Town of Chapel Hill
Town-wide Transportation Model

Presentation to Town Council

March 25, 2021

Presented By:

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HNTB North Carolina, PC

Town of Chapel Hill

Town-wide Transportation Model

Today's Presentation

- Current Schedule
- Background for Transportation Modeling
- Capabilities of the Model
- Use in the TIA Process
- Current Model Status and Future Potential Add-Ons
- Aura TIA Comparison
- Town-wide Model Demonstration

Town of Chapel Hill

Town-wide Transportation Model

Current Schedule

- Model development nearing completion for weekday AM, Noon, and PM peak hour scenarios
- Council Internal Progress Meetings This Week
- Public Input Meeting next Monday (3/29)
- Formal Presentation to Council (TBD)

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Town-wide Transportation Model

Background for Transportation Modeling

Why Develop Models?

- Emulate Observed Current Conditions
- Predict Future Conditions
- Assess Future Issues
- Test Improvement Scenarios

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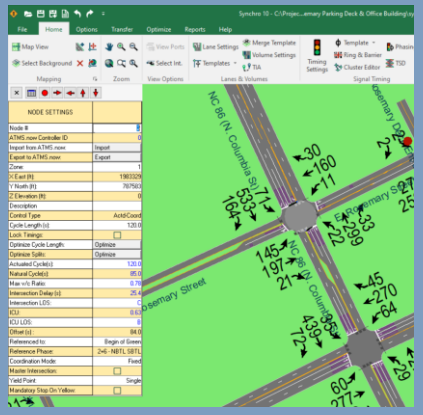
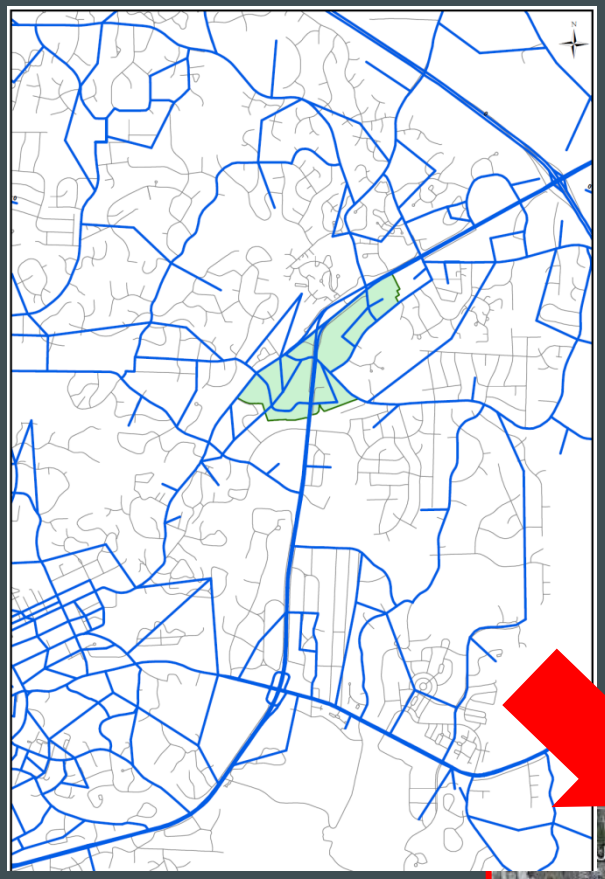
Town-wide Transportation Model

Background for Transportation Modeling

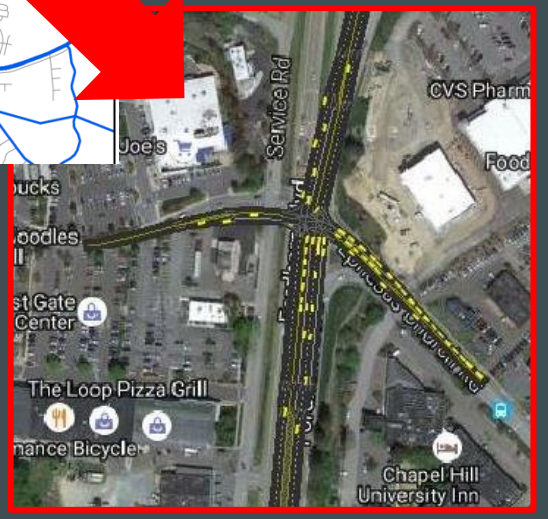
Transportation Models



"BIG PICTURE MODEL"



"DETAILED MODEL"



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Town-wide Transportation Model

Background for Transportation Modeling

What would we use a particular model for?

- "Macro" Level Travel Demand Models
- Long-Range Planning, Larger Regional & Corridor Studies
- "Micro" Level Deterministic Models
- Operations analysis, Freeway Interchange Design, Intersection Design
- "Micro" Level Simulation Models
- Same as Deterministic but can better handle system interactions

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Town-wide Transportation Model

Background for Transportation Modeling

What Information Does a Model Tell Us?

- Traffic Volumes/Throughput
- Travel Times / Speeds
- Delay in Maintaining Desired Speed
- Density of Vehicles on Freeway
- Level-of-Service (LOS)
- Facility Capacity

- Simulation Model Can Provide at Network, Corridor and Intersection Level

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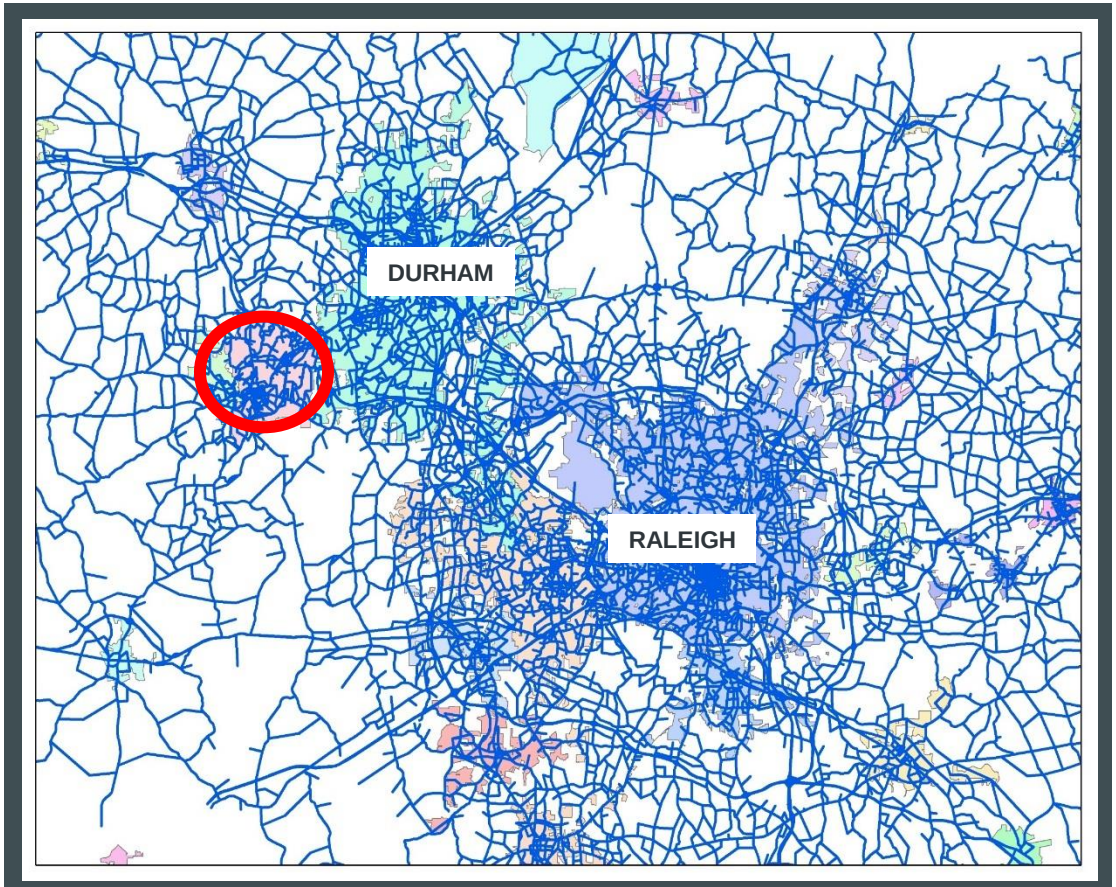
Town-wide Transportation Model

Background for Transportation Modeling

TRM Version 5 Regional Network



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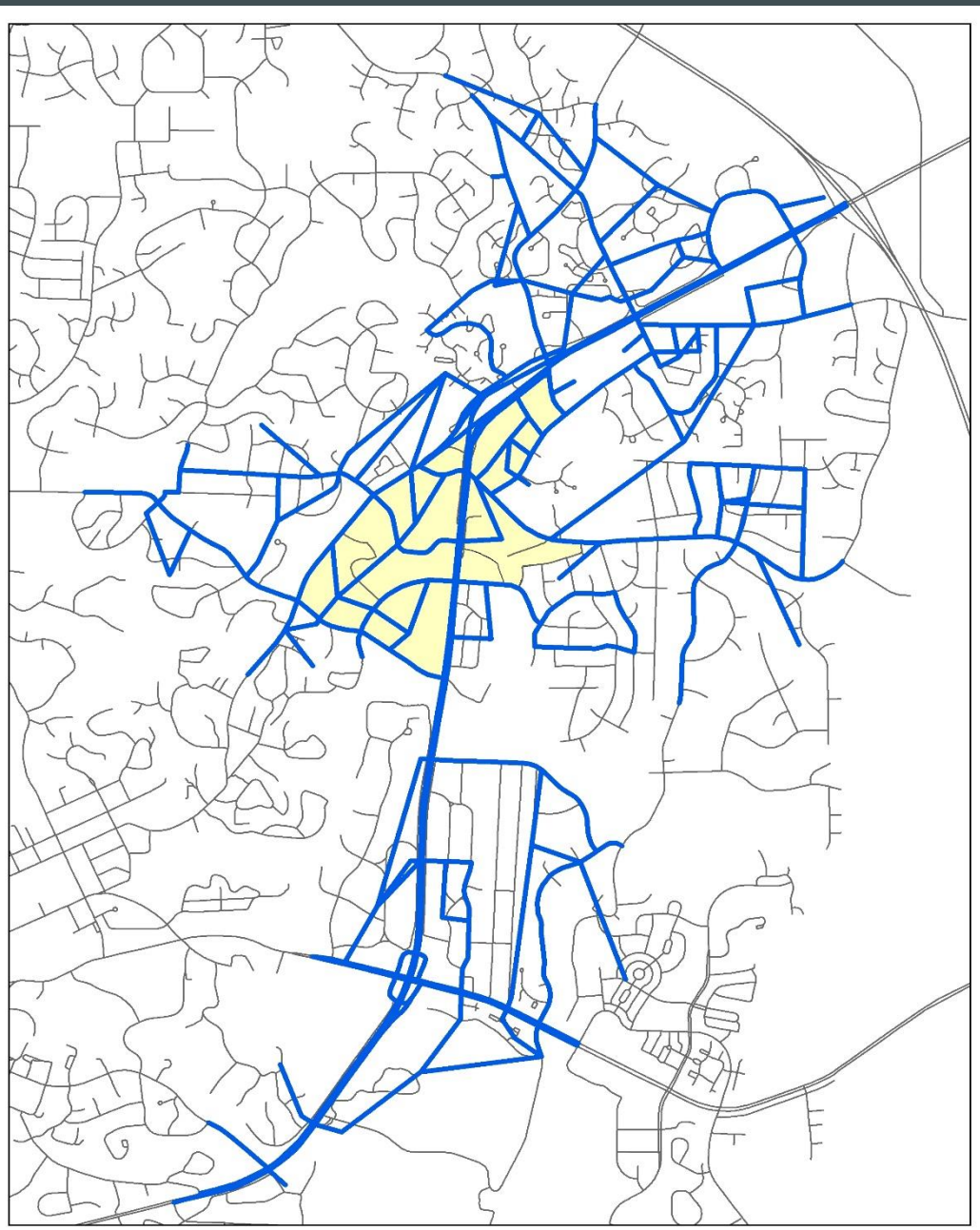
Town-wide Transportation Model

Background for Transportation Modeling

TransCAD Sub-Area Model

Blue Hill District TIA

Used for Traffic Growth Rate Estimation



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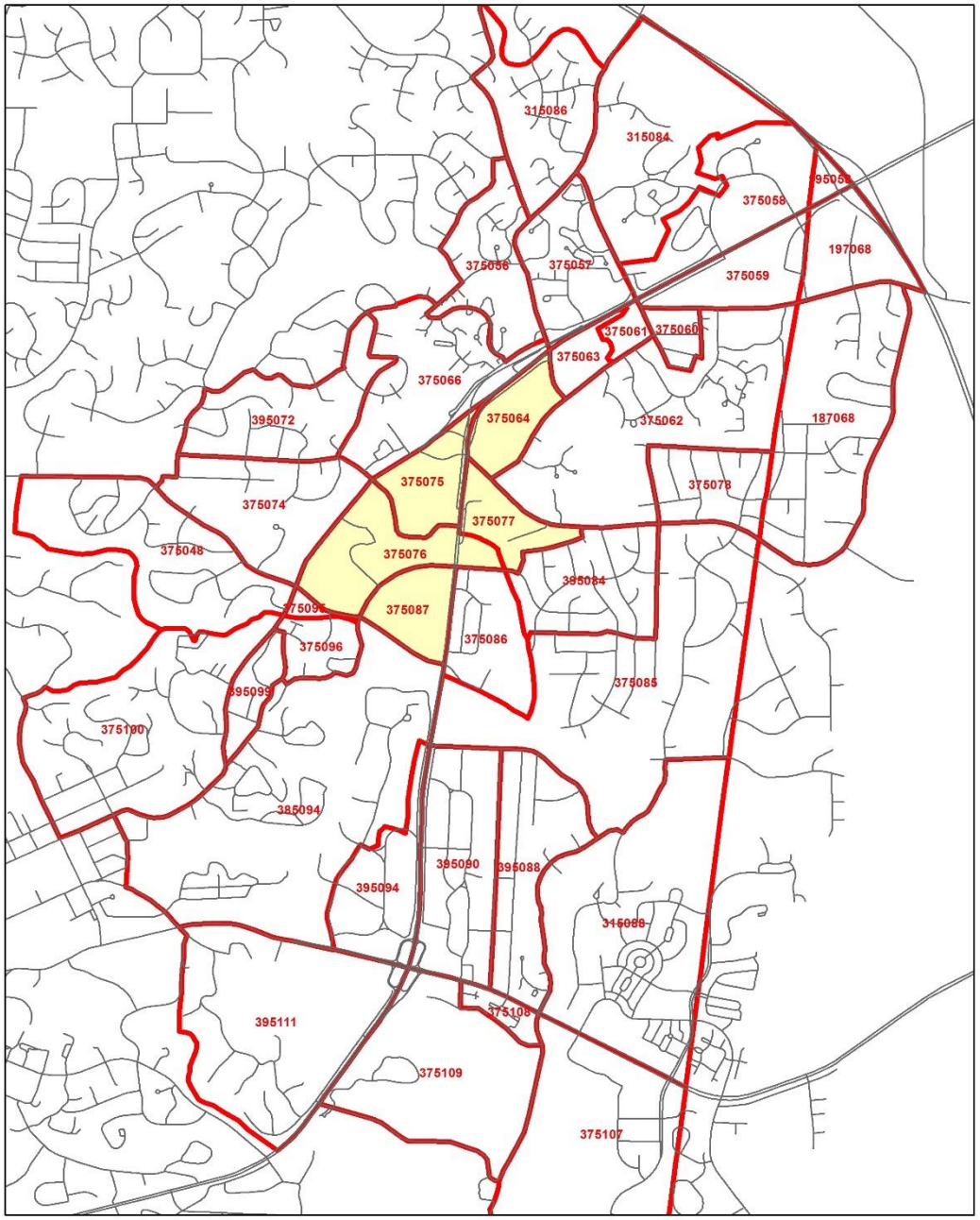
Town-wide Transportation Model

Background for Transportation Modeling

TransCAD Sub-Area Model

Blue Hill District TIA

Traffic Analysis Zones (TAZ)



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Town-wide Transportation Model

Background for Transportation Modeling

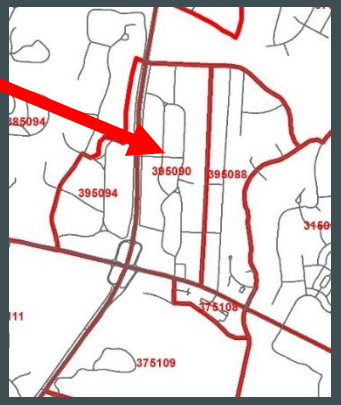
Blue Hill District TIA

Sub-Area Model Modifications

Calculate Adjusted Growth Rates on Study Area Roadway Links

Background Development	TAZ	Data Scenario	Residential Data			Employment Data				
			HH	STUD_OFF	POP	IND	RET	HWY	OFF	SER
Gateway LRT**	525	Adjusted	404	0	810	5	82	69	87	584
		Original TRM	404	0	810	5	82	69	87	584
Wegmans & SECU	1990	Adjusted	301	0	603	0	280	35	736	378
		Original TRM	119	240	240	0	280	81	70	560
American Legion	1993	Adjusted	1065	187	2272	10	9	9	744	312
		Original TRM	843	187	1836	0	10	9	9	18
Greenfield Place	1994	Adjusted	117	0	235	0	12	2	5	182
		Original TRM	6	0	13	0	12	2	5	182
Berkshire (Village Plaza)	1998	Adjusted	266	0	532	67	771	180	24	788
		Original TRM	200	0	332	67	742	180	24	788
Obey Creek	2053	Adjusted	680	12	1431	25	770	66	648	164
		Original TRM	255	21	614	25	40	28	40	258
Carolina North	2089	Adjusted	253	363	541	0	48	48	379	473
		Original TRM	409	573	853	0	95	95	757	946
Glen Lennox	2107	Adjusted	1649	732	3182	16	263	126	1753	358
		Original TRM	628	279	1144	16	63	88	78	268

Data from current projects (University Place / Aura) Can Be Added/Analyzed in this manner



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Town-wide Transportation Model

Model Capabilities

What Can It Be Used for?

- Entire Town – Macro Analyses
- Scalable for Corridors/Areas
- Scalable Durations (Peaks, Off-Peaks, Special Events)
- Provide Consistent “Base” Model
- High Level Scenario Testing
- Detailed TIA Analysis
- Assessment of Emergency Response Times
- BRT Evaluation

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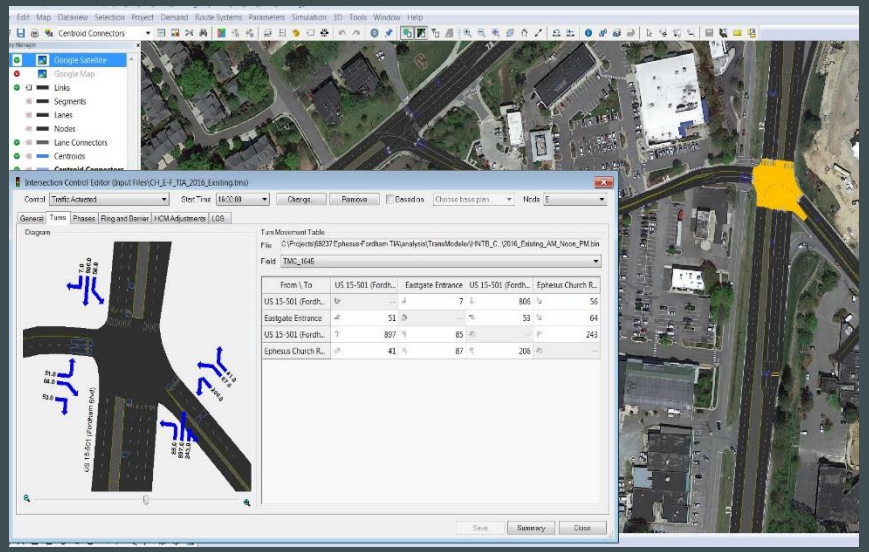
Town-wide Transportation Model

Model Capabilities

Network Elements

- Roadway Geometry (lanes, turns)
- Traffic Control (signals, stop signs)
- Signal timings
- Pedestrian Crossings / Signals
- Traffic/Pedestrian Volumes
- Vehicle Mix (cars, trucks, buses)
- Vehicle Characteristics (speed distributions)



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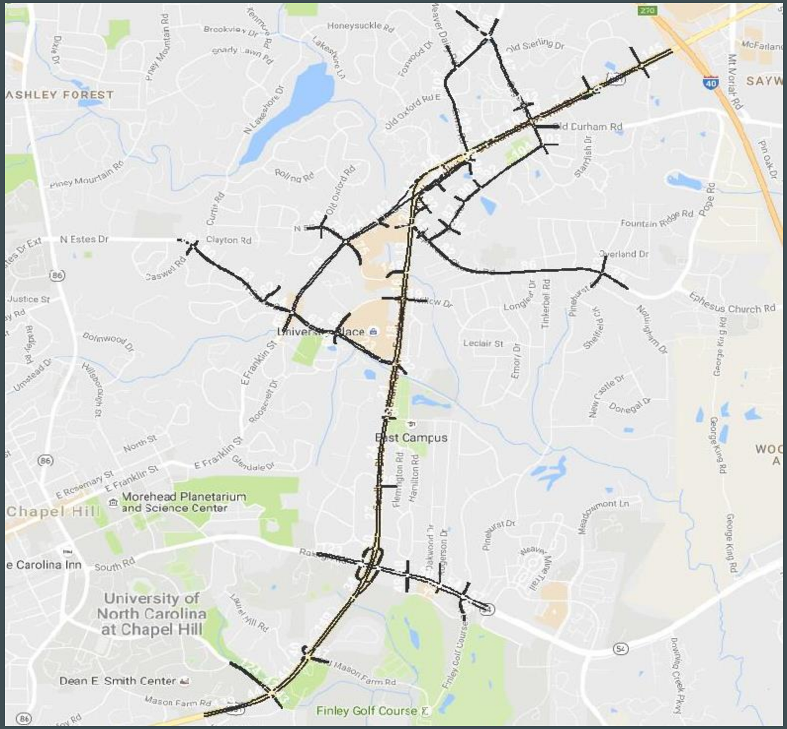
Town-wide Transportation Model

Model Capabilities

System Performance Comparisons



MOE	AM Peak Hour			Noon Peak Hour			PM Peak Hour		
	2030 Build + Imprv	2030 Build	Δ Imprv to Build	2030 Build + Imprv	2030 Build	Δ Imprv to Build	2030 Build + Imprv	2030 Build	Δ Imprv to Build
Trips Completed	18,653	17,901	4.2%	16,207	15,947	1.6%	21,448	20,100	6.7%
Trips Queued	2	214	-99.1%	1	59	-99.0%	4	583	-99.4%
Vehicle Miles Traveled (VMT)	31,774	29,884	6.3%	29,031	28,249	2.8%	35,573	33,353	6.7%
Vehicle Hours Traveled (VHT)	1,193	1,427	-16.4%	1,149	1,263	-9.1%	1,482	1,863	-20.4%
Network Speed (mph)	27	21	27.2%	25	22	13.0%	24	18	34.1%
Network Delay (Hours)	547	806	-32.2%	557	678	-17.9%	752	1,071	-29.9%
Delay Per Vehicle (Seconds)	105	162	-34.9%	124	153	-19.2%	126	192	-34.3%

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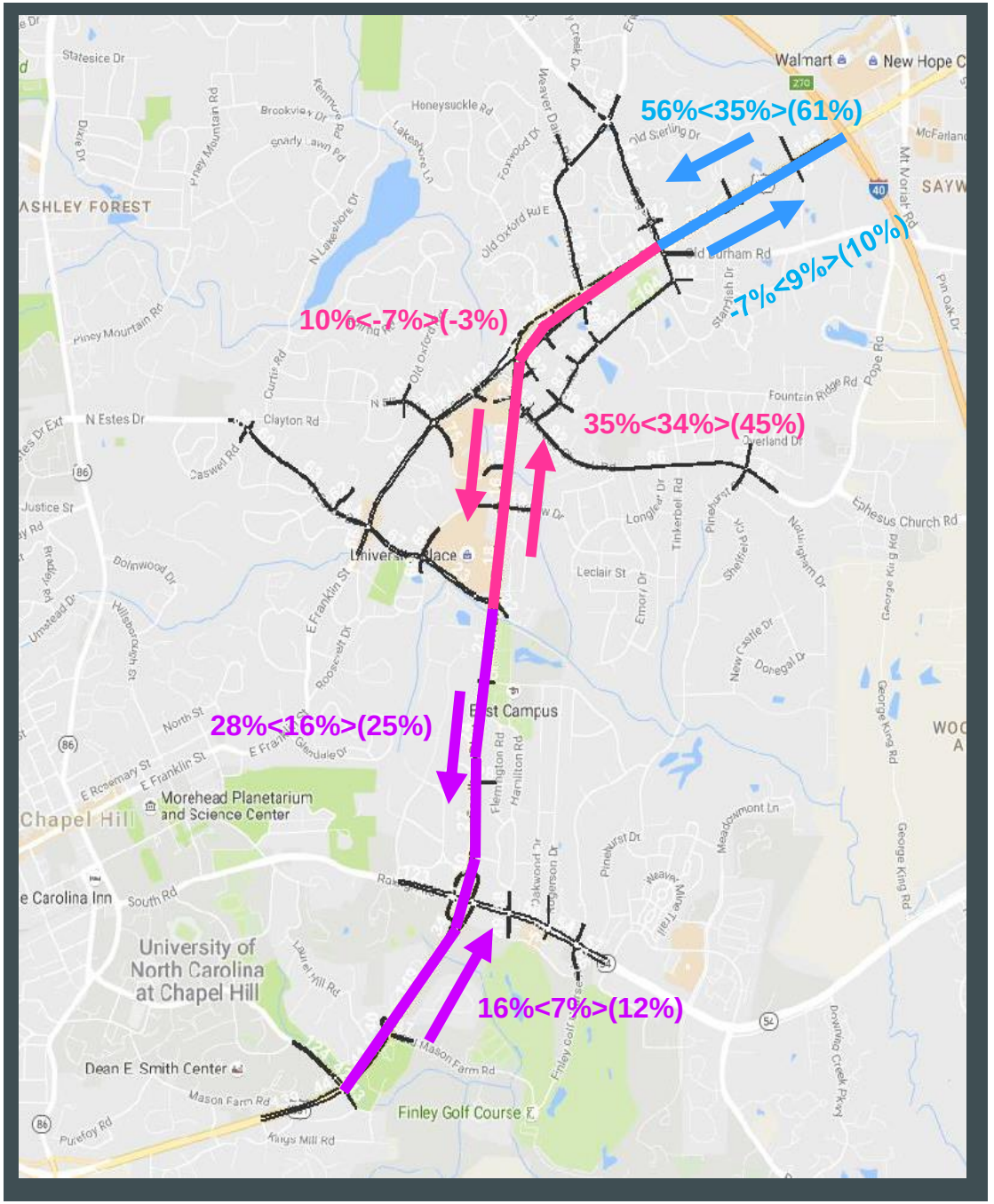
Town-wide Transportation Model

Model Capabilities

Corridor Performance Comparisons

AM <Noon> (PM) Peak Hour
Percent Change in Speed
From 2030 "Build" Scenario

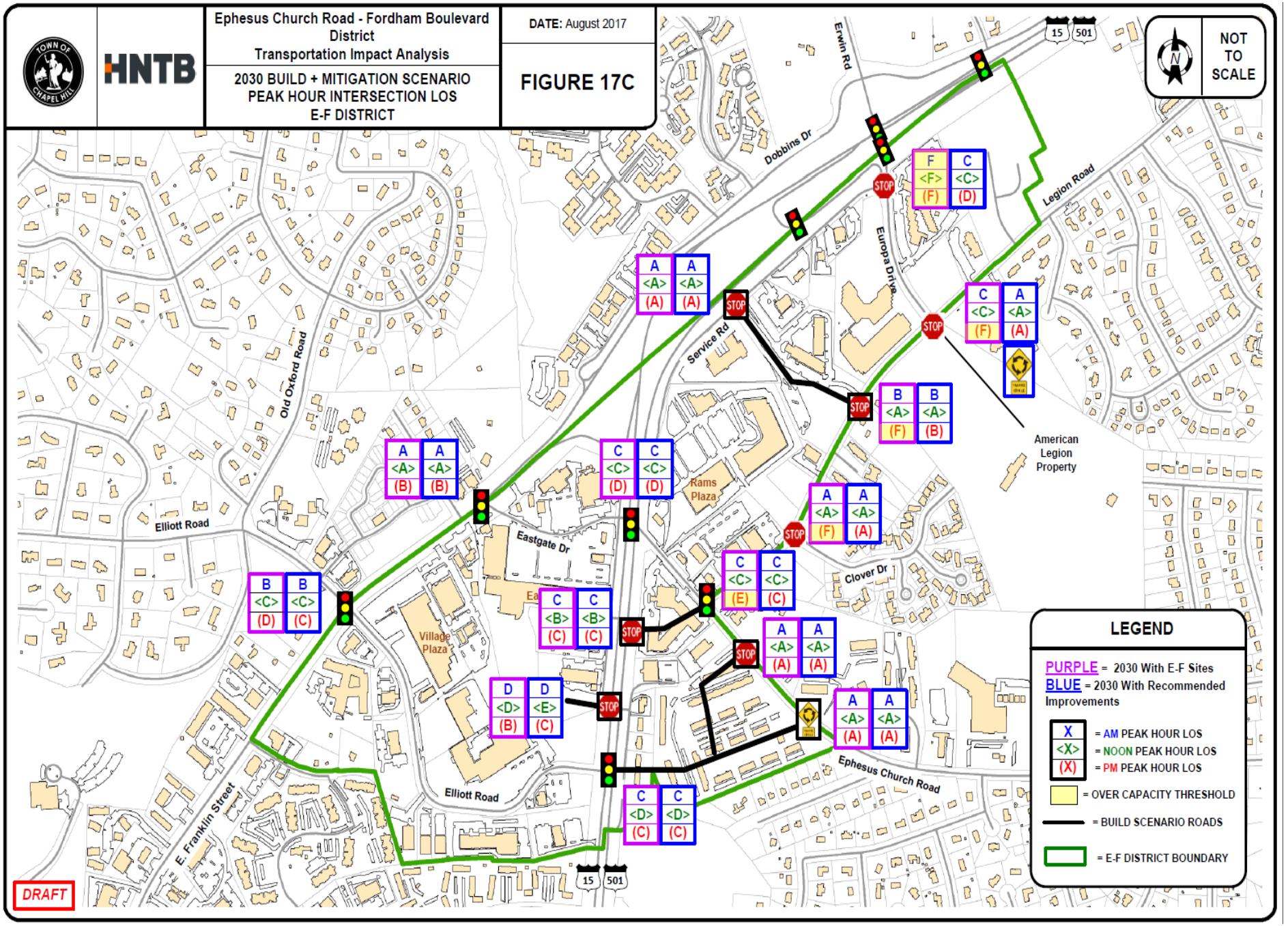


Ephesus Church Road - Fordham Boulevard District
Transportation Impact Analysis

2030 BUILD + MITIGATION SCENARIO
PEAK HOUR INTERSECTION LOS
E-F DISTRICT

DATE: August 2017

FIGURE 17C



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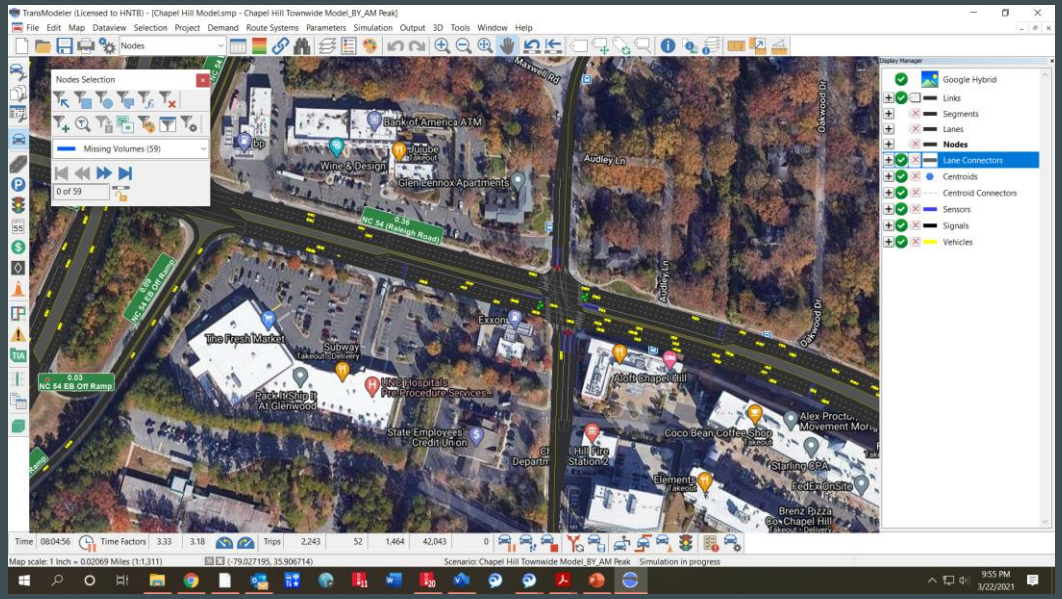
Model Capabilities

Visualizations

2-D / 3-D

Video Exporting



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Use in TIA Process

- Replaces Synchro as Primary Evaluation Tool
- Would Still Adhere to Town/NCDOT TIA Preparation Process
- Use of LOS as Evaluation Threshold
- Would Need to Establish Additional Guidelines for Model Use/Application

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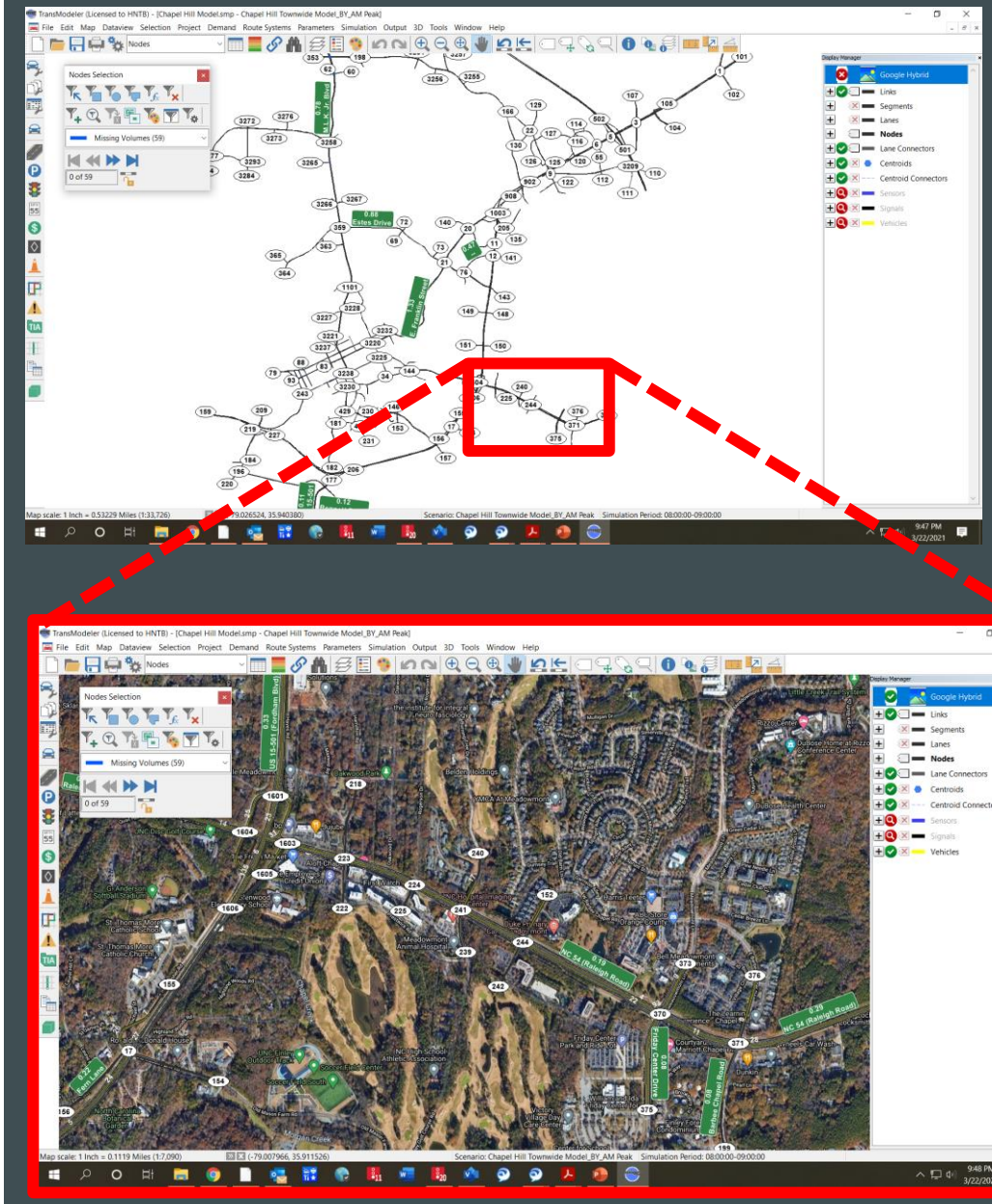
Town-wide Transportation Model

Use in TIA Process



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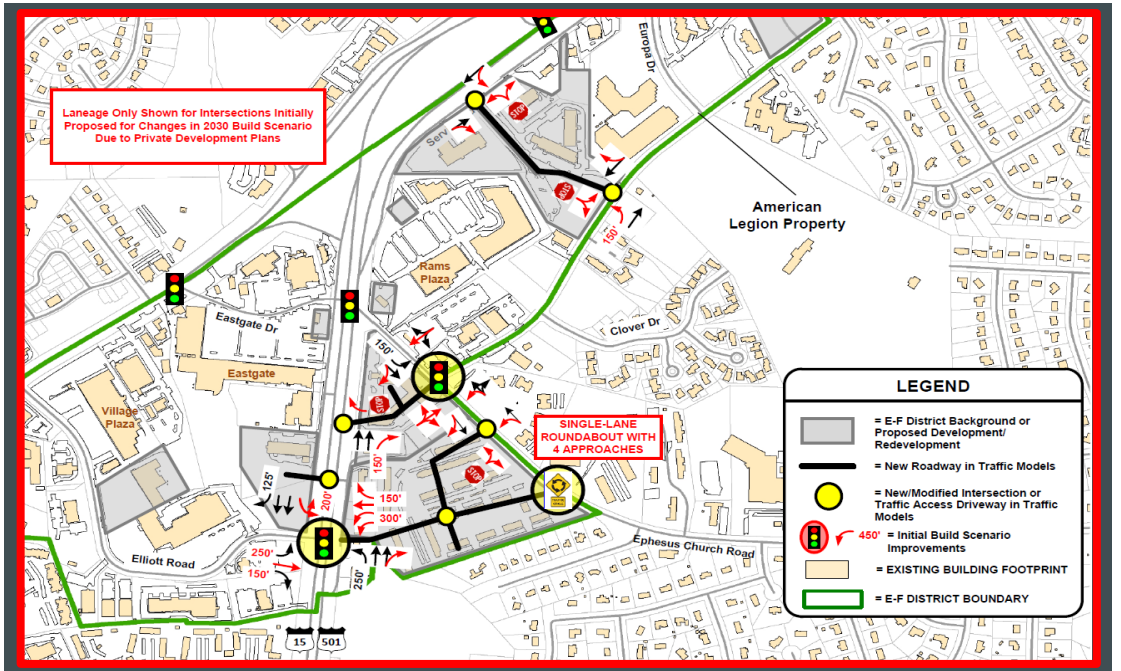
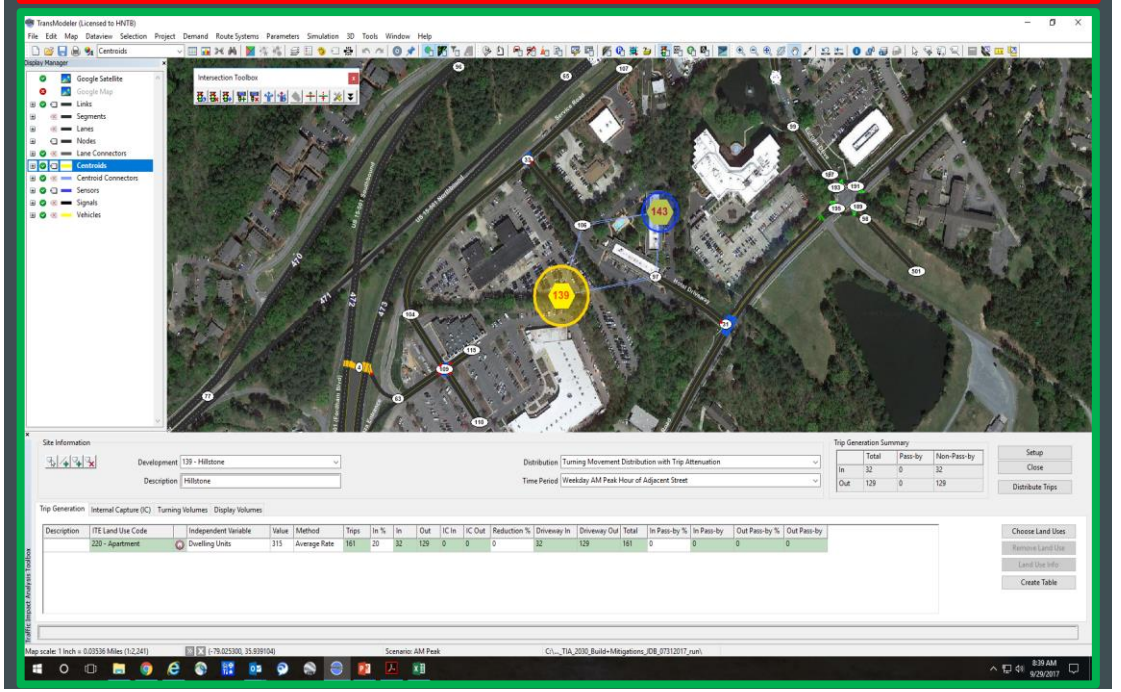
Use in TIA Process

Model Development

New Roadways

New Development Traffic Generated / Assigned Using "TIA Toolbox"





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Town-wide Transportation Model

Current Model Status

Data Collection/Integration

- Blue Hill District TIA Model (2016)
- Eastowne Master Plan TIA Model (2019)
- University Place TIA (2020)
- NCDOT SPOT Program Models
- Synchro TIA Models
- NCDOT/Town Signal Plans/Timings
- TIA Traffic Counts (Weekday AM, Noon, PM Peaks)

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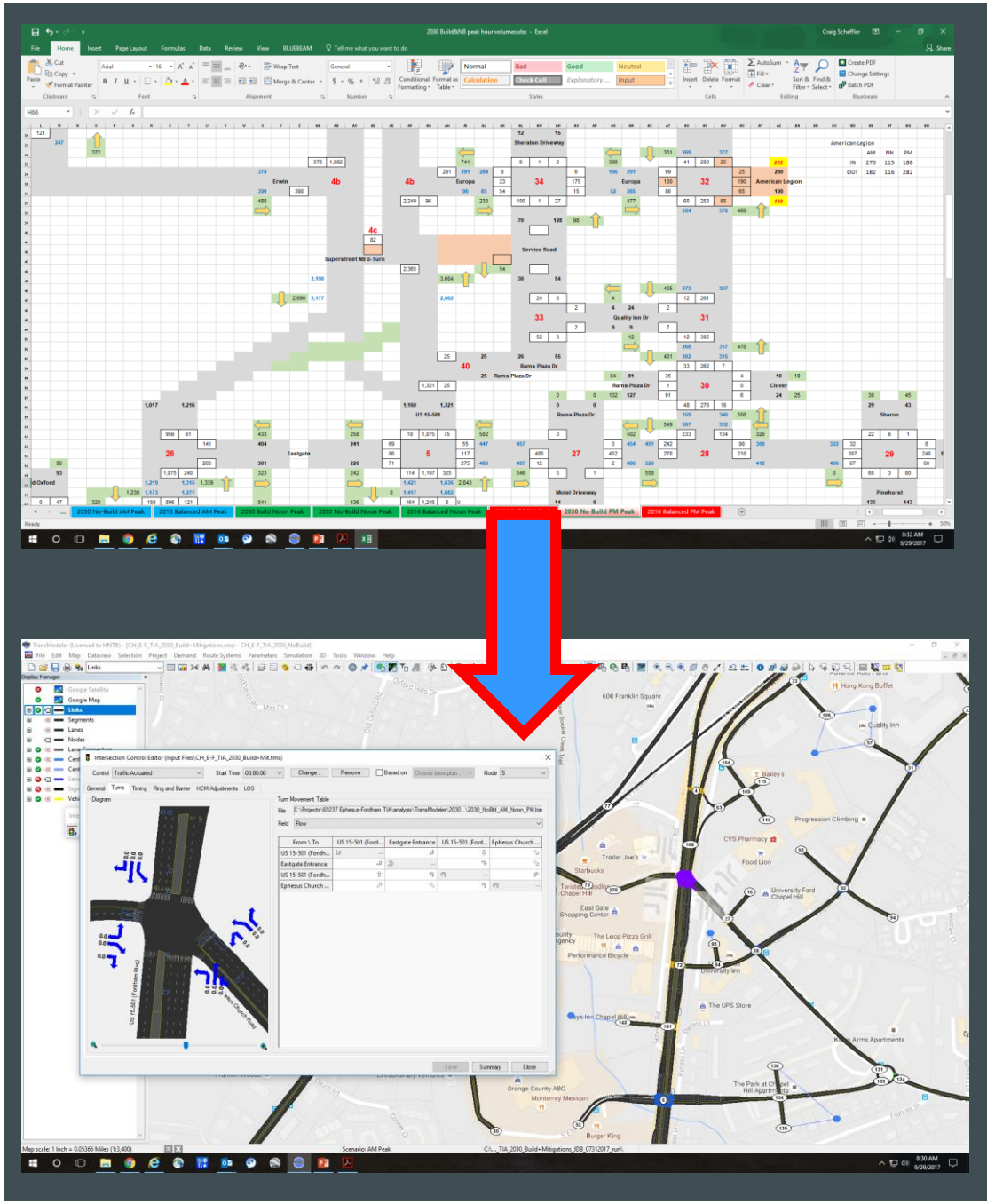
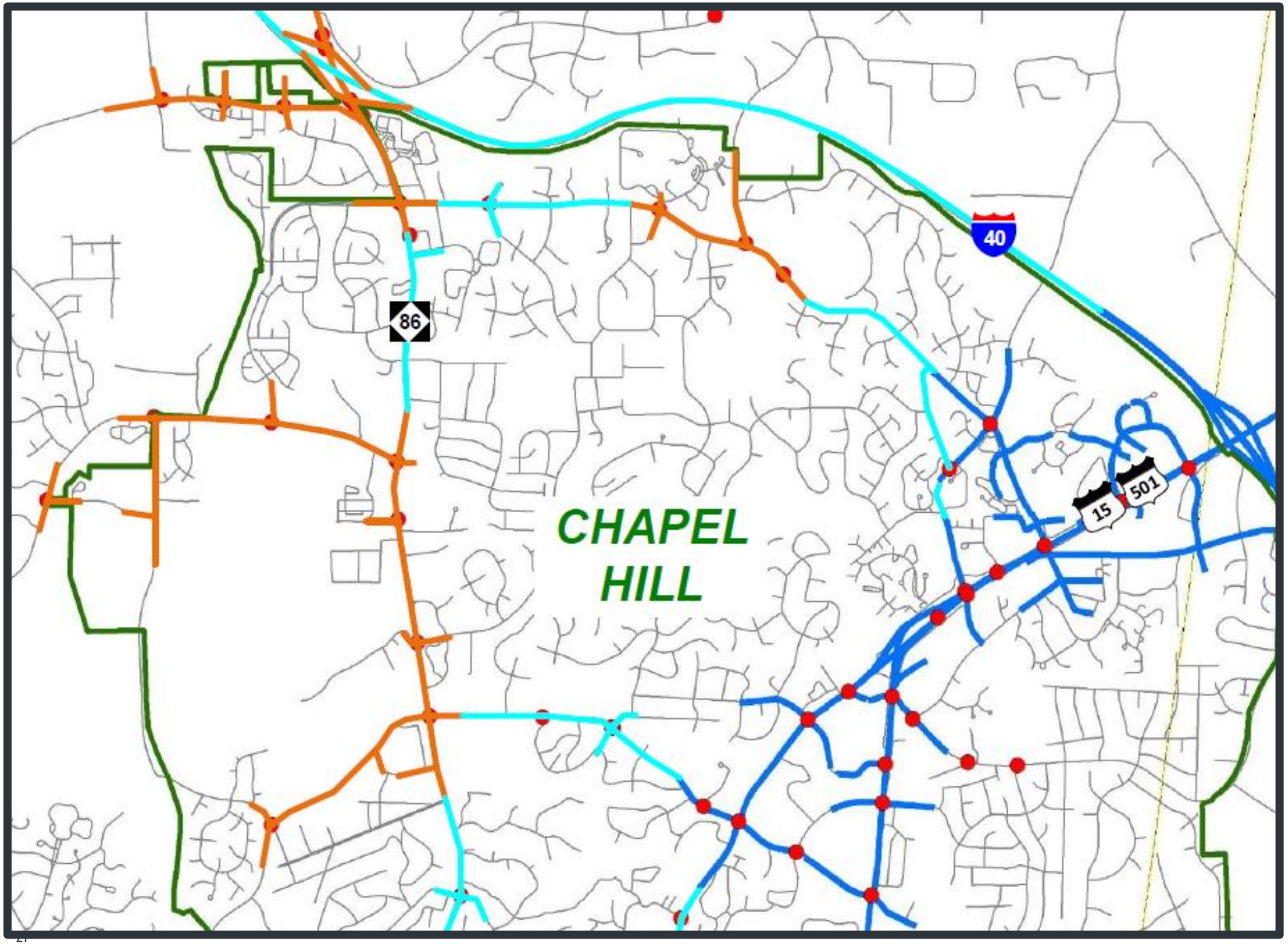
Town-wide Transportation Model

Current Model Status

Model Development

Normalizing/Updating Traffic Count Data

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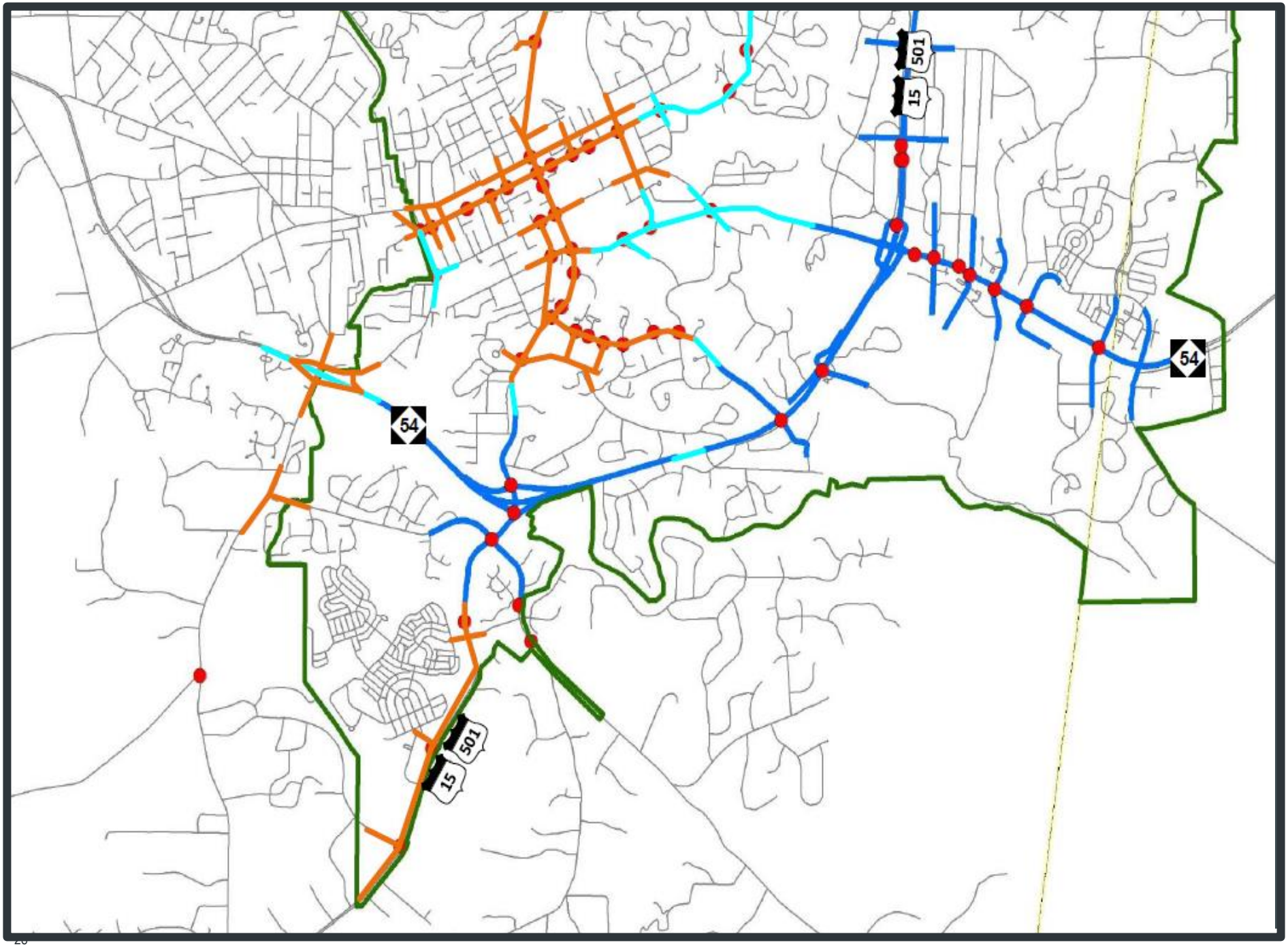
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Town-wide Transportation Model

Aura TIA Comparison

2024 Build+Recommended Improvements

PM Peak Hour

Intersection and Approach	Traffic Control	Town-Wide Model	Aura TIA
MLK Blvd and Airport Rd	Unsignalized	-	-
Eastbound		C - 16.7	C - 17.8
MLK Blvd and Estes Dr	Signalized	**D - 39.8**	**D - 52.3**
Eastbound		D - 53.9	E - 66.5
Westbound		D - 39.3	E - 69.9
Northbound		D - 37.1	D - 50.2
Southbound		C - 28.3	C - 33.5
MLK Blvd and Piney Mountain Rd	Signalized	**B - 17.0**	**B - 10.8**
Eastbound		E - 65.4	E - 72.0
Westbound		E - 61.6	E - 71.3
Northbound		A - 4.9	A - 5.5
Southbound		A - 8.0	A - 8.6
MLK Blvd and Homestead Rd	Signalized	**C - 27.5**	**C - 20.7**
Eastbound		D - 50.1	D - 54.6
Westbound		E - 67.5	E - 58.6
Northbound		B - 14.6	B - 13.3
Southbound		B - 10.7	B - 19.6
Estes Dr and Somerset Dr	Unsignalized	-	-
Southbound		C - 24.6	E - 36.1
Estes Dr and Caswell Dr	Signalized	**C- 25.4**	**C - 21.1**
Eastbound		A - 8.0	A - 8.0
Westbound		B - 18.2	C - 24.6
Northbound		D - 50.5	D - 35.0
Southbound		C - 33.6	E - 57.3
Estes Dr and Franklin St	Signalized	**D - 49.3**	**E - 59.6**
Eastbound		E - 55.7	E - 70.0
Westbound		E - 55.4	E - 66.0
Northbound		D - 43.7	E - 68.4
Southbound		C - 27.1	D - 40.0
MLK Blvd and Future Access #1	Unsignalized	-	-
Westbound		B - 14.7	C - 22.8
Estes Dr and Future Access #2	Unsignalized	-	-
Southbound		C - 24.6	**F - 97.3**

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Town-wide Transportation Model

Town-Wide Model Demonstration

- Aura TIA Model
- 2021 AM Peak Town-Wide Model
- TIA Toolbox

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Town-Wide Transportation Model

QUESTIONS AND DISCUSSION

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