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TRAFFIC IMPACT ANALYSIS GREENBRIDGE DEVELOPMENT

Chapel Hill, North Carolina

Executive Summary



prepared for:
The Town of Chapel Hill, NC

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E.0 EXECUTIVE SUMMARY

E.1 Project Overview

Greenbridge Development is a proposed development project on Rosemary Street between Merritt Mill Road and Graham Street in Chapel Hill, North Carolina. The proposed development will replace the existing community building, an eight-room rooming house, one single family house and 12 apartment units with 40,000 square feet of retail space and 103 multi-family residential dwelling units totaling 200,000 square feet. The Greenbridge Development will also include 210 parking spaces, all of which will be located below grade, under the proposed development. The development will have access/egress to and from Merritt Mill Road and Graham Street. Figure E-1 shows the site plan. The site is located in the Town Center 2 (TC-2) zoning district, as indicated in the Town of Chapel Hill zoning map, as indicated in the Town of Chapel Hill zoning map (see Figure E-2).

E.2 Proposed Project Traffic

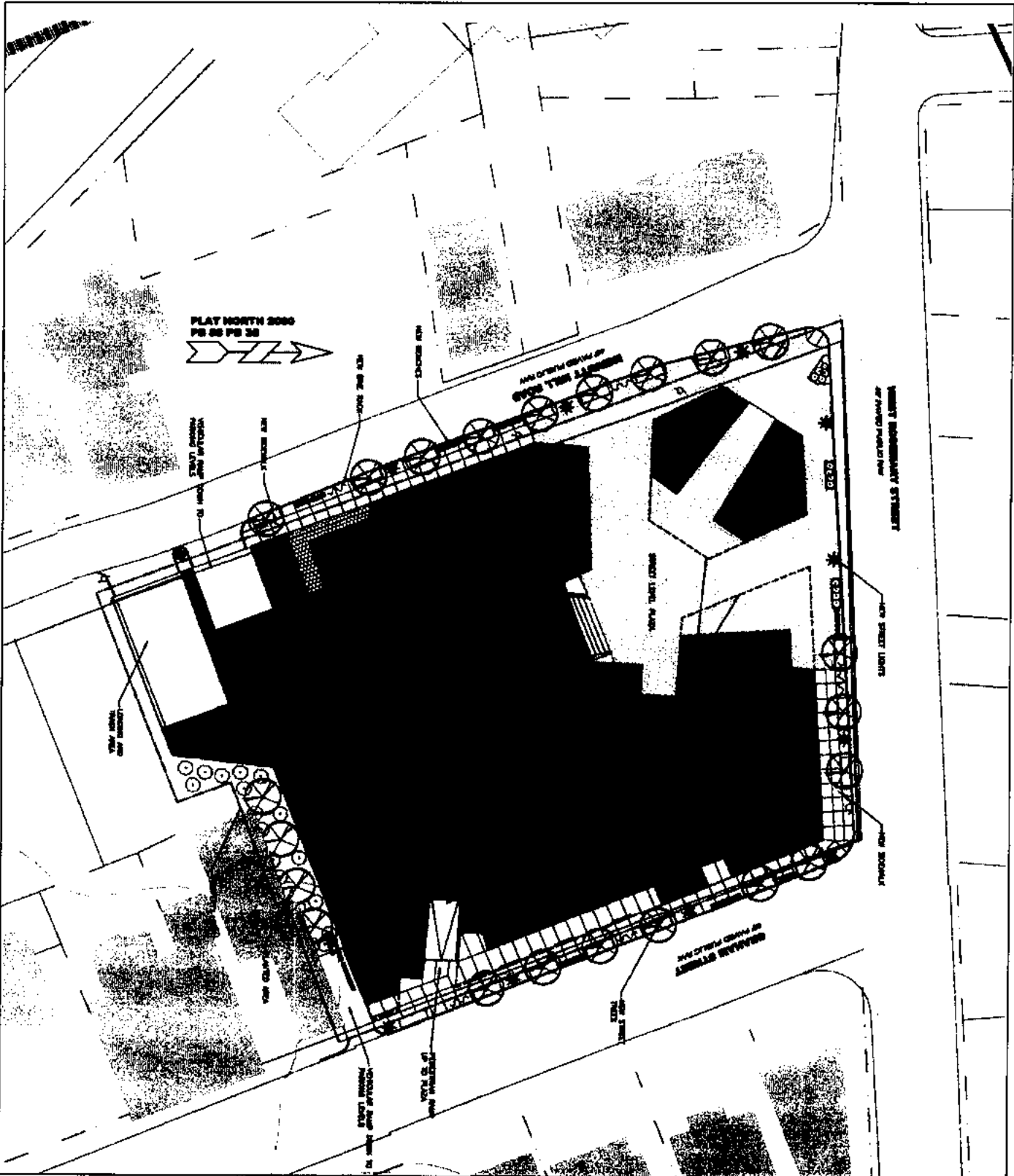
The proposed Greenbridge Development will generate approximately 4,355 vehicle trips per day. Of these trips, 149 vehicle trips will occur during the AM peak hour, 392 vehicle trips during Mid-day peak hour, and 392 vehicle trips during the PM peak hour. The existing development generates minimal traffic. Hence, in determining the impacts of the proposed development, this study did not account for any reduction in traffic due to removal of the existing development.

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

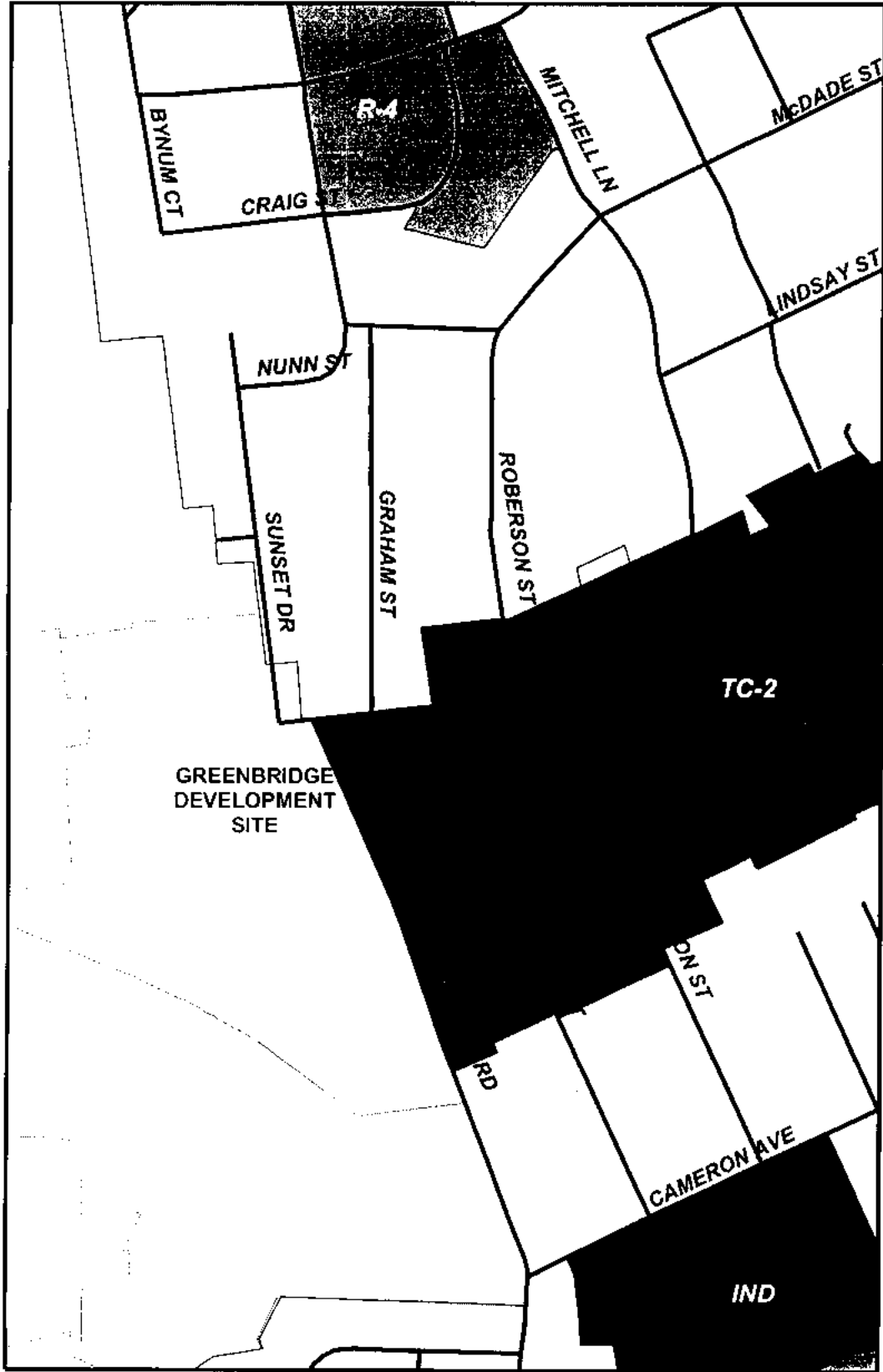
**Table E-1.
Site Trip Generation
Greenbridge Development**

TRIP GENERATION VOLUMES									
Land Use	Size	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	103 Units	306	306	11	48	25	25	31	19
Retail Space	40,000 square feet	1,872	1,872	55	35	171	171	164	178
New trips added to the road network		2,178	2,178	66	83	196	196	195	197



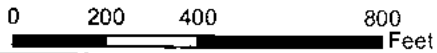


	<p>GREENBRIDGE DEVELOPMENT TRAFFIC IMPACT ANALYSIS CHAPEL HILL, NC</p>		<p>PROJECT SITE PLAN</p>
	<p>RS&H ARCHITECTS-ENGINEERS-PLANNERS, INC CHARLOTTE, NORTH CAROLINA</p>		<p>Figure E-1</p>



LEGEND

- Streets
- Zoning**
- NC
- TC-1
- TC-2
- TC-2-C
- IND
- OI-1
- OI-2
- OI-2-C
- OI-3
- OI-4
- R-2
- R-3
- ▨ R-4
- R-6
- Carrboro Jurisdiction



	GREENBRIDGE DEVELOPMENT TRAFFIC IMPACT ANALYSIS CHAPEL HILL, NC		PROJECT LOCATION
	RS&H ARCHITECTS-ENGINEERS-PLANNERS INC. CHARLOTTE, NORTH CAROLINA		FIGURE E-2

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 five intersections for the 2006 Existing Conditions, 2010 No Build Conditions, and 2010 Build Conditions:

Arterial Segments:

- Rosemary Street between Merritt Mill Road and Roberson Street
- Franklin Street/Main Street between Merritt Mill Road and Roberson Street
- Merritt Mill Road between Franklin Street and Rosemary Street

Intersections:

- Rosemary Street at Merritt Mill Road/Sunset Drive (four-leg unsignalized intersection)
- Rosemary Street at Graham Street (four-leg unsignalized intersection)
- Rosemary Street at Roberson Street (four-leg signalized intersection)
- Franklin Street/Main Street at Merritt Mill Road/Brewer Lane (five-leg signalized intersection)
- Franklin Street at Graham Street (four-leg signalized intersection)

Table E-2 and E-3 compare the arterial and intersection capacity analysis results for all of the three scenarios analyzed in this study. Table E-4 summarizes the impacts of the proposed project for the 2010 Build Conditions (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 (per direction)*	2006 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	Franklin Street	Eastbound	4	1,600	366	391	390	421	468	471	460	548	566
		Westbound	4	1,600	295	557	658	357	665	783	391	826	884
Minor Arterial	Merritt Mill Road	Northbound	2	550	105	71	96	117	80	107	137	133	161
		Southbound	2	550	52	86	146	58	96	68	80	149	218
	Rosemary Street	Eastbound	2	550	395	389	442	459	463	545	486	525	607
		Westbound	2	550	244	423	548	295	507	647	316	570	709

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

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Table E-3.
Intersection Capacity Analysis Summary

Intersection	Traffic Movement*	2006 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
Rosemary Street at Merritt Mill Road (North-south stop controlled)	Eastbound	LTR	A	A	A	A	A	A	A	A
	Westbound	L	A	A	A	A	A	A	A	A
	Northbound	LTR	B	C	D	C	C	F	C	D
	Southbound	LTR	B	B	C	C	C	D	C	C
Rosemary Street at Graham Street (North-south stop controlled)	Eastbound	LTR	A	A	A	A	A	A	A	A
	Westbound	L	A	A	A	A	A	A	A	A
	Northbound	LT	C	C	D	C	C	F	C	C
	Southbound	R	B	B	B	B	B	B	B	B
		LTR	B	B	C	B	B	D	B	C



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Table E-3 Continued

Intersection	Traffic Movement*	2006 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
Rosemary Street at Roberson Street (Signalized intersection)	Overall Intersection	B	A	B	B	A	B	B	A	B
	Eastbound	LTR	A	A	A	A	A	A	A	A
	Westbound	L	A	A	A	A	A	A	A	A
		TR	A	A	A	A	A	A	A	A
	Northbound	LTR	C	C	C	C	C	C	C	C
	Southbound	LTR	E	D	D	E	D	E	D	E
Franklin Street at Merritt Mill Road (Signalized intersection)	Overall Intersection	C	C	E	C	C	E	C	C	F
	Eastbound	LTR	B	B	C	C	D	C	C	E
	Westbound	L	B	B	C	B	B	C	B	C
		TRA	B	B	B	B	B	C	B	B
	Northbound	ALLT	E	E	F	E	E	F	E	F
	Southbound	R	B	B	B	B	B	B	B	B
Northeast Bound	LTR	C	C	C	C	C	C	C	C	E
	AR	D	D	F	E	D	F	E	D	F
Franklin Street at Graham Street (Signalized intersection)	Overall Intersection	A	A	A	A	A	A	A	A	B
	Eastbound	L	A	A	A	A	A	A	A	A
	Westbound	TR	A	A	A	A	A	A	A	A
		LTR	A	A	A	A	A	A	A	A
	Northbound	L	C	C	E	C	E	C	C	D
	Southbound	TR	B	B	D	C	B	C	C	D
Merritt Mill Road at Site Driveway (East-west stop controlled)	Overall Intersection	C	C	E	C	C	E	C	C	E
	Eastbound	LTR	B	B	C	C	D	C	C	E
	Westbound	L	B	B	C	B	B	C	B	C
		TRA	B	B	B	B	B	C	B	C
	Northbound	ALLT	E	E	F	E	E	F	E	F
	Southbound	R	B	B	B	B	B	B	B	B
Graham Street at Site Driveway (East-west stop controlled)	Overall Intersection	A	A	A	A	A	A	A	A	B
	Eastbound	L	A	A	A	A	A	A	A	A
	Westbound	TR	A	A	A	A	A	A	A	A
		LTR	A	A	A	A	A	A	A	A
	Northbound	L	C	C	E	C	E	C	C	D
	Southbound	TR	B	B	D	C	B	C	C	D

* AL - Adjacent Left-turning Movement; L - Left-turning Movement; T - Through Movement; R - Right-turning Movement; AR - Adjacent Right-turning Movement



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

Analyses	Impacts
Peak Hour Arterial Capacity	No arterial capacity issues have been identified on any of the study area roads.
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.
New Signal Location	A signal warrant analysis was performed at the unsignalized intersection of Rosemary Street with Merritt Mill Road and Rosemary Street with Graham Street to determine the need for a traffic signal. Travel conditions at neither intersection met the three warrants analyzed: Warrant 2 - Four-Hour Vehicular Volume, Warrant 3 - Peak Hour Vehicular Volume and Warrant 7 - Crash Experience.
Traffic Signal Phasing	The intersections analyzed for this study have multi-phase signal controllers that can accommodate variations in traffic flow. According to these analyses, the traffic demand on the northbound Merritt Mill Road and northeast bound Brewer Lane approaches exceeds at the intersection of Franklin Street/Main Street and Merritt Mill Road exceeds the intersection capacity limits under the 2006 Existing and the 2010 No Build and Build Conditions. In order to improve the traffic flow, this study recommends improvements to the signalized intersection of Franklin Street/Main Street with Merritt Mill Road/Brewer Lane for the 2010 Build Conditions.
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 in the study area flows at acceptable Levels of Service during the 2006 Existing Conditions, 2010 No Build Conditions, and 2010 Build Conditions with one exception. The exception is traffic demand at the intersection of Franklin Street/Main Street with Merritt Mill Road/Brewer Lane either approaches or exceeds the intersection capacity limits under all the three scenarios analyzed. A detailed description of the proposed mitigation measures for this intersection 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	There is no sight distance problem at the intersections of Merritt Mill Road and Graham Street with the proposed site driveways.
Appropriateness of Acceleration/Deceleration Lanes	The speed limit on Merritt Mill Road and Graham Street, the roadways to which the proposed development will have direct access is low (25 miles per hour) indicating that there is no need for acceleration/ deceleration lanes at the proposed site driveway.
Pedestrian and Bicycle Facilities	The section of Rosemary Street within the study area has continuous sidewalk on the north side of the roadway between Main Street and Roberson Street. On the south side of the roadway, there is sidewalk between Graham Street and Roberson Street. On Franklin Street, there is continuous sidewalk on both sides of the roadway throughout the study area. There is continuous sidewalk on both sides of the roadway on Merritt Mill Road and Graham Street between Rosemary Street and Franklin Street. Roberson Street has continuous sidewalk on its west side. The sidewalk on the east side of Roberson Street starts at Rosemary Street and runs approximately one-third the distance from Rosemary Street to Franklin Street. There is no bicycle lane or bicycle facility on any roadways in the study area.
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.



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

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 proposed site will have access to Merritt Mill Road and Graham Street. At this new roadway, improvements required to accommodate site traffic are limited to one approach lane and one exit lane at each of the site driveways.

Recommended Improvements

Three different alternatives are suggested to mitigate the traffic impacts at the intersection of Franklin Street/Main Street with Merritt Mill Road/Brewer Lane. Since the 2010 Build Conditions indicate that the PM peak hour is the most congested in the study area, a PM peak hour intersection capacity analysis was performed for the Alternatives A and B for this intersection. This study did not include any capacity analysis for the Alternative C.

Alternative 'A': This alternative proposes converting the segment of Merritt Mill Road between Franklin Street/Main Street and Rosemary Street into one-way operation. Should this improvement be implemented, the intersection of Franklin Street/Main Street with Merritt Mill Road/Brewer Lane as a whole would operate at Level of Service D or better throughout the day. However, the traffic demand on the northeast bound (Brewer Lane) approach would continue to flow at either Level of Service E or F, during at least one peak period of the day - same as the Existing and No Build Conditions. The existing properties along this section of Merritt Mill Road would need to be notified and presented this alternative to verify if the effected property owners can live with Alternative " A .

Alternative 'B': This alternative proposes restricting ingress/egress between Brewer Lane and Franklin Street/Main Street to right-in and right-out traffic movements only. To prohibit the left-turning movements into Brewer Lane from the westbound Franklin Street and the northbound/southbound Merritt Mill Road approaches, a median barrier should be considered on Main Street at this intersection. With the proposed improvements, traffic on Brewer Lane would be controlled by a Stop sign and traffic on Main Street/Franklin Street/Merritt Mill Road would be controlled by a two-phase traffic signal. The Brewer Lane phase would be removed. With this improvement, the intersection of Franklin Street/Main Street with Merritt Mill Road/Brewer Lane as a whole would operate at Level of Service D or better throughout the day. However, the traffic demand on the northeast bound (Brewer Lane) approach would continue to flow at Level of Service E, during at least one peak period of the day - same as the Existing and No Build Conditions.

This alternative would also require improvements at the intersection of Main Street/Rosemary Street (in the Town of Carrboro): a new westbound left-turning movement to accommodate the traffic flow and circulation back to Brewer Lane. Eastbound on-street parking on Rosemary Street between Main Street and Merritt Mill Road would need to be removed to accommodate the new westbound left-turning lane (fourth travel lane) at the intersection of Main Street with Rosemary Street. The proposed new left-turning movement may require the Main Street/Rosemary Street intersection to be re-aligned to accommodate the turning radius for large trucks making the westbound left-turning movement.



Alternative 'C': This alternative proposes a one-lane roundabout at the intersection Franklin Street/Main Street with Merritt Mill Road/Brewer Lane. This alternative would probably be a long term improvement as it would require acquiring additional right-of-way. The existing traffic signal at this location would be removed and "yield" control would be implemented for vehicles entering the roundabout. No intersection capacity analysis was performed for this alternative.

Table E-5 compares the PM peak hour intersection Level of Service for all of the scenarios analyzed. Detailed synchro capacity analysis reports are attached in the Appendix of the Traffic Impact Analysis Report.

It should be noted that the westbound, northbound and southbound approaches of this intersection are in the Town of Chapel Hill jurisdiction and the eastbound Main Street and northeast bound Brewer Lane approaches are in the Town of Carrboro jurisdiction. Any improvements to this intersection should be coordinated between these two agencies. A more detailed analysis is required before selecting a final recommendation to improve the traffic flow at the intersection of Franklin Street/Main Streetwith Merritt Mill Road/BrewerLane.

Conceptual drawings illustrating each of the three proposed alternatives A, B, and C, are also included in the Appendix.

Table E-5.
PM Peak Hour Intersection Capacity Analysis
Mitigation Alternatives

Condition	Overall Intersection Delay (sec)	Level of Service					
		Overall	EB	WB	NB	SB	NE bound (5th leg)
2006 Existing	58	E	C	B		C	
2010 No Build	77	E	D	C		C	
2010 Build			E	B		E	
Alternative A	39	D	D	B	D	-	
Alternative B	41	D	D	C	D	C	E
Alternative C	No Analysis was conducted						

