATIONS:

- The proposed buildings may be supported on conventional shallow foundations bearing on stiff or stronger undisturbed inorganic clay, structural fill as defined in this report, flowable fill, lean concrete, or competent bedrock. ECS does not recommend foundations bearing in or within the existing undocumented fill materials. The following net allowable design bearing pressures may be used in foundation design:



- 
- 2,000 psf for continuous wall foundations bearing on soil.
  - 2,400 psf for isolated column foundations bearing on soil.
  - 5,000 psf for foundations bearing on competent rock.
- 
- Soil bearing foundations are expected to be dominant. Individual foundations must not bear on soil and rock simultaneously unless they are specifically designed to accommodate the stress concentrations associated with variable bearing conditions (e.g., use of grade beams).
  - Existing fill and below grade structures and utilities in the proposed foundation areas should be removed in their entirety. Most of the existing fill encountered did not appear to be adequately compacted. In planned floor slab and pavement areas, existing fill and below grade structures and utilities may be left in-place provided they are 2 feet or more below finished grades, the area is determined to be adequate via proofrolling in the presence of an ECS representative at the time of construction, and the owner is willing to accept the associated risks. If abandoned utilities are left in-place in floor slab and pavement areas, then the abandoned utilities should be grouted full.
  - Floors may be designed as slabs-on-grade with a subgrade modulus of 100 pci.
  - A site class of "C" may be used in seismic design per the 2018 Kentucky Building Code.
  - Foundation excavations and floor and pavement subgrades should be evaluated by an ECS representative during construction to confirm that encountered conditions are consistent with the findings of this exploration.

*This summary should not be separated from the entire text of the report with the complete qualifications and considerations mentioned herein. Details of our conclusions and recommendations are discussed in the report text. Findings and recommendations in this report are based on an assumed finish floor elevation. As such, ECS should be contacted to provide appropriate values and recommendations for changes to the assumed elevations.*

---

## 1.0 INTRODUCTION

### 1.1 GENERAL

The purpose of this report is to provide the results of our subsurface exploration, engineering analyses, and geotechnical recommendations for the design of foundations, floor slabs, and pavements for the proposed development on Tucker Station Road, Louisville, Kentucky. Also included are geotechnical subgrade preparation and fill placement guidelines. The recommendations developed for this report are based on project information supplied by Mr. Jake Spring of Xebec Realty.

### 1.2 SCOPE OF SERVICES

Fifty-seven (57) soil test borings were performed at the selected locations in the proposed construction areas. A laboratory testing program was also implemented to characterize the physical and engineering properties of the subsurface soils. This report describes our exploratory and testing procedures, presents our findings and evaluations, and includes the following:

- Summary of the project information provided.
- Description of existing site conditions, reported geology, and encountered subsurface conditions.
- Assessment of general adequacy of the site for the intended use from a geotechnical standpoint.
- Site preparation and structural fill placement recommendations.
- Recommended foundation type(s), design parameters, and construction guidelines.
- Recommended ground floor bearing parameters and construction guidelines.
- Recommended flexible and rigid pavement design parameters and construction guidelines.
- Site class for seismic design based on the boring data and on available data from the vicinity.
- Other identified geotechnical concerns and recommended additional sampling/testing/analysis.

Our services were provided in accordance with our Terms and Conditions of Service included in our Proposal No. 61:P2474, dated September 22, 2021.



## 2.0 PROJECT INFORMATION

### 2.1 SITE INFORMATION

SUBJECT	SUMMARY OF EXISTING SITE CONDITIONS
Site Address	The site is an approximately 108 acres of land on Tucker Station Road in Louisville, Kentucky. For location, refer to <b>Site Location Diagram</b> and <b>Boring Location Plan</b> in <b>Appendix</b> .
General Description & Topography	The site consists of wooded areas, agricultural fields, several buildings (residential houses) and outbuildings, access roads and driveways, a creek/swale, an existing stockpile of construction debris (mainly crushed asphalt), and an existing pond. The site is undulating but generally sloped downward to the south of the site with a maximum elevation difference of approximately 20 to 30 feet within the proposed building footprints.
Surface Water Drainage	Surface drainage appeared to be poor to fair.
Ground Cover	<ul style="list-style-type: none"> <li>– Topsoil</li> <li>– Gravel/crushed stone (in Borings B-37, B-45, and B-46)</li> </ul>
Existing Utilities	Several underground utilities (including gas, water, electric, communication, etc.) were identified in the proposed construction areas.

### 2.2 PROPOSED CONSTRUCTION

SUBJECT	DESIGN INFORMATION / EXPECTATIONS
Project Description	Four (4) industrial warehouses between approximately 195,000 and 285,000 square feet (a total of approximately 950,000 square feet) with surrounding, loading docks, parking areas, and drive lanes are proposed.
Usage	Industrial
Maximum Column Loads	Less than 150 kips (assumed)
Maximum Wall Loads	Less than 5 kips per linear foot (assumed)
Finish Floor Elevation	Proposed Building in Lot 1: EL 668 feet (assumed) Proposed Building in Lot 2: EL 674 feet (assumed) Proposed Building in Lot 3: EL 673 feet (assumed) Proposed Building in Lot 3: EL 673 feet (assumed)
Maximum Cut/Fill	± 15 feet overall site grading for building area (assumed).
Design Traffic Loads	Light Duty: Daily 18-kip equivalent axle load of 7 (parking areas for cars and light trucks). Heavy Duty: Daily 18-kip equivalent axle load of 75 (drive lanes and entrances for cars, light trucks, and the occasional garbage truck).

### 3.0 SITE GEOLOGY

According to the Geologic Map of Jeffersontown Quadrangle, Jefferson County, Kentucky published by the United States Geological Survey (USGS), and information obtained from the Kentucky Geological Survey (KGS) Geologic Information Service website, the majority of the subject site was underlain by "Drakes formation". However, in northwestern portion of the site and along eastern property line, the site was underlain by Osgood & Brassfield Formations.

Site Geology - Underlying Formations <sup>(1)</sup>		
FORMATION	DESCRIPTION	KARST POTENTIAL <sup>2,3</sup>
<b>Osgood &amp; Brassfield Formations</b> (In northwestern portion and along eastern property line)	<u>Osgood Shale:</u> a) Shale and dolomite. b) Shale is greenish gray, silty, poorly fissile, dolomitic; weathers to gray flakes or to yellowish gray or grayish yellow clay. c) Dolomite is yellowish gray with reddish or orange mottling (probably a weathered color), fine grained; occurs at base of unit; resembles lowest dolomite bed of the Laurel Dolomite. d) Outcrop areas of the shale are excellent sites for farm ponds. Unit is not resistant to weathering. <u>Brassfield Formation:</u> e) Three types of limestone. Each generally 2 feet or less thick and may be missing at a given locality. f) At top is an orange yellow, medium grained, fossil fragmental limestone. In middle is a medium to dark gray, fine grained, unfossiliferous limestone. At base is a light olive gray, coarse grained, highly fossiliferous limestone. g) Mapped with the Osgood Formation. The karst potential indicated in the adjacent column is for both formations. The Brassfield Formation is susceptible to karst activity.	Non-karst <sup>4</sup>
<b>Drakes Formation</b> (Majority of the site)	<u>Saluda Dolomite Member:</u> a) Limestone and shale. b) Limestone is light to dark gray, very fine to coarse grained. c) Shale is grayish black, carbonaceous, calcareous, and imperfectly fissile. <u>Bardstown Member:</u> d) LIMESTONE and SHALE. e) Limestone is greenish gray or olive gray, muddy, shaly weathering. f) Shale makes up a small percentage of the unit and is generally indistinguishable from the muddy limestone. g) Basal contact commonly well exposed. <u>Rowland Member:</u> h) LIMESTONE and SHALE. i) Limestone is light gray, olive gray or greenish gray, weathers yellowish gray. Silty and argillaceous, fine to medium grained, slightly dolomitic. j) Shale is olive gray, calcareous, silty and clayey, occurring as partings and thin beds. k) Muddy limestone and shale are more abundant in lower 10 feet and make up about 20 percent of the unit.	Low <sup>4</sup>

Notes:

- (1) Source: Geologic Map of the Jeffersontown Quadrangle, Jefferson County, Kentucky published by the United States Geological Survey, and information obtained from the KGS Geologic Map Information Service website.
- (2) Karst is topography commonly formed over limestone or dolomite and characterized by sinkholes, irregular rock conditions, underground drainage, springs, and caves.
- (3) The karst potential level is based on the tendency for the site to develop or have karst features and is not necessarily indicative of the actual presence or absence of existing karst activity at the site.
- (4) According to the KGS Potential Classification definitions, formations designated with "non-karst" and "low" karst potential are formations where karst feature are rare or absent, and where karst features are poorly developed or absent, respectively.



## 4.0 FIELD EXPLORATION AND LABORATORY TESTING

### 4.1 SUBSURFACE CHARACTERIZATION

SUBJECT	SUMMARY OF SUBSURFACE EXPLORATION <sup>(1)</sup>
<b>Boring Method</b>	Continuous Flight Auger & Direct Push
<b>Sampling Method</b>	Standard Penetration Testing (ASTM D-1586); and Rock Coring (ASTM D-2113)
<b>Number of Borings</b>	Fifty-seven (57) soil test borings: <ul style="list-style-type: none"> <li>– Building 1 – Borings B-01 through B-13</li> <li>– Building 2 – Borings B-14 through B-24</li> <li>– Building 3 – Borings B-25 through B-35</li> <li>– Building 4 – Borings B-36 through B-41</li> <li>– Pavements and Drives – Borings B-42 through B-57</li> </ul>
<b>Boring Locations</b>	Refer to <b>Boring Location Plan</b> in the <b>Appendix</b> for specific locations
<b>Boring Depths</b>	Refer to <b>Boring Records</b> in the <b>Appendix</b>
<b>Logging Method</b>	Full-time presence of an ECS engineer to observe, manage, and document the drilling, sampling and testing results, and encountered conditions. Water level measurement obtained in boreholes during drilling.
<b>Groundwater</b>	Groundwater was encountered in Boring B-21 in soil-rock interface at approximately 4.5 feet below existing grades. Groundwater was not encountered in the remainder of borings at the time of drilling.
<b>Refusal <sup>(2)</sup></b>	In forty-seven (47) borings, refusal was encountered between approximately 1.9 and 11.6 feet below existing grades. Refusal was not encountered prior to boring termination at approximately 8 or 5.5 feet below existing grades at the remainder of borings.

Notes:

- (1) Detailed descriptions of the exploration methods are listed in the **Field Procedures** section of the **Appendix**.
- (2) Refusal is the term applied to material that cannot be penetrated with drilling tools or has a standard penetration resistance exceeding 50 blows per 6-inch increment or 10 blows with little to no penetration of the splitspoon. Refusal may be encountered on continuous bedrock, discontinuous floaters, cemented soil, weathered rock, buried construction debris, buried structures, or other hard subsurface materials.

The following sections provide generalized characterizations of the soil strata. Please refer to the **Boring Records** and **Boring Composite(s)** in the **Appendix** for detail at specific boring locations.

APPROXIMATE DEPTH (FT)	STRATUM	DESCRIPTION	N-VALUES BLOWS PER FOOT (BPF) <sup>2</sup>
0 – 1.8	I	<b>TOPSOIL</b> – Approximately 1 to 21 inches. <b>GRAVEL</b> – Approximately 8 to 18 inches (Borings B-37, B-45, and B-46).	N/A
0.1 – 8.5	II	<b>FILL/POSSIBLE FILL</b> – Brown, tan brown, orange brown, gray, low to high plasticity, dry to moist, silty <b>CLAY</b> with trace to some crushed stone, crushed asphalt, and organics.	4 to 50+
0.2 – 6.8	III	<b>LOW TO MODERATE PLASTICITY CLAY (CL)</b> – Brown, tan to orange brown, low to moderate plasticity, soft to hard, dry to very moist, silty <b>LEAN CLAY</b> with trace to little black oxide nodules.	2 to 21
0.3 – 11.6	IV	<b>HIGH PLASTICITY CLAY (CH)</b> – Tan to orange brown with gray mottling, high plasticity, stiff to hard, dry to very moist, silty <b>FAT CLAY</b> with trace to little black oxide nodules.	5 to 38

APPROXIMATE DEPTH (FT)	STRATUM	DESCRIPTION	N-VALUES BLOWS PER FOOT (BPF) <sup>2</sup>
7.0 – 22.0	V	LIMESTONE – light to medium gray to yellow gray, completely weathered to unweathered, thin to massive bedded, soft to hard (with interbedded shale in two borings) (Rock Core Borings B-9, B-14, B-32, and B-41)	N/A

Notes:

- (1) This summary is generalized and does not describe the actual conditions in each boring. These zones also may not occur at each location. Depths are approximate. Detailed descriptions of the encountered materials are listed on the **Boring Records** in the **Appendix**.
- (2) BPF – Blows per Foot

#### 4.2 LABORATORY TEST SUMMARY

Laboratory testing was performed on selected samples obtained during our field exploration operations. Classification and index property tests were performed. The laboratory testing program included:

- Natural Moisture Content
- Atterberg Limits

Each sample was visually classified on the basis of texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures), including Unified Soil Classification System (USCS) classification symbols, and ASTM D2487 Standard Practice for Classification for Engineering Purposes. After classification, the samples were grouped in the major zones noted on the **Boring Records** in the **Appendix**. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

SUMMARY OF LABORATORY TEST RESULTS <sup>(1), (2)</sup>					
STRATUM	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNIFIED SOIL CLASSIFICATION
II	13.7 – 34.8	–	–	–	–
III	11.7 – 34.5	43, 36	24, 21	19, 15	CL
IV	12.3 – 36.4	75, 88, 81, 69, 79, 79, 63	34, 38, 28, 26, 24, 26, 30	41, 50, 53, 43, 55, 53, 33	CH

Notes:

- (1) A more detailed summary of the laboratory test results is included on the **Boring Records** in the **Appendix**. Detailed descriptions of the laboratory test methods are listed in the **Laboratory Procedures** section of the **Appendix**.
- (2) This table only summarizes the laboratory test results conducted on samples obtained from the recent exploration.



---

## 5.0 GEOTECHNICAL CONCERNS

Analysis of the provided project information, observed site conditions, encountered subsurface conditions, and our experience with similar projects, revealed the following important geotechnical considerations. These considerations must be properly addressed in planning, budgeting, design, and construction phases to reduce impacts on construction cost, completion schedule, performance of the building and site improvements, and long-term maintenance of the proposed construction. Our recommendations for addressing these concerns are provided in subsequent sections of this report.

### 5.1 SHALLOW REFUSAL

- Auger and/or direct push refusal was encountered approximately 1.9 to 11.6 feet below existing grades.
- Based on our assumed FFEs, rock will likely be anticipated at some foundation bearing depths, but soil bearing conditions should predominate throughout the planned foundation areas.
- The presence of refusal above planned foundation, slab, or utility elevations can increase site development costs and slow construction, especially if the cost of excavation methods is not considered in planning and design.
- Foundation design should accommodate the different materials that will be encountered at the foundation depths.
- It is possible that the depth to rock in unexplored areas may vary significantly from the depths indicated by the test borings.
- Removal of most of the on-site refusal material, if necessary, with conventional excavation equipment is not expected to be effective. The competent rock on-site requires special rock removal equipment (e.g., hoeram, blasting, etc.) for efficient excavation.
- The difficulty of removal will be affected by the methodology used, the experience of the operator, and the type of equipment used.
- Greater than normal differential settlement likely will occur if foundations are supported on both rock and soil simultaneously. Alternatives to address this concern are included in **Section 6.6**.

### 5.2 DEEP FILLS

- Deep fills are considered those more than 10 feet. As fill depths exceed 10 feet, settlement and differential support issues become more of a concern.
- In general, we would anticipate that properly placed and compacted clay fill will consolidate 1 to 2 percent of the height of the fill, which for 10 feet of fill, translates to approximately 1 to 2 ½ inches of settlement associated exclusively from consolidation of the new fill under its own weight.
- While much of this settlement would occur during or shortly after placement, as fills get deeper, the settlement periods lengthens so that some settlement would occur well after placement and could damage overlying construction.
- In addition to the settlement of the new fill, the underlying residual soils also will consolidate under the weight of the new fill. This settlement will increase as both the height of the new fill and the compressibility of the underlying residual soil increases.

- For the anticipated depth of deep fills (generally in the range of 10 to 15 feet), the anticipated settlement of the residual soils under the weight of new deep fills likely would be less than 1 inch.
- Settlement rates can be accelerated by filling above planned grade to surcharge the area.
- Flexible utility connections can be used to accommodate expected differential settlement.
- The concerns associated with deep fills can be reduced by following the fill placement recommendations provided in subsequent sections of this report.

### 5.3 EXISTING FILL/POSSIBLE FILL

- Existing uncontrolled fill was encountered in several borings. The fill materials encountered appeared to have not been placed in a controlled manner or with adequate compaction effort.
- The existing fill (possible fill) should be considered uncontrolled fill since no records are available documenting the material quality or content. The unknown quality, consistency, and behavior characteristics of uncontrolled fill creates concerns for the behavior of overlying construction.
- Potential problems for the proposed construction created by the presence of the existing uncontrolled fill include larger than normal total and differential settlements, collapse of buried objects, and poor bearing support. The manifestation of these problems can cause poor foundation, slab, and pavement performance.
- Because of the unacceptably high risks associated with uncontrolled fill in foundation areas, support of new foundations in or over uncontrolled fill is not recommended.
- In some cases, existing fill could be left in place in new floor slab and pavement areas if the owner is willing to accept the associated risk, including, but not limited to greater than normal distress and future repair.

### 5.4 EXISTING CONSTRUCTION

- The planned construction areas included several existing buildings which will be demolished.
- The buried (below grade) components associated with the existing structures (e.g., foundations, utilities, etc.) can cause new construction to behave poorly for many reasons, including stress concentrations resulting from point loading and poor support caused by old backfill.
- Cosmetic and structural damage to the overlying construction can result if the existing building components are not properly addressed during construction.
- Care should be exercised during demolition to reduce the amount of area disturbed during removal activities (e.g., do not push or pull foundations from the ground because this process commonly disturbs large zones of adjacent soils).
- Backfill should be placed following the recommendations under structural fill section.
- It is important that subgrades are carefully evaluated during construction for poorly compacted backfill associated with buried or removed building components and improved as necessary per recommendations provided by ECS during construction.

### 5.5 EXISTING PAVEMENTS

- Existing surfaces included asphalt parking areas and driveways.



- Existing pavements should be left in-place as long as possible to act as a construction platform.
- Water is commonly trapped under surface paving. Accordingly, soft, saturated soils may be present in some areas below existing pavement.
- Water seepage into excavations from the existing gravel base and utility backfill should be anticipated.
- Moisture conditioning of soils underlying these surface materials commonly is necessary and should be anticipated for this project.
- In addition, asphalt pavement commonly obscures the presence of soft soils. Some undercutting of soft soils below these surface materials should be anticipated.

## 5.6 EXISTING UTILITIES

- Future access to existing utilities will be difficult if covered by new construction.
- Existing utilities could be damaged by construction activity or by loads from the new structure.
- If existing or former underground utilities are abandoned and not removed or grouted full, soil may migrate into open voids (e.g., open pipes from utilities), causing subsidence of the overlying construction.
- In addition, existing utility lines, if located within proposed construction areas, may cause the new construction to behave unexpectedly due to the variable support conditions caused by old backfill.
- Furthermore, old backfill along utility lines also may provide inadequate support due to poor compaction. The poor support conditions may result in settlement or distress of the overlying new construction. Based on our experience, existing utility backfill rarely is adequate for support of new foundations.
- In floor slab and pavement areas, the load support characteristics of the backfill along utility lines typically can be assessed with careful proofrolling and subgrade evaluation during construction. Some undercutting and/or bridging of these backfill areas should be anticipated.

## 5.7 PLASTIC CLAYS

- Highly plastic clays (i.e. plasticity index greater than 30 – generally designated as “CH” or FAT CLAYS in the report and on boring logs) were encountered in most borings.
- Highly plastic clays are susceptible to volume changes (shrink/swell problems) with changes in moisture. Accordingly, it is advisable to reduce the potential for moisture changes to the soil because of the shrink/swell concerns and the possible impact on the proposed construction.
- Volume changes associated with the highly plastic clays in the geologic formation underlying the site have the potential to produce building or other improvement damage (e.g., floor heave or subsidence, door/window alignment changes, hardscape movements, and drywall cracking).
- Movement may be cyclic (shrink when dry, swell when wet), continuing to produce building distortions that require increased and regular maintenance or repair.
- Typically, the volume changes are not of the magnitude to result in damage that would impair the structural integrity of buildings.

- Exposure to prolonged wet or dry weather conditions during construction can result in volume changes in bearing and subgrade materials or problems achieving the required compaction levels.
- The risks associated with highly plastic clays are common for the project vicinity and are not unique to the site. Most of the effects of highly plastic clays can be reduced by employing the design and construction recommendations described in subsequent sections of this report.

## **5.8 POND AND CREEK**

- A pond was located in the southwestern portion of the proposed Building 1, and a creek was crossing the center of the site from north to south. Soft, inadequate soils (e.g., organic, saturated deposits) requiring remediation and/or stabilization typically are encountered in and around these areas. In addition, trapped and/or perched groundwater can be encountered within these areas.
- The soft, inadequate soils and groundwater issues may complicate construction and increase site development costs. Both conditions should be anticipated along existing drainage swales and within the pond areas and can be addressed during construction with proper planning and budgeting.
- The impact of pond and creek on site development costs can be reduced by scheduling site work during the drier months of the year.

## **5.9 AGRICULTURAL USE**

- Soft soils, organic soils, poorly drained soils, and old drain tiles commonly are associated with the past agricultural activities.
- The upper zone of agricultural land typically is low in density and high in moisture.
- The past agricultural activities may necessitate moisture conditioning, undercutting and/or recompaction of the existing surface soils if exposed at final grades or if fill is to be placed over them, especially if construction occurs during the wetter parts of the year.
- Pockets of soils with a high organic matter (if encountered below the predominant topsoil depths) must be removed.
- Old drain tiles commonly have water trapped in them and often are surrounded by soft, organic soils.
- When drain tiles are damaged during construction, the release of the trapped water can cause problems (e.g., saturation of subgrade soils or the release of water in foundation or utility excavations). These conditions, if they occur, typically are addressed during construction based on the specifics of the individual situation.
- These conditions should be anticipated and included in site preparation planning and budgeting and construction scheduling.
- The impact of past agricultural activities on-site can be reduced by scheduling site work during the drier months of the year.

## **5.10 TREES**

- Mature trees were located within the boundaries of the proposed buildings.
- Organic matter, roots, topsoil, and inadequate soils are associated with trees and heavy vegetative growth.



- Structural problems can result if trees and root balls are not properly removed and backfilled or if topsoil depths are not removed during the earthwork operations.
- Fill material that contains significant roots (i.e., more than 3 percent organics as determined by loss-on-ignition testing) is not adequate for use as controlled fill.
- It is important to note that the topsoil depths reported for this exploration were based on measurements in specific small-diameter samples, which were representative of that location but may not have been representative of each condition or predominant conditions.
- To efficiently remove extensive or pervasive root systems associated with “localized” heavily vegetated areas (e.g., pockets of trees or heavily overgrown areas) and to create a subgrade that drains, it is sometimes necessary to remove topsoil to a consistent depth over an area that exceeds the specific topsoil depths in localized areas (e.g., may strip 12 inches in an area even though the topsoil depths varied from 4 to 12 inches).
- Stripping more than the reported topsoil depths should be expected in some areas, especially areas with current or past heavy vegetation growth or trees.

#### 5.11 DEGRADABLE SOILS

- Most of the soils on-site are susceptible to degradation. Degradable soils readily lose strength, become soft, and “pump” when subjected to construction equipment, especially under wet conditions.
- Undercutting and/or stabilization of soft clay soils could have a cost impact on the project, especially if not properly addressed in the project documents (e.g., definition of what is inadequate and the responsibility for maintenance of these soils once stabilized) or if not properly addressed during construction (e.g., subjected to repeated construction traffic with no protection).

#### 5.12 REUSE OF ON-SITE SOILS

- In general, most of the on-site soils appeared adequate for reuse as structural fill provided the soils are moisture conditioned to appropriate moisture contents for compaction.
- Existing fill may be considered for reuse provided no inadequate materials are present. Sorting to remove inadequate (e.g., organics, remnant topsoil, remnant construction debris, etc.) or oversized material from the existing fill should be expected prior to reuse.
- Some wetting, drying, mixing or chemical treatment of the soils may be necessary to obtain workable moisture contents for the on-site soils, especially during wetter times of the year.
- Reuse of the on-site soils will be subject to the weather considerations described subsequently.

#### 5.13 SUBGRADE IMPROVEMENT

- Most borings encountered soft, weak soils in the upper approximate 2 to 2.5 feet below existing grades.
- Localized improvements will likely be needed in some areas, especially if construction occurs during the wetter/cooler periods of the year.
- The required extent of improvement will depend to a large degree on when earthwork operations take place as well as on how the earthwork contractor prepares the site. The level of improvement likely will increase if:
  - Construction traffic is concentrated along localized soft or poor subgrade routes.

- Earthwork occurs during cool, wet periods (typically November through May).
- Provided construction occurs during the drier time of the year, it would be our expectation that much of the improvement could be achieved by scarifying, drying and recompacting the soils. If construction occurs during the wetter periods of the year, more aggressive treatment would likely be required (i.e., removal and replacement or lime drying).
- Subgrade improvement alternatives, if required, include but are not limited to:
  - Scarification, drying, and recompaction of surface materials.
  - Removal of inadequate materials and replacement with structural fill.
  - Bridging with a thick lift of limestone aggregate.
  - Placement of a geosynthetic or geo-grid in combination with granular fill.
  - Chemical stabilization and/or modification (e.g., kiln dust, lime, or Portland cement).
- The type of subgrade improvement chosen should take weather limitations, or other limitations unique to each method, into consideration.

#### 5.14 WEATHER CONSIDERATIONS

- Conducting site work during periods of cool and/or wet weather (typically November to May) can be problematic for sites in the project region.
- Proper compaction of clay fill generally is very difficult to achieve during periods of cool and/or wet weather. Some drying, mixing, or chemical treatment of the soils would be necessary to obtain workable moisture contents for the on-site soils or proposed borrow materials if placed during the cool, wet seasons.
- If compaction of clay fill takes place under wet weather conditions, increased earthwork costs, an extended construction schedule, and soil improvement (likely chemical stabilization) likely would be required. In addition, reuse of the site soils may be severely limited.
- Surface soils tend to be softer during wet weather conditions due to the excess moisture in the near surface soils.
- Weather-softened surface soils tend to result in more undercutting and/or stabilization than would be required during dry weather conditions, which increases site development costs.
- Project specifications should include definitions and require contractors to provide unit rates for subgrade stabilization, removal of inadequate soils, and replacement of inadequate soils with structural fill appropriate for use during the anticipated construction season.



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## 6.0 SITE CONSTRUCTION RECOMMENDATIONS

### 6.1 PLANNING

- Adjust project plans, specifications, schedules and budgets to incorporate the issues discussed in **Section 5.0** and the recommendations provided herein.
- It will be critical that the planning of earthwork operations is carefully considered and executed given the presence of degradable soils.
- Findings and recommendations in this report were based on assumed finish floor elevations. As such, ECS should be contacted to provide appropriate values and recommendations for changes to the assumed elevations.

### 6.2 SUBGRADE PREPARATION

- Localized improvements will likely be needed in some areas, especially if construction occurs during the wetter/cooler periods of the year.
- The depth and extent of improvement required will be dependent on the time of year of construction, the weather preceding site work, and the site work techniques employed.
- The following subsections describe our general recommendations for preparing the site subgrade prior to fill placement operations.

#### Stripping and Grubbing:

- Materials required to be stripped:
  - Topsoil, asphalt pavements, vegetation, large root zones, organic material, and excessively wet, desiccated, frozen, contaminated, existing fill (especially with shale content), or otherwise inadequate materials.
- Minimum extent of stripping:
  - 10 feet beyond the building limits.
  - 5 feet beyond the pavement limits.
- ECS should observe and document that topsoil and poor surficial materials have been removed prior to the placement of structural fill or construction of structures.
- Stripped material not meeting structural fill requirements should be considered for reuse in landscaped areas only.

#### Subgrade Evaluation:

- Proofroll the site in the presence of an ECS representative with a pneumatic-tired vehicle (e.g., triaxial dump truck) loaded as recommended by the ECS representative.
- Proofroll subgrades prior to filling or after excavation to grade.
- Proofroll slab and pavement subgrades prior to granular base placement.
- Areas judged by the ECS representative to deflect excessively during proofrolling should be remediated in accordance with ECS recommendations provided at that time.
- Most borings encountered soft, weak soils in the upper approximate 2 to 2.5 feet below existing grades which probably will not pass a proofroll. Therefore, some remediation of soft soils should be anticipated.

- Prepare subgrades with a slight slope to maintain surface drainage.

**Other Measures:**

- Roll subgrade surfaces smooth if rain is expected.
- Slope final subgrades away from the proposed structure.
- Rough grade subgrades high to allow for removal of degraded soil.
- Remove soil frozen or softened by rain.

### 6.3 STRUCTURAL FILL

**Subgrade Requirements:**

- Subgrade proofrolled and required improvements completed.

**Fill Material Requirements:**

- No shale content.
- No deleterious debris.
- No rock pieces larger than 3 inches.
- Less than 3% organic material (loss on ignition).
- Maximum dry density of at least 100 pcf according to the Standard Proctor compaction method (ASTM D-698), unless specifically reviewed otherwise by ECS.
- Acceptable Unified Soil Classifications (USCS): CL, ML, GW, GM, GC, GP, SW, SP, SM, SC.
- Unacceptable USCS classifications: CH, OL, OH, Pt, MH.
- Evaluated and approved by ECS prior to construction.

**Fill Placement Guidelines:**

- Minimum compaction:
  - 98 % Standard Proctor maximum dry density (ASTM D-698).
- Moisture Content:
  - Within 2 % of optimum (ASTM D-698) if plasticity index less than 30.
- Maximum loose lift thickness: 8 inches.
- Compaction test frequency:
  - One test per lift for each 5,000 square feet of fill placed.
  - Minimum of 3 tests per lift.
- Bench new fill into existing slopes or sidewalls of deep excavations in 1-foot steps or as recommended by ECS at the time of construction.
- Compact and test each lift prior to placing additional lifts.
- Scarify smoothed fill surfaces prior to placing the next lift.
- Maintain positive surface drainage on fill surfaces during placement to avoid ponding of water.
- Roll fill surfaces smooth if rain is expected.
- Rough grade high to allow for removal of degraded surface soils if fill will be exposed to adverse weather conditions.



- Do not place fill on a frozen subgrade. At a minimum, remove frozen material, or allow to thaw and then recompact.

#### 6.4 EXISTING FILL/POSSIBLE FILL

##### General Comments:

- The recommendations contained in this report assume that the existing fill is uncontrolled fill.
- Structural fill should be placed and compacted in accordance with the recommendations provided in this report.

##### Foundation Areas:

- Foundations must not bear in or over existing fill.
- Foundations must penetrate existing fill and bear on stiff or stronger undisturbed inorganic clay, structural fill as defined in this report, flowable fill, or lean concrete.

##### Floor Slabs and Pavements:

- If existing fill is left in-place in floor slab and pavement areas and the owner is willing to accept the associated risks, the risks associated with the existing fill in floor slab and pavement areas can be reduced by implementing the following recommendations:
  - Visual observation and proofrolling evaluation of the subgrade by an ECS representative at the time of construction.
  - Improvement of the subgrade where and how recommended by ECS based on the results of proofrolling and observations.
- If the risks associated with the existing fill, as described in a previous section, are not acceptable, existing fill should be removed and replaced with controlled fill.

#### 6.5 EXISTING CONSTRUCTIONS

##### General Comments:

- Recommendations to address existing constructions can be affected by many factors, including factors that are not obvious until construction (e.g., removal of some features creates more potential problems and risks than leaving them in-place).
- As such, the recommendations provided below should be considered general guidelines. If modification to the recommendations provided below is needed, ECS should be contacted for guidance.

##### Building Components:

- Demolish and remove existing construction within the proposed foundation areas from existing or former construction in the area. Be sure to remove existing foundations, slabs, possible below grade walls, pavements, and buried utilities.
- Backfill the resulting excavations with properly placed and compacted fill that is keyed into the native soil in one-foot steps to provide a gradual transition in support conditions.
- It may be feasible to leave below grade structures in-place in proposed floor slab and pavement areas provided the below grade structures are removed to 2 feet below the

subgrade, the surrounding soils are determined to be unyielding under proofrolling, below grade structures do not conflict with new construction, and the owner is willing to accept the associated risks.

- Old floors or pavements, if encountered, must be broken up or penetrated at regular intervals to promote water drainage or be removed if in new foundation areas.
- The areas where existing construction was located need to be carefully proofrolled in the presence of an ECS representative.
- In addition to proofrolling, very careful earthwork evaluations must be conducted during construction to detect the presence and/or potential anomalies associated with the existing construction.

**Utilities:**

- Utilities should be relocated as necessary.
- Existing utilities within the proposed building area should be removed in their entirety (including line and associated backfill) unless the risk of damage to the proposed structure has been understood and accepted by the owner. The resulting excavation should then be backfilled in accordance with the recommendations in this report (including benching side slopes and proper compaction).
- Provided the risks associated with leaving utilities in-place are acceptable to the owner, abandoned lines should be grouted full.
- Needed improvements to poor backfill conditions should be identified during construction via proofrolling and surface probing by an ECS representative and remediated in accordance with the recommendations provided by ECS at the time of construction.

**6.6 SHALLOW ROCK**

- Auger and/or direct push refusal was encountered in the borings at approximately 1.9 to 11.6 feet below existing grades.
- Greater than normal differential settlement likely will occur if foundations are supported on both rock and soil simultaneously. Alternatives to address this concern include:
  - Adjust the floor elevation and/or building location to avoid this condition.
  - Remove rock and backfill with compacted clay or manufactured sand fill where necessary, so that foundations bear on at least 24 inches of approved native soil or controlled fill.
  - Support the building on isolated column foundations tied together with grade beams to reduce the effects of differential settlement. Isolated columns may bear entirely on rock or on soil but not both simultaneously. Adjacent columns may bear entirely on rock or soil.
  - Divide the building into sections that are entirely support on rock or on soil. Design for approximately 1 inch of differential settlement between sections.
- The method used to remove the on-site rock, if necessary, should be selected by the contractor. Removal of the on-site rock with conventional excavation equipment is not expected to be effective. The competent rock on-site requires special rock removal equipment (e.g., blasting, hoe-ram, etc.) for efficient excavation.



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## 6.7 PLASTIC CLAY

- The measures provided below will significantly reduce, but not eliminate, the likelihood the proposed construction will be impacted by the presence of plastic clays:
  - Test the moisture content of subgrade soils. Adjust soil moisture if the results fall outside the range of optimum to plus 3% above optimum.
  - Roof drains and surface drainage should not discharge or be directed to the ground surface within 20 feet of the proposed structures, unless the surface is impervious (such as concrete or pavement), to reduce moisture changes of the foundation soils.
  - Proper drainage should be provided around the proposed construction (e.g., slope the surface away from the building).
- If the risks associated with the plastic clays are not acceptable, then:
  - Do not place plastic clay fills within 2 feet of the planned finish subgrades (building and pavement).
  - Undisturbed plastic clays within 2 feet of planned finish subgrades and foundation bearing elevations are removed and replaced with low to moderate plasticity clay fill soils.

## 7.0 DESIGN RECOMMENDATIONS

### 7.1 SHALLOW FOUNDATIONS

#### General Comments:

- The proposed buildings may be supported on conventional shallow foundations.
- Foundations must bear on stiff or better undisturbed clay, Structural Fill, flowable fill, lean concrete, or competent bedrock. However, soil bearing foundations are expected to be dominant.
- Foundation bearing conditions should be carefully evaluated by ECS during construction.

#### Variable Bearing Conditions:

- Individual foundations must not bear on soil and rock simultaneously unless they are specifically designed to accommodate the stress concentrations associated with variable bearing conditions (e.g., use of grade beams).
- Individual foundations should bear entirely on soil or entirely on rock (i.e., one isolated column foundation may bear on soil while an adjacent one may bear on rock, but each isolated foundation may not bear on soil and rock simultaneously).
- To address the concerns associated with variable bearing concerns, a minimum 2-foot soil cushion should be present below soil-bearing foundations. This may require the removal of some rock to construct the soil cushion.
- The soil cushion may consist of clay or sand, but not gravel. The cushion should be placed and compacted in accordance with the "Structural Fill" recommendations provided in this report.

#### Foundation Design Recommendations:

- The design of the foundation should utilize the following parameters:

FOUNDATION DESIGN RECOMMENDATIONS				
DESIGN PARAMETER	SOIL BEARING		ROCK BEARING	
	CONTINUOUS WALL FOUNDATIONS	ISOLATED COLUMN FOUNDATIONS	CONTINUOUS WALL FOUNDATIONS	ISOLATED COLUMN FOUNDATIONS
Net Allowable Bearing Pressure <sup>(1)</sup>	2,000 psf	2,400 psf	5,000 psf	5,000 psf
Acceptable Bearing Material	Stiff Undisturbed Native Soils, Structural Fill, Flowable Fill, or Lean Concrete.	Stiff Undisturbed Native Soils, Structural Fill, Flowable Fill, or Lean Concrete.	Competent Bedrock: Relatively Unweathered Bedrock.	Competent Bedrock: Relatively Unweathered Bedrock.
Minimum Width	18 inches	24 inches	18 inches	24 inches
Depth of Foundations Subject to Freezing (Below slab or finished grade) <sup>(2)</sup>	30 inches	30 inches	30 inches	30 inches
Depth Foundations Protected from Freezing	12 inches	12 inches	12 inches	12 inches



FOUNDATION DESIGN RECOMMENDATIONS				
DESIGN PARAMETER	SOIL BEARING		ROCK BEARING	
	CONTINUOUS WALL FOUNDATIONS	ISOLATED COLUMN FOUNDATIONS	CONTINUOUS WALL FOUNDATIONS	ISOLATED COLUMN FOUNDATIONS
Estimated Total Settlement <sup>(4)</sup>	≤ 1 inch	≤ 1 inch	Negligible	Negligible
Estimated Differential Settlement <sup>(4)</sup>	≤ ¾ inch along 50 feet	≤ ¾ inch between columns	Negligible	Negligible

Notes:

- (1) Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
- (2) The 2018 Kentucky Building Code requires a minimum foundation embedment depth of 24 inches for foundations subject to freezing in Jefferson County. However, a minimum embedment of 30 inches is common for commercial development in the project region.
- (3) The recommended net allowable bearing pressures may be increased 33 percent for transient loading.
- (4) The estimated settlement potential is based on the following: empirical guidelines for the project material types and consistencies; the assumption that ECS will observe and test each foundation excavation during construction; and the provided project information. Actual settlements will depend, in part, on site preparation and conditions at each foundation location.

PARAMETERS FOR FOUNDATION LATERAL RESISTANCE	ESTIMATED VALUE <sup>(1)</sup>
Coefficient of Active Earth Pressure ( $K_o$ ) <sup>(2)</sup>	0.41
Coefficient of At-Rest Earth Pressure ( $K_o$ ) <sup>(2)</sup>	0.58
Coefficient of Passive Earth Pressure ( $K_p$ ) <sup>(2)</sup>	2.46
Moist Unit Weight of Soil ( $\gamma$ )	125 pcf
Base Shear Adhesion [Concrete on Undisturbed Clay]	400 psf
Coefficient of Friction [Concrete on Clay] ( $\mu$ )	0.30
Coefficient of Friction [Concrete on Rock] ( $\mu$ )	0.50

Notes:

- (1) These design parameters do not include factors of safety. Appropriate factors of safety should be included in the designs.
- (2) Provided earth pressure coefficients are based on an assumed internal angle of friction ( $\phi$ ) of 25 degrees for clay.
  - Desiccation or disturbance may result in soil voids or cracks adjacent to foundations, reducing passive and uplift resistance. As a result, for these calculations, the upper 2.5 feet of soils should be neglected for passive resistance.
  - Ignore passive earth pressure if the soil against the sides of the foundations may not be present during the life of the structure (e.g., the soil could be excavated or be subject to erosion).

**Construction Guidelines:**

- The bearing conditions of each foundation should be evaluated by ECS at the time of construction to confirm the presence of adequate bearing soils and to provide recommendations for the remediation of poor soils, if present. This evaluation should be performed before the reinforcing steel is placed in the excavations.
- Concrete should be placed the same day the foundations are excavated to reduce degradation of the bearing surface due to exposure. Alternatively, a "mud mat" of lean concrete should be placed to protect the bearing surface.

- Disturbed, degraded or loose material should be removed from the excavation bottoms prior to concrete placement.

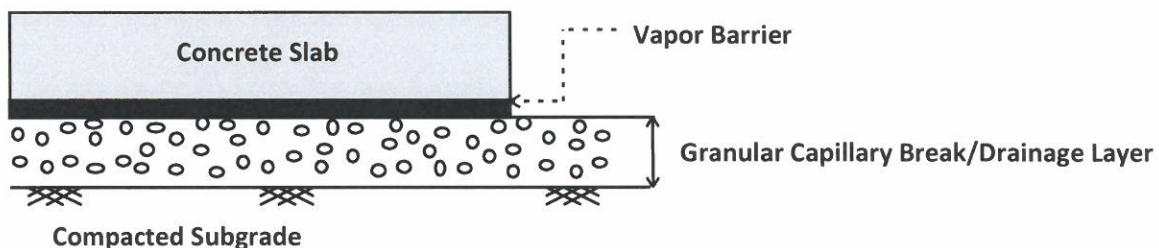
## 7.2 FLOOR SLABS

### Recommended Slab Type:

- Grade supported floor slabs

### Floor Subgrade Recommendations:

- Prepare subgrade in accordance with recommendations contained within this report.
- Subgrade proofrolled by an ECS representative and required improvements completed.
- Subgrade modulus for slab design: 100 pci.
- Place a minimum of 4 inches of well-graded crushed stone or angular sand base.
- Compact base material in accordance with the structural fill recommendations provided previously.
- Unless specifically approved otherwise, do not support floor slabs directly over open-graded coarse aggregate to avoid loss of concrete, increased concrete cracking during drying shrinkage, and puncture of the vapor barrier. If coarse aggregate is used as a drainage base, cap the coarse aggregate with a 2-inch (minimum) layer of well-graded aggregate (e.g., KYTC DGA).
- The following graphic depicts our soil-supported slab recommendations:



#### Notes:

- (1) Drainage layer should consist of a minimum of 4 inches of well graded crushed stone or angular sand or open-graded coarse gravel. However, if open graded stone is selected then a minimum 2-inch layer of coarse aggregate with fines (e.g., KYTC DGA) should be used to cap the open graded stone.
- (2) Subgrade compacted to 98% maximum dry density per ASTM D698.

### Construction Guidelines:

- If a vapor barrier will be used, an adequate concrete design mix, placement, finishing, and curing techniques should be employed to reduce the potential for differential slab shrinkage, cracking, and curling.
- Special care must be taken to avoid puncturing the vapor barrier during construction. We recommend utilizing the ACI 302 guidelines for placement of the vapor barrier, manufactured sand layer, and concrete as a function of the construction sequence.
- Drying shrinkage and concrete curing methods frequently causes floor slab cracks. Control joints and saw cuts should be installed in accordance with ACI guidelines to control cracking.



- Slab joints should be doweled or keyed to allow rotation of the slab sections without localized vertical displacement.
- Penetrations of the floor slab by fixed objects, such as drains or piping, restrict shrinkage movement and must be isolated to reduce cracking potential.
- Slab-on-grade floor should be structurally isolated from foundation supported walls.
- Backfill along foundation excavations should be carefully controlled to reduce differential slab settlement.

### 7.3 SEISMIC DESIGN CONSIDERATIONS

- The 2018 Kentucky Building Code (KBC) requires site classification for seismic design based on the upper 100 feet of a soil profile. At least two methods are utilized in classifying sites, namely the shear wave velocity ( $v_s$ ) method and the Standard Penetration Resistance (N-value) method. The second method (N-value) was used in classifying this site.
- Based upon our interpretation of the subsurface conditions, the appropriate Seismic Site Classification is "C" as shown in the preceding table.

SEISMIC SITE CLASSIFICATION			
Site Class	Soil Profile Name	Shear Wave Velocity, $V_s$ , (ft./s)	N value (bpf)
A	Hard Rock	$V_s > 5,000$ fps	N/A
B	Rock	$2,500 < V_s \leq 5,000$ fps	N/A
C	Very dense soil and soft rock	$1,200 < V_s \leq 2,500$ fps	$> 50$
D	Stiff Soil Profile	$600 \leq V_s \leq 1,200$ fps	15 to 50
E	Soft Soil Profile	$V_s < 600$ fps	$< 15$

#### Ground Motion Parameters:

- In addition to the seismic site classification noted above, ECS has determined the design spectral response acceleration parameters following the International Building Code (IBC) 2015 methodology. The Mapped Responses were estimated from the OSHPD Seismic Design Map website (<http://seismicmaps.org/>). The design responses for the short (0.2-sec,  $S_{DS}$ ) and 1-second period ( $S_{D1}$ ) are noted at the right end of the following Table:

GROUND MOTION PARAMETERS [IBC 2015 Method]								
Period (sec)	Mapped Spectral Response Accelerations (g)		Values of Site Coefficient for Site Class		Maximum Spectral Response Acceleration Adjusted for Site Class (g)		Design Spectral Response Acceleration (g)	
0.2	$S_s$	0.192	$F_a$	1.2	$S_{MS}=F_a S_s$	0.231	$S_{DS}=2/3 S_{MS}$	<b>0.154</b>
1.0	$S_1$	0.101	$F_v$	1.699	$S_{M1}=F_v S_1$	0.172	$S_{D1}=2/3 S_{M1}$	<b>0.115</b>

- The Site Class definition should not be confused with the Seismic Design Category designation which the Structural Engineer typically assesses.

#### 7.4 FLEXIBLE PAVEMENT DESIGN

##### Application:

- Main driving lanes, parking areas or other locations where heavy vehicle or other equipment will not turn on a tight radius or be parked for extended periods of time.

##### General Comments:

- The pavement sections below are guidelines that may or may not comply with local jurisdictional minimums.
- If the traffic loads, Daily Equivalent 18-kip Axle Loads (DEALs), used in this report differ from the expected traffic loads onsite, ECS should be contacted to modify the pavement design.

FLEXIBLE DESIGN PARAMETERS	
Design Method	AASHTO Guide for Design of Pavement Structures (1993)
Daily Equivalent 18-KIP Axle Loads	7 (Light Duty) – Car parking areas. 75 (Heavy Duty) – Semi Parking Areas.
Design Life	20 Years
California Bearing Ratio (CBR)	3 (Assumed)
Reliability	80%
Terminal Serviceability Index	2.0

RECOMMENDED FLEXIBLE PAVEMENT SECTIONS <sup>(1)</sup>			
Pavement Section	Hot Mix Asphalt Wearing Surface	Hot Mix Asphalt Binder or Base	Granular Base Kentucky DGA
Light Duty	1 inch	2 inches	8 inches
Heavy Duty	1 inch	4 inches	12 inches

##### Notes:

- (1) It should be noted that although flexible pavement for the 20-year design period is structurally sound, an asphalt overlay is usually necessary after 7 to 12 years due to normal wear and exposure of the surfacing layer. In general, asphalt pavement should be sealed approximately 3 to 5 years to extend the life of the asphalt.

##### Subgrade Requirements:

- Prepare subgrade in accordance with recommendations contained within this report.
- Proofroll in the presence of an ECS representative and complete required improvements.
- Pavement subgrades sloped to facilitate drainage.

##### Drainage Requirements:

- Permit water movement beneath curbs at the subgrade level.
- Design catch basins to include finger drains at the granular base level.



### Construction Guidelines

- Pavements should be constructed in accordance with the construction and material guidelines in the most recent edition of the Kentucky Transportation Cabinet's "Standard Specifications for Road and Bridge Construction."
- Granular base should be compacted in accordance with the structural fill recommendations provided in a previous section.
- In-place density, thickness, and gradation tests should be conducted by a ECS representative on the pavement components during construction to confirm compliance with project specifications.

## 7.5 RIGID PAVEMENT DESIGN

### Application:

- Rigid pavements are adequate wherever flexible pavements can be used. Rigid pavements often provide better service for dumpster aprons, entranceways, or other areas where heavy trucks will turn on a tight radius or be parked for extended periods of time.

### General Comments:

- The pavement sections below are guidelines that may or may not comply with local jurisdictional minimums.

RIGID PAVEMENT DESIGN PARAMETERS	
Design Method	ACI Guide for the Design and Construction of Concrete Parking Lots (ACI 330R-08)
Traffic Category	A (Light Duty): Car parking areas and access lanes C (Heavy Duty): Semi parking areas.
Design Life	20 Years
California Bearing Ratio (CRR)	3 (Assumed)
Effective Subgrade Modulus	100 pci
Concrete Modulus of Rupture	500 psi

RECOMMENDED RIGID PAVEMENT SECTIONS		
Pavement Section	Portland Cement Concrete	Granular Base Kentucky DGA
Light Duty	5 inches	4 inches
Heavy Duty	7 inches	6 inches

### Subgrade Requirements:

- Prepare subgrade in accordance with recommendations contained within this report.
- Proofroll in the presence of an ECS representative and complete required improvements.
- Pavement subgrades sloped to facilitate drainage.

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**Drainage Requirements:**

- Permit water movement beneath curbs at the subgrade level.
- Design catch basins to include finger drains at the granular base level.

**Concrete Recommendations:**

- 4,000 pounds per square inch (psi) minimum 28-day compressive strength.
- 4 to 6 percent entrained air.
- Proper joint spacing to control shrinkage cracking.
- Dowels at construction joints to properly transfer loads between pavement sections.
- Control joints where concrete pavement abuts fixed structures or protrusions.



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## 8.0 CLOSING

There are certain limitations inherent to geotechnical explorations and reports. These limitations are discussed below and in the **GBA "Important Information About Your Geotechnical Engineering Report"** in the **Appendix**. They should be fully considered prior to using the recommendations in this report.

Our geotechnical exploration identified the subsurface conditions that existed only at the locations and times that the borings were advanced. Given the natural variable characteristics of soil and rock, conditions may vary over short distances, change with time, or be affected by natural events, such as floods or earthquakes, or by human activity, such as past land use or new construction. As such, the information generated during our geotechnical exploration may not be representative of the entire conditions that may exist on the project site now or in the future. We use our professional judgment to render an opinion about the subsurface conditions that may exist in the areas of the site not specifically tested during our exploration based on our review of available field and laboratory data and our past experience with similar subsurface conditions. However, the subsurface conditions encountered during construction may vary from the assumed conditions. Variations in the subsurface conditions between our borings and in unexplored areas of the site could affect our interpretations. Thus, it is important to retain ECS to provide construction monitoring services based on our involvement in the project, our knowledge about the site, and our knowledge relating to the assumptions and recommendations contained within this report.

The recommendations contained within this report are dependent on many factors, including, but not limited to, the project information provided by others and the specific conditions encountered during our exploration. If the project information contained within this report is incorrect or changed at a later date or if the location or nature of the structures or facility components changes, ECS should be notified and given the chance to assess the impact of the changes. We cannot and do not accept responsibility or liability for problems that occur because we were not given the opportunity to properly assess changes to the project. The recommendations contained in this report must not be considered valid unless our firm reviews such changes and required modifications to our recommendations are verified in writing.

Our recommendations are dependent on several factors including, but not limited to, our review of project drawings and specifications prior to construction and observation of actual conditions during construction, including providing the required Special Inspections. We strongly recommend that ECS be retained to review pertinent portions of the project plans and specifications.

This report should be reproduced in its entirety only. Portions of this report should not be separated and used by others. It should be noted that this report was not prepared for the purpose of bid development and should not be used as such.

This geotechnical report is unique and was based on client needs and project requirements for the specific project described in this report. As such, no one other than who the report was intended and prepared for should rely on this report or the information contained within the report without first consulting with ECS. This report is not valid for any purpose or project except as described in this report.

This report and our recommendations were prepared using the generally accepted standards of geotechnical engineers practicing in this region. No warranty is express or implied.

## APPENDIX

Site Location Diagram

Boring Location Plans

Soil & Rock Classification

Boring Legend

Boring Records

Boring Composite

Field Procedures

Laboratory Procedures

GBA "Important Information About Your Geotechnical Engineering Report"