South Carolina
Department of Transportation

Traffic Impact Study

Simpsonville Downtown Traffic Plan

Simpsonville SC

Prepared by SCDOT

In Partnership with City of Simpsonville and the Greenville Legislative Delegation

SCDOT DISTRICT 3 TRAFFIC ENGINEERING
864-241-1010

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EXECUTIVE SUMMARY

SCDOT Traffic Engineering has completed a Traffic Impact Study to evaluate the potential traffic pattern changes associated with the City of Simpsonville Downtown Revitalization Plan.

Based on conversations with the City of Simpsonville, it was determined that creating one-way pairs utilizing College and Curtis Streets could achieve the desired outcome allowing commuting traffic to pass through the downtown area more efficiently.

As part of the analysis, SCDOT evaluated traffic using the two roadways in a Clockwise and Counter Clockwise fashion to determine if there were benefits of one direction or another within the existing roadway network.

Traffic Counts were collected at various times throughout the study period as additional questions would arise or additional information was needed to best evaluate the modifications and future trips expected by users of the downtown roadway network.

The analysis indicated that with the current information, while both Counter and Counter Clockwise directions were more efficient than the existing network, the Counter Clockwise direction was the more efficient direction. The analysis also indicated that Main St would work better and more efficiently without the concrete islands present in the roadway today.

The study network will need six (6) signalized intersections in the build condition while the existing network today only has three (3) signalized intersections. The additional signals will be needed to facilitate the transitions from two way streets to one way streets within the network and to provide safe ingress from side streets into the network. Diagrams showing the modifications are included within the study.

Some areas of concern, as the analysis was conducted, primarily occurred around the introduction of major pedestrian activity to the corridor. Without knowing exactly where development would occur or pedestrian activity would cross the roadways within the network, it was difficult to add delay to the vehicles using the network. Some delay was added where we expected pedestrian activity around the new Park at Academy and Curtis. In addition to the pedestrian activity, an additional concern of adding cut-through traffic through the Pliney and Poinsetta neighborhoods could occur and should be monitored after the downtown traffic plan has been implemented.

The proposed network will function more efficiently than the existing network, but must be implemented in its entirety. The only small modification improvement that was shown to be possible without the full traffic shift, would be the removal of the concrete islands along Main Street to improve flow and increase storage for turning movements on Main St.

PROJECT DESCRIPTION AND EXISTING CONDITIONS

SCDOT in working with the City of Simpsonville has evaluated the transportation impacts resulting from the modification of the downtown roadway network. Evaluation of the transportation impacts associated with the proposed project first requires a thorough description and quantification of the proposed project and the project site, which is included in the following sections.

PROJECT DESCRIPTION

The project proposal is to modify College and Curtis Streets in Downtown Simpsonville from providing two way traffic on each roadway to one way traffic on each roadway. The project will improve turning movements throughout the network without needing to widen roadways to provide turn lanes. The final roadway configuration will stay within the existing R/W limiting the impacts to business, parks, and residents throughout the network.

Traffic management through the corridor would be enhanced through the addition of three (3) signals.

The project would likely be operational within two years and therefore a 2024 horizon has been reviewed for this report. Figure one (1) depicts the existing roadway network.

GEOMETRICS AND TRAFFIC CONTROL

A comprehensive field inventory of the site and study area has been conducted. The field inventory included a collection of geometric data, traffic volumes, and traffic control within the study area. The existing lane geometrics and traffic control characteristics for the study area roadways/intersections are graphically depicted in Figure two (2).

Study Area Roadways

The main study area focus was on the core downtown network which consisted of the following roadways:

Running N-S: Maple St., Main St., Hedge St., Church St., and Academy St.

Running E-W: Curtis St., and College St.

Many other roadways shown below in the diagram were reviewed and traffic counts obtained to best determine the projected redistribution of traffic depending on the direction of travel for each direction.

While not specifically analyzed for future capacity, comments from the observations are included in the conclusions.

Figure 1 – Existing Roadway Network

Existing Conditions

During the morning peak, Downtown Simpsonville has extensive traffic queues along E. Curtis St. and E. College St., as well as, significant queues along SE Main St. The absence of left turn lanes from both of these routes onto SE Main St. is a large part of the problem. As the E. Curtis St. queue builds, motorists use: Hedge St. toward E. College St. or W. Fernwood Dr., Church St. and Academy St. to E. College St., Hunter St. to Pliney Cir., Poinsettia Dr. and Eastview Dr. to W. Fernwood Dr. Several of the alternate routes used to avoid congestion increase traffic along neighborhood streets significantly. The congestion avoidance has also made timing of the current traffic signals more difficult.

In the afternoon, the longer queues develop along SE Main St., W. College St. and W. Curtis St. Many of the drivers work their way through downtown to depart on E. College St. or E. Curtis St. As in the morning, a large number of motorist use Pliney Cir. and W. Fernwood Dr. through neighborhoods to avoid delays. Limited left turn storage, on SE Main St., is a major restriction to traffic flow through downtown.

The existing roadway and traffic control devices at each intersection are shown below in Figure two (2).

Figure 2 – Existing Conditions

PROBABLE IMPACTS OF THE PROJECT

To estimate the impact of site-generated traffic volumes on the roadway network under Future conditions, existing traffic volumes in the study area were redistributed, which is when the existing roadway traffic is shifted to future traffic patterns as the project is constructed and fully operational. Traffic volumes on the roadway network at this time will include all existing traffic and any new traffic due to the redistribution of the existing traffic. The traffic through the downtown network was reviewed in two different scenarios, Clockwise (CW) and Counter Clockwise (CCW). The analyzed conditions are shown in Figures three (3) (CCW) and Figure four (4) (CW). Consideration of these factors give rise to the results presented in the operation analysis.


Maple St
Main St
College St
Curtis St
Hedge St
Church St
Academy St

Figure 3 – CCW


Maple St
Main St
College St
Curtis St
Hedge St
Church St
Academy St
STOP

Figure 4 - CW

Specific Development

No specific background developments have been included in future traffic conditions. It is recognized that the City of Simpsonville will be completing the new City Administration, Fire, and Police offices adjacent to the study network.

PLANNED ROADWAY IMPROVEMENTS

No funded roadway improvement projects were identified within the study by SCDOT or GPATS that are expected to add capacity by the time the project is completed.

Traffic Volumes

In order to determine the existing traffic volume and flow patterns within the study area, weekday morning (7:00-9:00 AM) and evening (4:00-6:00 PM) peak period turning movement specific volume data was collected for the above-cited study area intersections. Figure five (5) and Figure six (6) graphically depicts the distributed trips for the Counter Clockwise direction during the AM and PM peak hours. Figures seven (7) and eight (8) depict the distributed trips for the Clockwise direction during the AM and PM peak hours.

As will be shown in the Figures 5-8, a larger study network was developed to better understand and distribute trips through the core network.

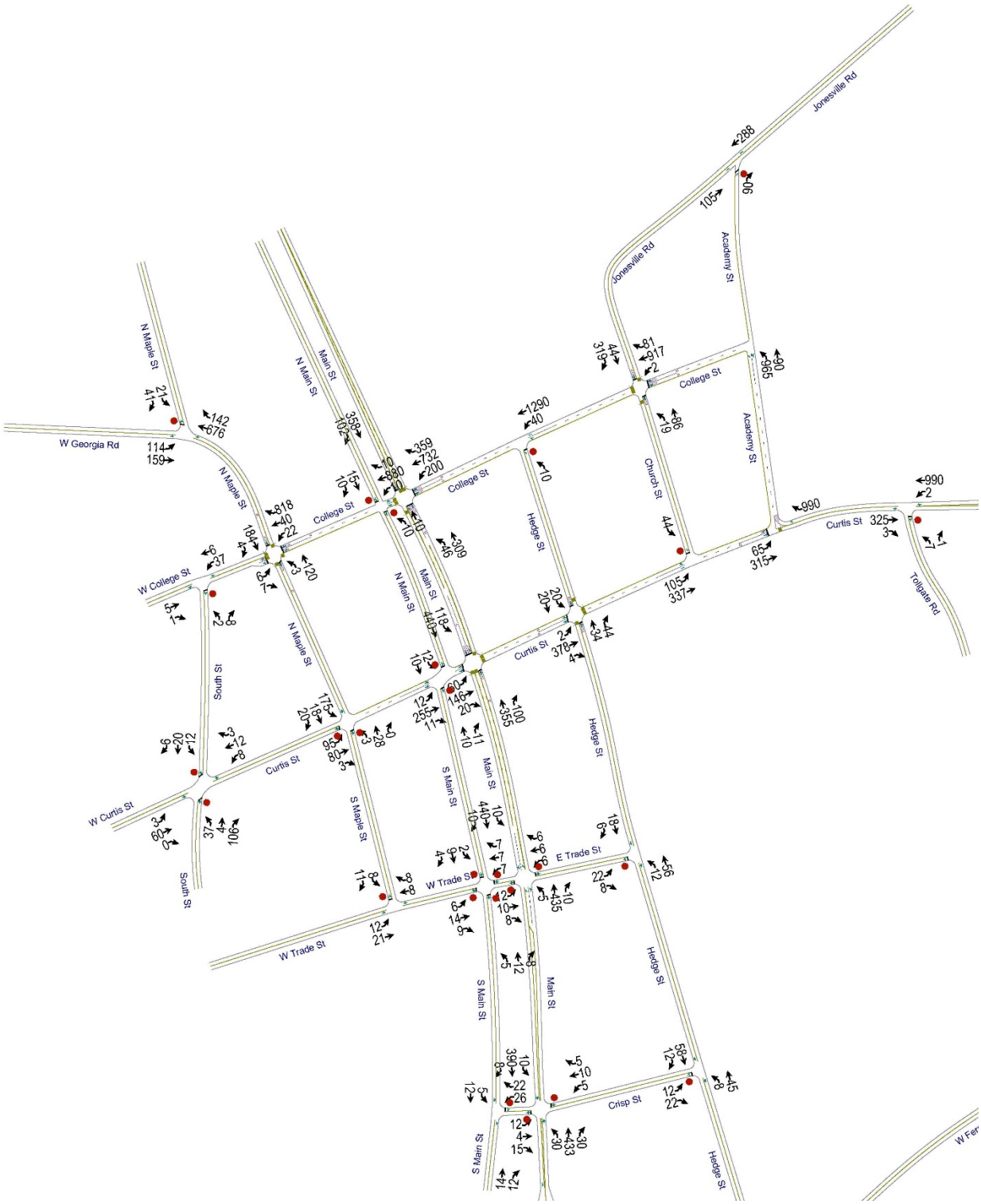

Figure 5 – CCW AM Peak Hour

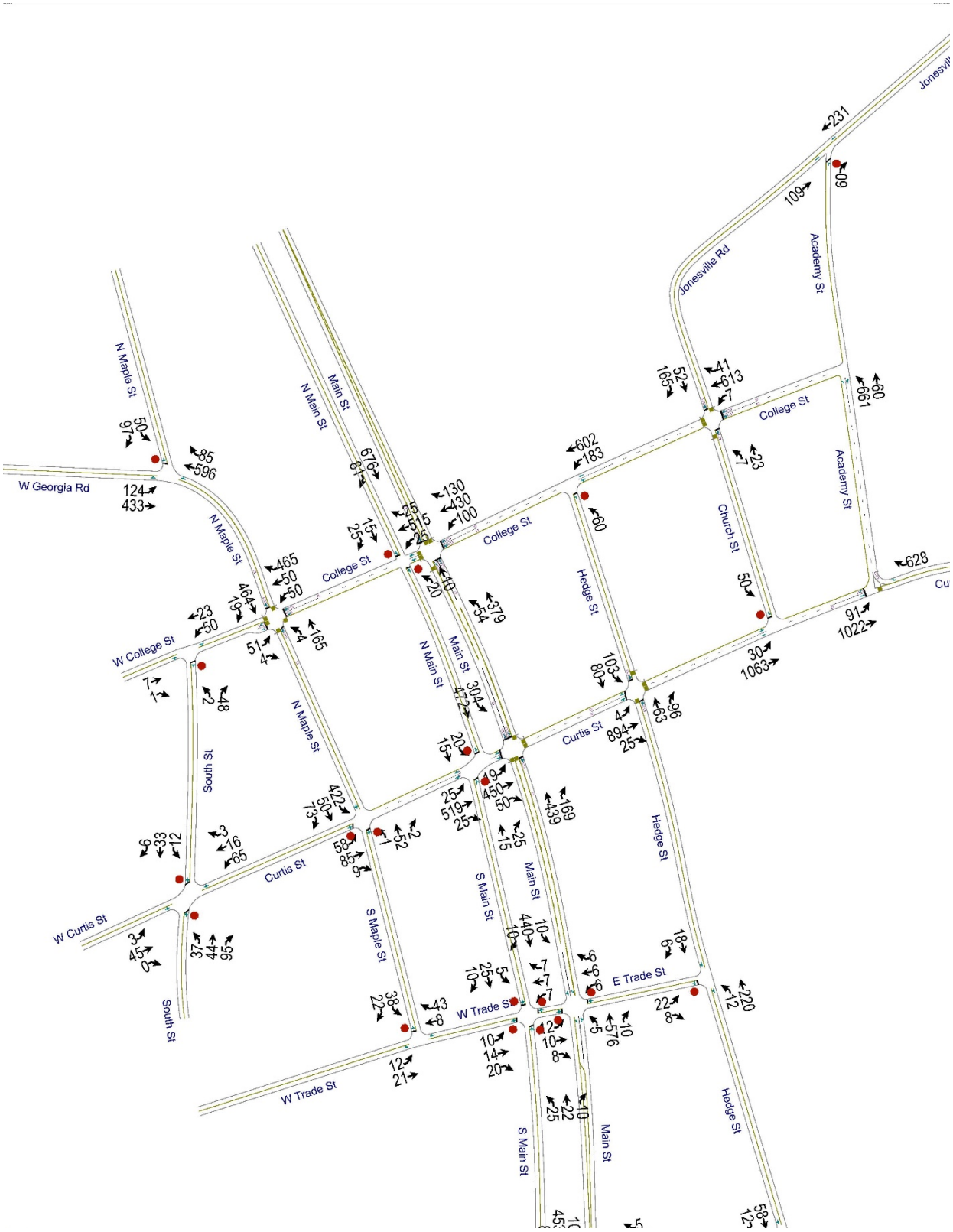

Figure 6 – CCW PM Peak Hour

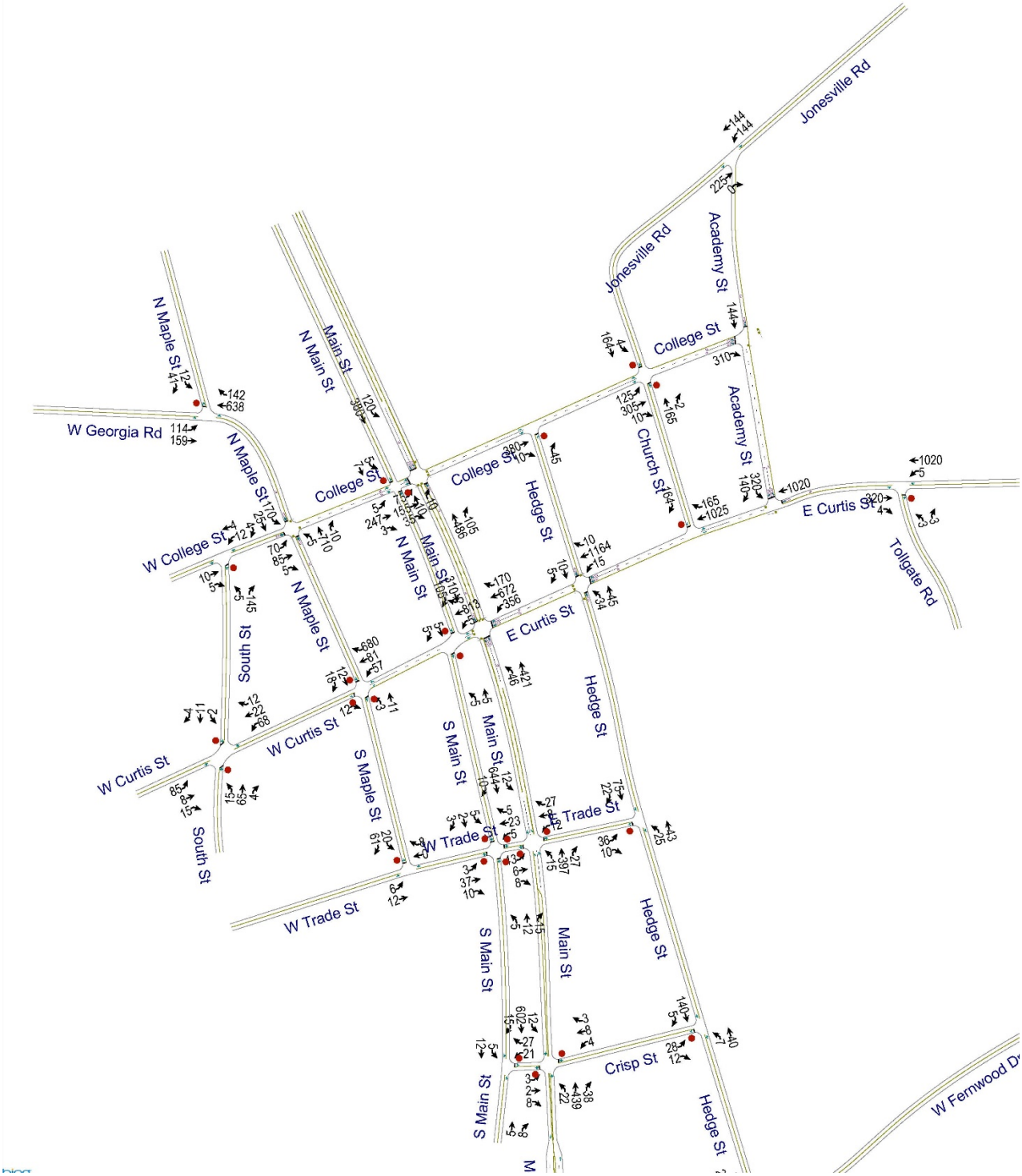

Figure 7 – CW AM Peak Hour

Figure 8 – CW PM Peak Hour

TRAFFIC OPERATIONS ANALYSIS

Measuring existing and future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, capacity analyses were conducted using the Clockwise and Counter Clockwise directions for traffic volume conditions. Capacity analyses provide an indication of how well the study area intersections serve existing and future traffic demands.

METHODOLOGY

Level-of-Service (LOS)

A primary result of capacity analyses is the assignment of LOS to traffic facilities under various traffic flow conditions. The concept of LOS is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A LOS definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six LOS are defined for each type of facility. They are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F the worst.

Since the LOS of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of LOS, depending on the time of day, day of week, or period of a year.

HCM 6th Edition LOS Criteria for Signalized and Unsignalized Intersections

Signalized Intersections		**Unsignalized Intersections**	
LOS	**Control Delay per Vehicle (seconds)**	**LOS**	**Control Delay per Vehicle (seconds)**
A	≤ 10	A	≤ 10
B	> 10 and ≤ 20	B	> 10 and ≤ 15
C	> 20 and ≤ 35	C	> 15 and ≤ 25
D	> 35 and ≤ 55	D	> 25 and ≤ 35
E	> 55 and ≤ 80	E	> 35 and ≤ 50
F	> 85	F	> 50

ANALYSIS RESULTS

As part of this traffic study, capacity analyses have been performed at the study area intersections. The results of these analyses are summarized in Table 1 and Table 2.

AM Peak Hour Comparison

Maple @ College		CCW		Clockwise	
		Delay	LOS	Delay	LOS
	NB	33	C	26	C
	SB	35	C	63	E
	EB	19	B	59	E
	WB	21	C		
	Overall	24	C	37	D

Main @ Curtis		CCW		Clockwise	
		Delay	LOS	Delay	LOS
	NB	7	A	30	C
	SB	5	A	52	D
	EB	31	C		
	WB			12	B
	Overall	10	B	24	C

Main @ College		CCW		Clockwise	
		Delay	LOS	Delay	LOS
	NB	14	**B**	9	A
	SB	76	E	5	A
	EB			47	D
	WB	30	C		
	Overall	37	D	15	B

Hedge @ Curtis		CCW		Clockwise	
		Delay	LOS	Delay	LOS
	NB	27	C	54	D
	SB	45	D	30	C
	EB	2	A		
	WB			1	A
	Overall	9	A	5	A

Church/Jonesville @ College				**Academy @ College**	
		Delay	LOS	Delay	LOS
	NB	48	D		
	SB	44	D	55	E
	WB	8	A		
	EB			0.5	A
	Overall	20	B	18	B

Academy @ Curtis		CCW		Clockwise	
		Delay	LOS	Delay	LOS
	EB	1	A		
	WB	3	A	47	D
	SB			45	D
	Overall	2	A	46	D

Table 1

As shown in Table 1 the LOS for the proposed signalized intersections throughout the network varies based on the proposed direction of travel. In general during the AM Peak hour the Counter Clockwise direction showed less delay while providing a more consistent movement through the roadway network.

PM Peak Hour Comparison

Maple @ College		CCW		Clockwise	
		Delay	LOS	Delay	LOS
	NB	26	C	50	D
	SB	47	D	85	F
	EB	75	E	59	E
	WB	4	A		
	Overall	26	C	64	E

Main @ Curtis		CCW		Clockwise	
		Delay	LOS	Delay	LOS
	NB	31	C	20	C
	SB	22	C	20	C
	EB	26	C		
	WB			37	D
	Overall	26	C	26	C

Main @ College		CCW		Clockwise	
		Delay	LOS	Delay	LOS
	NB	10	**B**	8	A
	SB	46	D	10	B
	EB			35	D
	WB	34	C		
	Overall	33	C	16	B

Hedge @ Curtis		CCW		Clockwise	
		Delay	LOS	Delay	LOS
	NB	25	C	52	D
	SB	81	F	33	C
	EB	7	A		
	WB			3	A
	Overall	20	C	7	A

Church/Jonesville @ College				Academy @ College	
		Delay	LOS	Delay	LOS
	NB	36	D		
	SB	26	C	54	E
	WB	5	A		
	EB			0.3	A
	Overall	11	B	11	B

Academy @ Curtis		CCW		Clockwise	
		Delay	LOS	Delay	LOS
	EB	7	A		
	WB	3	A	73	E
	SB			30	C
	Overall	5	A	51	D

Table 2

As shown in Table 2 the LOS for the PM Peak Hour did show more delay as the predominant travel patterns shifted as drivers returned from I-385 and moved through the network toward the neighborhoods to the east of downtown. Again, the Counter Clockwise direction showed less delay while providing a more consistent movement through the roadway network. No signalized intersection is projected to have an overall LOS below a C during the PM peak hour in the CCW direction while Clockwise direction does have an overall worse than C.

Summary and Conclusions

Either of the proposed one-way traffic patterns will reduce delays through the downtown area. The Counter Clockwise pattern shows greater improvements along E. Curtis St. and E. College St. It will also accommodate an increase in traffic volume, from additional development down SC 417 to the East. The signal at E. Curtis St. and Academy St. will only impede traffic flow when a pedestrian activates a crosswalk in the CCW direction. However, measures should be taken to deter cut through traffic on Eastview Dr., Poinsettia Dr., and Hunter St. Access to W. Curtis St., from S. Main St. may become more difficult.

The Counter Clockwise direction was found to have a slightly more favorable traffic flow for the side roads entering the Downtown Core. The intersection of Maple St. at Curtis St. may need to continue to be evaluated as it will be a free flow movement for traffic from Maple St. onto the EB Curtis St.

The Clockwise direction was shown to work better on Curtis St than College St. But the largest drawback was at the intersection of Academy St. at E. Curtis St. This movement would require a left turn to continue towards the East and subsequently caused the clockwise direction additional delay. With traffic in the clockwise pattern, the Intersection of Maple at W. Curtis would be a free flow movement, but a right turn and thus should have less delays.

Vehicle and pedestrian detection, signal communications, and signal timings will be crucial to the success of the one way pairs in the downtown core. Once motorist have experienced the new traffic pattern for a while, additional traffic counts may be necessary. Every time significant development takes place to the east of Simpsonville, along SC 417 or Jonesville Rd., signal timing will likely be impacted in the morning and afternoon.

With the redevelopment of the Downtown Core and the new Park, pedestrian activity is expected to increase. Accommodations have been made for pedestrians around the new park, but further study may need to be completed on the West side of Main St. as development continues.

It is recommended a downtown parking plan be completed to better understand future pedestrian movements and needs as it relates to the transportation plan.