



To: Ms. Megan Ledbetter, AICP

From: Jonathan Guy, P.E., AICP

Date: July 6, 2018

**RE: *Tanglewood Business Park, Clemmons, NC
Traffic Impact Analysis Review***

At the direction of the Village of Clemmons, Kimley-Horn has conducted a review of the sealed traffic impact analysis (TIA) prepared by Davenport, dated April 27, 2018. The TIA is intended to address the proposed multi-phase development of 1,012,500 square feet of industrial park development. The proposed development is to be located off Topsider Drive, with access to Idols Road, in Clemmons, NC.

This memo outlines our technical review of the TIA. Our technical review comments and recommendations are provided below.

TECHNICAL REVIEW COMMENTS

The following comments were developed in accordance with the traffic impact analysis guidelines contained within the NCDOT *Policy on Street and Driveway Access to North Carolina Highways*, the NCDOT *Congestion Management Capacity Analysis Guidelines*, and the *Village of Clemmons TIA Handbook*.

TIA Observations

The following observations are offered based on a review of the TIA as presented. These comments are subject to change based on the Final TIA.

The proposed industrial development will take access from a Village of Clemmons Street, Topsider Drive, and impact streets within the Village of Clemmons. However, no coordination or acknowledgement of the Traffic Impact Analysis Procedural Manual are contained within the TIA. The TIA Procedural Manual provides guidance regarding the development of TIA's within the Village of Clemmons. While the subject property is not located within the corporate limits of the Village, it will take access from a Village owned and maintained streets. Compliance to the Village of Clemmons TIA guidelines should be adhered to.

Trip Generation

The TIA utilized local data for two sites within the Triad to determine the trip generation potential of the proposed development rather than ITE Land Use Code (LUC) 130 Industrial Park. The TIA does not provide justification for the use of local data over the accepted ITE LUC 130. In review of NCDOT's rate versus equation guidance, NCDOT recommends using ITE LUC 130 equations for the adjacent street.

The local data used in the TIA is based on a 2,748,00-sf facility in Rural Hall, NC (Northridge Business Park). The Davenport TIA generates 34 AM (28/6) and 43 PM (9/34).

ITE LUC 130 Trip Generation information is as follows.

- $\ln(T) = 0.52 \ln(x) + 4.45$
- 0.40 (81% in; 19% out)
- 0.40 (21% in; 79% out)

ITE LUC 130 generates 60 AM (49/11) and 60 PM (13/47) for the phase 1 development (150,000 sf). Based on a review of the 10th edition trip generation data from ITE for LUC 130 the following observations have been developed:

- Average SF is approximately 700k sf
- Maximum SF is less than 2.5m sf (less than the local study used to generate the trip generation rate in the study)
- There are 31 and 32 (AM and PM) studies used to develop the trip generation calculations.

Land use context including access and adjacent street type and classification are all elements that should be considered when selecting a site for the collection of local data. For the two sites utilized in this TIA, there are significant differences between the local land use sites utilized and the proposed site:

- Proximity to limited access facility
- Visibility from adjacent roadway
- Property size
- Adjacent roadway connectivity

These elements should have been factored in when developing a local trip generation rate for the proposed site. Site characteristics as well as the type of use and end user should be factored in when developing a local rate. Since this information has not been provided, ITE data should have been utilized.

Documentation on why local data was utilized rather than ISTE should be provided for acceptance and incorporation in the study.

Trip Generation Comparison

On page 25 within the TIA, Table 7.3 provides a comparison of the trip generation potential of the proposed industrial park and a proposed 268-unit single family residential subdivision. The comparison utilizes national averages for residential trips (ITE) while utilizing locally captured data for the industrial site. This method has the potential to create a skewed perspective of the trip generation potential between the two land uses based on the two different data sources. Considering the two different data sources, this should not be considered an accurate assessment of the trip generation potential comparison for the two different land uses. Local data or ITE trip generation data should be utilized for both land uses for an accurate comparison.

Traffic Analysis

Multiple files were provided for the review for the TIA with similar naming conventions (AM Ex vs AM Existing). In the future, only the files producing the analyses in the TIA should be provided for review.

Meadowbrook at US 158

- Loops not coded correctly per the signal plan – defaults utilized
- Analysis utilizes field conditions for left-turn phasing and not guidelines reflected in NCDOT Congestion Management TIA and Village of Clemmons TIA guidelines for future year left-turn phasing
- In the AM peak hour (phase 1) the EB approach is projected to operate at LOS E (degrades from LOS D in the background condition) – mitigation should be recommended based on NCDOT and Village guidelines.
- In the PM peak hour (full build) the EB approach is projected to operate at LOS E (degrades from LOS D in the background condition) – mitigation should be recommended based on NCDOT and Village guidelines.
- In the PM peak hour (full build) the SB approach is projected to operate at LOS E (degrades from LOS D in the background condition) – mitigation should be recommended based on NCDOT and Village guidelines.
- Analysis uses current signal timings for the AM and PM operations throughout rather than NCDOT Congestion Management and Village of Clemmons modeling settings
- Signal splits are changed between the no-build and the build scenarios – this gives a false prediction between the overall and approach operations for the intersection as well as the necessary need for mitigation. These are only allowed to change between the build and build improved.
- No approach grades were input into the analysis. Both the Lewisville-Clemmons and Middlebrook approaches have significant grades that will impact the operations of the signal in all scenarios modeled.

Idols Road at Middlebrook Drive

- The intersection is incorrectly modeled in all scenarios – the SB left and right movements are coded as free when they should be under stop control. The WB movements are modeled as stop.
- Analysis cannot be accurately reviewed under this modeling condition.

Distribution and Assignment

The distribution changes between the initial phase and the final phase without justification or reason. Specifically, 5 % was taken from Idols Road and sent to the SW towards Dock Davis Road. It is unclear why traffic, in either phase, would utilize Dock Davis Road to Hampton Road, when Idols Road provides a more direct connection to the points to the south. Clarification should be provided on why this change occurred.

Volume Development

The TIA references the extension of Idols Road from its current terminus to Stratford Road (US 158) and its completion occurring in 2018. For the background traffic volume development, the TIA utilizes the traffic associated with the two offsite developments (Eastwood Homes and Barrington Oaks Phase 2). The TIA did not utilize a growth rate, which is common even with offsite development, to generate future traffic volumes.

At a minimum the TIA should have utilized a growth rate to generate future year background traffic volumes. The preferred method would have been to utilize the forecasted volumes developed for the Idols Road extension project for the background traffic volumes. As currently developed, the TIA only adds a very small amount of traffic at two intersections, US 158 and Idols Road with Middlebrook Road.

Auxiliary Turn Lane Warrants

The TIA prepared turn lane warrants for unsignalized intersections of Idols Road at Dillon Industrial Park, but did not incorporate these into the recommendations for the TIA. Turn lanes are warranted based on the results of those projections at Idols Road and Dillon Industrial Drive. For example, in the AM – Phase 1 a left-turn lane with 50 feet of storage is warranted. For the AM – full build, a left-turn with 100 feet is warranted. Considering this development will be served via heavy vehicles, a minimum of 100 feet of storage should be provided for the left-turn lane.

In addition, turn lane warrants should have been prepared for all unsignalized intersections within the study area. Lastly, the Village of Clemmons TIA procedural manual requires a section in the TIA (section 7) to be included in the TIA.

A quick review of the turn lane warrants at Idols Road and Middlebrook Road indicate the following turn lanes are warranted at full buildout:

- SB Right – 100 ft of storage
- EB Left – 100 ft of storage
- WB Right – 125 ft of storage

Recommendations

The TIA projects unacceptable LOS operations at the intersection of US 158 and Middlebrook Road, as noted previously, without providing recommendations for mitigation. The TIA states that right-of-way restrictions prohibit the improvement of the intersection. Furthermore, the TIA provides auxiliary turn lane warrants but does not list those as recommendations for the project to construct. The TIA does not provide a comprehensive mitigation strategy for the proposed development based on NCDOT TIA or the Village of Clemmons TIA guidelines.

CONCLUSIONS

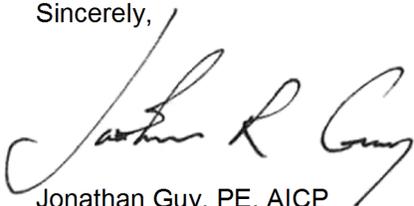
Based on the technical review of the TIA, as submitted, the TIA utilizes methodologies and data sources without justification or explanation for their incorporation. The utilization of these elements provides an analysis scenario depicting the potential impacts associated with the development that are one sided. The TIA minimizes the background traffic growth by not utilizing the forecasted volumes for the extension of Idols Road, utilizes local trip generation data for an un-similar in context and size industrial development, and does not provide recommendations for mitigation as required under NCDOT and Village of Clemmons TIA guidelines. Lastly, the TIA parameters were not coordinated with the Village of Clemmons even though access to the proposed development will occur on Village owned streets.

Based on the items identified in this technical review, we recommend the following items be addressed in the final report:

- Trip Generation should be based on ITE LUC 130 rather than local data
- Background traffic volumes should be developed using the Idols Road forecast volumes or the utilization of an approved growth rate
- Update the traffic analysis utilizing NCDOT and Village of Clemmons modeling guidelines
- Provide justification for a phased distribution and assignment or utilize a single distribution and assignment
- Provide auxiliary turn lane warrants for all unsignalized intersections with in the study area

Please contact me at (704) 488-3055 or jonathan.guy@kimley-horn.com should you have any questions regarding this analysis.

Sincerely,



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Vice President