

**Kangaroo Express Development – Transportation Impact Analysis**  
**Hampstead, NC**  
**Prepared for Commercial Site Design, PLLC**  
**October 31, 2014**

### **Executive Summary**

The proposed Kangaroo Express development is to be located on the northwest corner of the intersection of US 17 and Hoover Road in the Hampstead community in Pender County, NC. The development is planned to be constructed in two phases. Phase 1 is proposed to include a gas/service station with convenience market and 16 fueling positions and a 1,400 square foot fast-food restaurant with a drive-thru window. Phase 1 has a planned build-out date of 2015. Phase 2 is to consist of a 4,500 square foot fast-food restaurant with a drive-thru window and has a projected build-out date of 2018.

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 the new development traffic. The following intersections were included in the study:

- US 17 at Hoover Road
- US 17 at Site Access 1 (right-in / right-out)
- Hoover Road at Site Access 2 (right-in only)
- Hoover Road at McDonald's Driveway / Site Access 3

These intersections were analyzed during the AM and PM peaks for the following conditions:

- 2014 Existing Conditions
- 2015 Phase 1 Future No-Build Conditions
- 2015 Phase 1 Build Conditions
- 2018 Phase 2 Future No-Build Conditions
- 2018 Phase 2 Build Conditions
- 2018 Phase 2 Build Conditions with Improvements

The Wilmington Urban Area Municipal Planning Organization and NCDOT were contacted to obtain background information and to ascertain the elements to be covered in this Transportation Impact Analysis (TIA). Information regarding the property was provided by Commercial Site Design.

### ***Phase 1 Level of Service Analysis***

The results of the Phase 1 Level of Service (LOS) analysis are discussed by intersection below and presented in tabular format:

#### *US 17 @ Hoover Road*

In the 2015 future no build conditions, with the growth in the background traffic, this signalized intersection is expected to operate at a LOS C in the AM peak and a LOS B during the PM peak. With the addition of the Phase 1 Site Trips, the intersection is expected to operate at a LOS C in both the AM peak and PM peaks. No improvements are recommended for Phase 1.

#### *US 17 @ Site Access 1 (right-in / right-out)*

In the 2015 future build conditions, this right-in / right-out intersection is expected to operate at a LOS D in both the AM peak and PM peaks. The need for an auxiliary right turn lane was reviewed based on page 80 of the NCDOT “Policy on Street and Driveway Access to North Carolina Highways” and indicates that based on projected traffic volumes, a right turn lane is warranted on southbound US 17. The following improvement is recommended in order to facilitate right turn entry into the site:

- Provide a southbound right turn lane with 100’ of storage and appropriate deceleration length and taper.

With this improvement in place, the intersection is expected to remain at a LOS D in both the AM and PM peaks with reductions in the control delay of 1.1 and 1.2 seconds respectively.

#### *Hoover Road @ Site Access 2 (right-in only)*

In the 2015 future build conditions, this right-in only intersection is expected to operate at a LOS A with no delay in both the AM peak and PM peaks. The need for an auxiliary right turn lane was reviewed based on page 80 of the NCDOT “Policy on Street and Driveway Access to North Carolina Highways” and indicates that based on projected traffic volumes, a right turn lane is warranted on westbound Hoover Road. The following improvement is recommended in order to facilitate right turn entry into the site:

- Provide a westbound right turn lane with 50’ of storage and appropriate deceleration length and taper.

Note that a 50’ rather than 100’ storage is being recommended due to space constraints. The proximity of this intersection to the intersection of US 17 will also keep speeds well below the 45 mph posted speed limit for westbound vehicles approaching this access point.

*Hoover Road @ Site Access 3 / McDonald's Drive*

In the 2015 future no build conditions, with the growth in the background traffic, this unsignalized intersection is expected to operate at a LOS B in both the AM peak and PM peaks. With the addition of the Phase 1 Site Trips, the intersection is expected to operate at a LOS C in the AM peak and a LOS B during the PM peak. No improvements are recommended for Phase 1.

Table 7.2 presents the summary of the level of service analysis for the Phase 1 Future Build conditions.

<b>Table 7.2 - Level of Service Summary</b>			
<b>AM Peak</b>	<b>2015 Future No Build</b>	<b>2015 Phase 1 Build</b>	<b>2015 Phase 1 Build with Improvements</b>
US 17 at Hoover Road	C (23.5)	C (31.4)	
US 17 at Site Access 1 (right-in / right-out)		D (26.3) EB Approach	D (25.2) EB Approach
Hoover Rd at Site Access 2 (right-in only)		A (0.0)	
Hoover Rd at Site Access 3 / McDonald's Drive	B (14.9) NB Approach	C (19.8) SB Approach	
<b>PM Peak</b>	<b>2015 Future No Build</b>	<b>2015 Phase 1 Build</b>	<b>2015 Phase 1 Build with Improvements</b>
US 17 at Hoover Road	B (13.1)	C (22.2)	
US 17 at Site Access 1 (right-in / right-out)		D (26.0) EB Approach	D (24.8) EB Approach
Hoover Rd at Site Access 2 (right-in only)		A (0.0)	
Hoover Rd at Site Access 3 / McDonald's Drive	B (11.3) NB Approach	B (14.2) SB Approach	

LOS (delay in seconds)  
Note for unsignalized conditions, LOS and delay indicates only minor street approach with longest delay

### ***Phase 2 Level of Service Analysis***

The results of the Phase 2 Level of Service (LOS) analysis are discussed by intersection below and presented in tabular format:

#### *US 17 @ Hoover Road*

In the 2018 future no build conditions, with the growth in the background traffic and the Phase 1 site trips, this signalized intersection is expected to operate at a LOS D in the AM peak and a LOS C during the PM peak. With the addition of the Phase 2 Site Trips, the intersection is expected to operate at a LOS E in the AM peak and a LOS D during the PM peak. The following improvement is recommended:

- Optimize the traffic signal timing splits for the new traffic volumes.

With this improvement in place, the intersection is expected to improve to a LOS D in the AM peak and a LOS C during the PM peak.

#### *US 17 @ Site Access 1 (right-in / right-out)*

In the 2018 future no build conditions, this right-in / right-out intersection is expected to operate at a LOS D in both the AM and PM peaks. With the addition of the Phase 2 Site Trips, the intersection is expected to operate at a LOS E in the AM peak and a LOS D during the PM peak. No additional improvements are recommended.

#### *Hoover Road @ Site Access 2 (right-in only)*

In the 2018 future no build and future build conditions, this right-in only intersection is expected to operate at a LOS A with no delay in both the AM peak and PM peaks. No additional improvements are recommended.

#### *Hoover Road @ Site Access 3 / McDonald's Drive*

In the 2018 future no build conditions, with the growth in the background traffic, this unsignalized intersection is expected to operate at a LOS C in both the AM peak and PM peaks. With the addition of the Phase 2 Site Trips, the intersection is expected to operate at a LOS D in the AM peak and a LOS C during the PM peak. The need for an auxiliary right turn lane was reviewed based on page 80 of the NCDOT "Policy on Street and Driveway Access to North Carolina Highways" and indicates that based on projected traffic volumes, a right turn lane is warranted on westbound Hoover Road. The following improvement is recommended in order to facilitate right turn entry into the site:

- Provide a westbound right turn lane with 50' of storage and appropriate deceleration length and taper.

Note that a 50' rather than 100' storage is being recommended due to space constraints.

With this improvement in place, the intersection is expected to remain at a LOS D in the AM and LOS C in the PM peak with reductions in the control delay of 2.6 and 0.5 seconds respectively.

Table 8.2 presents the summary of the level of service analysis for the Phase 2 Future Build conditions.

### 1.1 Phase 2 Recommended Improvements Summary

<b>Table 8.2 – Phase 2 Level of Service Summary</b>			
<b>AM Peak</b>	<b>2018 Future No Build</b>	<b>2018 Phase 2 Build</b>	<b>2018 Phase 2 Build with Improvements</b>
US 17 at Hoover Road	D (46.0)	E (67.3)	D (47.0)
US 17 at Site Access 1 (right-in / right-out)	D (29.6) EB Approach	E (39.1) EB Approach	
Hoover Rd at Site Access 2 (right-in only)	A (0.0)	A (0.0)	
Hoover Rd at Site Access 3 / McDonald's Drive	C (22.3) SB Approach	D (33.4) SB Approach	D (30.8) SB Approach
<b>PM Peak</b>	<b>2018 Future No Build</b>	<b>2018 Phase 2 Build</b>	<b>2018 Phase 2 Build with Improvements</b>
US 17 at Hoover Road	C (32.1)	D (45.9)	C (30.1)
US 17 at Site Access 1 (right-in / right-out)	D (30.6) EB Approach	D (34.8) EB Approach	
Hoover Rd at Site Access 2 (right-in only)	A (0.0)	A (0.0)	
Hoover Rd at Site Access 3 / McDonald's Drive	B (15.0) SB Approach	C (17.1) SB Approach	C (16.6) SB Approach
LOS (delay in seconds)			
Note for unsignalized conditions, LOS and delay indicates only minor street approach with longest delay			



## Summary and Conclusion

The proposed Kangaroo Express development is to be located on the northwest corner of the intersection of US 17 and Hoover Road in the Hampstead community in Pender County, NC. The development is planned to be constructed in two phases. Phase 1 is proposed to include a gas/service station with convenience market and 16 fueling positions and a 1,400 square foot fast-food restaurant with a drive-thru window. Phase 1 has a planned build-out date of 2015. Phase 2 is to consist of a 4,500 square foot fast-food restaurant with a drive-thru window and has a projected build-out date of 2018.

DAVENPORT was retained to determine the potential traffic impacts of this development and to identify any transportation improvements that may be required to accommodate the impacts of both background traffic and new development traffic.

Based on trip generation equations published in Trip Generation (Institute of Transportation Engineers, 9th Edition), Phase 1 of this development has a trip generation potential of 1,419 daily net trips with 95 net trips in the AM peak and 119 net trips in the PM peak. At full build, the development has a trip generation potential of 2,547 daily net trips with 199 net trips in the AM peak and 192 net trips in the PM peak.

In conclusion, this study has determined the potential traffic impacts of this development and has identified transportation improvements that will be required to accommodate the impacts of the proposed development traffic. The aforementioned improvements should all be constructed in accordance with NCDOT's Policy on Street and Driveway Access to North Carolina Highways. Table C presents a summary of the level of service results for all analyzed conditions. Table D illustrates the recommendations related to this development. Figure A shows the recommended improvements for both phases.



**Table 9.2 - Level of Service Summary**

AM Peak	2014 Existing	2015 Future No Build	2015 Phase 1 Build	2015 Phase 1 Build with Improvements	2018 Future No Build	2018 Phase 2 Build	2018 Phase 2 Build with Improvements
US 17 at Hoover Road	C (22.2)	C (23.5)	C (31.4)		D (46.0)	E (67.3)	D (47.0)
US 17 at Site Access 1 (right-in / right-out)			D (26.3) EB Approach	D (25.2) EB Approach	D (29.6) EB Approach	E (39.1) EB Approach	
Hoover Rd at Site Access 2 (right-in only)			A (0.0)		A (0.0)	A (0.0)	
Hoover Rd at Site Access 3 / McDonald's Drive	B (14.6) NB Approach	B (14.9) NB Approach	C (19.8) SB Approach		C (22.3) SB Approach	D (33.4) SB Approach	D (30.8) SB Approach
PM Peak	2014 Existing	2015 Future No Build	2015 Phase 1 Build	2015 Phase 1 Build with Improvements	2018 Future No Build	2018 Phase 2 Build	2018 Phase 2 Build with Improvements
US 17 at Hoover Road	B (12.2)	B (13.1)	C (22.2)		C (32.1)	D (45.9)	C (30.1)
US 17 at Site Access 1 (right-in / right-out)			D (26.0) EB Approach	D (24.8) EB Approach	D (29.0) EB Approach	D (34.8) EB Approach	
Hoover Rd at Site Access 2 (right-in only)			A (0.0)		A (0.0)	A (0.0)	
Hoover Rd at Site Access 3 / McDonald's Drive	B (11.2) NB Approach	B (11.3) NB Approach	B (14.2) SB Approach		B (15.0) SB Approach	C (17.1) SB Approach	C (16.6) SB Approach
LOS (delay in seconds) Note for unsignalized conditions, LOS and delay indicates only minor street approach with longest delay							

**Table 9.2 - Recommended Improvement Summary**

<p>US 17 at Hoover Road</p>	<p><u>Phase 2:</u></p> <ul style="list-style-type: none"> <li>• Optimize the traffic signal timing splits for the new traffic volumes</li> </ul>
<p>US 17 at Site Access 1 (right-in / right-out)</p>	<p><u>Phase 1:</u></p> <ul style="list-style-type: none"> <li>• On the southbound approach along US 17, construct a right turn lane with a minimum of 100' of storage and appropriate taper</li> </ul>
<p>Hoover Rd at Site Access 2 (right-in only)</p>	<p><u>Phase 1:</u></p> <ul style="list-style-type: none"> <li>• On the westbound approach along Hoover Road, construct a right turn lane with a minimum of 50' of storage and appropriate taper</li> </ul>
<p>Hoover Rd at Site Access 3 / McDonald's Drive</p>	<p><u>Phase 2:</u></p> <ul style="list-style-type: none"> <li>• On the westbound approach along Hoover Road, construct a right turn lane with a minimum of 50' of storage and appropriate taper</li> </ul>