Peer Review of

TRAFFIC IMPACT ASSESSMENT

For Briar Chapel Development in Chatham County, North Carolina

Peer Review Report

Submitted to:

CHATHAM COUNTY, NORTH CAROLINA
Planning Department

Submitted by:

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.

August 24, 2004

Chatham County

PB 100 YEARS

TABLE OF CONTENTS

PEER REVIEW REPORT

Appendix A – Review of Intersection Analysis & Improvements

PEER REVIEW REPORT

I. Proposed Development

Briar Chapel is a large-scale planned residential community located in northern Chatham County west of Jordan Lake, half-way between Chapel Hill and Pittsboro town limits. This is a proposed development by Newland Communities located approximately six miles north of the Town of Pittsboro west of US Highway 15-501. The site is generally bounded by Fearrington Village and Andrews Store Road on the south and Mann's Chapel Road on the north and west. The proposed site is shown in Figure 1.

Briar Chapel is currently planned to have 2,389 dwelling units over a gross site area of 1,589 acres with net residential density of 6.64 dwelling units per acre. The residential communities are designed around five neighborhoods – West, North, Central, East and Traditional – to provide choices in housing types. In addition, Briar Chapel will have 0.522 million square feet of commercial space, one K-8 public school serving 900 students, one charter school serving 400 students, two community recreation centers, one County park, and several neighborhood parks. Full build-out is anticipated in 2014.

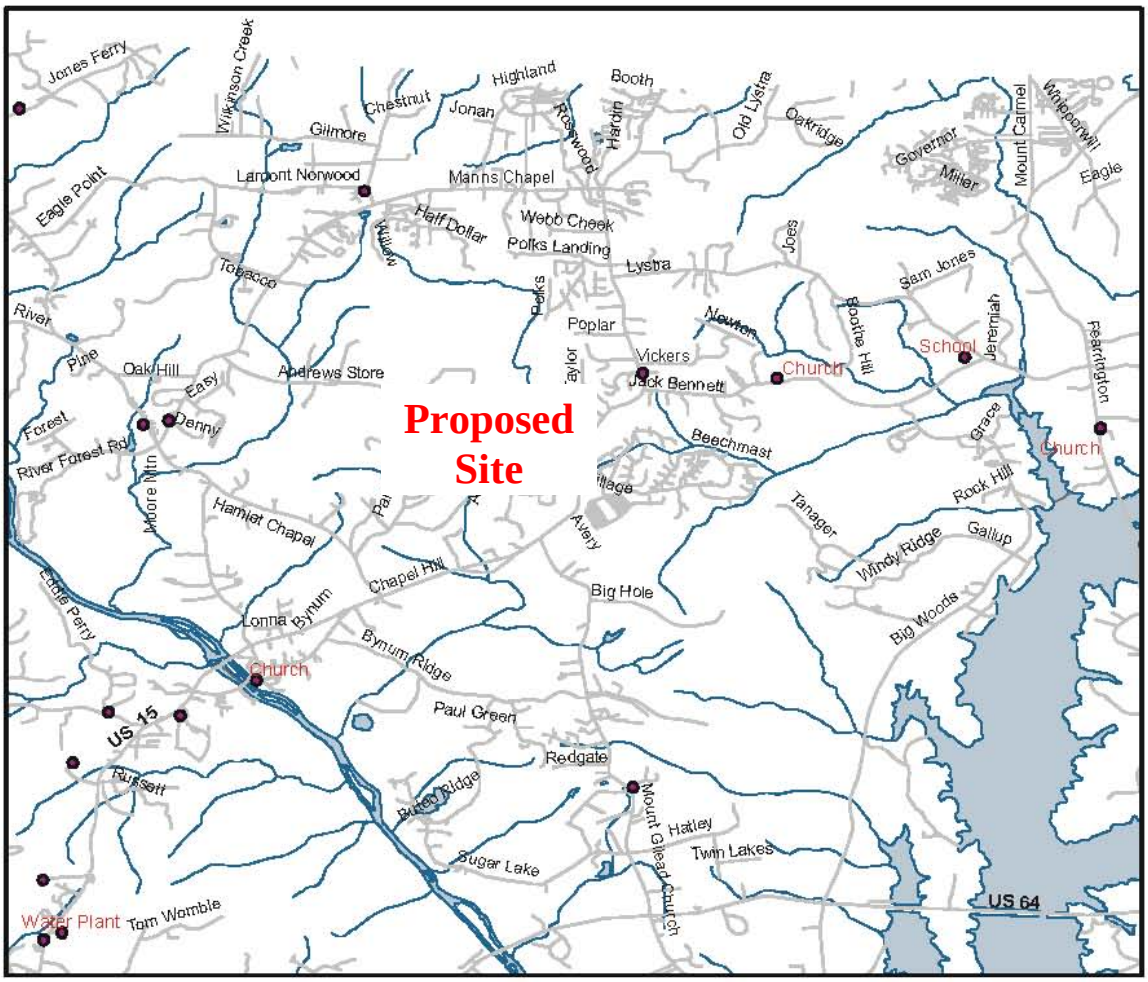
According to the permit application, the Briar Chapel development fulfills Chatham County's definition of a 'compact community.' Consequently, the development's approval process is guided by the requirements described in the County's Compact Communities Ordinance, which was adopted by the Chatham County Commissioners in early 2004.

II. Key TIA Assumptions

A Transportation Impact Assessment (TIA) report was prepared by Kimley Horn and Associates, Inc. of Raleigh, North Carolina, in June of 2004 on behalf of the developer's site planning firm The John R. McAdams Company of Durham, North Carolina.

The TIA performed capacity analyses at major street and site access intersection locations within the impact area of the proposed Briar Chapel development. The capacity analysis covered in the TIA included five signalized intersections and twelve unsignalized intersections, including the proposed site access roads. A majority of these intersections are along US Highway 15-501, starting from the intersection with Smith Level Road which connects to Carrboro, and ending with the intersection with Mount Gilead Church Road which connects to US Highway 64 near the Griffins Crossroads community. The TIA analysis was focused on US Highway 15-501 because it is a major north-south thoroughfare in Chatham County and will serve as a primary regional access route to the proposed development. Other off-site intersections analyzed in the TIA included the Lystra Road/Farrington Road intersection located east of the Governor's Club development, which serves as a 'back-road' gateway for travel to and from Durham, Research Triangle Park (RTP) and Cary via Farrington Road.

Figure 1



PROPOSED SITE

The TIA report shows that the proposed development is expected to generate 31,491 new daily vehicle trips, of which 3,317 vehicles trips would occur during the morning commute hour (AM peak) and 3,191 vehicle trips would occur during the afternoon rush hour (PM peak). These traffic figures are known as 'New External Trips' and are the basis for traffic impact analysis. These figures were calculated based on national standard trip rates provided in the Institute of Transportation Engineers (ITE) Trip Generation Manual (7th Edition). The computational steps first include estimating the total site-generated traffic and then applying reductions due to internal trips (i.e., trips that do not involve going out of the proposed development) and pass-by trips (i.e., trips already passing-by on the adjacent or nearby roads but now stopping at the site for business and commercial activities). The TIA shows that the total site-generated traffic, prior to any reductions, are 39,101 daily vehicle trips, 3,423 vehicle trips during AM peak, and 3,756 vehicle trips during PM peak. Using ITE trip generation reductions, the daily vehicle trips are reduced by 7,610 vehicles, AM peak hour trips by 106 vehicles, and PM peak hour trips by 565 vehicles.

The TIA report (See Figure 4, TIA Report) assumed that a significant majority, 63 percent, of Briar Chapel's peak hour traffic would use US Highway 15-501 to travel north and south and reach such destinations as Chapel Hill, Durham, RTP and Cary. The TIA also assumed that 11 percent of site traffic would use the Farrington Road/Lystra Road gateway. Out of the remaining 26 percent, the TIA assumed that 7 percent of site traffic would use Smith Level Road for Carrboro destinations, 7 percent would use Hamletts Chapel Road and River Forrest Road for western Chatham County destinations, 6 percent would use Jones Ferry Road as an alternate route to Carrboro, and 4 percent would use the Mount Gilead Church Road to access US Highway 64 east of Pittsboro.

The TIA analysis is based on five access roads to the site, two from the south on Andrews Store Road, two from the east on US Highway 15-501, and one from the north on Mann's Chapel Road.

III. Key TIA Findings

The Briar Chapel TIA analysis shows Level of Service (LOS)[1] deficiencies at several intersections in the study area under future (2014) peak hour travel conditions when approved and site traffic are added to future background traffic. These are documented in Appendix A by each intersection analyzed in the TIA.

In addition to current TIP improvements along US Highway 15-501 (where the roadway is widened to a four-lane median divided cross-section from the proposed Pittsboro

[1] LOS is defined by Highway Capacity Manual (HCM) and is a qualitative assessment of the effect of prevailing traffic conditions such as speed, volume, roadway configuration, and signal control type and timing. LOS ratings A, B and C are normally considered desirable and LOS D is considered acceptable. LOS E and F are undesirable traffic conditions, typically associated with long traffic delays.

Bypass to the Chapel Hill Bypass and new signals are installed at Lystra Road and Jack Benett Road along with a coordinated signal system), the Briar Chapel TIA proposed intersection-specific improvements to mitigate traffic impacts at the following existing intersections:

- US Highway 15-501/Mann's Chapel Road
- US Highway 15-501/Vickers Road
- US Highway 15-501/Taylor Road
- US Highway 15-501/Andrews Store Road
- US Highway 15-501/Mount Gilead Church Road
- Mann's Chapel Road/Andrews Store Road
- Hamletts Chapel Road/River Forrest Road
- Lystra Road/Jack Bennett Road
- Lystra Road/Farrington Road

The proposed improvements primarily involved addition of turn lanes and/or traffic signals. The details of the proposed intersection-specific improvements are presented in Appendix A.

IV. Peer-Review Comments and Recommendations

Chatham County retained Parsons Brinckerhoff of Raleigh, North Carolina to conduct a 30-day Peer-Review of the Briar Chapel TIA as per the requirements stipulated in the Chatham County's Compact Communities Ordinance. Below is a summary of our peer-review comments and recommendations. The detailed technical review comments on the TIA report's intersection capacity analyses are provided in Appendix A.

Overall the TIA report presents a traditional approach of preparing TIAs in North Carolina. It followed a standard process that is used for most of the regular size developments. However, given the large scale nature of the Briar Chapel development and the rural small town character of Chatham County, the TIA should analyze the broader impacts of increased daily traffic on many of the area's two-lane roadway system and consider additional mitigations to make the transportation system safe and sensitive to demands of all transportation users including pedestrians, bicyclists, bus riders, carpoolers, commuters, employees, shoppers, visitors, emergency services, and goods delivery personnel. Consequently, additional improvements were suggested based on this peer-review.

IV.A *Trip Generation and Distribution*

Based on review of TIA calculation sheets, the overall trip reduction assumptions used in the TIA due to internal capture and pass-by trips appear to be optimistic for daily and PM peak hour traffic conditions. The TIA findings that 15 percent of site's PM peak hour trips or 20 percent of daily trips would be internal and pass-by trips are considered high

due to the low percentage of non-residential land uses proposed for the development. However, the underlying assumptions about internal-capture and pass-by trips could be viewed reasonable provided they are supported by local data or experience.[2]

The TIA-assumed peak hour trip distribution for western Chatham County destinations (7 percent) using Hamletts Chapel Road and River Forrest Road appear to be high and usage of the Mount Gilead Church Road (4 percent) appear to be low. This conclusion is based on a review of the Triangle Regional Model (TRM)'s projected traffic distribution. TRM shows that future peak period traffic would be heavily oriented towards Chapel Hill, Carrboro, RTP, and Cary. Overall, the TIA-assumed trip distribution pattern looks reasonable.

IV.B *Intersection Analysis*

The TIA did a good faith effort in evaluating the impacts of the site on study area intersections. However, the TIA identified intersection improvements based on Synchro LOS results. While it is acceptable to use Synchro LOS in traffic impact analysis, HCM LOS methodology is a conservative approach to traffic analysis. In congested traffic conditions, the HCM method generally provides more conservative estimates on LOS. The TIA analysis (Synchro) considered right-turn on red/overlap phasing[3] to improve LOS at several intersections, which may not be feasible at locations with heavy pedestrian traffic. Also the TIA analysis (Synchro) for some of the intersections provided implicit consideration to signal operation due to the likely presence of pedestrians. Consequently, the LOS results at some congested intersections could be optimistic.

Based on this peer-review, further improvements are suggested at the following intersections to avoid long delays and improve traffic safety:

- US Highway 15-501/Mann's Chapel Road
- US Highway 15-501/Taylor Road
- US Highway 15-501/Andrews Store Road
- US Highway 15-501/Mount Gilead Church Road
- Hamletts Chapel Road/Mann's Chapel Road/River Forrest Road
- Lystra Road/Jack Bennett Road
- Mann's Chapel Road/North Access Road
- Andrews Store Road/South Access Road

The specific improvements at these intersections are listed in Appendix A. The suggested intersection improvements should be further investigated and coordinated with NCDOT.

[2] The TIA preparer (Kimley-Horn) indicated during a meeting on August 13, 2004 that NCDOT has reviewed and supported the internal capture rates used in the TIA and Chatham County has deferred the issue to NCDOT.

[3] Vehicles are directed to make right turns from different approaches with green directional arrows.

IV.C *Roadways*

The TIA did not analyze the capacity improvement needs along specific roadway segments. The TIA only evaluated intersection improvement needs.

Given the scale of the development and daily traffic demands exceeding 30,000 vehicles, it is plausible that some two-lane roadways would need to be widened. The current site plan shows major activities and attraction points along the Andrews Store Road, including two schools and a village center. Therefore, consideration should be given in providing a 3-lane or 4-lane cross-section on Andrews Store Road from southern access driveways to Highway 15-501, in order to provide bicycle lanes, safe turning lanes and additional traffic lane-capacity. The specific needs for these road segment improvements should be investigated and coordinated with NCDOT.

Additional right-of-way may be needed along Andrews Store Road as it currently has only 60 feet of right-of-way.

The site plan shows several driveways along US Highway 15-501 in addition to the two full-movement driveways (Taylor Road and Vickers Road). These additional access points along Highway 15-501 must have adequate spacing and conform to the NCDOT's access management standards. These driveways typically can only have partial movements allowed (e.g., right-in/right-out).

IV.D *Street Connections*

The Compact Communities Ordinance of Chatham County requires street interconnectivity. The proposed development should show future street connections and provide appropriate stub outs in the site plan to the following roads in order to preserve opportunities for interconnectivity:

- Half Dollar Road (Local gravel road with 60 ft. right-of-way connecting to Dollar Road. Dollar Road is a paved local street with connection to Mann's Chapel Road to the north of the site.)
- Persimmon Hills Road (Local street west of the site with 50 ft. right-of-way with access to Mann's Chapel Road)
- Creek's Edge Road (Local street east of the site with 60 ft. right-of-way with access to US Highway 15-501)

These street connections would need to be provided based on local community interests and with appropriate traffic calming features to minimize the potential for any 'cut-through' traffic.

IV.E *Pedestrian and Bicycle Facilities*

The Compact Communities Ordinance of Chatham County also requires interconnectivity through a network of pedestrian and bicycle pathways. The proposed development plan should show, with higher level of details and clarity than what have been presented in the Greenway Plan, sidewalks, walking and biking pathways within and around the site with appropriate connections to neighborhood parks, County park, schools, village center, village market, and town center.

The needs for these facilities have not been discussed in the TIA as they were covered in the Greenway Plan. The Greenway Plan should be further reviewed from traffic operations perspective during the site plan approval process or when detailed plans are available.

IV.F *Traffic Calming*

In order to promote safety within the development, the site plan should incorporate traffic calming features on site streets, especially in and around the neighborhood parks, community centers and schools. The needs for traffic calming are not addressed in the TIA, but should be considered as part of the site plan approval process when detailed plans are available.

IV.G *Transit*

The Compact Communities Ordinance of Chatham County also requires provision of transit-oriented town or village centers. The proposed development should work with the Triangle Transit Authority and other transit providers in the neighboring area such as Chapel Hill Transit to identify potential locations of future transit stops in and around the development. Consideration should be given in defining a park-and-ride lot for transit users around the town center, or village center, or village market. Currently, the transit needs are discussed in the TIA in general terms. These general concepts for transit improvements should be further developed and integrated into the site plan during the site plan approval process.

IV.H *Traffic Signal Upgrades*

It is recommended that signal timing plans are updated along US Highway 15-501 to keep the newly installed signal system tuned-in to changes in study area traffic patterns. As new signals are installed along the corridor, consideration should be given for signal interconnects, if they are closely spaced (less than 1000 ft). In addition, traffic signals

would need to be upgraded to incorporate any required pedestrian signal heads. The developer should work with NCDOT to determine specific improvement needs including signal warrant study at several locations (see Figure 9, TIA Report).

IV.I *Traffic Safety and Circulation near Schools*

The TIA analysis does not address traffic safety and circulation issues around the two new schools proposed within the Traditional neighborhood of the Briar Chapel development because the school designs are still at conceptual-level. When the design of the schools has been advanced, a more detailed review is recommended to ensure adequate on-site queuing space, parking, and bus/auto pick-up/drop-off zones. Review at engineering level of detail, to ensure proper turning radii, sight distance, and aisle widths, is also recommended.

IV.J *Phasing of Improvements*

The Compact Communities Ordinance specifies the need to complete certain percent of roadways and non-motorized facilities before final plat approvals.

The Briar Chapel development should complete 33 percent of the required street improvements (as described in Appendix A) prior to 50 percent build-out of the site, and 100 percent of the required street improvements prior to 90 percent build-out of the site.

APPENDIX A

Review of Intersection Analysis & Improvements

Chatham County

Introduction

A peer review was performed on the transportation impact analysis (TIA) prepared for the proposed Briar Chapel Development. The proposed Briar Chapel Development, located west of Highway 15-501 located between SR 1532 (Mann's Chapel Road) and SR 1528 (Andrews Store Road), is estimated to generate 3,317 vehicle trips during the AM peak hour and 3,191 vehicle trips during the PM peak hour. The 24-hour Daily Traffic is projected to be 31,491 vehicles. (Note: The TIA initially reported daily trips of 31,226 vehicles. The daily trip figure was revised by the TIA preparer during the TIA peer-review.) The expected land uses are 1,877 single family homes, 432 town homes, 80 apartments, 200,000 square feet of retail space, 270,000 square feet of office space, 52,000 square feet of specialty retail space, a 900-student K-8 school, a 400-student charter school, and a county park. A TIA report, prepared by Kimley-Horn and Associates, Inc. dated June 2004, was submitted to the County by the applicant Newland Communities**.**

Study Area

The TIA study area includes analysis of nineteen (19) intersections in the vicinity of the proposed site. These intersections are:

Signalized

- US Highway 15-501 / Smith Level Road;
- US Highway 15-501 / SR 1724 (Old Lystra Road);
- US Highway 15-501 / SR 1532 (Mann's Chapel Road);
- US Highway 15-501 / Village Way; and
- SR 1721 (Lystra Road) / SR 1008 (Farrington Road).

Unsignalized

- US Highway 15-501 / SR 1721 (Lystra Road);
- US Highway 15-501 / SR 1717 (Jack Bennett Road);
- US Highway 15-501 / SR 1529 (Taylor Road);
- US Highway 15-501 / SR 1528 (Andrews Store Road);
- US Highway 15-501 / Mt. Gilead Church Road;
- SR 1532 (Mann's Chapel Road) / Poythress Road;
- SR 1532 (Mann's Chapel Road) / SR 1526 (Andrews Store Road);
- Hamletts Chapel Road / SR 1532 (Mann's Chapel Road) / River Forrest Road;
- SR 1540 (Jones Ferry Road) / Damascus Church Road;
- SR 1721 (Lystra Road) / SR 1717 (Jack Bennett Road);
- US Highway 15-501 / SR 1719 (Vickers Road) (East Access Road);
- SR 1532 (Mann's Chapel Road) / North Access Road;
- SR 1526 (Andrews Store Road) / South Access Road; and
- SR 1526 (Andrews Store Road) / Second South Access Road.

Approved Development

Approved developments are defined as approved, but not yet constructed, projects within the vicinity of the subject project. Traffic and roadway improvements associated with the following approved developments were included in the Briar Chapel TIA analysis:

- Fearrington Village development (east of US Highway 15-501 at the US Highway 15-501 / Village Way intersection),
- Chatham Downs development (southeast quadrant of US Highway 15-501 / SR 1721 (Lystra Road) intersection), and
- The Homestead development (south of SR 1717 (Jack Bennett Road) on Bigwoods Road).

TIP Roadway Improvements

The current TIP project in the study area includes:

- NCDOT TIP #R-942 - the widening of US Highway 15-501 to multi-lanes from the proposed Pittsboro Bypass (R-2219) to the Chapel Hill Bypass (estimated construction date FY 2004).

The TIA analysis assumed the roadway improvements that are part of this NCDOT TIP project (R-942). In addition, the TIA assumed roadway improvements along Mann's Chapel Road that are part of a North Carolina Moving Ahead (NCMA) project in Chatham County.

Trip Generation

Overall, the gross trip generation estimates for the development look reasonable. However, the following comments should be noted in connection to predicting the number of net new external vehicle trips due to the proposed development.

School Trips

NCDOT Municipal & School Transportation Assistance has a spreadsheet to calculate number of trips for schools in North Carolina based on data obtained from public and private schools in the state. Unless otherwise instructed by NCDOT, this spreadsheet should be considered for estimating the trips generated by the schools since the *ITE Trip Generation 7th Edition* rates are lower than the NCDOT spreadsheet.

Internal Capture

The 15% internal capture for the daily traffic and 10% internal capture for the PM peak hour traffic appear high for this development due to the low percentage of non-residential land uses proposed for the development. While ITE calculations may support these internal capture rates, the TIA should document in the report the basis for these assumptions and supporting local data or experience. ITE recognizes the importance of using local data as ITE's internal capture rates were not derived from a sufficiently large sample.

Pass-by Trips

The TIA assumes 20% pass-by trips for the Southern Village Retail portion of the development. This is consistent with the *ITE Trip Generation Handbook* (October 1998). According to the Handbook, for a development with this size of retail, approximately 32% of the trips are pass-by trips. The 20% that is used in the TIA reflects a conservative estimate to consider local traffic conditions.

Traffic Impact Analysis

Three scenarios were analyzed: existing traffic (2004), 2014 Background + committed improvements, and 2014 Build-out + recommended improvements.

It should be noted here that for each intersection, only the year of full build-out was included within this summary memo, unless otherwise noted.

It should be noted that the TIA used Synchro LOS for analyzing signalized intersections.

US Highway 15-501 / Smith Level Road (signalized)

The following table summarizes the Levels of Service for this signalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**A**	**C**

In order to improve operations along US Highway 15-501, the following improvements are committed by NCDOT TIP project R-942 (US Highway 15-501 widening) and may be required by this development at this intersection:

- An additional northbound left-turn lane on US Highway 15-501;
- An additional northbound through lane on US Highway 15-501;
- An additional southbound through lane on US Highway 15-501;
- An southbound right-turn lane on US Highway 15-501; and
- Dual eastbound right-turn lanes on Smith Level Road.

After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Background + committed improvements	**A**	**B**
2014 Buildout + recommended improvements	**B**	**C**

No additional improvements are required / recommended at this location.

US Highway 15-501 / SR 1724 (Old Lystra Road) (signalized)

The following table summarizes the Levels of Service for this signalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**D**	**B**

In order to improve operations along US Highway 15-501, the following improvements are committed by NCDOT TIP project R-942 (US Highway 15-501 widening) and may be required by this development at this intersection:

- A northbound left-turn lane on US Highway 15-501;
- An additional northbound through lane on US Highway 15-501;
- A northbound right-turn lane on US Highway 15-501;
- An additional southbound through lane on US Highway 15-501; and
- A westbound right-turn lane on SR 1724 (Old Lystra Road).

After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Background + committed improvements	**A**	**B**
2014 Buildout + recommended improvements	**C**	**C**

No additional improvements are required / recommended at this location.

US Highway 15-501 / SR 1532 (Mann's Chapel Road) (signalized)

The following table summarizes the Levels of Service for this signalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**D**	**B**

In order to improve operations along US Highway 15-501, the following improvements are committed by NCDOT TIP project R-942 (US Highway 15-501 widening) and may be required by this development at this intersection:

- An additional northbound through lane on US Highway 15-501;
- An additional southbound through lane on US Highway 15-501;
- An additional eastbound left-turn lane on SR 1532 (Mann's Chapel Road);
- A eastbound right-turn lane on SR 1532 (Mann's Chapel Road); and
- A westbound left-turn lane on SR 1532 (Mann's Chapel Road). After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Background + committed improvements	**C**	**C**

The following improvements are proposed and required of this development at this signalized intersection:

- Restripe the northbound right-turn lane to a through / right-turn lane on US Highway 15-501;
- An additional northbound departure lane on US Highway 15-501;
- A third southbound though lane on US Highway 15-501;
- An additional southbound departure lane on US Highway 15-501; and
- Extend the dual eastbound left-turn lanes to provide 500 feet of storage on each on SR 1532 (Mann's Chapel Road).

After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Buildout + recommended improvements	**C**	**C**

The additional northbound and southbound through lanes on US Highway 15-501 will only increase capacity at the intersection if they have adequate lengths and continuity. Without adequate lengths and continuity, the lane utilization is likely to be lower than is shown in Synchro since the lane will drop before reaching either SR 1724 (Old Lystra Road) to the north, or SR 1721 (Lystra Road) to the south of SR 1532 (Mann's Chapel Road). If this lane is removed from the analysis, the LOS for the AM is closer to LOS F due to the high volume of through vehicles traveling along US Highway 15-501.

Further evaluations may be needed to explore the effects of adjacent driveways on this intersection and the feasibility of the additional through lanes.

US Highway 15-501 / SR 1721 (Lystra Road) (unsignalized)

The following table summarizes the Levels of Service for the minor approach left turns at this unsignalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**E**	**C**

In order to improve operations along US Highway 15-501, the following improvements are committed by NCDOT TIP project R-942 (US Highway 15-501 widening) and may be required by this development at this intersection:

- A signal;
- A northbound left-turn lane on US Highway 15-501;
- An additional northbound through lane on US Highway 15-501;
- A northbound right-turn lane on US Highway 15-501;
- A southbound left-turn lane on US Highway 15-501;
- An additional southbound through lane on US Highway 15-501; and
- A westbound right-turn lane on SR 1721 (Lystra Road).

After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Background + committed improvements	**A**	**A**
2014 Buildout + recommended improvements	**C**	**B**

No additional improvements are required / recommended at this location.

US Highway 15-501 / SR 1717 (Jack Bennett Road) (unsignalized)

The following table summarizes the Levels of Service for the minor approach left turns at this unsignalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS [Delay (sec)]
Existing (2004)	**E**	**F [141.5]**

In order to improve operations along US Highway 15-501, the following improvements are committed by NCDOT TIP project R-942 (US Highway 15-501 widening) and may be required by this development at this intersection:

- A signal;
- A northbound left-turn lane on US Highway 15-501;
- An additional northbound through lane on US Highway 15-501;
- A northbound right-turn lane on US Highway 15-501;
- A southbound left-turn lane on US Highway 15-501;
- An additional southbound through lane on US Highway 15-501;
- A southbound right-turn lane on US Highway 15-501; and
- A westbound right-turn lane on SR 1717 (Jack Bennett Road)

After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Background + committed improvements	**B**	**A**
2014 Buildout + recommended improvements	**B**	**B**

No additional improvements are required / recommended at this location.

US Highway 15-501 / SR 1529 (Taylor Road) (unsignalized)

The following table summarizes the Levels of Service for the minor approach left turns at this unsignalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**C**	**C**

In order to improve operations along US Highway 15-501, the following improvements are committed by NCDOT TIP project R-942 (US Highway 15-501 widening) and may be required by this development at this intersection:

- A northbound left-turn lane on US Highway 15-501;
- A northbound through / right-turn lane on US Highway 15-501;
- A southbound left-turn lane on US Highway 15-501;
- An additional southbound through lane on US Highway 15-501; and
- A southbound right-turn lane on US Highway 15-501.

After these improvements are implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Background + committed improvements	**C**	**E**

The following improvements are proposed and required of this development at this unsignalized intersection:

- A signal;
- Dual eastbound left-turn lanes on SR 1529 (Taylor Road);
- Restripe the eastbound approach to a through / right-turn lane on SR 1529 (Taylor Road);
- A westbound left-turn lane on the commercial entrance; and
- A westbound through / right-turn lane on the commercial entrance.

After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Buildout + recommended improvements	**A**	**C**

The following additional improvement is required at this location for safety concerns and for gradual turnout and deceleration off the high-speed through traffic lanes along US Highway 15-501:

- A northbound right-turn lane on US Highway 15-501.

US Highway 15-501 / SR 1528 (Andrews Store Road) (unsignalized)

The following table summarizes the Levels of Service for the minor approach left turns at this unsignalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**D**	**E**

In order to improve operations along US Highway 15-501, the following improvements are committed by NCDOT TIP project R-942 (US Highway 15-501 widening) and may be required by this development at this intersection:

- A northbound left-turn lane on US Highway 15-501;
- A northbound through / right-turn lane on US Highway 15-501;
- A southbound left-turn lane on US Highway 15-501;
- An additional southbound through lane on US Highway 15-501; and
- A southbound right-turn lane on US Highway 15-501.

After these improvements are implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS [Delay (sec)]	PM LOS [Delay (sec)]
2014 Background + committed improvements	**F [63.6]**	**F [305.2]**

The following improvements are proposed and required of this development at this unsignalized intersection:

- A signal;
- A eastbound left-turn lane on SR 1528 (Andrews Store Road);
- A westbound left-turn lane on the commercial entrance; and
- A westbound through / right-turn lane on the commercial entrance.

After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS [Delay (sec)]	PM LOS [Delay (sec)]
2014 Buildout + recommended improvements	**C**	**C**

The following additional improvement is required at this location for safety concerns and for gradual turnout and deceleration off the high-speed through traffic lanes along US Highway 15-501:

- A northbound right-turn lane on US Highway 15-501.

US Highway 15-501 / Village Way (signalized)

The following table summarizes the Levels of Service for this signalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**A**	**A**

In order to improve operations along US Highway 15-501, the following improvements are committed by NCDOT TIP project R-942 (US Highway 15-501 widening) and may be required by this development at this intersection:

- A northbound left-turn lane on US Highway 15-501;
- An additional northbound through lane on US Highway 15-501;
- A northbound right-turn lane on US Highway 15-501;
- A southbound left-turn lane on US Highway 15-501;
- An additional southbound through lane on US Highway 15-501;
- An southbound right-turn lane on US Highway 15-501;
- A eastbound left-turn lane on SR 1527 (Morris Road);
- A eastbound through / right-turn lane on SR 1527 (Morris Road); and
- A westbound through / right-turn lane on Village Road.

After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Background + committed improvements	**B**	**B**
2014 Buildout + recommended improvements	**C**	**B**

No additional improvements are required / recommended at this location.

US Highway 15-501 / Mt. Gilead Church Road (unsignalized)

The following table summarizes the Levels of Service for the minor approach left turns at this unsignalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**D**	**B**

In order to improve operations along US Highway 15-501, the following improvements are committed by NCDOT TIP project R-942 (US Highway 15-501 widening) and may be required by this development at this intersection:

- A northbound left-turn lane on US Highway 15-501;
- An additional northbound through lane on US Highway 15-501;
- A southbound left-turn lane on US Highway 15-501; and
- An additional southbound through lane on US Highway 15-501.

After these improvements are implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS [Delay (sec)]	PM LOS
2014 Background + committed improvements	**F [52.2]**	**C**

The following improvements are proposed and required of this development at this unsignalized intersection:

- A westbound right-turn lane on Mt. Gilead Church Road.

After this improvement is implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS [Delay (sec)]	PM LOS
2014 Buildout + recommended improvements	**F [110.1]**	**E**

Although delays may be acceptable on minor approaches at unsignalized intersections, this intersection should be monitored for future signalization given that this serves as a southern gateway to and from the US Highway 64 corridor.

SR 1532 (Mann's Chapel Road) / Poythress Road (unsignalized)

The following table summarizes the Levels of Service for the minor approach left turns at this unsignalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**B**	**B**

In order to improve operations in the area, the following improvement is committed by NCDOT and may be required by this development at this intersection:

- An eastbound left-turn lane on SR 1532 (Mann's Chapel Road).

After this improvement is implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Background + committed improvements	**B**	**B**
2014 Build-out + recommended improvements	**C**	**C**

No additional improvements are required / recommended at this location.

SR 1532 (Mann's Chapel Road) / SR 1526 (Andrews Store Road) (unsignalized)

The following table summarizes the Levels of Service for the minor approach left turns at this unsignalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**B**	**B**

In order to improve operations in the area, the following improvement is committed by NCDOT and may be required by this development at this intersection:

- A northbound right-turn taper on SR 1532 (Mann's Chapel Road).

After this improvement is implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Background + committed improvements	**B**	**B**

The following improvements are proposed and required of this development at this unsignalized intersection:

- Extend the northbound right-turn taper to provide 150 feet of storage on SR 1532 (Mann's Chapel Road).

After this improvement is implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Build-out + recommended improvements	**C**	**B**

No additional improvements are required / recommended at this location.

Hamletts Chapel Road / SR 1532 (Mann's Chapel Road) / River Forrest Road (unsignalized)

The following table summarizes the Levels of Service for the minor approach left turns at this unsignalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**C**	**B**
2014 Background + committed improvements	**E**	**B**

The following improvements are proposed and required of this development at this unsignalized intersection:

- Modify the intersection by putting stop signs on all four approaches to create an all-way stop control intersection.

After this improvement is implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Buildout + recommended improvements	**B**	**A**

A four-way stop control at this location should only be considered if the traffic volume pattern meets the standards defined in the latest Manual on Uniform Traffic Control Devices (MUTCD). If the MUTCD standards are not met, other reasonable roadway improvements should be considered at this location.

SR 1540 (Jones Ferry Road) / Damascus Church Road (unsignalized)

The following table summarizes the Levels of Service for the minor approach left turns at this unsignalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS
Existing (2004)	**B**	**B**
2014 Background + committed improvements	**B**	**B**
2014 Buildout + recommended improvements	**C**	**C**

No additional improvements are required / recommended at this location.

SR 1721 (Lystra Road) / SR 1717 (Jack Bennett Road) (unsignalized)

The following table summarizes the Levels of Service for the minor approach left turns at this unsignalized intersection with the existing lane geometry:

Scenario	AM LOS [Delay (sec)]	PM LOS
Existing (2004)	**C**	**B**
2014 Background + committed improvements	**F [447.0]**	**D**

The following improvements are proposed and required of this development at this unsignalized intersection:

- A northbound right-turn lane on SR 1717 (Jack Bennett Road); and
- Monitor the intersection to see if it meets MUTCD signal warrants in the future.

After these improvements are implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS [Delay (sec)]	PM LOS
2014 Buildout + recommended improvements	**F [223.4]**	**D**

Although delays may be acceptable for minor approaches at unsignalized intersections, further improvements including future signalization should be considered given both would be heavily traveled roadways in the future.

SR 1721 (Lystra Road) / SR 1008 (Farrington Road) (signalized)

The following table summarizes the Levels of Service for this signalized intersection with the existing lane geometry:

Scenario	AM LOS	PM LOS [Delay (sec)]
Existing (2004)	**B**	**B**
2014 Background + committed improvements	**D**	**F [223.4]**

The following improvements are proposed and required of this development at this signalized intersection:

- A southbound right-turn lane on SR 1008 (Farrington Road); and
- Modify the signal phasing to provide a protected left-turn phase for eastbound left-turns off of SR 1721 (Lystra Road).

After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Buildout + recommended improvements	**C**	**B**

No additional improvements are required / recommended at this location.

US Highway 15-501 / SR 1719 (Vickers Road) (East Access Road) (unsignalized)

In order to improve operations along US Highway 15-501, the following improvements are committed by NCDOT TIP project R-942 (US Highway 15-501 widening) and may be required by this development at this intersection:

- A northbound left-turn lane on US Highway 15-501;
- An additional northbound through lane on US Highway 15-501;
- A northbound right-turn lane on US Highway 15-501;
- A southbound left-turn lane on US Highway 15-501;
- An additional southbound through lane on US Highway 15-501; and
- A southbound right-turn lane on US Highway 15-501.

After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS [Delay (sec)]	PM LOS [Delay (sec)]
2014 Background + committed improvements	**F [95.9]**	**F [451.7]**

The following improvements are proposed and required of this development at this unsignalized intersection:

- A signal;
- A eastbound left-turn lane on East Access Road; and
- Restripe the eastbound approach to provide a through / right-turn lane on East Access Road.

After these improvements are implemented, analysis indicates that the Level of Service for this intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Buildout + recommended improvements	**C**	**C**

No additional improvements are required / recommended at this location.

SR 1532 (Mann's Chapel Road) / North Access Road (unsignalized)

In order to improve operations in the area, the following improvements are committed by NCDOT and may be required by this development at this intersection:

- A eastbound left-turn lane on SR 1532 (Mann's Chapel Road); and
- A westbound left-turn lane on SR 1532 (Mann's Chapel Road).

The following improvements are proposed and required of this development at this unsignalized intersection:

- Monitor the intersection to see if it meets MUTCD signal warrants in the future;
- A northbound left-turn / through lane on North Access Road;
- A northbound right-turn lane on North Access Road; and
- Restripe the southbound approach to provide a left-turn / through / right-turn lane on SR 1605.

After these improvements are implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS [Delay (sec)]	PM LOS [Delay (sec)]
2014 Buildout + recommended improvements	**F [178.5]**	**F [86.5]**

Additional design improvements should be considered at this location to avoid potential safety issues.

SR 1526 (Andrews Store Road) / South Access Road (unsignalized)

The following improvements are proposed and required of this development at this unsignalized intersection:

- Monitor the intersection to see if it meets MUTCD signal warrants in the future;
- A eastbound left-turn lane on SR 1526 (Andrews Store Road);
- A westbound right-turn lane on SR 1526 (Andrews Store Road);
- A southbound left-turn lane on South Access Road;
- A southbound through / right-turn lane on South Access Road; and
- Restripe the northbound approach to provide a left-turn / through / right-turn lane on Parker Herndon Road.

After these improvements are implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS [Delay (sec)]	PM LOS
2014 Buildout + recommended improvements	**F [76.1]**	**C**

Additional design improvements should be considered at this location to avoid potential safety issues.

SR 1526 (Andrews Store Road) / Second South Access Road (unsignalized)

The following improvements are proposed and required of this development at this unsignalized intersection:

- A eastbound left-turn lane on SR 1526 (Andrews Store Road);
- A westbound right-turn lane on SR 1526 (Andrews Store Road);
- A southbound left-turn lane on Second South Access Road; and
- A southbound right-turn lane on Second South Access Road.

After these improvements are implemented, analysis indicates that the minor street left turn Level of Service for this unsignalized intersection is as follows:

Scenario	AM LOS	PM LOS
2014 Buildout + recommended improvements	**C**	**B**

No additional improvements are required / recommended at this location.

Summary of TIA Required Improvements

General

1. The Developer is responsible for traffic signal phasing revisions in the study area required due to the added traffic to the network by the proposed development. This includes all intersections evaluated in the TIA and additional intersections identified by NCDOT.
2. The improvements that were needed to fix current or future background traffic conditions were considered as 'required' by the peer-reviewer.

US Highway 15-501 / SR 1532 (Mann's Chapel Road)

1. Re-striping the northbound right-turn lane to a through / right-turn lane on US Highway 15-501.
2. Construction of an additional exclusive northbound departure lane on US Highway 15-501.
3. Construction of a third exclusive southbound through lane on US Highway 15-501.
4. Construction of an additional exclusive southbound departure lane on US Highway 15-501.
5. Extension of the dual exclusive eastbound left-turn lanes to provide 500 feet of storage each on SR 1532 (Mann's Chapel Road).

US Highway 15-501 / SR 1529 (Taylor Road)

1. Installation of a signal when warranted.
2. Construction of dual exclusive eastbound left-turn lanes on SR 1529 (Taylor Road).
3. Re-striping the eastbound approach to a through / right-turn lane on SR 1529 (Taylor Road).
4. Construction of an exclusive westbound left-turn lane on the commercial entrance.

5. Construction of a westbound through / right-turn lane on the commercial entrance.

US Highway 15-501 / SR 1528 (Andrews Store Road)

1. Installation of a signal when warranted.
2. Construction of an exclusive eastbound left-turn lane on SR 1528 (Andrews Store Road).
3. Construction of an exclusive westbound left-turn lane on the commercial entrance.
4. Construction of a westbound through / right-turn lane on the commercial entrance.

US Highway 15-501 / Mt. Gilead Church Road

1. Construction of an exclusive westbound right-turn lane on Mount Gilead Church Road.

SR 1532 (Mann's Chapel Road) / SR 1526 (Andrews Store Road)

1. Extension of the exclusive northbound right-turn lane to provide 150 feet of storage on SR 1532 (Mann's Chapel Road).

Hamletts Chapel Road / SR 1532 (Mann's Chapel Road) / River Forrest Road

1. Modification of the intersection to provide stop signs on all four approaches for an all-way stop control intersection.

SR 1721 (Lystra Road) / SR 1717 (Jack Bennett Road)

1. Construction of an exclusive northbound right-turn lane on SR 1717 (Jack Bennett Road).
2. Monitoring of the intersection to see if it meets MUTCD signal warrants in the future.

SR 1721 (Lystra Road) / SR 1008 (Farrington Road)

1. Construction of an exclusive southbound right-turn lane on SR 1008 (Farrington Road).
2. Modification of the signal to provide a protected left-turn phase for the eastbound left turns off of SR 1721 (Lystra Road).

US Highway 15-501 / SR 1719 (Vickers Road) (East Access Road)

1. Installation of a signal when warranted.
2. Construction of an exclusive eastbound left-turn lane on East Access Road.
3. Re-striping of the eastbound approach to provide a through / right-turn lane on East Access Road.

SR 1532 (Mann's Chapel Road) / North Access Road

1. Installation of a signal when warranted.
2. Construction of a northbound left-turn / through lane on North Access Road.
3. Construction of an exclusive northbound right-turn lane on North Access Road.
4. Re-striping the southbound approach for a left-turn / through / right-turn lane on SR 1605.

SR 1526 (Andrews Store Road) / South Access Road

1. Installation of a signal when warranted.

2. Construction of an exclusive eastbound left-turn lane on SR 1526 (Andrews Store Road).
3. Construction of an exclusive westbound right-turn lane on SR 1526 (Andrews Store Road).
4. Construction of an exclusive southbound left-turn lane on South Access Road.
5. Construction of a southbound through /right-turn lane on South Access Road.
6. Re-striping the northbound approach to provide a left-turn / through / right-turn lane on Parker Herndon Road.

SR 1526 (Andrews Store Road) / Second South Access Road

1. Construction of an exclusive eastbound left-turn lane on SR 1526 (Andrews Store Road).
2. Construction of an exclusive westbound right-turn lane on SR 1526 (Andrews Store Road).
3. Construction of an exclusive southbound left-turn lane on Second South Access Road.
4. Construction of an exclusive southbound right-turn lane on Second South Access Road.

Summary of Required Improvements Committed by NCDOT

The following improvements have been committed by the NCDOT TIP Project R-942 and the NCDOT Moving Ahead project. Since these improvements have been assumed as part of TIA's future background analysis, these improvements may be required by this development.

US Highway 15-501 / Smith Level Road

1. Construction of an additional exclusive northbound left-turn lane on US Highway 15-501.
2. Construction of an additional exclusive northbound through lane on US Highway 15-501.
3. Construction of an additional exclusive southbound through lane on US Highway 15-501.
4. Construction of an exclusive southbound right-turn lane on US Highway 15-501.
5. Construction of dual exclusive eastbound right-turn lanes on Smith Level Road.

US Highway 15-501 / SR 1724 (Old Lystra Road)

1. Construction of an exclusive northbound left-turn lane on US Highway 15-501.
2. Construction of an additional exclusive northbound through lane on US Highway 15-501.
3. Construction of an exclusive northbound right-turn lane on US Highway 15-501.
4. Construction of an additional exclusive southbound through lane on US Highway 15-501.
5. Construction of an exclusive westbound right-turn lane on SR 1724 (Old Lystra Road).

US Highway 15-501 / SR 1532 (Mann's Chapel Road)

1. Construction of an additional exclusive northbound lane on US Highway 15-501.
2. Construction of an additional exclusive southbound through lane on US Highway 15-501.
3. Construction of an additional exclusive eastbound left-turn lane on SR 1532 (Mann's Chapel Road).
4. Construction of an exclusive eastbound right-turn lane on SR 1532 (Mann's Chapel Road).
5. Construction of an additional exclusive westbound left-turn lane on SR 1532 (Mann's Chapel Road).

US Highway 15-501 / SR 1721 (Lystra Road)

1. Installation of a signal.
2. Construction of an exclusive northbound left-turn lane on US Highway 15-501.
3. Construction of an additional exclusive northbound through lane on US Highway 15-501.
4. Construction of an exclusive northbound right-turn lane on US Highway 15-501.
5. Construction of an exclusive southbound left-turn lane on US Highway 15-501.
6. Construction of an additional exclusive southbound through lane on US Highway 15-501.
7. Construction of an exclusive westbound right-turn lane on SR 1721 (Lystra Road).

US Highway 15-501 / SR 1717 (Jack Bennett Road)

1. Installation of a signal.
2. Construction of an exclusive northbound left-turn lane on US Highway 15-501.
3. Construction of an additional exclusive northbound through lane on US Highway 15-501.
4. Construction of an exclusive right-turn lane on US Highway 15-501.
5. Construction of an exclusive southbound left-turn lane on US Highway 15-501.
6. Construction of an additional exclusive southbound through lane on US Highway 15-501.
7. Construction of an exclusive southbound right-turn lane on US Highway 15-501.
8. Construction of an exclusive westbound right-turn lane on SR 1717 (Jack Bennett Road)

US Highway 15-501 / SR 1529 (Taylor Road)

1. Construction of an exclusive northbound left-turn lane on US Highway 15-501.
2. Construction of a northbound through / right-turn lane on US Highway 15-501.
3. Construction of an exclusive southbound left-turn lane on US Highway 15-501.
4. Construction of an additional exclusive southbound through lane on US Highway 15-501.
5. Construction of an exclusive southbound right-turn lane on US Highway 15-501.

US Highway 15-501 / SR 1528 (Andrews Store Road)

1. Construction of an exclusive northbound left-turn lane on US Highway 15-501.
2. Construction of a northbound through / right-turn lane on US Highway 15-501.
3. Construction of an exclusive southbound left-turn lane on US Highway 15-501.
4. Construction of an additional exclusive southbound through lane on US Highway 15-501.
5. Construction of an exclusive southbound right-turn lane on US Highway 15-501.

US Highway 15-501 / Village Way

1. Construction of an exclusive northbound left-turn lane on US Highway 15-501.
2. Construction of an additional exclusive northbound through lane on US Highway 15-501.
3. Construction of an exclusive right-turn lane on US Highway 15-501.
4. Construction of an exclusive southbound left-turn lane on US Highway 15-501.
5. Construction of an additional exclusive southbound through lane on US Highway 15-501.
6. Construction of an exclusive southbound right-turn lane on US Highway 15-501.
7. Construction of an exclusive eastbound left-turn lane on SR 1527 (Morris Road).
8. Construction of an eastbound through / right-turn lane on SR 1527 (Morris Road).
9. Construction of a westbound through / right-turn lane on Village Road.

US Highway 15-501 / Mt. Gilead Church Road

1. Construction of an exclusive northbound left-turn lane on US Highway 15-501.
2. Construction of an additional exclusive northbound through lane on US Highway 15-501.
3. Construction of an exclusive southbound left-turn lane on US Highway 15-501.
4. Construction of an additional exclusive southbound through lane on US Highway 15-501.

SR 1532 (Mann's Chapel Road) / Poythress Road

1. Construction of an exclusive eastbound left-turn lane on SR 1532 (Mann's Chapel Road).

SR 1532 (Mann's Chapel Road) / SR 1526 (Andrews Store Road)

2. Construction of an exclusive northbound right-turn taper on SR 1532 (Mann's Chapel Road).

US Highway 15-501 / SR 1719 (Vickers Road) (East Access Road)

1. Construction of an exclusive northbound left-turn lane on US Highway 15-501.
2. Construction of an additional exclusive northbound through lane on US Highway 15-501.
3. Construction of an exclusive northbound right-turn lane on US Highway 15-501.
4. Construction of an exclusive southbound left-turn lane on US Highway 15-501.
5. Construction of an additional exclusive southbound through lane on US Highway 15-501.
6. Construction of an exclusive southbound right-turn lane on US Highway 15-501.

SR 1532 (Mann's Chapel Road) / North Access Road

1. Construction of an exclusive eastbound left-turn lane on SR 1532 (Mann's Chapel Road).
2. Construction of an exclusive westbound left-turn lane on SR 1532 (Mann's Chapel Road).

Summary of Peer-Review Recommended Improvements

US Highway 15-501 / SR 1529 (Taylor Road)

- Construction of an exclusive northbound right-turn lane on US Highway 15-501.

US Highway 15-501 / SR 1528 (Andrews Store Road)

- Construction of an exclusive northbound right-turn lane on US Highway 15-501.

US Highway 15-501 / SR 1532 (Mann's Chapel Road)

- Evaluate the feasibility of providing additional through lanes to this signalized intersection by coordinating with NCDOT. In addition, explore the effects of adjacent driveways on the operation of this intersection.

US Highway 15-501 / Mt. Gilead Church Road

- Monitor this unsignalized intersection for potential signalization in the future.

Hamletts Chapel Road / SR 1532 (Mann's Chapel Road) / River Forrest Road

- Monitor this unsignalized intersection to see whether MUTCD requirements are met to implement a four-way stop. If not, other options should be evaluated.

SR 1721 (Lystra Road) / SR 1717 (Jack Bennett Road)

- Monitor this unsignalized intersection for potential signalization in the future.

SR 1532 (Mann's Chapel Road) / North Access Road

- Evaluate intersection design solutions to reduce potential safety issues and side-street delays during peak hour traffic conditions.

SR 1526 (Andrews Store Road) / South Access Road

- Evaluate intersection design solutions to reduce potential safety issues and side-street delays during peak hour traffic conditions.

Phasing

Phasing of construction may require additional analysis if off-site improvements are to be phased with construction. The main site appears to be close to full buildout by 50% and the driveways on US Highway 15-501 are the ones that develop last (i.e. the commercial development).

Technical Comments

1. The protected, permitted + protected, and split signal phasing should be consistent between AM and PM scenarios. If overlaps are shown in the AM, they should also be used in the PM. Dallas Permitted plus protected phasing is not used along US Highway 15-501. Permitted + Protected phasing may not be used along US Highway 15-501 due to the high through volumes on US Highway 15-501, unless NCDOT signal timing plans show such assumptions. Pedestrian phasing should be shown on the Synchro reports where pedestrian signal heads were recommended in the study area. (Additional information received from the TIA preparer shows that intersection LOS ratings do not change when the permitted+protected phasing at the intersection of US Highway 15-501 and Mann's Chapel Road are changed to protected-only.)

2. The turn bay lengths should not increase from the 2014 No-Build + improvements scenarios to the 2014 Build + improvement scenarios. The turn bays that are constructed during the NCDOT TIP project R-942 should not be extended unless the TIA notes the change. The TIP project should also widen any existing lanes that are less than 12' up to current standards. The lane widths should not change from the AM to the PM scenarios. (Additional information received from the TIA preparer indicates that these inconsistencies do not change the intersection LOS ratings. However, a future TIA addendum would make the necessary corrections.)
3. The lane geometry as shown on Figure 8 of the TIA should match the lane geometry in the Synchro files. Additional turn lanes are shown in the Synchro reports that are not shown on Figure 8. The driveway geometry in the Synchro reports does not match the recommended lane geometry at the South Access Driveway. (Additional information received from the TIA preparer indicates that these inconsistencies do not change the intersection LOS ratings. However, a future TIA addendum would make the necessary corrections.)