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TRAFFIC PLANNING AND DESIGN, INC.

Ridgeway Avenue One-Way Analysis

For Submission To:

Town of Black Mountain, NC

Ridgeway Avenue One-Way Analysis

FOR SUBMISSION TO:
Town of Black Mountain, NC

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EXECUTIVE SUMMARY

Traffic Planning and Design, Inc. (TPD) conducted a traffic analysis for Ridgeway Avenue. The corridor study area, as shown in **Figure 1**, extends from Richardson Blvd & Sutton Avenue intersection to Ridgeway Avenue & State Street intersection. The corridor is in the Town of Black Mountain, North Carolina.

The purpose of this study is to evaluate proposed one-way traffic flow on Ridgeway Avenue. This two-way to one-way traffic conversion will create an opportunity to reallocate roadway width to provide a shoulder for bicycle and pedestrian traffic on Ridgeway Avenue.

The scope of the traffic analysis in this report includes an evaluation of the existing traffic conditions and an analysis of proposed one-way traffic flow between Sutton Avenue at Richardson Boulevard and E. State Street at Ridgeway Avenue. One-way traffic flow to be studied would be southbound only due to geometric constraints at the E. State Street at Ridgeway Avenue intersection.

Under existing conditions, Ridgeway Avenue operates with 2 lanes and is a local downtown roadway running north and south between Sutton Avenue and State Street. There are a mix of residential, and commercial land uses along this stretch of Ridgeway Avenue. There are no existing sidewalk or bicycle facilities along Ridgeway Avenue. The recorded 2022 ADT volumes for Ridgeway Avenue is 2,494 vehicles per day (VPD). **Table 1** summarizes the existing roadway characteristics.

Traffic was analyzed for the weekday A.M. and weekday P.M. peak hours at the following study area intersections included in this analysis are as follows:

- Sutton Avenue at Richardson Boulevard
- E. State Street at Ridgeway Avenue
- E. State Street at Montreat Road/Broadway Avenue
- E. State Street at Richardson Boulevard
- Sutton Avenue at Broadway Avenue

Note: Traffic counts for the Saturday midday peak hour were reviewed and are lower than the volumes analyzed during the weekday analysis. As such, it was determined that additional Saturday analysis was not warranted.

The results of the analysis indicate that the study area intersections are anticipated to operate at the same overall intersection level of service (ILOS) after redistribution or traffic, with one exception. After redistributing traffic from Ridgeway Avenue through the Richardson Boulevard and State Street signalized intersection, the northbound thru-right movement resulted in an increase in delay and vehicle queues that requires mitigation through signal retiming. **With the proposed timing revision for the traffic signal at Richardson Boulevard and State Street, all intersection movements will operate an acceptable LOS C or better and all turning lane queues will remain within available storage capacity. As such, the impact of this one-way conversion will be adequately mitigated.**

A more detailed summary of traffic analysis results is as follows:

Richardson Boulevard & State Street

- With no mitigation, under the 2024 Build (Redistributed) Analysis, during the midday peak hour, the northbound thru-right movement LOS is anticipated to drop from LOS C to LOS E with an increase in delay of 43.8 seconds. During the P.M. peak hour, the northbound thru-right movement LOS is anticipated to drop from LOS C to LOS F with an increase in delay of 60.4 seconds. To reduce

the increase in delay, **signal timing is recommended as discussed further in the Signal Timing Adjustments Section of this report.**

- With no mitigation, under the 2024 Build (Redistributed), the northbound left approach queue is anticipated to increase from 48 feet to 356 feet in the midday peak hour. During the PM peak hour, the northbound left approach queue is anticipated to increase from 68 feet to 359 feet. To reduce the increase in queue, **signal timing is recommended as discussed further in the Signal Timing Adjustments Section of this report.**
- Signal timing modifications, to provide additional green time to the northbound and southbound movements, will mitigate the impacts of the one-way conversion based on overall intersection delay and queueing. Comparing Build conditions (no-mitigation) to Build conditions with revised signal retiming, the northbound thru-right improves in the midday peak hour reducing delay from 68.4 seconds to 30.4 seconds and improving the LOS from E to C. The northbound thru-right improves in the P.M. peak hour reducing delay from 84.3 seconds to 33.8 seconds and improving the LOS from F to C. The northbound left queuing during the midday peak hour improves from 356 feet to 67 feet. The northbound left queuing during the P.M. peak hour improves from 359 feet to 46 feet.

RECOMMENDATIONS

Ridgeway Avenue & State Street

- Install On-Way signage on Ridgeway Avenue to alert motorists of the direction of vehicular flow.

Richardson Boulevard & Sutton Avenue

- Install DO NOT ENTER and Right Turn Only signage on Sutton Avenue to alert motorists of the direction of vehicular flow and prevent wrong way travel.
- Install NO LEFT TURN signs on southbound Richardson Boulevard.

Ridgeway Avenue & Center Avenue

- Install appropriate DO NOT ENTER, ONE WAY, and NO RIGHT TURN signs on Center Avenue and Ridgeway Avenue to alert motorists of the direction of travel and prevent wrong way travel.

INTRODUCTION

Traffic Planning and Design, Inc. (TPD) conducted a traffic analysis for Ridgeway Avenue. The corridor study area, as shown in **Figure 1**, extends from Richardson Blvd & Sutton Avenue intersection to Ridgeway Avenue & State Street intersection. The corridor is in the Town of Black Mountain, North Carolina. Ridgeway Avenue and Sutton Avenue are Town maintained roadways.

The purpose of this study is to evaluate proposed one-way traffic flow on South Ridgeway Avenue. This two-way to one-way traffic conversion will create an opportunity to reallocate roadway width to provide a shoulder for bicycle and pedestrian traffic on South Ridgeway Avenue.

The scope of the traffic analysis in this report includes an evaluation of the existing traffic conditions and an analysis of proposed one-way traffic flow between Sutton Avenue at Richardson Boulevard and E. State Street at Ridgeway Avenue. One-way traffic flow to be studied would be southbound only due to geometric constraints at the E. State Street at Ridgeway Avenue intersection.

Under existing conditions, Ridgeway Avenue operates with 2 lanes and is a local downtown roadway running north and south between Sutton Avenue and State Street. There are a mix of residential, and commercial land uses along this stretch of Ridgeway Avenue. There are no existing sidewalk or bicycle facilities along Ridgeway Avenue. The recorded 2022 ADT volumes for Ridgeway Avenue is 2,494 vehicles per day (VPD). **Table 1** summarizes the existing roadway characteristics.

EXISTING CONDITIONS

Existing Roadway Network

For this analysis, the following intersections adjacent to the corridor were evaluated:

- E. State Street at Ridgeway Avenue
- E. State Street at Montreat Road/Broadway Avenue
- E. State Street at Richardson Boulevard
- Sutton Avenue at Broadway Avenue
- Sutton Avenue at Richardson Boulevard

Table 1 summarizes the existing roadway characteristics. The existing lane configurations are illustrated in **Figure 2.**

TABLE 1: EXISTING ROADWAY CHARACTERISTICS

Roadway	Roadway Maintenance	Predominant Directional Orientation	Posted Speed Limit
State St	Local	East-West	20 MPH
Montreat/Broadway	Local	North-South	20 MPH
Richardson Blvd	Local	North-South	20 MPH
Ridgeway Ave	Local	North-South	25 MPH
Sutton Ave	Local	East-West	25 MPH

The following is a description of the intersecting roadways:

- State Street - State Street currently operates with one lane east and west with a 2-way left turn lane. The posted speed limit is 20 MPH. There is a mix of residential, commercial and office land uses along this stretch of State Street. There are existing sidewalks along the north and south side of the corridor. There are no existing bicycle facilities. The NCDOT recorded 2018 AADT for this corridor is 7,600 vehicles per day (VPD) for State Street.
- Ridgeway and Sutton Avenues - Ridgeway and Sutton Avenues currently operate with one lane north and south. The posted speed limit is 25 MPH. The pavement width is approximately 20 feet. There are a mix of residential, commercial land uses along this stretch of Ridgeway/Sutton Avenue. There are no existing sidewalk or bike facilities. The recorded 2022 ADT volumes for Ridgeway Avenue is 2,494 vehicles per day (VPD).

Existing Traffic Volume Data

Twenty-four (24) hour Automatic Traffic Recorder (ATR) counts for a seven (7) day period (Dec 14, 2022 – Dec 20, 2022) for determining daily and hourly traffic flows, along with distribution of northbound versus southbound traffic. ATR counts were collected at one (1) location on S. Ridgeway Avenue.

New intersection turning movement traffic counts were collected between December 13 and 14, 2022 (Tuesday and Wednesday) between the hours of 7:00 AM and 7:00 PM and on Saturday, December 17, 2022, between the hours of 12:00 noon and 3:00 PM at the following intersections:

- Sutton Avenue at Richardson Boulevard
- E. State Street at Ridgeway Avenue

Previously collected traffic count data (2019 and 2017) for the following intersections were utilized with balancing adjustments to reflect current traffic volumes:

- E. State Street at Montreat Road/Broadway Avenue
- E. State Street at Richardson Boulevard
- Sutton Avenue at Broadway Avenue

For volume balancing, the overall study area peak hours were utilized as follows:

- Weekday Morning: 7:15-8:15 A.M.
- Weekday Midday: 12:15-1:15 P.M.
- Weekday Evening: 3:00-4:00 P.M.
- Saturday Midday: 12:15-1:15 P.M.

For the E. State Street & Montreat and E. State Street & Richardson intersections, peak hour volumes were utilized from TPDs' Honeycutt One-Way Analysis and are illustrated in **Figure 3**.

Existing condition traffic volumes for the weekday A.M., Midday, and P.M. peak hours are illustrated in **Figure 4A**. Existing condition traffic volumes for the weekend Saturday peak hour are illustrated in **Figure 4B.** Manual traffic count data sheets and calculations are provided in **Appendix A.**

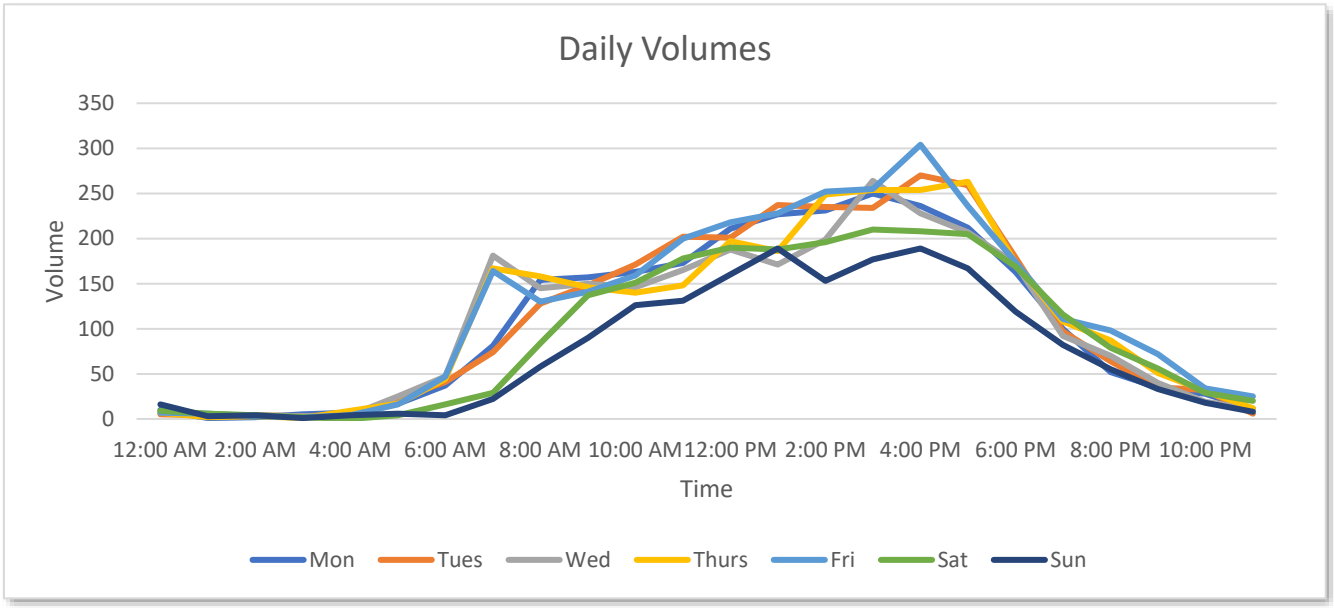
Ridgeway Avenue - Peak Hour Data Analysis

Table 2 and **Graphs 1** and **2** below summarize the directional volume data collected from the 24-hour Automatic Traffic Recorder (ATR) counts on Ridgeway Avenue from December 14-20, 2022.

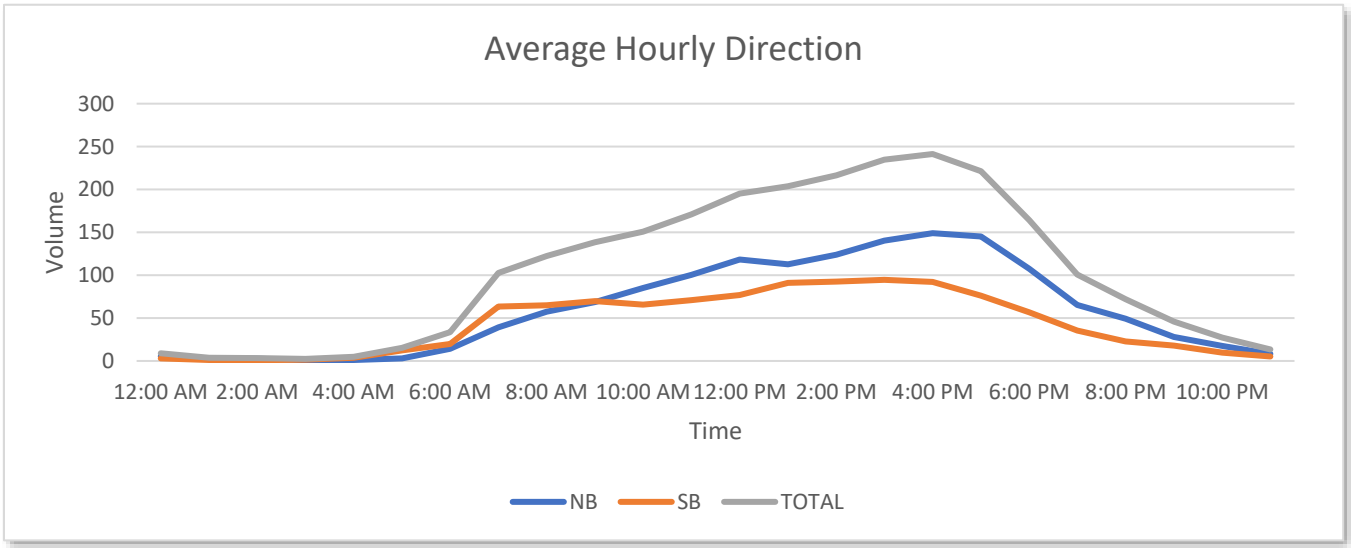
Table 2: Average Hourly Volume (northbound + southbound)

Ridgeway Avenue	A.M.		Midday		P.M.	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Weekday	51 vph	82 vph	123 vph	80 vph	150 vph	100 vph
Weekend	9 vph	17 vph	106 vph	69 vph	114 vph	80 vph

GRAPH 1:
TYPICAL DAILY TRAFFIC PATTERNS ON RIDGEWAY AVENUE NORTHBOUND + SOUTHBOUND



GRAPH 2:
AVERAGE HOURLY DIRECTIONAL FLOW ON RIDGEWAY AVENUE



Speed Characteristics

Table 3 summarizes speed data that was collected from the 24-hour ATR counts from December 14-20, 2022.

Table 3: Ridgeway Avenue Speed Characteristics

Ridgeway Avenue	Northbound	Southbound	Total
85th Percentile	31 MPH	28 MPH	29 MPH
Average Speed	26 MPH	23 MPH	24 MPH
Pace Speed	21-30 MPH	21-30 MPH	21-30 MPH

Identification of Heavy Vehicle Percentages

Table 4 summarizes heavy vehicle (truck) data collected from the 24-hour ATR counts from December 14-20, 2022.

Table 4: Heavy Vehicle Percentages for Ridgeway Avenue (Buses + 2 axel-6 tire)

Ridgeway Avenue	Heavy Vehicle Percentage %
Northbound	4.3
Southbound	2.7
Total	3.7

FUTURE NO-BUILD CONDITIONS

Annual Background Growth

Background growth factors for the roadways in the study area were developed by TPD. A background growth trend factor of 1% per year was utilized to apply two years of growth for the 2024 future year. The additional traffic volumes due to background growth were added to the existing traffic data to produce 2024 No-Build condition traffic volumes. No-Build condition volumes for the weekday A.M, Midday, and P.M. peak hours are illustrated in **Figure 5A** for the future year 2024 conditions. No-Build condition volumes for the weekend Saturday peak hour are illustrated in **Figure 5B** for the future year 2024 conditions.

BUILD (REDISTRIBUTED) CONDITION TRAFFIC VOLUMES

Northbound traffic volumes on Ridgeway Avenue were redistributed throughout the network to account for the proposed one-way southbound flow between the intersections of State Street & Ridgeway Avenue and Sutton Avenue & Richardson Boulevard. Since the northbound traffic will be restricted under this "Build" Condition, all existing northbound Ridgeway traffic was redistributed to other roadways in the study area.

Redistribution volumes for the weekday A.M, Midday, and P.M. peak hours are illustrated in **Figure 6A**. Redistribution volumes for the weekend Saturday peak hour is illustrated in **Figure 6B**. Build (Redistributed)

condition volumes for the weekday A.M, Midday, and P.M. peak hours are illustrated in **Figure 7A** for the future year 2024 Build conditions. Build (Redistributed) condition volumes for the weekend Saturday peak hour is illustrated in **Figure 7B** for the future year 2024 Build conditions.

LEVEL OF SERVICE

Intersection Level of Service

For analysis of intersections, level of service is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. LOS criteria is stated in terms of control delay per vehicle for a one-hour analysis period. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The criteria are indicated in **Table 5**. Delay, as it relates to level of service, is a complex measure and is dependent upon several variables. For signalized intersections, these variables include the quality of vehicle progression, the cycle length, the green time ratio, and the volume/capacity ratio for the lane group in question. For unsignalized intersections, delay is related to the availability of gaps in the flow of traffic on the major street and the driver's discretion in selecting an appropriate gap for a particular movement from the minor street (straight across, left or right-turn).

TABLE 5: LEVEL OF SERVICE CRITERIA

Level of Service	Control Delay Per Vehicle (Seconds)	
	Signalized	Unsignalized[1]
A	< 10	< 10
B	> 10 and < 20	> 10 and < 15
C	> 20 and < 35	> 15 and < 25
D	> 35 and < 55	> 25 and < 35
E	> 55 and < 80	> 35 and < 50
F	> 80 or v/c > 1.0	> 50 or v/c > 1.0

1 Obtained from Exhibits 18-4 and 19-1 of the Transportation Research Board's Highway Capacity Manual 2010

The existing intersections were analyzed according to the methodologies contained in the *Highway Capacity Manual* (HCM) *6th Edition* and using Synchro 10 software, and the reports are included in **Appendix B**. The signals in the corridor are not currently coordinated and are fully actuated. Existing signal plans are included in **Appendix C**. The Level of Service (LOS) analysis for all the intersections in the corridor was conducted using Synchro 10 software.

Level of Service Results

Level of service (LOS) analysis for the study area intersections are shown in **Table 6**.

TABLE 6
LEVEL OF SERVICE DELAY (SECONDS) SUMMARY – AM & MIDDAY

Intersection	Movement	Weekday A.M. Peak Hour					
		Existing Condition		2024 Conditions			
				No-Build		Build	
		LOS	Delay	LOS	Delay	LOS	Delay
Richardson Blvd & State Street	**EB Approach**	**A**	**7.5**	**A**	**7.4**	**A**	**7.4**
	EB L	A	5.9	A	5.9	A	5.9
	EB TR	A	7.6	A	7.5	A	7.5
	WB Approach	**A**	**9.6**	**A**	**9.2**	**A**	**9.2**
	WB L	A	6.2	A	6.1	A	6.1
	WB TR	A	10.0	A	9.6	A	9.6
	NB Approach	**C**	**23.4**	**C**	**23.0**	**C**	**33.5**
	NB L	B	19.6	B	19.6	B	19.6
	NB TR	C	23.6	C	23.3	C	34.0
	SB Approach	**C**	**20.1**	**C**	**20.0**	**C**	**20.1**
	SB L	C	20.5	C	20.3	C	20.5
	SB TR	B	19.4	B	19.4	B	19.4
	ILOS	B	10.5	B	10.2	B	13.2
Ridgeway Avenue & State Street	EB L	A	8.9	A	8.5	A	8.5
	WB L	A	8.2	A	8.0	A	8.3
	NB LTR	B	13.0	B	11.4	---	---
	SB LTR	D	29.4	C	20.8	C	21.5
Richardson Blvd & Sutton Avenue	EB L	A	7.7	A	7.7	A	7.9
	SB LTR	A	9.3	A	9.2	A	9.2

Intersection	Movement	Weekday MIDDAY Peak Hour					
		Existing Condition		2024 Conditions			
				No-Build		Build	
		LOS	Delay	LOS	Delay	LOS	Delay
Richardson Blvd & State Street	**EB Approach**	**A**	**7.3**	**A**	**7.3**	**A**	**7.3**
	EB L	A	6.2	A	6.2	A	6.2
	EB TR	A	7.4	A	7.5	A	7.5
	WB Approach	**A**	**7.5**	**A**	**7.6**	**A**	**7.5**
	WB L	A	6.1	A	6.1	A	6.1
	WB TR	A	7.8	A	7.8	A	7.7
	NB Approach	**C**	**23.7**	**C**	**23.8**	**E**	**62.8**
	NB L	C	21.1	C	21.1	C	21.5
	NB TR	C	24.5	C	24.6	**E**	**68.4**
	SB Approach	**C**	**20.4**	**C**	**20.4**	**C**	**20.5**
	SB L	B	20.0	B	20.0	C	20.4
	SB TR	C	20.5	C	20.5	C	20.5
	ILOS	B	10.6	B	10.6	C	23.8
Ridgeway Avenue & State Street	EB L	A	7.8	A	7.8	A	7.8
	WB L	A	7.9	A	7.9	A	8.3
	NB LTR	B	12.3	B	12.5	---	---
	SB LTR	B	12.9	B	13.2	B	13.6
Richardson Blvd & Sutton Avenue	EB L	A	7.7	A	7.7	A	8.1
	SB LTR	A	9.8	A	9.9	A	9.3

TABLE 6 (CONT.)
LEVEL OF SERVICE DELAY (SECONDS) SUMMARY – PM

Intersection	Movement	Weekday P.M. Peak Hour					
		Existing Condition		2024 Conditions			
				No-Build		Build	
		LOS	Delay	LOS	Delay	LOS	Delay
Richardson Blvd & State Street	**EB Approach**	**A**	**8.4**	**A**	**8.5**	**A**	**8.4**
	EB L	A	6.0	A	6.1	A	6.0
	EB TR	A	8.6	A	8.7	A	8.6
	WB Approach	**A**	**8.1**	**A**	**8.1**	**A**	**7.9**
	WB L	A	6.5	A	6.6	A	6.6
	WB TR	A	8.3	A	8.3	A	8.2
	NB Approach	**C**	**23.2**	**C**	**23.3**	**E**	**78.7**
	NB L	C	20.7	C	20.6	C	20.9
	NB TR	C	23.8	C	23.9	**F**	**84.3**
	SB Approach	**C**	**20.1**	**C**	**20.1**	**C**	**20.4**
	SB L	C	20.2	C	20.2	C	21.0
	SB TR	C	20.1	C	20.1	C	20.1
	ILOS	B	10.4	B	10.4	C	26.4
Ridgeway Avenue & State Street	EB L	A	7.9	A	7.9	A	7.9
	WB L	A	8.4	A	8.4	A	9.1
	NB LTR	C	15.6	C	16.0	---	---
	SB LTR	B	14.6	B	14.8	C	16.9
Richardson Blvd & Sutton Avenue	EB L	A	7.7	A	7.7	A	8.2
	SB LTR	B	10.0	B	10.0	A	9.6

Under the 2024 Build (Redistributed) Analysis without any proposed mitigation, the Richardson Boulevard & State Street intersection, the following conditions are noted:

- During the midday peak hour, the northbound thru-right movement LOS is anticipated to drop from LOS C to LOS E with an increase in delay of 43.8 seconds.
- During the P.M. peak hour, the northbound thru-right movement LOS is anticipated to drop from LOS C to LOS F with an increase in delay of 60.4 seconds.
- To reduce the increase in delay, **signal timing is recommended as discussed further in the Signal Timing Adjustments Section of this report.**

QUEUE ANALYSIS

Queue analyses were conducted at the study area intersections using *Synchro 11* software. For this analysis, the 95th percentile Synchro queue and SimTraffic Max Observed queue are summarized in **Table 7** below.

TABLE 7
SIMTRAFFIC MAX QUEUE (FEET) ANALYSIS

Intersection	Movement	Available Storage	Weekday A.M. Peak Hour			Weekday Midday Peak Hour			Weekday P.M. Peak Hour		
			Existing	2024 Conditions		Existing	2024 Conditions		Existing	2024 Conditions	
				No-Build	Build		No-Build	Build		No-Build	Build
Richardson Blvd & State Street	EB L	200	48	84	50	69	68	52	72	124	52
	EB TR	---	205	295	[121]	206	136	268	221	267	268
	WB L	---	92	72	157	79	69	74	54	75	74
	WB TR	---	141	182	267	150	171	194	113	143	194
	NB L	125	44	23	24	43	48	**356**	68	68	**359**
	NB TR	---	106	110	129	108	83	[219]	87	[67]	[240]
	SB L	80	47	47	28	49	28	50	48	50	50
	SB TR	---	52	30	30	52	71	71	95	73	71
Ridgeway Avenue & State Street	EB L	150	49	47	50	25	26	127	26	0	127
	WB L	100	62	60	48	94	47	92	100	70	92
	NB LTR	---	72	73	---	72	69	---	68	113	---
	SB LTR	---	45	24	45	45	24	47	46	24	47
Richardson Blvd & Sutton Avenue	EB L	---	53	53	31	55	68	72	55	52	72
	SB LTR	---	78	54	30	56	56	78	80	70	78

SimTraffic Max Queue [95th percentile Synchro Queue] – XX [XX]

Under the 2024 Build (redistributed) conditions without any proposed mitigation for the A.M, midday, and P.M. peak hours at the Richardson Boulevard & State Street intersection the following conditions are noted:

- The northbound left approach is anticipated to increase in queue from 48 feet to 356 feet in the midday peak hour exceeding the available storage.
- The northbound left approach is anticipated to increase in queue from 68 feet to 359 feet in the midday peak hour exceeding the available storage.
- To reduce the increase in queue, **signal timing is recommended as discussed further in the Signal Timing Adjustments Section of this report.**

For all other intersections, from no-build to build (redistributed) conditions, queues are not anticipated to exceed the available storage. Therefore, there are no other recommendations for minimizing queue lengths.

SIGNAL TIMING ADJUSTMENTS

Level of service (LOS) analysis for the timing adjusted study area intersection of Richardson Boulevard & State Street is provided in **Table 8**. The 95th percentile Synchro queue and SimTraffic Max Observed queue for the timing adjusted intersection is summarized in **Table 9** below. Proposed retiming includes an increased green time for the northbound and southbound movements and a decrease in green time for the westbound and eastbound movements.

TABLE 8
LEVEL OF SERVICE DELAY (SECONDS) SUMMARY – TIMING ADJUSTMENT

Intersection	Movement	Weekday Midday Peak Hour						Weekday P.M. Peak Hour					
		2024 No-Build		2024 Build		2024 Build*		2024 No-Build		2024 Build		2024 Build*	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Richardson Blvd & State Street	**EB App.**	**D**	**43.7**	**A**	**7.3**	**A**	**9.8**	**A**	**8.5**	**A**	**8.4**	**A**	**9.9**
	EB L	A	6.2	A	6.2	A	8.3	A	6.1	A	6.0	A	7.1
	EB TR	A	7.5	A	7.5	B	10.1	A	8.7	A	8.6	B	10.1
	WB App.	**C**	**29.7**	**A**	**7.5**	**B**	**10.1**	**A**	**8.1**	**A**	**7.9**	**A**	**9.3**
	WB L	A	6.1	A	6.1	A	8.2	A	6.6	A	6.6	A	7.8
	WB TR	A	7.8	A	7.7	B	10.4	A	8.3	A	8.2	A	9.6
	NB App.	**E**	**59.7**	**E**	**62.8**	**C**	**29.2**	**C**	**23.3**	**E**	**78.7**	**C**	**32.3**
	NB L	C	21.1	C	21.5	B	17.5	C	20.6	C	20.9	B	17.2
	NB TR	C	24.6	**E**	**68.4**	C	30.8	C	23.9	**F**	**84.3**	C	33.8
	SB App.	**E**	**62.3**	**C**	**20.5**	**B**	**16.9**	**C**	**20.1**	**C**	**20.4**	**B**	**16.8**
	SB L	B	20.0	C	20.4	B	16.8	C	20.2	C	21.0	B	17.2
	SB TR	C	20.5	C	20.5	B	17.0	C	20.1	C	20.1	B	16.7
	ILOS	B	10.6	C	23.8	B	15.8	B	10.4	C	26.4	B	15.6

2024 Build = Signal Timing Adjustments Applied*

TABLE 9
SIMTRAFFIC MAX QUEUE (FEET) ANALYSIS – TIMING ADJUSTMENT

Intersection	Movement	Available Storage	Weekday Midday Peak Hour			Weekday P.M. Peak Hour		
			2024 Conditions			2024 Conditions		
			No-Build	Build	Build*	No-Build	Build	Build*
Richardson Blvd & State Street	EB L	200	68	52	124	124	52	119
	EB TR	---	136	268	218	267	268	226
	WB L	---	69	74	111	75	74	54
	WB TR	---	171	194	158	143	194	177
	NB L	125	48	**356**	67	68	**359**	46
	NB TR	---	83	[219]	178	[67]	[240]	[198]
	SB L	80	28	50	28	50	50	28
	SB TR	---	71	71	69	73	71	51

2024 Build = Signal Timing Adjustments Applied*
SimTraffic Max Queue [95th percentile Synchro Queue] – XX [XX]

As indicated in the above tables, modifying the signal timing, and redistributing green time to the northbound and southbound movements will mitigate the impacts of the one-way conversion based on overall intersection delay and queueing. When comparing Build conditions (no-mitigation) to Build* with signal retiming:

- The northbound thru-right improves in the midday peak hour reducing delay from 68.4 seconds to 30.4 seconds and improving the LOS from E to C. The northbound thru-right improves in the P.M. peak hour reducing delay from 84.3 seconds to 33.8 seconds and improving the LOS from F to C. Both for Midday and P.M. peak hours, adjusting the signal timing has reduced queueing for the northbound thru-right movement.
- The eastbound thru-right and westbound thru-right during the midday and P.M. peak hours experienced a drop from LOS A to B. This is not a concern as these movements only see a small 2-4 second increase in delay.

- The northbound left queuing during the midday peak hour improves from 356 feet to 67 feet. The northbound left queuing during the P.M. peak hour improves from 359 feet to 46 feet.

CONCLUSIONS

The results of the analysis indicate that the study area intersections are anticipated to operate at the same overall intersection level of service (ILOS) after redistribution or traffic, with one exception. After redistributing traffic from Ridgeway Avenue through the Richardson Boulevard and State Street signalized intersection, the northbound thru-right movement resulted in an increase in delay and vehicle queues that requires mitigation through signal retiming. **With the proposed timing revision for the traffic signal at Richardson Boulevard and State Street, all intersection movements will operate an acceptable LOS C or better and all turning lane queues will remain within available storage capacity. As such, the impact of this one-way conversion will be adequately mitigated.**

Note: Traffic counts for the Saturday midday peak hour were reviewed and are lower than the volumes analyzed during the weekday analysis. As such, it was determined that additional Saturday analysis was not warranted.

Richardson Boulevard & State Street

- With no mitigation, under the 2024 Build (Redistributed) Analysis, during the midday peak hour, the northbound thru-right movement LOS is anticipated to drop from LOS C to LOS E with an increase in delay of 43.8 seconds. During the P.M. peak hour, the northbound thru-right movement LOS is anticipated to drop from LOS C to LOS F with an increase in delay of 60.4 seconds. To reduce the increase in delay, signal timing recommendations were provided.
- With no mitigation, under the 2024 Build (Redistributed), the northbound left approach queue is anticipated to increase from 48 feet to 356 feet in the midday peak hour. During the PM peak hour, the northbound left approach queue is anticipated to increase from 68 feet to 359 feet. To reduce the increase in queue, signal timing recommendations are provided.
- Signal timing modifications, to provide additional green time to the northbound and southbound movements, will mitigate the impacts of the one-way conversion based on overall intersection delay and queueing. Comparing Build conditions (no-mitigation) to Build conditions with revised signal retiming, the northbound thru-right improves in the midday peak hour reducing delay from 68.4 seconds to 30.4 seconds and improving the LOS from E to C. The northbound thru-right improves in the P.M. peak hour reducing delay from 84.3 seconds to 33.8 seconds and improving the LOS from F to C. The northbound left queuing during the midday peak hour improves from 356 feet to 67 feet. The northbound left queuing during the P.M. peak hour improves from 359 feet to 46 feet.

Ridgeway Avenue & State Street

- Install On-Way signage on Ridgeway Avenue to alert motorists of the direction of vehicular flow.
- After redistribution, all movements will operate at acceptable LOS with no concerning queue lengths.

Richardson Boulevard and Sutton Avenue

- Install DO NOT ENTER and Right Turn Only signage on Sutton Avenue to alert motorists of the direction of vehicular flow and prevent wrong way travel.
- Install NO LEFT TURN signs on southbound Richardson Boulevard.
- After redistribution, all movements will operate at acceptable LOS with no concerning queue lengths.

Ridgeway Avenue & Center Avenue

- Install appropriate DO NOT ENTER, ONE WAY, and NO RIGHT TURN signs on Center Avenue and Ridgeway Avenue to alert motorists of the direction of travel and prevent wrong way travel.