ROUNDABOUT FEASIBILITY REVIEW AND ANALYSIS
US 31W AT UNIVERSITY BOULEVARD AND CHESTNUT STREET

Bowling Green, Warren County, Kentucky
Item No. 3-131.00

Prepared for

Kentucky Transportation Cabinet
District 3

Prepared by

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INTRODUCTION

The purpose of this document is to update the roundabout feasibility analysis presented in the October, 2009 report issued by KTC regarding two proposed roundabouts on US 31W at University Boulevard and Chestnut Street. A new alternative is presented, which would utilize a single roundabout at US 31W and University Boulevard and provide an "inside left-turn" treatment at the 'T' intersection of US 31W and Chestnut Street. A schematic of this alternative, referred to as Alternative 5A, is presented in **Attachment A**.

Analysis conducted as part of this review included capacity analysis consistent with KYTC roundabout guidelines as well as VISSIM micro-simulation to allow comparison of Alternative 5A to the previously considered intersection alternatives. The previous alternatives were identified and evaluated in the "Scoping Study Report; US 31W at University Blvd./Chestnut St." prepared by Qk^4 in December 2008.

US 31W AT UNIVERSITY BOULEVARD

The initial roundabout design proposed at this location was shown to operate over capacity on both US 31W approaches and the University Boulevard approach. Here the lane configuration at the intersection is modified to allow improved lane utilization and a right turn lane from US 31W to University Boulevard was added to serve this heavy movement. The proposed lane configuration is shown in **Figure 1** below.

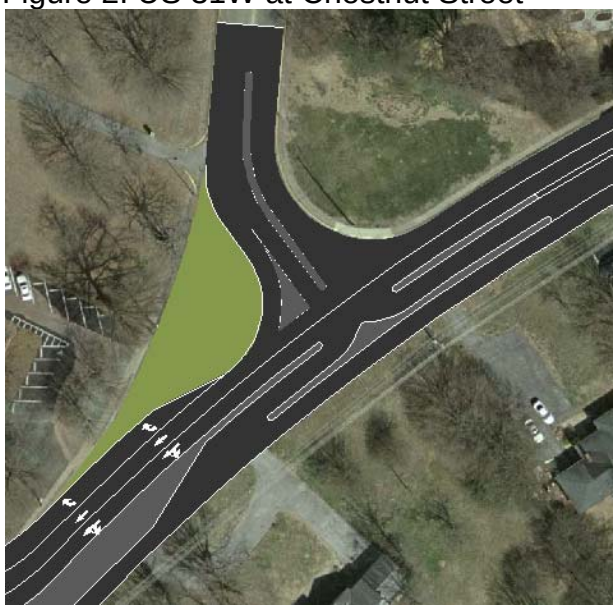
As a result of these improvements, all but one movement is shown to operate below 85 percent of capacity in the design year as required by the KYTC roundabout guidance. The southbound right turn movement from University Boulevard to US 31W is shown to operate at 97 percent of capacity during the design year, with an anticipated delay of 13.5 seconds. This delay is caused by the high volume of right turning traffic (590 vph) and high delays would also be expected with the other alternatives examined. **Attachment B** contains the roundabout capacity analysis for the AM and PM peak periods.

Figure 1: US 31W at University Boulevard

US 31W AT CHESTNUT STREET

As identified in the initial report, the majority of delay experienced at Chestnut Street is due to the significant queues which form on US 31W and block the intersection at Chestnut Street. Therefore, the introduction of the proposed roundabout is anticipated to significantly reduce these delays. In addition, an innovative left turn treatment is proposed which would remove conflicts between left turning traffic and northbound US 31W traffic. Due to the removal of these conflicting flows, capacity for the left turn movements from Chestnut Street is approximately doubled. **Figure 2** shows the proposed channelization to accommodate the inside left turn maneuver.

Figure 2: US 31W at Chestnut Street



SYSTEM ANALYSIS

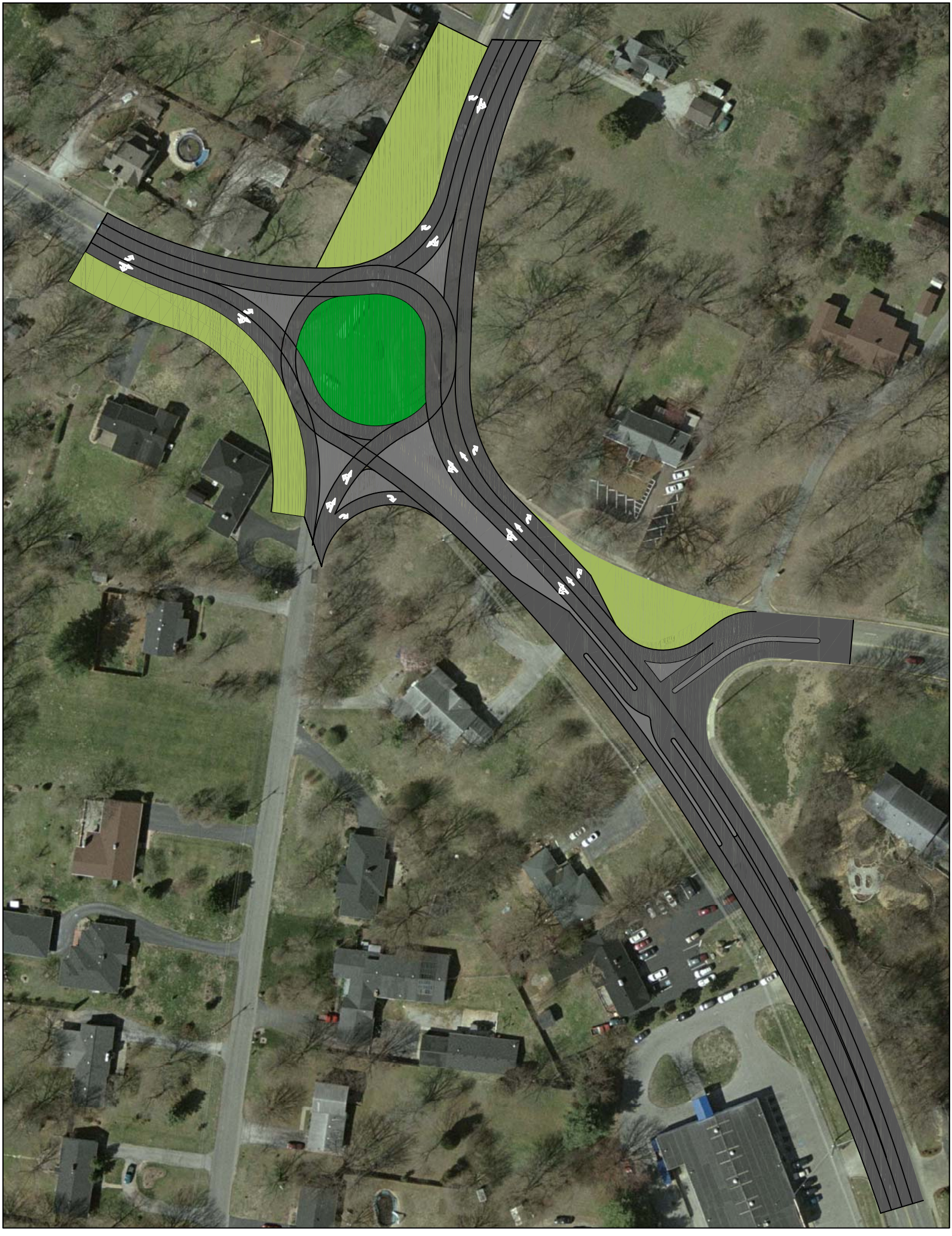
As identified above, a VISSIM micro-simulation model was developed to analyze this alternative so that system performance could be compared to the other alternatives previously identified and evaluated. **Table 1** below summarizes this analysis. As can be seen from this analysis, Alternative 5A provides the greatest overall delay reduction compared to the No Build Alternative and the other alternatives considered.

CONCLUSION

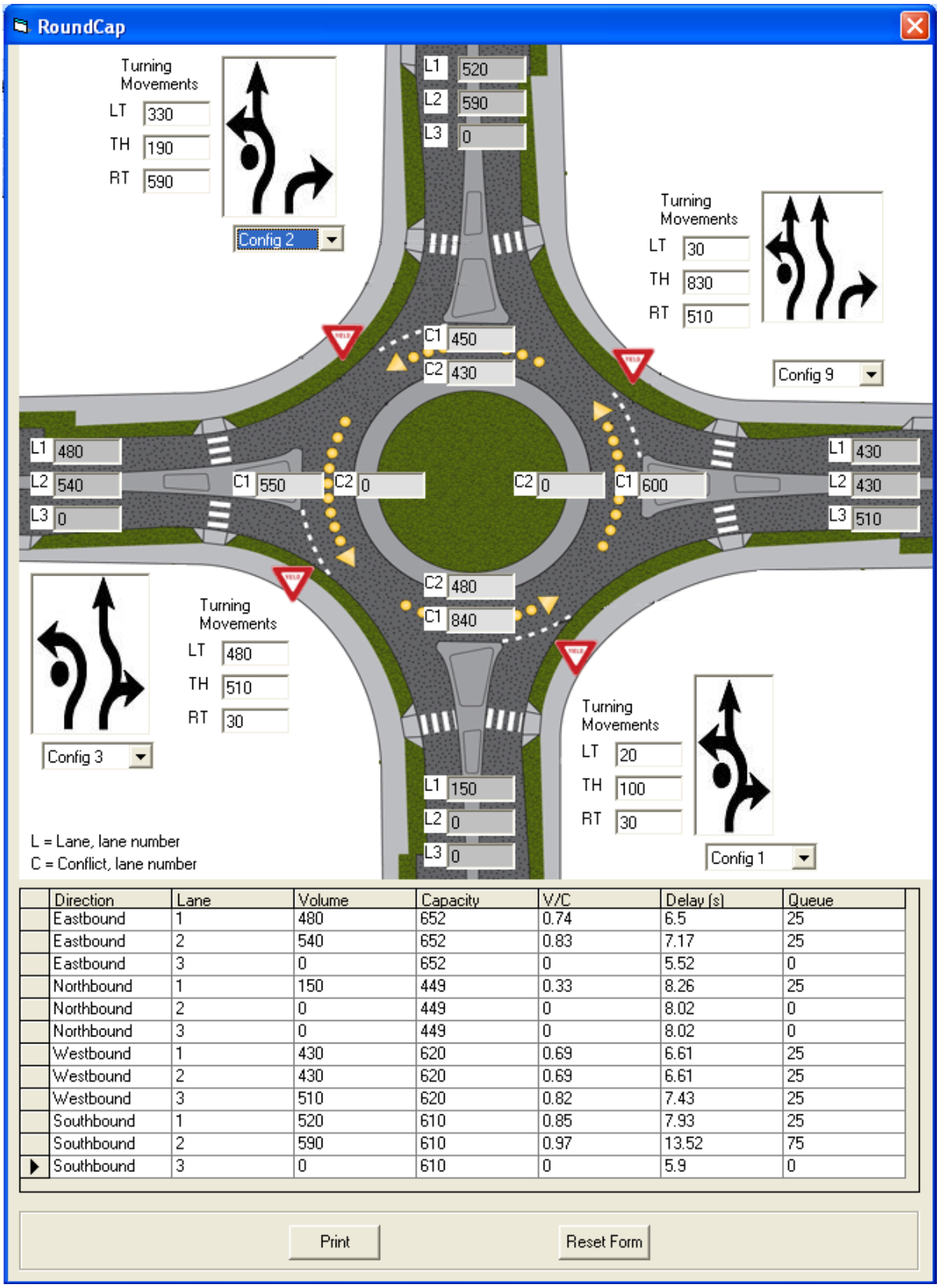
This report analyzed the feasibility of a single roundabout alternative to alleviate congestion at University Boulevard and Chestnut Street. The analysis presented above has identified the modified roundabout as feasible at US31W and University Boulevard and found that it provides improved performance over the other alternatives initially considered at this location. The conceptual schematic of the design presented in **Attachment A** should be further evaluated to refine the roundabout geometrics and to identify potential methods for reducing impacts on residences and businesses on US 31W.

Table 1: System Performance Evaluation

System Origin-Destination		Travel Time(seconds)					
From	**To**	**No Build**	**Alt 1**	**Alt 3**	**Alt 7**	**Alt 5**	**Alt 5A**
Northbound US 31W	Eastbound Loving Way	55	51	36	15	14	40
Northbound US 31W	Northbound US 31W	56	55	42	24	10	45
Northbound US 31W	Northbound Chestnut Street	86	94	54	40	55	54
Northbound US 31W	Westbound University Boulevard	136	135	121	115	51	139
Westbound Loving Way	Northbound US 31W	41	32	16	4	9	21
Westbound Loving Way	Northbound Chestnut Street	38	52	6	25	10	34
Westbound Loving Way	Westbound University Boulevard	29	23	28	32	17	19
Westbound Loving Way	Southbound US 31W	19	17	30	15	19	24
Southbound US 31W	Northbound Chestnut Street	218	5	1	3	95	1
Southbound US 31W	Westbound University Boulevard	294	16	1	7	116	4
Southbound US 31W	Southbound US 31W	275	47	29	29	229	14
Southbound US 31W	Eastbound Loving Way	269	63	32	16	241	19
Southbound Chestnut Street	Westbound University Boulevard	672	61	38	44	22	9
Southbound Chestnut Street	Southbound US 31W	619	94	62	50	26	20
Southbound Chestnut Street	Eastbound Loving Way	425	99	62	32	24	26
Southbound Chestnut Street	Northbound US 31W	356	34	24	27	24	0
Eastbound University	Southbound US 31W	32	37	30	31	6	51
Eastbound University	Eastbound Loving Way	37	38	32	33	48	53
Eastbound University	Northbound US 31W	144	136	126	123	69	106
Eastbound University	Northbound Chestnut Street	156	142	116	121	73	112
Total Average Delay		190	70	55	52	58	37
Percent Reduction from No-Build			63%	71%	73%	70%	**81%**



Attachment B-1: Alternative 5A: PM Peak Period



Direction	Lane	Volume	Capacity	V/C	Delay (s)	Queue
Eastbound	1	480	652	0.74	6.5	25
Eastbound	2	540	652	0.83	7.17	25
Eastbound	3	0	652	0	5.52	0
Northbound	1	150	449	0.33	8.26	25
Northbound	2	0	449	0	8.02	0
Northbound	3	0	449	0	8.02	0
Westbound	1	430	620	0.69	6.61	25
Westbound	2	430	620	0.69	6.61	25
Westbound	3	510	620	0.82	7.43	25
Southbound	1	520	610	0.85	7.93	25
Southbound	2	590	610	0.97	13.52	75
Southbound	3	0	610	0	5.9	0

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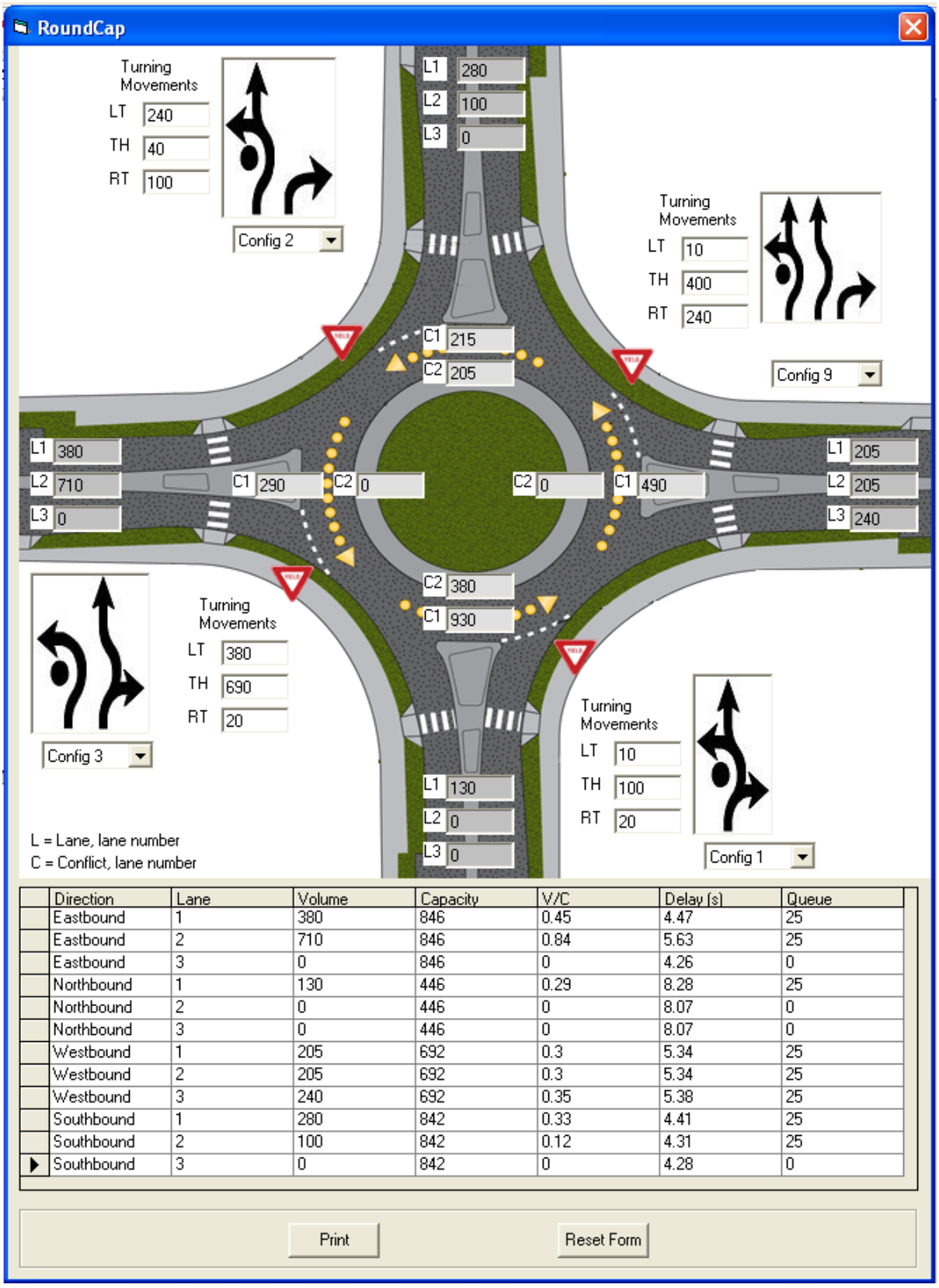
Attachment B-2: Alternative 5A: PM Peak Period



Direction	Lane	Volume	Capacity	V/C	Delay (s)	Queue
Eastbound	1	380	846	0.45	4.47	25
Eastbound	2	710	846	0.84	5.63	25
Eastbound	3	0	846	0	4.26	0
Northbound	1	130	446	0.29	8.28	25
Northbound	2	0	446	0	8.07	0
Northbound	3	0	446	0	8.07	0
Westbound	1	205	692	0.3	5.34	25
Westbound	2	205	692	0.3	5.34	25
Westbound	3	240	692	0.35	5.38	25
Southbound	1	280	842	0.33	4.41	25
Southbound	2	100	842	0.12	4.31	25
Southbound	3	0	842	0	4.28	0

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