



**Bellemeade Development – Transportation Impact Analysis
Greensboro, NC
Prepared for CIP Construction Company
August 26, 2014**

Executive Summary

The proposed Bellemeade Development is located at the southeast quadrant of the intersection of Eugene Street and Lindsay Street in downtown Greensboro, North Carolina. As currently planned, this development will ultimately consist of a total of 15,000 square feet of retail, an apartment with 300 dwelling units and a hotel with 100 rooms. The site plan shows the proposed two (2) accesses on Eugene Street, one (1) access on Battleground Avenue and one (1) access on Bellemeade Street. The site plan proposes close Lindsay Street between Battleground Avenue and North Eugene Street.

DAVENPORT was retained to determine the potential traffic impacts of this development and to identify transportation improvements that may be required to accommodate the impacts of both background traffic and new development traffic; with an anticipated closure of Lindsay Street. The following intersections were included in the study:

- Smith Street at Eugene Street
- Smith Street at Battleground Avenue
- Smith Street at Greene Street
- Lindsay Street/ Site Access 1 at Eugene Street
- Lindsay Street/ Site Access 2 at Battleground Avenue
- Lindsay Street at Greene Street
- Battleground Avenue at Greene Street
- Bellemeade Street at Eugene Street
- Bellemeade Street at Greene Street
- Site Access 3 at Eugene Street
- Site Access 4 at Bellemeade Street (entry only)

To determine the effects of a potential closure of Lindsay Street, the Greensboro Department of Transportation (GDOT) has requested that the above-mentioned intersections be analyzed for the following two scenarios to provide a comparison of results:

- Baseline Conditions: Build-out with Lindsay Street open (for comparison only)
- Proposed Conditions: Build-out with closure of Lindsay Street at the site (per site plan)



The intersections were analyzed during the AM (7-9 am) and PM (4-6 pm) peaks for the following conditions:

- 2014 Existing Conditions
- 2017 Future No Build Conditions
- 2017 Future Build Conditions
- 2017 Future Build Conditions with Improvements

The planned build-out year for this development is 2016. A study year of 2017 (build-out plus one year) was used for analysis purposes.

In addition, a pedestrian analysis was conducted to review the adequacy of pedestrian facilities surrounding the proposed site. The following intersections were included in this analysis:

- Eugene Street at Lindsay Street / Site Access 1
- Lindsay Street / Site Access 2 at Battleground Avenue
- Eugene Street at Bellemeade Street

This report provides discussion of the vehicular analysis followed by discussion of the pedestrian analysis. This Transportation Impact Analysis (TIA) was carried out based on Greensboro Department of Transportation (GDOT) typical standards. Information regarding the property was provided by the developer, CIP Construction Company.

Developments Included in the Analysis

Per the GDOT staff, there are two (2) developments in the vicinity of the project to be included in the analysis.

In 2010, The Weaver Foundation Development was approved for 224,000 square feet of general office and South Elm Development. DAVENPORT conducted a transportation impact analysis for this project. The analysis indicated that the site would generate 1,986 new vehicle trips.

In 2012, DAVENPORT conducted a TIA for the then called South Elm Development – now renamed to Union Square. The original project was approved for mix-used development including apartments, retail, hotel and office/ institutional buildings. The site plan was revised in early 2014 to consist of 177 apartment units, 31,900 square feet of retail space, 180,000 square feet of office space, and 210,000 square feet of institutional space. Analysis indicates that this site will generate 8,730 new vehicle trips.

In addition, The Tanger Performing Arts Center (GPAC) is a planned development in downtown Greensboro, which is planned to have 3,500 seats. A TIA has yet to be conducted on this project. However, in order to accommodate for this major planned downtown project, trips related to this site were estimated and included in this analysis. Expected trips for the GPAC were included in the PM peak analysis based on expected traffic patterns and engineering judgment. More information can be found in the Supporting Documentation section of the appendix.

Redistribution of Lindsay Street Traffic

With the build out of the site, Lindsay Street will be closed at the site. Background traffic on this section of Lindsay Street will need to reroute to other streets. Proposed vehicle rerouting is shown in Exhibit A. Proposed pedestrian rerouting is shown in Exhibit B. The assignment of the redistributed trips was determined by reviewing the existing traffic patterns and was coordinated very closely with GDOT.

Analysis Results

Baseline Conditions: Lindsay Street Open

In Baseline Conditions with Lindsay Street remaining open, the analysis indicates a level of service (LOS) D or better at each of the study intersections in AM and PM peak hours.

Proposed Conditions: Closure of Lindsay Street at the Site

In Proposed Conditions with the closure of Lindsay Street at the site, a portion of background traffic is expected to reroute from Eugene Street onto Greene Street due to the road closure. In particular, the northbound traffic volume on Eugene Street north of Smith Street is expected to decrease by 18 vehicles in the AM peak hour and 134 vehicles in the PM peak hour. The northbound traffic volume on Greene Street is expected to increase by the same amounts. In terms of site traffic on Greene Street north of Smith Street, an additional 8 trips are expected in the AM peak hour and 11 trips in the PM peak hour. The combined background and site traffic added to Greene Street north of Smith Street is 24 trips in the AM peak and 145 trips in the PM peak. A comparison of the level of service at the intersection of Smith Street and Greene Street indicates a slight increase in delay from future no build conditions to future build conditions. Level of service (LOS) A is maintained in both future no build and future build AM and PM peaks, with an increase in delay of 1.1 seconds in the AM peak and 1.6 seconds in the PM peak.

The need for auxiliary turn lanes at the site accesses was reviewed based on pages 23 and 27 of the GDOT Driveway Manual. Based on projected traffic volumes, no turn lanes are warranted at the site accesses. It is recommended that all site accesses be designed according to GDOT Driveway Manual standards.

Site Access 4 on Bellemeade Street is expected to serve only hotel traffic. Based on the number of vehicles entering the site access during the AM and PM peaks (10 and 22 vehicles, respectively), a throat distance of 20 feet will be required.

Based on our modeling, westbound traffic at the intersection of Bellemeade Street and Eugene Street is anticipated to reach a 95th percentile queue distance of more than 228 feet. The current left turn lane storage is 125 feet. However, in order to extend the left turn lane on Bellemeade Street, on-street parking would need to be eliminated. This projected queuing during peak hours may make it difficult for left turns to access the site at Site Access 4. However, this condition should be short lived, and is not uncommon



for dense urban settings. Additionally, Site Access 3 on Eugene Street provides an alternate entrance into the hotel should the wait be unacceptable. Traffic also has the option of going around the block and accessing the driveway from the westbound direction.

Based on projected traffic volumes, no auxiliary turn lanes are warranted at this location. Based on a review of the site plan, three (3) parking spaces of on-street parking on Bellemeade Street close to Site Access 4 will need to be eliminated to accommodate the proposed driveway.

Intersection Level of Service Summary

Table A summarizes the level of service analysis at the study intersections:

Table A - Level of Service Summary – Proposed Conditions			
AM Peak	2014 Existing	2017 Future No Build	2017 Proposed Conditions - Future Build
Smith Street at Eugene Street	C (20.8)	C (31.7)	C (32)
Smith Street at Battleground Avenue	A (1.6)	A (9.9) NB Approach	A (10) NB Approach
Smith Street at Greene Street	A (2.8)	A (3.1)	A (5.0)
Lindsay Street (Site Access 1) at Eugene Street	B (17.1)	C (22.7)	<u>Signalized:</u> B (17.9) <u>Unsignalized:</u> C (24.4) WB Approach
Lindsay Street (Site Access 2) at Battleground Avenue	B (12) SB Approach	B (12.6) SB Approach	A (9.8) SB Approach
Lindsay Street at Greene Street	B (13.1)	B (13.7)	B (15.5)
Battleground Street at Greene Street	A (9.7) EB Approach	A (9.9) EB Approach	B (10.9) EB Approach
Bellemeade Street at Eugene Street	B (12.2)	B (13.9)	C (20.4)
Bellemeade Street at Greene Street	B (11.6)	B (13.1)	B (15.0)
Site Access 3 at Eugene Street			D (28.4) WB Approach
Site Access 4 at Bellemeade Street			A (0.2) EB Approach
LOS (delay in seconds)			
Note for unsignalized conditions, LOS and delay indicates only minor street approach with longest delay			

Table A - Level of Service Summary – Proposed Conditions cont.

PM Peak	2014 Existing	2017 Future No Build	2017 Proposed Conditions - Future Build
Smith Street at Eugene Street	B (18.2)	C (22.5)	C (22.0)
Smith Street at Battleground Avenue	A (2.4)	A (9.4) NB Approach	A (9.4) NB Approach
Smith Street at Greene Street	A (6.4)	A (6.7)	A (9.4)
Lindsay Street (Site Access 1) at Eugene Street	B (10.7)	B (13.3)	<u>Signalized:</u> A (9.0) <u>Unsignalized:</u> F (65.4) WB Approach
Lindsay Street (Site Access 2) at Battleground Avenue	B (13.1) SB Approach	B (14.1) SB Approach	B (10.2) NB Approach
Lindsay Street at Greene Street	A (9.2)	B (16.4)	B (17.7)
Battleground Street at Greene Street	A (9.0) EB Approach	A (9.5) EB Approach	B (11.0) EB Approach
Bellemeade Street at Eugene Street	B (11.5)	B (11.6)	C (34.5)
Bellemeade Street at Greene Street	B (10.6)	B (18.5)	C (30.0)
Site Access 3 at Eugene Street			C (20.8) WB Approach
Site Access 4 at Bellemeade Street			A (0.6) EB Approach

LOS (delay in seconds)

Note for unsignalized conditions, LOS and delay indicates only minor street approach with longest delay

Pedestrian Analysis

A pedestrian analysis was conducted to review the adequacy of pedestrian facilities surrounding the proposed site. In particular, this pedestrian analysis assesses the proposed future conditions with the closure of Lindsay Street at the site.

The following intersections were included in this analysis:

- Eugene Street at Lindsay Street / Site Access 1
- Lindsay Street / Site Access 2 at Battleground Avenue
- Eugene Street at Bellemeade Street

Pedestrian Level of Service Analysis

A pedestrian level of service analysis was carried out using ARTPLAN 2012 software in order to review the adequacy of proposed pedestrian facilities in the vicinity of the site. The ARTPLAN 2012 software is developed by the Florida Department of Transportation, and is based on the 2010 Highway Capacity Manual.

With 2017 future build volumes and the facilities shown on the site plan assumed to be in place, the pedestrian level of service results are shown in Table B.

Table B - Pedestrian Level of Service for Peak Hour		
Roadway Segment	LOS	Score
Eugene Street between Bellemeade Street and Smith Street	B	2.05
Bellemeade Street between Eugene Street and Greene Street	A	1.59

Analysis based on FDOT Quality/Level of Service Handbook (2012)

Additionally, the 2010 Highway Capacity Manual provides a method of analyzing the level of service for pedestrian crosswalks at a signalized intersection. This evaluates the level of service for a pedestrian crossing the intersections, taking into account factors including the lane geometry, signal timing and phasing, pedestrian volumes and conflicting vehicle volumes at the intersections. The results for the signalized intersection of Eugene Street and Bellemeade Street are presented in Table C below.

Table C - Crosswalk Level of Service	
Eugene Street at Bellemeade Street	
PM Peak	2017 Future Build
Eastbound Approach	B (2.04)
Westbound Approach	B (2.13)
Northbound Approach	B (2.61)
Southbound Approach	B (2.59)
LOS (crosswalk score)	

Pedestrian Volume Signal Warrant Analysis

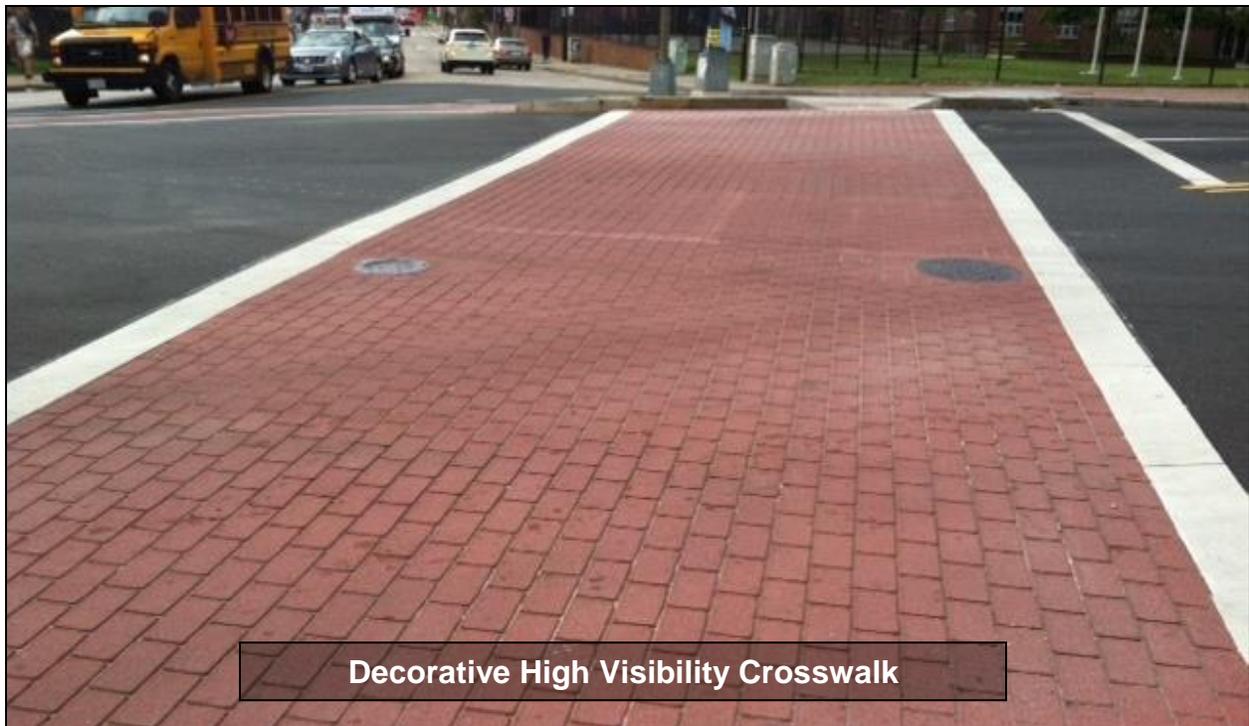
The intersection of Eugene Street at Lindsay Street / Site Access 1 was assessed for a signal warrant based on pedestrian volume. The Manual on Uniform Traffic Control Devices (MUTCD) provides guidance for a signal warrant based on pedestrian volumes – Warrant 4. This warrant is intended “for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.” The projected vehicular and pedestrian volumes at this location do not meet the criteria for this warrant. More information may be found in the Appendix.

Pedestrian Recommendations

The site plan provides for a paved area for pedestrian use on the northeast corner of the intersection of Eugene Street at Bellemeade Street. In addition to the pedestrian facilities shown on the site plan, the following are recommended to accommodate pedestrians within the project limits:

- Provide high visibility crosswalks, consistent with other nearby crosswalks in downtown Greensboro, with minimum width of 10 feet at the following intersections:
 - Eugene Street at Bellemeade Street
- Provide ADA compliant decorative sidewalk pavement patterns and ramps, consistent with other nearby intersections in downtown Greensboro, at the following intersections:
 - Eugene Street at Lindsay Street / Site Access 1
 - Eugene Street at Bellemeade Street
- Provide a 10-foot wide sidewalk on the property frontage along Bellemeade Street and Eugene Street.
- An exclusive pedestrian phase can be considered for the intersection of Eugene Street at Bellemeade Street during special events with high pedestrian volumes.

Exhibit B illustrates the expected rerouting of pedestrian traffic due to closure of Lindsay Street at the site.





Summary and Conclusion

The proposed Bellemeade Development is located at the southeast quadrant of the intersection of Eugene Street and Lindsay Street in downtown Greensboro, North Carolina. As currently planned, this development will ultimately consist of a total of 15,000 square feet of retail, 300 apartment units, and a 100-room hotel. The site plan proposes two (2) accesses on Eugene Street, one (1) access on Battleground Avenue and one (1) entry only on Bellemeade Street. Based on trip generation rates and equations published in Trip Generation (Institute of Transportation Engineers, 9th Edition), this development has a trip generation potential of 253 trips in the AM peak and 411 trips in the PM peak. With a combined effect of pedestrian and pass-by trip reduction, this development has a trip generation potential of 248 net trips in the AM peak and 357 net trips in the PM peak.

DAVENPORT was retained to determine the potential traffic impacts of this development and to identify transportation improvements that may be required to accommodate the impacts of both background traffic and new development traffic. Per GDOT, in order to provide a comparison of results analysis was carried out for two (2) build out scenarios: **Baseline Conditions** considered Lindsay Street remaining open, and **Proposed Conditions** considered closure of Lindsay Street at the site.

In conclusion, this study has reviewed the impacts of both pedestrian and vehicular background traffic and traffic due to the proposed development – specifically the closure of Lindsay Street, and has determined that with the recommended improvements in place, there will be adequate capacity to accommodate future vehicle and pedestrian traffic generated by this site.