

**TECHNICAL  
MEMORANDUM - DRAFT**



**To**  
Kumar Neppalli  
Traffic Engineering Manager  
Town of Chapel Hill

**From**  
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HNTB North Carolina, P.C.

**Cc**  
HNTB Project File: 75645

**Subject**  
Town of Chapel Hill Town-Wide  
Transportation Model – Estes Drive  
Scenario Testing

**Date**  
05/10/21

HNTB North Carolina, PC (HNTB), under contract with the Town of Chapel Hill, has developed a Town-wide Transportation Model using the Caliper Corporation TransModeler software tool. This document is intended to provide information on scenario tests developed using the Town-wide Model that focus on the Estes Drive area and proposed Aura Development.

**Introduction**

In the development review process for the proposed Aura Development, located in the northeast quadrant of NC 86 (Martin Luther King, Jr. Blvd) and Estes Drive, the Chapel Hill Town Council directed Town staff to provide additional future scenario testing using the Town-wide Transportation Model to include a broader range of background potential future developments. Town staff coordinated with HNTB to develop a list of potential developments to be added to the Town-wide Model for a test of operational performance in the 2024 analysis year previously assumed for the Aura Development Transportation Impact Analysis.

**Scenario Testing Methodology and Assumptions**

The 2021 Base Year Town-wide model was used for the scenario testing exercise with currently (as of May 2021) coded attributes (roadway geometrics, traffic control and Base Year signal timings) to create 2024 AM and PM peak hour scenarios, with the following changes:

- Committed and/or recommended roadway and signal timing improvements applied to the Estes Drive intersections with NC 86 (Martin Luther King, Jr. Blvd) and E. Franklin Street.
- Proposed or assumed Access Laneage and Traffic Control for Background Developments in the Estes Drive/NC 86 (Martin Luther King, Jr. Blvd) vicinity.
- Utilization of the TransModeler TIA Toolbox feature to input all known and projected land uses and their intensities (as provided in previous TIA reports or information from Town) to generate AM and PM peak hour trips from each background development. Trips were distributed and assigned, using TIA Toolbox/TransModeler methodologies, and based on existing peak hour traffic patterns and O-D matrix.

Each scenario model was run for the typical weekday AM and PM peak hours, with 15 minute model seeding periods, and an assumed equal distribution of traffic flow over the peak hour. All other assumptions regarding vehicle characteristics and driver behaviors coded into the 2021 Base Year model were left unchanged. Model Measures-of-Effectiveness (MOE) results were extracted for intersection performance for the following intersections along Estes Drive:

- NC 86 (Martin Luther King, Jr. Blvd) and Estes Drive
- Somerset Drive and Estes Drive
- E. Franklin Street and Estes Drive
- Future potential local roadway connections and Estes Drive/NC 86 in the Central West Planning Area
- Future planned Aura Development driveways and Estes Drive/NC 86

The MOE results contain vehicular delay, Level-of-Service (LOS) and queue length information, including averages and maximum/ minimum data extracted from randomized number seed stochastic variation results from five model runs for each scenario. Scenario tests of a potential traffic signal and roundabout were also completed at the current Estes Drive and Somerset Drive intersection (future potential four-legged intersection). The following scenarios were tested for AM and PM peak hour conditions:

- 2021 Base Year
- 2024 Without Aura (Includes all other background developments and committed transportation network improvements)
- 2024 With Aura
- 2024 With Aura (Includes all recommended improvements from Aura TIA)

Future potential background development information was compiled from previous TIA studies and/or information from Town of Chapel Hill staff for the Central West planning area. Trip generation information for each development or redevelopment parcel was added to all 2024 scenarios and is shown in **Table 1**. The Town-wide model TIA Toolbox methodology was used to generate trips for each development and trips were distributed through the entire Town-wide model based on Base Year model trip matrix methodologies. It was conservatively assumed that all potential developments would be fully built-out and operational for the 2024 analysis year.

**Table 1. 2024 Scenario Test Background Development Information**

Background Developments List for 2024 Aura/Estes Drive Scenario Testing										
ID	Development Name	Area	Land Use	ITE LUC Density Change	AM Peak Trips			PM Peak Trips		
					IN	OUT	TOTAL	IN	OUT	TOTAL
1	Fordham Apartments	Blue Hill	Multi-Family Residential	273 Units - 50 Hotel units	11	89	100	85	40	125
2	Hillstone	Blue Hill	Multi-Family Residential	220 Units	29	115	144	112	60	172
3	Quality Inn	Blue Hill	Multi-Family Residential	236 Units + 125 Hotel Units	55	110	165	89	56	145
4	Park at Chapel Hill	Blue Hill	Multi-Family Residential	+500 Net Units	49	197	246	94	44	138
5	University Place - Phase 1	Mall Area	Commercial	Mixed Uses	367	291	658	704	632	1,336
6	Town Municipal Services Campus	NC 86	Institutional - Office	48k Office + 24k Police Station Net	126	16	142	38	150	188
7	E. Rosemary Parking Deck & Office	Downtown	Public Parking/General Office	Net Parking Incr + 200K Office	327	40	367	82	305	387
8	W. Rosemary St Hotel	Downtown	Hotel	125 Unit Hotel - 90 Existing Parking	17	26	43	36	19	55
9	Union Chapel Hill Apartments	Downtown	Multi-Family Residential	350 Condos - 111 Apartments	24	97	121	148	80	228
A	Aura	Central West	Mixed-Use	Mixed Uses	81	129	210	120	86	206
B	Rummel Property	Central West	Multi-Family Residential	175 units	14	42	57	45	66	111
C	Azalea	Central West	Senior Assisted Living	100 Units	18	9	27	23	28	51
D	Amity UMC	Central West	Institutional - Church	N/A	0	0	0	0	0	0
E		Central West	Multi-Family Residential	36 units	4	9	13	9	14	23
F	YMCA Expansion	Central West	Recreational	30K SF	35	18	53	46	52	98
G	Saw Mill	Central West	Multi-Family Residential	112 units	10	27	37	30	42	72
H	Richardson Property	Central West	Multi-Family Residential	117 units	10	29	39	31	45	76
I	Office Park	Central West	General Office	N/A	0	0	0	0	0	0
J	Peace Property	Central West	Multi-Family Residential	65 units	5	16	22	17	25	42
					1,182	1,260	2,443	1,708	1,745	3,453
	-2024 Build Scenario Only									

**Model Results and Comment**

Town-wide model results were collected for the intersections along Estes Drive as described above. Model results for intersection delay (overall average and average by approach), the corresponding equivalent Level-of-Service (LOS) and Maximum queue recorded for the adjacent roadway links were extracted at the completion of each AM and PM peak hour scenario model run batch. Additional information for the maximum and minimum delay and maximum queue data over the five model runs were requested and included in tabular data. **Table 2** shows the 2021 Base Model results. The intersection of E. Franklin Street and Estes Drive is at/over capacity (LOS E) in the current PM Peak hour. Estes Drive at NC 86 experiences some excessive queuing that spills back beyond existing left and right-turning bays in both peak hours.

Table 2. 2021 Base Model Scenario Traffic Operations Results

2021 Base Model		AM Peak Hour						
Intersection and Approach	Traffic Control	LOS	Average Delay (Sec/Veh)	Maximum Delay (Sec/Veh)	Minimum Delay (Sec/Veh)	Average Max Queue (ft)	Maximum Queue (ft)	Minimum Queue (ft)
<b>NC 86 (MLK Blvd) and Estes Drive</b>	Signal	<b>D</b>	<b>47.3</b>	<b>52.1</b>	<b>43.4</b>			
Eastbound		E	76.3	92.1	56.7	900	1075	650
Westbound		D	46.8	50.9	42.2	350	375	275
Northbound		C	33.5	36.3	30.9	400	525	350
Southbound		C	34.6	38.1	33.0	450	600	400
<b>Estes Drive and Somerset Drive</b>	Two-Way Stop	-	-	-	-	-	-	-
Southbound		A	5.4	7.9	2.5	25	25	25
<b>Estes Drive and E. Franklin Street</b>	Signal	<b>C</b>	<b>28.7</b>	<b>29.8</b>	<b>26.7</b>			
Eastbound		C	33.5	35.9	28.6	425	500	350
Westbound		C	33.0	34.7	29.9	225	250	150
Northbound		C	24.0	26.1	20.7	200	225	125
Southbound		C	25.3	27.5	22.3	375	425	300

2021 Base Model		PM Peak Hour						
Intersection and Approach	Traffic Control	LOS	Average Delay (Sec/Veh)	Maximum Delay (Sec/Veh)	Minimum Delay (Sec/Veh)	Average Max Queue (ft)	Maximum Queue (ft)	Minimum Queue (ft)
<b>NC 86 (MLK Blvd) and Estes Drive</b>	Signal	<b>E</b>	<b>58.5</b>	<b>62.6</b>	<b>56.0</b>			
Eastbound		E	70.1	83.6	63.3	650	725	450
Westbound		E	63.0	78.1	50.8	850	1500	375
Northbound		E	59.6	61.8	55.9	625	675	550
Southbound		D	45.6	48.9	42.7	475	600	450
<b>Estes Drive and Somerset Drive</b>	Two-Way Stop	-	-	-	-	-	-	-
Southbound		C	16.0	20.6	12.5	125	100	150
<b>Estes Drive and E. Franklin Street</b>	Signal	<b>D</b>	<b>47.9</b>	<b>50.5</b>	<b>46.1</b>			
Eastbound		E	58.0	68.1	51.7	625	700	500
Westbound		D	54.8	56.4	51.0	525	550	450
Northbound		D	41.8	42.5	40.5	475	500	425
Southbound		D	43.2	47.0	38.7	500	550	475

Max Queue Lengths Calculated to Nearest Upstream Intersection/Node in Model – Queue May Exceed Distance Reported  
**RED** – Overall Intersection (Signalized) or Critical Movement (Unsignalized) Exceeds Town Operational Performance LOS Threshold

The 2024 No-Build scenario model operational results are shown in Table 3. With the addition of the substantial number of background potential developments, increases in vehicular delay and degradation of LOS occurs at several study area intersections. Improvements to the NC 86 intersection with Estes Drive mitigate operational issues at this location. A new local roadway connecting to Somerset Drive at Estes

Drive, along with increased traffic volumes by 2024 at this location cause operational problems in the AM and PM peak hours.

**Table 3. 2024 No-Build Aura Scenario - Traffic Operations Results**

2024 No-Build Model		AM Peak Hour						
Intersection and Approach	Traffic Control	LOS	Average Delay (Sec/Veh)	Maximum Delay (Sec/Veh)	Minimum Delay (Sec/Veh)	Average Max Queue (ft)	Maximum Queue (ft)	Minimum Queue (ft)
<b>NC 86 (MLK Blvd) and Estes Drive</b>	Signal	<b>D</b>	<b>40.9</b>	<b>41.5</b>	<b>36.5</b>			
Eastbound		E	76.3	79.7	53.3	1000	1100	700
<b>Westbound</b>		D	37.3	41.8	36.3	225	250	150
Northbound		C	30.4	31.4	25.5	300	375	250
Southbound		C	38.2	41.1	33.7	375	700	325
<b>Estes Drive and Somerset Drive</b>	Two-Way Stop	-	-	-	-	-	-	-
<b>Northbound</b>		C	18.2	19.4	15.6	50	50	25
Southbound		C	21.4	23.1	16.4	50	50	25
<b>Estes Drive and E. Franklin Street</b>	Signal	<b>D</b>	<b>43.4</b>	<b>43.6</b>	<b>41.8</b>			
Eastbound		D	50.5	58.0	45.0	650	700	550
Westbound		E	56.4	64.3	48.2	450	500	300
Northbound		C	31.2	33.3	29.4	225	250	200
Southbound		D	36.4	38.9	32.6	525	575	425
<b>NC 86 (MLK Blvd) and Local Road Connection (RIRO)</b>	Two-Way Stop	-	-	-	-	-	-	-
<b>Westbound</b>		A	5.6	6.0	4.7	50	75	25

2024 No-Build Model		PM Peak Hour						
Intersection and Approach	Traffic Control	LOS	Average Delay (Sec/Veh)	Maximum Delay (Sec/Veh)	Minimum Delay (Sec/Veh)	Average Max Queue (ft)	Maximum Queue (ft)	Minimum Queue (ft)
<b>NC 86 (MLK Blvd) and Estes Drive</b>	Signal	<b>E</b>	<b>55.1</b>	<b>64.1</b>	<b>49.2</b>			
Eastbound		D	54.3	63.2	50.1	550	675	325
<b>Westbound</b>		D	43.0	50.2	38.1	725	800	475
Northbound		E	65.7	79.2	57.5	675	700	650
Southbound		D	53.8	68.6	46.6	375	400	325
<b>Estes Drive and Somerset Drive</b>	Two-Way Stop	-	-	-	-	-	-	-
<b>Northbound</b>		<b>F</b>	<b>122.8</b>	<b>130.9</b>	42.1	275	325	100
Southbound		<b>F</b>	<b>155.7</b>	<b>166.4</b>	<b>70.3</b>	250	275	225
<b>Estes Drive and E. Franklin Street</b>	Signal	<b>F</b>	<b>119.3</b>	<b>138.4</b>	<b>98.4</b>			
Eastbound		F	91.4	118.1	77.6	750	1000	625
Westbound		F	160.6	172.2	92.7	1275	1500	875
Northbound		F	166.8	305.5	89.8	1600	2600	950
Southbound		E	69.5	67.7	57.5	700	875	575
<b>NC 86 (MLK Blvd) and Local Road Connection (RIRO)</b>	Two-Way Stop	-	-	-	-	-	-	-
<b>Westbound</b>		C	18.0	30.1	8.6	50	100	25

Max Queue Lengths Calculated to Nearest Upstream Intersection/Node in Model – Queue May Exceed Distance Reported  
**RED** – Overall Intersection (Signalized) or Critical Movement (Unsignalized) Exceeds Town Operational Performance LOS Threshold  
**GREEN** – New or Improved Intersection Approaches from Previous Scenario

The 2024 Build Scenario results are shown in **Table 4**. The Build Scenario includes the construction of the Aura Development with two proposed single lane driveways and no other improvements beyond what is reflected in the 2024 No-Build Scenario. In general, operations results show overall marginal increases in delay and queuing compared to the 2024 No-Build Scenario. The Aura Driveway connection with Estes Drive has a maximum (worst-case) model run delay exceeding the LOS E threshold for unsignalized intersections.

**Table 4. 2024 Build Aura Scenario - Traffic Operations Results**

2024 Build-Aura Model	Traffic Control	AM Peak Hour						
		LOS	Average Delay (Sec/Veh)	Maximum Delay (Sec/Veh)	Minimum Delay (Sec/Veh)	Average Max Queue (ft)	Maximum Queue (ft)	Minimum Queue (ft)
<b>NC 86 (MLK Blvd) and Estes Drive</b>	Signal	D	39.5	40.5	35.0			
Eastbound		E	67.8	79.4	51.7	850	1000	650
Westbound		D	39.1	41.8	37.1	250	325	200
Northbound		C	30.3	32.3	28.5	325	400	275
Southbound		C	29.0	30.3	25.9	375	850	250
<b>Estes Drive and Somerset Drive</b>	Two-Way Stop	-	-	-	-	-	-	-
Northbound		B	13.6	22.6	7.6	50	75	25
Southbound		B	14.9	21.9	10.0	100	100	50
<b>Estes Drive and E. Franklin Street</b>	Signal	D	43.4	43.6	41.8			
Eastbound		D	51.6	59.3	42.0	675	1400	575
Westbound		E	56.8	62.5	52.2	450	500	375
Northbound		C	31.7	36.8	29.2	225	275	175
Southbound		D	35.4	39.3	32.2	525	600	400
<b>MLK Blvd and Future Aura Access #1</b>	Two-Way Stop	-	-	-	-	-	-	-
<i>Westbound</i>		A	6.1	6.5	5.2	25	25	25
<b>Estes Dr and Future Aura Access #2</b>	Two-Way Stop	-	-	-	-	-	-	-
<i>Southbound</i>		C	15.3	18.8	13.0	50	100	25
<b>NC 86 (MLK Blvd) and Local Rd Access (RIRO)</b>	Two-Way Stop	-	-	-	-	-	-	-
Westbound		A	6.8	10.8	4.3	25	25	25

Max Queue Lengths Calculated to Nearest Upstream Intersection/Node in Model – Queue May Exceed Distance Reported  
*BLUE* – Proposed Aura Intersections/Approaches

**Table 4 (Continued). 2024 Build Aura Scenario - Traffic Operations Results**

2024 Build-Aura Model	Traffic Control	PM Peak Hour						
		LOS	Average Delay (Sec/Veh)	Maximum Delay (Sec/Veh)	Minimum Delay (Sec/Veh)	Average Max Queue (ft)	Maximum Queue (ft)	Minimum Queue (ft)
<b>NC 86 (MLK Blvd) and Estes Drive</b>	Signal	D	51.6	53.1	49.9			
Eastbound		E	57.1	63.0	49.5	575	650	425
Westbound		D	44.0	50.2	38.5	575	875	350
Northbound		E	59.8	62.7	57.9	675	700	625
Southbound		D	45.8	48.4	42.7	375	475	350
<b>Estes Drive and Somerset Drive</b>	Two-Way Stop	-	-	-	-	-	-	-
Northbound		F	76.4	113.7	46.6	200	275	125
Southbound		F	103.0	141.1	74.1	250	350	200
<b>Estes Drive and E. Franklin Street</b>	Signal	F	123.8	134.1	96.5			
Eastbound		F	88.0	93.5	78.7	775	1300	650
Westbound		F	146.5	168.6	115.0	1275	1450	1150
Northbound		F	193.8	227.5	133.4	1950	2400	1150
Southbound		E	72.1	78.0	63.7	850	875	750
<b>MLK Blvd and Future Aura Access #1</b>	Two-Way Stop	-	-	-	-	-	-	-
<i>Westbound</i>		A	5.4	6.4	4.2	25	25	25
<b>Estes Dr and Future Aura Access #2</b>	Two-Way Stop	-	-	-	-	-	-	-
<i>Southbound</i>		E	42.9	77.4	26.0	100	125	75
<b>NC 86 (MLK Blvd) and Local Rd Access (RIRO)</b>	Two-Way Stop	-	-	-	-	-	-	-
Westbound		C	21.3	30.1	14.5	50	100	25

Max Queue Lengths Calculated to Nearest Upstream Intersection/Node in Model – Queue May Exceed Distance Reported  
**RED** – Overall Intersection (Signalized) or Critical Movement (Unsignalized) Exceeds Town Operational Performance LOS Threshold  
**BLUE** – Proposed Aura Intersections/Approaches

The 2024 Build Scenario with Improvements model operational results are shown in **Table 5**. This includes all recommended improvements identified in the Aura TIA. These improvements include additional capacity and queue storage benefits for westbound Estes Drive at the NC 86 intersection, better performance for the proposed Aura Driveway along Estes Drive, and potentially some benefit for operations at the Estes Drive intersection with Somerset Drive and its potential fourth leg local access roadway connection – though additional mitigation would be needed to improve conditions in the 2024 PM peak hour at this location. Recommended improvements to the E. Franklin Street/Estes Drive intersection (a southbound right-turn lane on E. Franklin Street) do improve intersection capacity and reduce queue lengths, but do not completely mitigate anticipated PM peak hour congestion at this location.

**Table 5. 2024 Build Aura Scenario – With Recommended Improvements – Traffic Operations Results**

2024 Build-Aura Model - With Improvements		AM Peak Hour						
Intersection and Approach	Traffic Control	LOS	Average Delay (Sec/Veh)	Maximum Delay (Sec/Veh)	Minimum Delay (Sec/Veh)	Average Max Queue (ft)	Maximum Queue (ft)	Minimum Queue (ft)
<b>NC 86 (MLK Blvd) and Estes Drive</b>	Signal	<b>D</b>	<b>37.5</b>	<b>40.1</b>	<b>35.8</b>			
Eastbound		E	59.2	66.5	52.2	650	825	625
<i>Westbound</i>		C	38.7	41.9	36.8	250	300	200
Northbound		C	30.2	32.9	29.4	375	425	250
Southbound		C	28.8	30.2	27.9	375	500	300
<b>Estes Drive and Somerset Drive</b>	Two-Way Stop	-	-	-	-	-	-	-
Eastbound		-	-	-	-	-	-	-
Westbound		-	-	-	-	-	-	-
Northbound		B	13.2	15.7	11.1	50	50	25
Southbound		C	17.8	24.0	12.6	200	250	150
<b>Estes Drive and E. Franklin Street</b>	Signal	<b>D</b>	<b>42.7</b>	<b>46.3</b>	<b>36.5</b>			
Eastbound		D	54.9	66.5	38.2	650	725	400
Westbound		E	57.9	64.3	52.3	425	475	350
Northbound		C	31.0	33.2	27.8	225	275	150
<i>Southbound</i>		C	30.2	32.5	28.8	375	450	350
<b>MLK Blvd and Future Aura Access #1</b>	Two-Way Stop	-	-	-	-	-	-	-
Westbound		A	5.1	5.8	4.2	25	25	25
<b>Estes Dr and Future Aura Access #2</b>	Two-Way Stop	-	-	-	-	-	-	-
<i>Southbound</i>		B	14.1	17.7	11.2	50	75	25
<b>NC 86 (MLK Blvd) and Local Rd Access (RIRO)</b>	Two-Way Stop	-	-	-	-	-	-	-
Westbound		A	5.3	8.1	2.8	50	75	25

Max Queue Lengths Calculated to Nearest Upstream Intersection/Node in Model – Queue May Exceed Distance Reported  
**RED** – Overall Intersection (Signalized) or Critical Movement (Unsignalized) Exceeds Town Operational Performance LOS Threshold  
**GREEN** – New or Improved Intersection Approaches from Previous Scenario



**Table 5 (Continued). 2024 Build Aura Scenario – With Recommended Improvements**  
**Traffic Operations Results**

2024 Build-Aura Model - With Improvements	Traffic Control	PM Peak Hour						
		LOS	Average Delay (Sec/Veh)	Maximum Delay (Sec/Veh)	Minimum Delay (Sec/Veh)	Average Max Queue (ft)	Maximum Queue (ft)	Minimum Queue (ft)
<b>NC 86 (MLK Blvd) and Estes Drive</b>	Signal	D	47.4	51.2	45.6			
Eastbound		E	55.1	58.5	51.5	475	600	300
<i>Westbound</i>		D	38.1	40.6	36.5	425	500	325
Northbound		D	53.1	59.8	50.0	625	900	550
Southbound		D	45.1	49.8	41.8	375	525	325
<b>Estes Drive and Somerset Drive</b>	Two-Way Stop	-	-	-	-	-	-	-
Eastbound		-	-	-	-	-	-	-
Westbound		-	-	-	-	-	-	-
Northbound		F	56.9	74.6	45.6	150	250	100
Southbound		F	87.2	128.2	62.9	250	300	200
<b>Estes Drive and E. Franklin Street</b>	Signal	F	102.3	113.2	92.6			
Eastbound		F	88.8	95.6	83.4	750	1250	600
Westbound		F	144.2	191.1	113.3	1275	1325	1150
Northbound		F	135.7	189.6	86.3	1100	1525	700
<i>Southbound</i>		D	53.9	60.3	49.5	675	725	500
<b>MLK Blvd and Future Aura Access #1</b>	Two-Way Stop	-	-	-	-	-	-	-
Westbound		A	6.2	7.1	3.4	25	25	25
<b>Estes Dr and Future Aura Access #2</b>	Two-Way Stop	-	-	-	-	-	-	-
<i>Southbound</i>		D	31.1	41.3	25.6	75	100	50
<b>NC 86 (MLK Blvd) and Local Rd Access (RIRO)</b>	Two-Way Stop	-	-	-	-	-	-	-
Westbound		B	12.2	14.6	8.9	50	100	25

Max Queue Lengths Calculated to Nearest Upstream Intersection/Node in Model – Queue May Exceed Distance Reported  
**RED** – Overall Intersection (Signalized) or Critical Movement (Unsignalized) Exceeds Town Operational Performance LOS Threshold  
**GREEN** – New or Improved Intersection Approaches from Previous Scenario

Per Town staff direction, two additional scenarios related to traffic control alternatives at the Estes Drive intersection with Somerset Drive were developed and model run results are shown in **Table 6**. The addition of a two-phase traffic circle, coordinated with the existing signals along Estes Drive, performs acceptably in both peak hours. The implementation of a single lane roundabout at this location performs well in the AM peak hour but may operate near capacity in the PM peak hour. Both alternatives improve the ability for minor street traffic from Somerset Drive and the potential future local roadway connection to the south to gain access to Estes Drive compared to the existing two-way stop control scenario. Management of queues along the high volume Estes Drive corridor caused by either the roundabout or traffic signal is an important consideration.

**Table 6. 2024 Build With Improvements Scenario – Somerset Drive Traffic Control Alternatives**

2024 Build-Aura Model - With Improvements		AM Peak Hour						
Intersection and Approach	Traffic Control	LOS	Average Delay (Sec/Veh)	Maximum Delay (Sec/Veh)	Minimum Delay (Sec/Veh)	Average Max Queue (ft)	Maximum Queue (ft)	Minimum Queue (ft)
<b>Estes Drive and Somerset Drive</b>	<i>Signal</i>	<b>A</b>	<b>4.1</b>	<b>5.1</b>	<b>3.4</b>			
Eastbound		A	2.9	3.3	2.4	75	100	50
Westbound		A	1.8	3.5	1.0	175	250	150
Northbound		F	75.8	92.3	63.3	75	100	50
Southbound		F	73.2	88.5	52.1	50	75	25
<b>Estes Drive and Somerset Drive</b>	<i>Round about</i>	<b>C</b>	<b>22.3</b>	<b>23.4</b>	<b>21.2</b>			
Eastbound		D	26.4	28.7	25.0	375	450	275
Westbound		C	16.4	17.2	15.5	275	300	225
Northbound		B	12.6	14.4	10.7	200	250	175
Southbound		B	10.1	11.9	8.6	150	175	125
2024 Build-Aura Model - With Improvements		PM Peak Hour						
Intersection and Approach	Traffic Control	LOS	Average Delay (Sec/Veh)	Maximum Delay (Sec/Veh)	Minimum Delay (Sec/Veh)	Average Max Queue (ft)	Maximum Queue (ft)	Minimum Queue (ft)
<b>Estes Drive and Somerset Drive</b>	<i>Signal</i>	<b>B</b>	<b>19.7</b>	<b>21.5</b>	<b>16.8</b>			
Eastbound		A	9.6	10.6	8.8	425	525	350
Westbound		B	17.4	21.8	12.0	175	250	150
Northbound		F	61.7	65.2	56.0	250	200	250
Southbound		E	56.2	58.5	54.6	675	1000	600
<b>Estes Drive and Somerset Drive</b>	<i>Round about</i>	<b>E</b>	<b>35.5</b>	<b>38.4</b>	<b>31.7</b>			
Eastbound		C	23.4	24.9	21.0	300	400	250
Westbound		E	47.2	54.3	40.6	425	600	375
Northbound		B	11.4	15.8	6.5	200	225	150
Southbound		D	27.4	35.5	21.6	150	175	125

Max Queue Lengths Calculated to Nearest Upstream Intersection/Node in Model – Queue May Exceed Distance Reported  
*GREEN* – New or Improved Intersection Approaches from Previous Scenario