
TRAFFIC IMPACT ANALYSIS THE RESIDENCE AT GROVE PARK

Chapel Hill, North Carolina

Executive Summary



Prepared for:
The Town of Chapel Hill, NC

RS&H
IMPROVING YOUR WORLD
RS&H Architects-Engineers-Planners, Inc.
prepared by:

Architects-Engineers-Planners, Inc.

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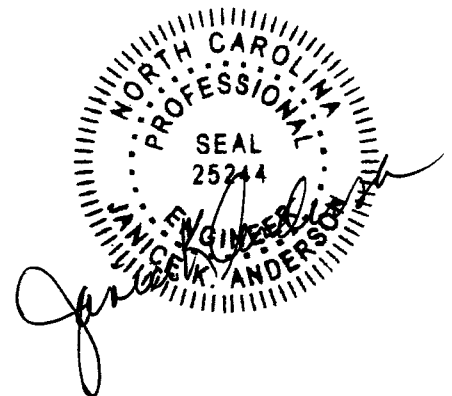


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E.0 EXECUTIVE SUMMARY

E.1 Project Overview

The Residences at Grove Park is a proposed condominium project at 425 Hillsborough Street with entrances on Martin Luther King Jr. Boulevard and Hillsborough Street in Chapel Hill, North Carolina. The proposed project will replace the existing 111 apartment units with 350 residential condominium dwelling units totaling 520,107 square feet. The proposed development will also include 524 parking spaces, all of which will be located on site with the proposed development. Figure E-1 shows the site plan. The proposed development will have access/egress to and from Martin Luther King Jr. Boulevard and Hillsborough Street. The site is zoned as Residential 2 (R-2) as indicated in the Town of Chapel Hill Zoning Map (see Figure E-2).

This study analyzes two Build Conditions: Build Conditions I; and Build Conditions II. Under the 2010 Build Conditions I, The Residences at Grove Park Development will have two driveway accesses: one with Martin Luther King Jr. Boulevard and the second with Hillsborough Street. The 604 Martin Luther King Jr. Boulevard development will have one driveway access with Martin Luther King Jr. Boulevard and no direct access to either The Residences at Grove Park or to Hillsborough Street. Under the 2010 Build Conditions II, this study evaluates the provision of a shared access between the 604 Martin Luther King Jr. Boulevard Development and The Residences at Grove Park (425 Hillsborough Street) with Martin Luther King Jr. Boulevard. Under this alternative, The Residences at Grove Park and the 604 Martin Luther King Jr. Boulevard developments will have one shared driveway access with Martin Luther King Jr. Boulevard.

E.2 Proposed Project Traffic

The proposed Residences at Grove Park Development (239 new units) will generate approximately 1,586 additional vehicle trips per day. Of these additional trips, 121 vehicle trips will occur during the AM peak hour, 150 vehicle trips during Mid-day peak hour, and 149 vehicle trips during the PM peak hour.

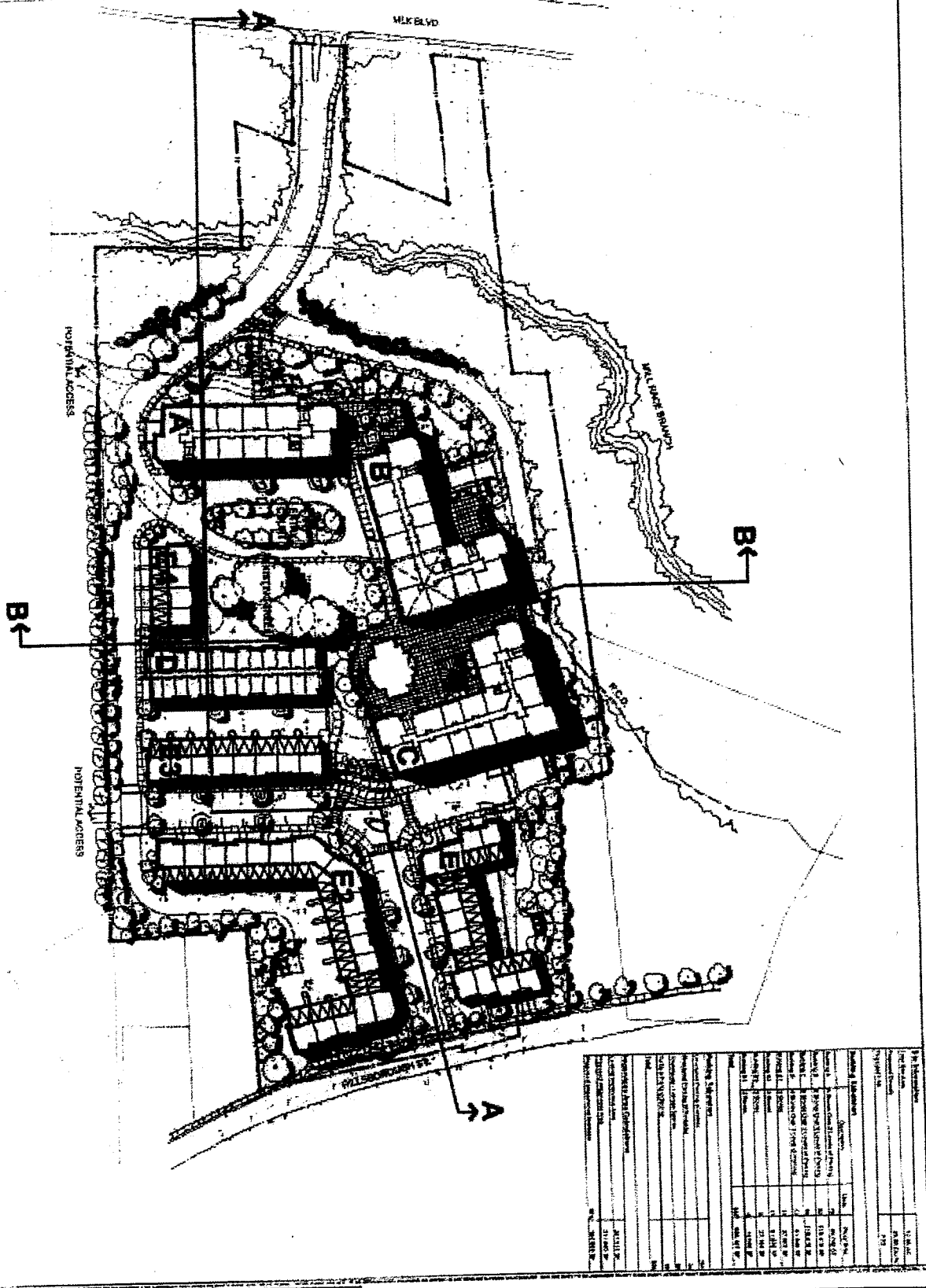
Table E-1 summarizes the trip generation rates and the number of trips generated by the proposed land use categories during the morning, mid-day and evening peak periods of the day.

**Table E-1
Site Trip Generation Rates and Volumes
The Residences at Grove Park**

Land Use	Size	Traffic Volumes							
		Weekday (veh. per day)		AM Peak Hour (veh. per hour)		Mid day Peak Hour (veh. per hour)		PM Peak Hour (veh. per hour)	
		Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Residential Dwelling Units (To Be Removed)	111 Units	409	409	12	46	39	39	51	28
Residential Dwelling Units (New)	350 Units	1,202	1,202	36	143	114	114	148	80
New Trips added to the Road Network		793	793	24	97	75	75	97	52



CONCEPTUAL SITE PLAN



Project Information	
Project Name	Greenbridge Development
Client	RS&H Architects-Engineers-Planners, Inc.
Location	Chapel Hill, NC
Scale	1" = 20' (Site Plan)
North Arrow	As Shown
Prepared by	RS&H Architects-Engineers-Planners, Inc.
Checked by	RS&H Architects-Engineers-Planners, Inc.
Date	2010.08.10



GREENBRIDGE DEVELOPMENT
 TRAFFIC IMPACT ANALYSIS
 CHAPEL HILL, NC

RS&H ARCHITECTS-ENGINEERS-PLANNERS, INC
 CHARLOTTE, NORTH CAROLINA



PROJECT SITE PLAN

Figure E-1

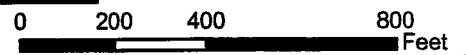


LEGEND

— Streets

Zoning

- NC
- TC-1
- TC-2
- OI-1
- OI-2
- OI-3
- OI-4
- OI-1-C
- R-1
- R-2
- R-3
- R-4
- R-6
- R-5-C



	<p>THE RESIDENCE AT GROVE PARK TRAFFIC IMPACT ANALYSIS CHAPEL HILL, NC</p>		<p>PROJECT LOCATION</p>
	<p>RS&H ARCHITECTS-ENGINEERS-PLANNERS INC. CHARLOTTE, NORTH CAROLINA</p>		<p>FIGURE E-2</p>

E.3 Project Impacts

To determine the traffic impacts of the proposed site development on nearby roadways, traffic flow conditions were analyzed at the following three arterial segments and eight intersections for the 2007 Existing Conditions, 2010 No Build Conditions, and 2010 Build Conditions I and II:

Arterial Segments:

- Martin Luther King Jr. Boulevard/Columbia Street between Rosemary Street and Hillsborough Street
- Hillsborough Street between Rosemary Street and Martin Luther King Jr. Boulevard
- Rosemary Street between Martin Luther King Jr. Boulevard and Hillsborough Street

Intersections

- Hillsborough Street at E. Rosemary Street
- Hillsborough Street at North Street
- Hillsborough Street at Site Driveway #1
- Hillsborough Street at Site Driveway #2
- Martin Luther King Jr. Boulevard at Hillsborough Street/Umstead Drive
- Martin Luther King Jr. Boulevard at Site Driveway #3
- Martin Luther King Jr. Boulevard at North Street
- Martin Luther King Jr. Boulevard at N. Columbia/S. Columbia Street

Table E-2 and E-3 compare the arterial and intersection capacity analysis results for all of the scenarios analyzed in this study. Table E-4 summarizes the overall impacts of the proposed project for the year 2010 (a year after it is built and fully occupied).

Table E-2
Arterial Capacity analysis Summary

Facility Type	Segment	Direction of Travel	No. of Lanes (both directions)	Threshold Capacity (vehicles per hour per direction)*	2007 Existing Conditions			2010 No Build Conditions			2010 Build Conditions		
					AM Peak	Mid-day Peak	PM Peak	AM Peak	Mid-day Peak	PM Peak	AM Peak	Mid-day Peak	PM Peak
Major Arterial	MLK Jr. Boulevard	Northbound	4	1,600	0.57	0.4	0.9	0.68	0.53	1.09	0.69	0.54	1.1
		Southbound	4	1,600	0.69	0.43	0.52	0.85	0.56	0.65	0.86	0.57	0.67
Minor Arterial	Hillsborough Street	Northbound	2	550	0.52	0.67	0.91	0.57	0.75	1.03	0.58	0.77	1.05
		Southbound	2	550	0.67	0.67	0.84	0.76	0.74	0.93	0.79	0.76	0.94
	Rosemary Street	Eastbound	2	550	0.76	0.65	1.31	1.09	1.04	1.77	1.1	1.05	1.79
		Westbound	2	550	0.82	0.67	0.94	0.96	0.94	1.29	0.97	0.96	1.3

* Guidelines for Traffic Impact Analysis, Town of Chapel Hill, October, 2001.

**Table E-4
Summary of the Proposed Project's Impacts**

Analyses	Impacts
Peak Hour Arterial Capacity	Traffic demand on the three arterial segments analyzed would exceed the roadway capacity limits during at least one peak hour of the day during both the No Build and Build Conditions.
Site Access	The two driveways shown in the proposed site plan should be sufficient to accommodate the site traffic as estimated for the proposed development. A single shared driveway for the two development projects along Martin Luther King Jr. Boulevard would reduce conflict points on Martin Luther King, Jr. Boulevard. However, traffic flow conditions would not be significantly different from a two-driveway option.
New Signal Location	A signal warrant analysis for the intersection of Martin Luther King Jr. Boulevard and Site Driveway #3 indicated that a signal may not be warranted by 2010 but that the intersection should be monitored to determine if warrants are met in the future.
Traffic Signal Phasing	The intersections analyzed for this study have multi-phase signal controllers that can accommodate variations in traffic flow. According to this analysis, the traffic demand on one or more approaches at two of the three signalized intersections analyzed in this study exceeds the intersection capacity under the 2007 Existing and the 2010 No Build and Build Conditions. In order to improve the traffic flow, this study recommends improvements to the intersections of Martin Luther King Jr. Boulevard/Hillsborough Street and Martin Luther King Jr. Boulevard/Rosemary Street.
High Crash Locations	Crash data were obtained from the North Carolina Department of Transportation (NCDOT) for 36-month period for locations most likely to be impacted by the proposed development. This crash data indicated that the travel conditions in the study area are relatively safe today.
Traffic Signal Progression	The signalized intersections in the study area were analyzed as isolated intersections, therefore no progression analysis was conducted part of this study.
Peak Hour Intersection Capacity	The peak hour intersection capacity analysis indicates that traffic demand on one or more approaches at two of the three signalized intersections analyzed in this study exceeds the intersection capacities under the 2007 Existing and the 2010 No Build and Build Conditions. A detailed description of the proposed mitigation measures for these intersections is provided in Section E-4.
Turn Lane Storage Requirements	The capacity analysis indicates that no separate left-turn lanes or additional storage lengths will be necessary at any of the intersections analyzed for this study.
Intersection Sight Distance	At the intersection of Martin Luther King Jr. Boulevard with Driveway #3, roadway improvements are recommended to provide a safe sight distance as recommended by AASHTO Green Book. At the intersection of Hillsborough Street with Driveway #1, there is no sight distance problem.
Appropriateness of Acceleration/Deceleration Lanes	The speed limit on Martin Luther King Jr. Boulevard is 35 miles per hour and on Hillsborough Street is 25 miles per hour. Since the speed limits for the roadways are low, acceleration/ deceleration lanes are not needed at the proposed site driveway.
Pedestrian and Bicycle Facilities	In the study area, there are sidewalks on Martin Luther King Jr. Boulevard, Columbia Street, Rosemary Street, and North Street on either one or both sides of the roadway. In the study area, there are no exclusive bicycle lanes along any of the major/minor thoroughfares. However, on Martin Luther King Jr. Boulevard, between site driveway #3 and Hillsborough Street, the width of the outside lane is wider than the standard twelve foot lane; therefore, bicycle use is possible even though bicycle use is not clearly marked. The Bolin Creek Bike Route is a 6.9 mile loop utilizing the Carrboro Bike Path, Bolin Creek Greenway, and the streets of Carrboro and Chapel Hill.
Public Transportation Facilities	The study area is well served by the Chapel Hill Transit with several mid-block bus stops in the study area. No additional bus stop will be added as part of this project.



Table E-3
Intersection Capacity Analysis Summary

Intersection	2007 Existing Conditions			2010 No Build Conditions			2010 Built Conditions I			2010 Built Conditions II			2010 Build Conditions I with Recommended Improvements			2010 Build Conditions II with Recommended Improvements				
	AM Peak	Mid-day Peak	PM Peak	AM Peak	Mid-day Peak	PM Peak	AM Peak	Mid-day Peak	PM Peak	AM Peak	Mid-day Peak	PM Peak	AM Peak	Mid-day Peak	PM Peak	AM Peak	Mid-day Peak	PM Peak		
E. Rosemary Street at Hillsborough Street (Signalized Intersection)	Overall Intersection	B	B	C	B	C	C	B	C	B	C	C	B	C	C	B	C	C		
	Eastbound	LTR	C	A	B	C	B	C	B	C	A	B	C	A	B	C	A	B		
	Westbound	LTR	C	B	B	C	B	B	C	B	C	B	C	B	C	B	C	B		
	Northbound	L	B	C	D	B	D	D	B	D	D	B	D	D	B	D	D	B	D	
		TR	B	C	C	B	C	C	B	C	C	B	C	C	B	C	C	B	C	
	Southbound	L	B	C	C	B	C	C	B	C	C	B	C	C	B	C	C	B	C	
		TR	B	C	C	B	C	C	B	C	C	B	C	C	B	C	C	B	C	
	Westbound	LR	A	A	B	A	A	B	A	A	B	A	A	B	A	A	B	A	A	
		LT	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
	Eastbound	LR	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
		LT	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
	Northbound	LR	A	A	B	A	A	B	A	A	B	A	A	B	A	A	B	A	A	
LT		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		
Hillsborough Street at North Street (East - West Stop Controlled)	Overall Intersection	B	B	C	B	C	C	B	C	B	C	B	C	B	C	B	C	C		
	Eastbound	L	E	C	B	B	D	B	B	D	E	D	B	B	D	E	D	B		
	Westbound	TR	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
	Northbound	L	C	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	
		TR	C	B	D	C	B	E	C	B	E	C	B	E	C	B	E	C	B	
	Southbound	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
		TR	B	B	C	C	B	D	C	B	D	C	B	D	C	B	D	C	B	
	Westbound	LR	A	A	B	A	A	A	A	A	B	A	A	B	A	A	B	A	A	
		LT	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
	Hillsborough Street at Martin Luther King Jr. Boulevard (Signalized Intersection)	Overall Intersection	B	B	C	B	C	C	B	C	B	C	B	C	B	C	B	C	C	
		Eastbound	L	E	C	B	B	D	B	B	D	E	D	B	B	D	E	D	B	
		Westbound	TR	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
Northbound		L	C	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	
		TR	C	B	D	C	B	E	C	B	E	C	B	E	C	B	E	C	B	
Southbound		L	A	A	B	A	A	B	A	A	B	A	A	B	A	A	B	A	A	
		TR	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Westbound		LR	B	B	D	B	C	D	B	B	D	E	D	B	B	D	E	D	B	
		LT	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Southbound		LR	A	A	B	A	A	B	A	A	B	A	A	B	A	A	B	A	A	
		LT	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Martin Luther King Jr. Boulevard at Site Driveway #3 (East - West Stop Controlled)		Overall Intersection	B	B	C	B	C	C	B	C	B	C	B	C	B	C	B	C	C	
	Eastbound	L	E	C	B	B	D	B	B	D	E	D	B	B	D	E	D	B		
	Westbound	TR	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
	Northbound	L	C	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C	
		TR	C	B	D	C	B	E	C	B	E	C	B	E	C	B	E	C	B	
	Southbound	L	A	A	B	A	A	B	A	A	B	A	A	B	A	A	B	A	A	
		TR	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
	Martin Luther King Jr. Boulevard at North Street (East - West Stop Controlled)	Overall Intersection	B	B	C	B	C	C	B	C	B	C	B	C	B	C	B	C	C	
		Eastbound	L	E	C	B	B	D	B	B	D	E	D	B	B	D	E	D	B	
		Westbound	TR	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
		Northbound	L	C	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C
			TR	C	B	D	C	B	E	C	B	E	C	B	E	C	B	E	C	B
Southbound		L	A	A	B	A	A	B	A	A	B	A	A	B	A	A	B	A	A	
		TR	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
N. Columbia Street at E. Rosemary Street (Signalized Intersection)		Overall Intersection	B	B	C	B	C	C	B	C	B	C	B	C	B	C	B	C	C	
		Eastbound	L	E	C	B	B	D	B	B	D	E	D	B	B	D	E	D	B	
		Westbound	TR	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
		Northbound	L	C	C	D	D	C	D	D	C	D	D	C	D	D	C	D	D	C
			TR	C	B	D	C	B	E	C	B	E	C	B	E	C	B	E	C	B
	Southbound	L	A	A	B	A	A	B	A	A	B	A	A	B	A	A	B	A	A	
		TR	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	

E.4 Mitigation Measures/Recommendations

Roadway improvements are divided into four categories: improvements already planned by the Town of Chapel Hill or the North Carolina Department of Transportation, those required regardless of development at the proposed site, improvements proposed as part of the site development, and any additional improvements required as a result of site development.

Planned Improvements

Columbia Street at Rosemary Street: The Town of Chapel Hill plans to change the signal timing plan at this intersection by adding a protected/permitted left-turn phase for the northbound/southbound Columbia Street left-turning traffic. Currently, these movements have a permissive phase only.

There are no planned improvements to roadways in the study area.

Background Committed Improvements

No other roadway improvements that directly impact this analysis are committed by other development projects in the area.

Applicant Committed Improvements

The Residences at Grove Park Development will consolidate the three existing driveways into two driveways: one with Martin Luther King Jr. Boulevard and the second with Hillsborough Street. Improvements required to accommodate site traffic are limited to one approach lane and one exit lane at each of the site driveways.

Recommended Improvements

This study proposed improvements at the following three intersections:

- Columbia Street at Rosemary Street
- Martin Luther King Jr. Boulevard at Hillsborough Street
- Martin Luther King Jr. Boulevard at Site Driveway #3

Columbia Street at Rosemary Street: The intersection capacity analysis indicates that several approaches would function at Level of Service E or F during at least one peak hour of the day under both the 2010 No Build and Build Conditions. Hence, regardless of whether the proposed project is built, improvements should be considered at this intersection. Under the 2010 No Build Conditions, the eastbound left-turning movement would function with a volume-to-capacity ratio of 1.31 (with 405 vehicles per hour during the PM peak hour). The proposed project would add ten trips to this movement thereby increasing the volume-to-capacity ratio to 1.35. This clearly indicates a need for a dual left-turn lane for this approach regardless of the proposed project. By adding a dual left-turn lane and adjusting the signal timing plan, this intersection as a whole would function at Level of Service C or better throughout the day.

Martin Luther King Jr. Boulevard at Hillsborough Street: The intersection capacity analysis indicates that the eastbound left-turning movement and the westbound through movement would function either at Level of Service E or F during at least one peak hour of the day under both the 2010 No Build and Build Conditions. Hence, regardless of whether the proposed project is built, improvements should be considered at this intersection. By adjusting the signal timing plan, the westbound through movement would function at Level of Service D or better throughout the day, an acceptable rate of traffic flow for peak hour conditions. However, the eastbound left-turning movement would continue to either approach or exceed the roadway capacity limits under the AM and PM peak hours of the day. It should be noted that the traffic volume on this movement is minimal (less than 60 vehicles per hour) and also the proposed project does not add any traffic to this movement.

The intersection capacity analyses for the 2010 Build Conditions I and II with the recommended changes for the above two intersections are summarized in Table 12 and 13 respectively. Detailed SYNCHRO capacity analysis reports are included in the Appendix.

Martin Luther King Jr. Boulevard at Driveway #3: During the field visit it was observed that the vertical curve along the site driveway and vegetation in the southeastern quadrant of the intersection create obstructions to the driver's left-side view. To improve the sight distance at this intersection, roadway improvements such as re-grading of the driveway approach, removal of vegetation in the southeastern quadrant along Martin Luther King Jr. Boulevard should be considered.

A signal warrant analysis for Build Conditions II indicates that a signal may not be warranted by 2010 but that the intersection should be monitored to determine if warrants are met in the future.

