STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
800 BAY ROAD
P.O. BOX 778
DOVER, DELAWARE 19903

JENNIFER COHAN
SECRETARY

June 29, 2016

Ms. Betty Tustin
The Traffic Group, Inc.
104 Kenwood Court
Berlin, MD 21811

Dear Ms. Tustin:

Please find the revised Traffic Operational Analysis (TOA) review letter for the **TLBT Smyrna** commercial development (Tax Parcel 01-17-01900-01-0123-00001) enclosed with this correspondence. This revised letter replaces our letter of June 17, 2016, and has been updated to reflect a minor change to one of the recommendations. If you have any questions concerning this letter or the enclosed review letter, please contact me at (302) 760-2167.

Sincerely,

Troy Brestel
Project Engineer

TEB:km
Enclosures
cc with enclosures: Ms. Constance C. Holland, Office of State Planning Coordination
Mr. David Hugg, Town of Smyrna
Mr. Mir Wahed, Johnson, Mirmiran & Thompson, Inc.
Mr. Richard Mishura, Johnson, Mirmiran & Thompson, Inc.
DelDOT Distribution

DelDOT

DelDOT Distribution

Annie Cordo, Deputy Attorney General
Robert McCleary, Director, Transportation Solutions (DOTS)
Drew Boyce, Director, Planning
Mark Luszcz, Chief Traffic Engineer, Traffic, DOTS
Michael Simmons, Assistant Director, Project Development South, DOTS
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T. William Brockenbrough, Jr., County Coordinator, Development Coordination
Peter Haag, Traffic Studies Manager, Traffic, DOTS
Thomas Greve, Central District Engineer, Central District
Steve McCabe, Central District Public Works Engineer, Central District
Wendy Polasko, Kent Subdivision Coordinator, Development Coordination
David Dooley, Service Development Planner, Delaware Transit Corporation
Mark Galipo, Traffic Engineer, Traffic, DOTS
Anthony Aglio, Planning Supervisor, Statewide & Regional Planning
Claudy Joinville, Project Engineer, Development Coordination
Jonathan Moore, Subdivision Manager, Development Coordination

Engineering A Brighter Future®

June 29, 2016

Mr. Troy Brestel
Project Engineer
Development Coordination
DelDOT Division of Planning
P O Box 778
Dover, DE 19903

RE: Agreement No. 1654
Project Number T201469011
Traffic Impact Study Services
Task 11A-TLBT, Inc. Smyrna TOA

Dear Mr. Brestel:

Johnson, Mirmiran and Thompson (JMT) has completed the review of the Traffic Operational Analysis (TOA) for TLBT, Inc. Smyrna, prepared by The Traffic Group. This review was assigned Task Number 11A. The Traffic Group prepared the report in a manner generally consistent with DelDOT's *Development Coordination Manual.*

The TOA evaluates the impacts of a proposed 36,170 square foot supermarket on the northwest corner of the intersection of South Carter Road (Kent Road 137) and US Route 13 (Kent Road 2) in the Town of Smyrna. The retail development is proposed on a 4.18-acre parcel of land that is zoned H-C (Highway Commercial). Access to the development will be provided via one proposed entrance on South Carter Road. In addition, a permanent easement is proposed for the purpose of constructing a future road or commercial driveway through the adjacent property to connect the proposed supermarket to the existing intersection of South Carter Road and Bon Ayre Lane. Construction is expected to be completed in 2017.

DelDOT currently has two relevant studies within the study area which is Phase 3 of the *Statewide Divided Highway Safety Study* (Contract #T200950017) and the *Statewide Horizontal Curve Safety* study (Contract #T200950017).

Phase 3 of the *Statewide Divided Highway Safety Study* (Contract #T2000950017) is designed to improve safety along divided highways throughout Delaware. As part of the study, signing and striping were evaluated at signalized intersections along divided highways within the state roadway network per the *Delaware Manual on Uniform Traffic Control Devices (DE MUTCD)* standards. US Route 13 was evaluated as part of this study, which included the signalized intersection of US Route 13 and South Carter Road. Recommendations as part of this study include signage (Yield, Do Not Enter, Wrong Way, One Way, Turn Lane, Divided Highway, and Keep Right, etc.) improvements following *DE MUTCD* specifications. As this is an ongoing study, the above improvements have not yet been implemented.

The *Statewide Horizontal Curve Safety* study (Contract #T200950017) is designed to improve safety along horizontal curves for all roadway classifications throughout Delaware. As part of this study, all the horizontal curve locations are evaluated per the *DE MUTCD* standards. Improvements are recommended based on ball bank studies of each horizontal curve with proper signage and spacing based on Figure 2C-2 and Tables 2C-5 and 2C-6 of the *DE MUTCD*. As a recommendation of this study, plans were developed and approved in July 2014 for the horizontal curve along South Carter Road near the proposed Site Entrance (approximately 560 feet west of the US Route 13/South Carter Road intersection). In addition, striping recommendations were proposed to address the lane drop condition along westbound South Carter Road from US Route 13 to Bon Ayre Lane. Field visits confirm the above improvements have been completed.

Based on our review of the traffic operational analysis, we have the following comments and recommendations:

Based on an evaluation of the intersections needed to satisfy the LOS evaluation criteria stated in DelDOT's *Development Coordination Manual*, the following unsignalized intersections exhibit LOS deficiencies without the implementation of physical roadway and/or traffic control improvements:

Intersection	***Situations for which LOS deficiencies occur***
Site Entrance/ South Carter Road	2017 PM and Saturday with TLBT, Inc. Smyrna development and full access on South Carter Road at the proposed site entrance location (Case 3a)
South Carter Road/Bon Ayre Lane	2017 PM with TLBT, Inc. Smyrna development and full access on South Carter Road at the proposed site entrance location (Case 3a) 2017 AM, PM, and Saturday with TLBT, Inc. Smyrna development and full site access on South Carter Road at Bon Ayre Lane, and right-in/right-out only access at the proposed entrance location (Case 3b) 2017 PM with TLBT, Inc. Smyrna development and right-in/right-out/left-in access on South Carter Road at the proposed entrance location (Case 3c)

The TOA was evaluated based on three future 2017 access scenarios. The Case 3a scenario includes full movement on South Carter Road at the proposed site entrance location, which is located approximately 560 feet west of the US Route 13 and South Carter Road signalized intersection. The Case 3b scenario includes one full site access on South Carter Road at Bon Ayre Lane and a second right-in/right-out only access at the previously mentioned location. The Case 3b scenario was included as a permanent easement is proposed for the purpose of constructing a future road/commercial driveway through adjacent lands that would connect the proposed supermarket to the existing intersection of South Carter Road and Bon Ayre Lane, which is located approximately 700 feet west of the proposed site driveway. The Case 3c scenario includes a right-in/right-out/left-in access on South Carter Road at the proposed site entrance location.

The unsignalized intersection of the full movement Site Entrance and South Carter Road would exhibit LOS deficiencies for the southbound left turn lane exiting the development during the future 2017 PM peak and Saturday peak hours with the TLBT, Inc. Smyrna development (Case

3a). Specifically, this left turn movement would be LOS F with a delay of 163.2 seconds during the PM peak hour and 73.2 seconds during the Saturday peak hour, respectively. Furthermore, the maximum 95th percentile queue length along the southbound approach is projected to be approximately 175 feet during the Case 3a condition. Motorist safety is a concern due to the high traffic volumes along South Carter Road and the close proximity to the traffic signal at the intersection of US Route 13 and South Carter Road. Therefore, a full movement unsignalized intersection for this proposed site driveway is not recommended. The installation of a traffic signal would mitigate the LOS deficiencies. However, a traffic signal is not recommended at the Site Entrance/South Carter Road intersection due to the close proximity (560 feet) of the signalized intersection at US Route 13 and South Carter Road. It is recommended that the Site Entrance/South Carter Road intersection be constructed as a right-in/right-out/left-in access (Case 3c). Furthermore, due to vehicles expected to U-turn along the westbound South Carter Road approach to Bon Ayre Lane, it is recommended that the approach be redesigned to accommodate U-turn movements for passenger vehicles. It is expected that truck delivery traffic from the proposed development would utilize an alternate route to return to US Route 13.

The unsignalized intersection of South Carter Road/Bon Ayre Lane would exhibit LOS deficiencies for the northbound Bon Ayre Lane left turn lane (LOS E with a delay of 39.8 seconds and 47.0 seconds during Cases 3a and 3c, respectively) under the future 2017 PM peak hour conditions with the TLBT, Inc. Smyrna development. However, it is not recommended that any improvements be implemented by the developer at this intersection as the maximum 95th percentile queue length along the northbound Bon Ayre Lane left turn lane is projected to be approximately 35 feet, which could be accommodated along Bon Ayre Lane without significantly impacting roadway operations.

For the future 2017 conditions with the TLBT, Inc. Smyrna development (Case 3b) scenario and the future roadway/commercial driveway creating the fourth leg to the South Carter Road/Bon Ayre Lane intersection, LOS deficiencies will occur for the northbound Bon Ayre Lane left turns during the weekday AM and PM peak periods and the southbound Site Entrance left turns during the AM, PM, and Saturday peak periods. In addition, the maximum 95th percentile queue length for the southbound Site Entrance left turn lane movement is projected to be approximately 215 feet. These side-street delays and queues are a result of high traffic volumes along South Carter Road. Installing a traffic signal at this intersection would mitigate the LOS and queue deficiencies during the Case 3b scenario. Therefore, it is recommended that the developer fund an equitable portion of the geometric and signal improvements at the proposed future road/commercial driveway to create the fourth leg at the South Carter Road and Bon Ayre Lane intersection.

Should the Town of Smyrna approve the proposed development, the following items should be incorporated into the site design and reflected on the record plan. All applicable agreements (i.e. letter agreements for off-site improvements and traffic signal agreements) should be executed prior to entrance plan approval for the proposed development.

1. The developer should construct a right-in/right-out/left-in access for the proposed TLBT, Inc. Smyrna development on South Carter Road (as shown in the Site Map on page 9), approximately 560 feet west of US Route 13, to be consistent with the proposed lane configurations as shown in the table below:

Approach	Current Configuration	Proposed Configuration
Eastbound South Carter Road	One left turn lane, one through lane, and one right turn lane	No Change
Westbound South Carter Road	One left turn lane and two through lanes	One left turn lane, two through lanes, and one right turn lane
Southbound Site Entrance	Approach does not exist	One right turn lane

The developer should submit a plan to DelDOT's Subdivision Section depicting that the entrance is designed to accommodate truck traffic. Additionally, based on DelDOT's *Development Coordination Manual,* the recommended minimum storage length (excluding taper) is 240 feet for the westbound South Carter Road right turn lane. The storage lengths based on the HCS analysis provide shorter queue lengths that what is reported here.

2. The developer should submit a plan to DelDOT's Subdivision Section illustrating the westbound South Carter Road approach to Bon Ayre Lane can accommodate U-turn movements for passenger vehicles. If deficient, the developer should construct this intersection to accommodate westbound South Carter Road U-turn traffic.

3. The developer should enter into an agreement with DelDOT to fund an equitable portion for the geometric improvements of the proposed future road/commercial driveway to create the fourth leg at the South Carter Road and Bon Ayre Lane intersection (as shown in the Site Map on page 9), to be consistent with the proposed lane configurations as shown in the table below:

Approach	Current Configuration	Proposed Configuration
Eastbound South Carter Road	One through lane and one right turn lane	One left turn lane, one through lane, and one right turn lane
Westbound South Carter Road	One left turn lane and one through lane	One left turn lane, one through lane, and one right turn lane
Northbound Bon Ayre Lane	One left turn lane and one right turn lane	One left turn lane, one through lane, and one right turn lane
Southbound Site Entrance	One lane access road	One left turn lane, one through lane, and one right turn lane

Based on DelDOT's *Development Coordination Manual,* the recommended minimum storage length (excluding taper) is 120 feet for the eastbound South Carter Road left turn

lane and 110 feet for the westbound South Carter Road right turn lane. The storage lengths based on the HCS analysis provide shorter queue lengths that what is reported here.

4. The developer should enter into a traffic signal agreement with DelDOT to fund an equitable portion for the proposed future road/commercial driveway to create the fourth leg at the South Carter Road and Bon Ayre Lane intersection. The agreement should include pedestrian signals, crosswalks, and interconnection at DelDOT's discretion. One other developer (Liborio Investments IV, LLC) is expected to enter into a traffic signal agreement for this intersection as well. The developer should coordinate with DelDOT on the implementation and equitable cost sharing of the traffic signal. The developer will be required to perform a Signal Justification Study, including peak hour and four-hour signal warrant analysis at DelDOT's discretion.

5. The developer should provide for an easement to accommodate a future internal roadway connection within the site, located from the proposed site driveway at South Carter Road along the western portion of the development and tie-in to the adjacent lands north and west of the proposed site.

6. The developer should upgrade the curve warning signs (W1-1) on both the eastbound and westbound South Carter Road approaches to the right-in/right-out/left-in Site Entrance with combination horizontal alignment/intersection (W1-10) signs (36"x36") with advance street name (1-line) plaques (W16-8P), as necessary.

7. The following bicycle, pedestrian, and transit improvements should be included:

    a. A five-foot wide ADA compliant sidewalk with a five-foot setback from the roadway should be constructed (and maintained) along the site frontage. The sidewalk should be within a fifteen-foot wide dedicated permanent easement to DelDOT and/or State right of way. If feasible, the sidewalk should be placed behind utility poles and street trees should be provided within the buffer area. The sidewalk should extend west of the proposed site entrance on South Carter Road for future connection with the adjacent lands.
    b. ADA compliant curb ramps and marked crosswalks should be provided at the right-in/right-out/left-in site entrance location on South Carter Road. The use of diagonal curb ramps is discouraged.
    c. ADA compliant curb ramps and marked crosswalks should be provided at the proposed future road/commercial driveway to create the fourth leg at the South Carter Road and Bon Ayre Lane intersection. The use of diagonal curb ramps is discouraged.
    d. A five-foot wide bicycle lane should be provided along the north side of South Carter Road along the site frontage.
    e. For existing and proposed right turn lanes along South Carter Road, the five-foot wide bike lane should be maintained through the right turn lane in order to facilitate safe and unimpeded bicycle travel. A RIGHT TURN YIELD TO BIKES sign (*DE MUTCD* R4-4) should be added before the start of each right turn lane.

f. Utility covers should be moved outside of any bike lanes and paved shoulders or should be flush with the pavement.
g. All internal roads should be provided with sidewalks on both sides. The internal sidewalks should be provided west and north of the proposed development for future connection with the adjacent lands.
h. Relocate and upgrade the bus stop (Stop ID: 13GN) located southbound along US Route 13 from approximately 670 feet north of the South Carter Road/US Route 13 intersection to approximately 160 feet north of the South Carter Road/US Route 13 intersection adjacent to the pedestrian access (internal sidewalks and crosswalks) of the proposed TLBT, Inc. Smyrna development. The bus stop should be ADA compliant, include a bench, and provide a five-foot by eight-foot concrete pad.
i. Sidewalk connection should be provided along both the east and west sides of the proposed building to the proposed five-foot wide sidewalk along the South Carter Road site frontage.
j. ADA compliant curb ramps and marked crosswalks should be provided from the sidewalk east of the proposed building to US Route 13, including the concrete island connections. In addition, a continuous sidewalk connection should be provided from the proposed building to the proposed five-foot wide sidewalk along the US Route 13 site frontage.
k. Bike parking racks should be provided near the building entrances. Where the building architecture provides for an awning or other overhang, the bike parking should be covered.

Please note that this review generally focuses on capacity and level of service issues; additional safety and operational issues will be further addressed through DelDOT's subdivision review process.

Improvements in this TOA may be considered "significant" under DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DelDOT's website at http://www.deldot.gov/information/pubs_forms/manuals/de_mutcd/index.shtml. For any additional information regarding the work zone impact and mitigation procedures during construction please contact Mr. Adam Weiser of DelDOT's Traffic Section. Mr. Weiser can be reached at (302) 659-4073 or by email at Adam.Weiser@state.de.us.

Engineering A Brighter Future

Additional details on our review of the TOA are attached. Please contact me at (302) 266-9600 if you have any questions concerning this review.

Sincerely,
Johnson, Mirmiran, and Thompson, Inc.

Mir Ab Wahed

Mir Wahed, P.E., PTOE

cc: Richard Mishura
Joanne Arellano, P.E., PTOE

Enclosure

General Information

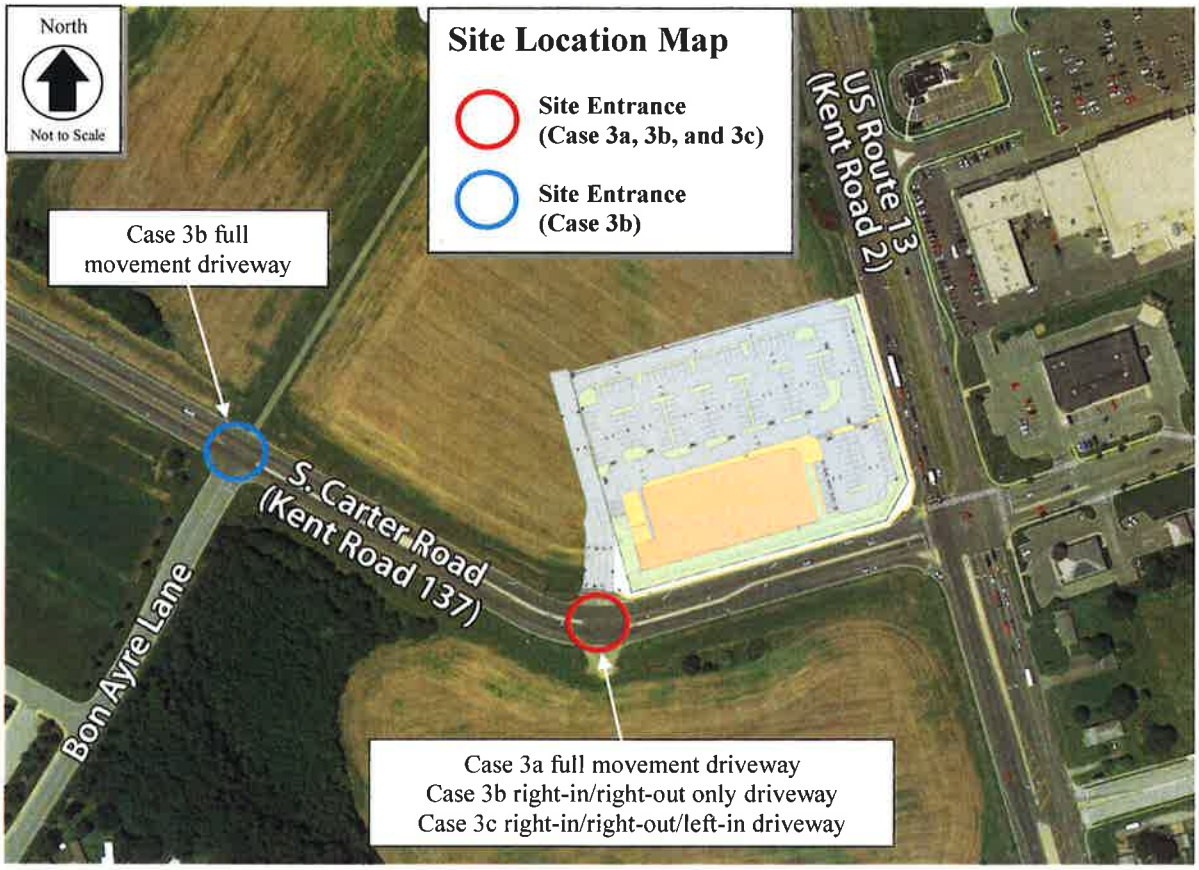
Report date: March 8, 2016
Prepared by: The Traffic Group
Prepared for: Lidl
Tax Parcel: 1-17-01900-01-0123-00001
Generally consistent with DelDOT's *Development Coordination Manual*: Yes.

Project Description and Background

Description: The proposed development will consist of a 36,170 square foot supermarket.
Location: The subject site is located on the northwest corner of the intersection of South Carter Road (Kent Road 137) and US Route 13 (Kent Road 2) in Kent County.
Amount of Land to be developed: The proposed development is on a 4.18-acre parcel.
Land Use approval(s) needed: Entrance Plan.
Proposed completion date: 2017.
Proposed access locations: One access point along South Carter Road. In addition, a permanent easement is proposed for the purpose of constructing a future road or commercial driveway through the commercially zoned lands of Liborio Investments IV, LLC to connect the proposed supermarket to the existing intersection of South Carter Road and Bon Ayre Lane.
Daily Traffic Volumes:

- 2015 Average Annual Daily Traffic on South Carter Road: 10,944 vehicles per day.

Site Map



**Graphic is an approximation based on the Site Plan prepared by Bohler Engineering dated September 15, 2015.*

Relevant and On-going Projects

DelDOT currently has two relevant studies within the study area which is Phase 3 of the *Statewide Divided Highway Safety Study* (Contract #T200950017) and the *Statewide Horizontal Curve Safety* study (Contract #T200950017).

Phase 3 of the *Statewide Divided Highway Safety Study* (Contract #T2000950017) is designed to improve safety along divided highways throughout Delaware. As part of the study, signing and striping were evaluated at signalized intersections along divided highways within the state roadway network per the *Delaware Manual on Uniform Traffic Control Devices (DE MUTCD)* standards. US Route 13 was evaluated as part of this study, which included the signalized intersection of US Route 13 and South Carter Road. Recommendations as part of this study include signage (Yield, Do Not Enter, Wrong Way, One Way, Turn Lane, Divided Highway, and Keep Right, etc.) improvements following *DE MUTCD* specifications. As this is an ongoing study, the above improvements have not yet been implemented.

The *Statewide Horizontal Curve Safety* study (Contract #T200950017) is designed to improve safety along horizontal curves for all roadway classifications throughout Delaware. As part of this study, all the horizontal curve locations are evaluated per the *DE MUTCD* standards. Improvements are recommended based on ball bank studies of each horizontal curve with proper signage and spacing based on Figure 2C-2 and Tables 2C-5 and 2C-6 of the *DE MUTCD*. As a recommendation of this study, plans were developed and approved in July 2014 for the horizontal curve along South Carter Road near the proposed Site Entrance (approximately 560 feet west of the US Route 13/South Carter Road intersection). In addition, striping recommendations were proposed to address the lane drop condition along westbound South Carter Road from US Route 13 to Bon Ayre Lane. Field visits confirm the above improvements have been completed.

Trip Generation

As per the TOA, the trip generation for the proposed development was determined by using the comparable land use and rates/equations contained in the *Trip Generation, 9th Edition: An ITE Informational Report*, published by the Institute of Transportation Engineers (ITE) for ITE Land Use Code 850 (Supermarket).

The peak period trip generation for the proposed development is included in Table 1.

Table 1
TLBT, Inc. Smyrna Development

Land Use	ADT	AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
36,170 Square Feet Supermarket	3,698	76	47	123	175	168	343	196	189	385
Pass-By Trips		0	0	0	63	60	123	0	0	0
Net New Trips		**76**	**47**	**123**	**112**	**108**	**220**	**196**	**189**	**385**

Overview of TOA

Intersections examined:

1. Site Entrance / South Carter Road (Kent Road 137)
2. US Route 13 (Kent Road 2) / South Carter Road
3. South Carter Road / Bon Ayre Lane

Note: South Carter Road is characterized by DelDOT's 2005 Functional Classification Map as a local road, whereas South Carter Road is characterized as an Urban Collector by DelDOT's 2015 Traffic Summary Manual. This review considered South Carter Road as an Urban Collector.

Conditions examined:

1. Case 1 – 2015 Existing conditions
2. Case 2 – 2017 No Build conditions without TLBT, Inc. Smyrna development
3. Case 3 – 2017 Build conditions with TLBT, Inc. Smyrna development
    a) Full access on South Carter Road at the proposed site entrance location
    b) Full access on South Carter Road at Bon Ayre Lane, and right-in/right-out only access at the proposed site entrance location
    c) Right-in/right-out/left-in access on South Carter Road at the proposed site entrance location

Note: Contrary to the December 8, 2015 DelDOT Scoping Meeting Memorandum, JMT has conducted an additional analysis considering the provision of a right-in/right-out/left-in entrance on South Carter Road (Case 3c) per June 10, 2016 DelDOT correspondence.

Peak hours evaluated: Weekday morning, weekday evening, and Saturday midday peak hours.

Committed Developments considered:

1. Carter Road Professional Center
2. Sunnyside Village Commercial (26,000 square feet)
3. Hickory Hollow (325 single-family detached houses)
4. Cambria Village (formerly known as Brookwood Crossing) (140 townhouses/ condominiums)
5. Willow Wood (497 single-family detached houses) – outside of Town limits
6. Worthington (303 single-family detached houses, 276 townhouses)

Intersection Descriptions

1. **Site Entrance / South Carter Road (Kent Road 137)**
   Type of Control: proposed stop controlled intersection (T-intersection)
   Eastbound Approach: (South Carter Road) existing one left turn lane, one through lane, and one right turn lane; proposed (Case 3a) one left turn lane, one through lane and one right turn lane; proposed (Case 3b) one through lane and one right turn lane
   Westbound Approach: (South Carter Road) existing one left turn lane and two through lanes; proposed (Case 3a) one left turn lane, two through lanes, and one right turn lane; proposed (Case 3b) two through lanes and one right turn lane
   Southbound Approach: (proposed Site Entrance) proposed (Case 3a) one left turn lane and one right turn lane, stop controlled; proposed (Case 3b) one right turn lane, stop controlled

   Note: The proposed lane configurations are based on the TOA submitted by The Traffic Group.

2. **US Route 13 (Kent Road 2) / South Carter Road**
   Type of Control: existing signal controlled intersection
   Eastbound Approach: (South Carter Road) existing one left turn lane, one through lane, and one channelized right turn lane

Westbound Approach: (Pharmacy Drive) existing one left turn lane, one through lane, and one right turn lane
Northbound Approach: (US Route 13) existing two left turn lanes, two through lanes, and one right turn lane
Southbound Approach: (US Route 13) existing one left turn lane, two through lanes, and one channelized right turn lane

3. **South Carter Road / Bon Ayre Lane**
Type of Control: existing stop controlled intersection (T-intersection); proposed stop controlled full movement intersection
Eastbound Approach: (South Carter Road) existing one through lane and one right turn lane; proposed (Case 3b) one left turn lane, one through lane, and one right turn lane
Westbound Approach: (South Carter Road) existing one left turn lane and one through lane; proposed (Case 3b) one left turn lane, one through lane, and one right turn lane
Northbound Approach: (Bon Ayre Lane) existing one left turn lane and one right turn lane, stop controlled; proposed (Case 3b) one shared through/left turn lane and one right turn lane, stop controlled
Southbound Approach: (proposed Site Entrance) proposed (Case 3b) one shared through/left turn lane and one right turn lane, stop controlled

Note: Under existing conditions, a service road for an adjacent water tower exists at the north leg of the intersection. This road is not taken into account in the analysis due to its minimal usage. The proposed lane configurations are based on the TOA submitted by The Traffic Group.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: Delaware Transit Corporation (DTC) currently provides existing services via DART Route 120 which can be accessed at the intersection of US Route 13 and South Carter Road. DART Route 120 provides 21 round trips on weekdays from 5:22 a.m. to 9:51 p.m. This bus service does not run on the weekends.

Planned transit service: JMT contacted Tremica Cherry, Transit Planner at the DTC. In a March 25, 2016 email, David Dooley, Senior Planner at the DTC, requested the relocation and upgrade of the bus stop (Stop ID: 13GN) located southbound along US Route 13, approximately 670 feet north of South Carter Road. The bus stop is recommended to be relocated at the pedestrian access of the proposed TLBT, Inc. Smyrna development (Supermarket) along US Route 13, approximately 160 feet north of South Carter Road. The bus stop should be ADA compliant and include a bench and a five-foot by eight-foot concrete pad.

Existing bicycle and pedestrian facilities: According to DelDOT's *Kent County Bicycle Map*, a connector bicycle route exists within the study area. The connector bicycle route along US Route 13 traverses through one of the project's study intersections (the US Route 13 intersection with South Carter Road).

Pedestrian facilities are present at the US Route 13 and South Carter Road signalized intersection and include curb ramps, crosswalks, and pedestrian signal heads to cross the north leg of US Route

13, the west leg of South Carter Road, and the east leg of Pharmacy Drive. Sidewalks are present on the east side of US Route 13.

Planned bicycle and pedestrian facilities: JMT contacted Mr. Anthony Aglio, DelDOT's Bicycle and Pedestrian Coordinator. John Fiori, DelDOT Bicycle Coordinator, along with coordination from Sarah Coakley, DelDOT's Pedestrian Coordinator, provided recommendations via an April 15, 2016 email. The following bicycle and pedestrian improvements have been included as recommendations:

- Ten-foot wide shared-use path along the US Route 13 and South Carter Road site frontages.
- Curb ramps and crosswalk at the site entrance with South Carter Road and at the intersection of South Carter Road/Bon Ayre Lane/Site Entrance.
- Bike lanes along the north side of South Carter Road from US Route 13 to Bon Ayre Lane.
- Internal sidewalks along both sides of the roadway within the proposed TLBT, Inc. Smyrna development and future connection with the adjacent property north and west of the site.
- Sidewalk connection along both the east and west sides of the proposed TLBT, Inc. Smyrna development to the shared-use path along South Carter Road.
- Curb ramps with landings from the proposed TLBT, Inc. Smyrna development sidewalk east to US Route 13 including the concrete island connections. In addition, continue the sidewalk connection from the proposed development sidewalk to US Route 13, as there appears to be a gap in the connection.
- Separate area within the site for bike racks.

Bicycle Level of Service and Bicycle Compatibility Index: According to the League of Illinois Bicyclists (LIB), Bicycle Level of Service (BLOS) is an emerging national standard for quantifying the bike-friendliness of a roadway by measuring on-road bicyclist comfort levels for specific roadway geometries and traffic conditions. Utilizing the 10-year projected AADT along the site frontage, the BLOS with the construction of the proposed development and the provision of 5' bike lanes are summarized below. The BLOS was determined utilizing the calculators published on the LIB website: http://www.rideillinois.org/blos/blosform.htm

- South Carter Road – BLOS: C

Previous Comments

All comments from the preliminary TOA have been addressed in the final TOA.

General HCS Analysis Comments

(See table footnotes on the following pages for specific comments)

1. The TOA used HCS 2010 Version 6.70 for the signalized intersections and HCS 2010 Version 6.80 for the unsignalized intersections, whereas JMT utilized HCS 2010 Version 6.80 for both signalized and unsignalized intersections.

2. Per DelDOT's *Development Coordination Manual,* JMT used a heavy vehicle percentage of 3% for each movement in the future scenario analysis, unless the existing heavy vehicle percentage was greater than 3%, in which case the existing heavy vehicle percentage was used for analysis of future scenarios. The TOA maintained the heavy vehicle percentages utilized in their existing cases throughout the future cases.

3. JMT included lane widths obtained from field measurements, whereas the TOA did not.

4. Differences in critical headways were noticed between the TOA and JMT's analysis. JMT utilized the HCS 2010 Version 6.80 default values, except where otherwise noted.

Table 2
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Final Traffic Operational Analysis for the TLBT, Inc. Smyrna Development
Report Dated March 8, 2016
Prepared by The Traffic Group

Unsignalized Intersection[1] Two-Way Stop Control (T-Intersection)	**LOS per TOA**			**LOS per JMT**		
Site Entrance / South Carter Road[2,3]	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2017 with development of TLBT, Inc. Smyrna (Case 3a)[4]						
Eastbound South Carter Road Left	A (8.4)	A (9.7)	A (9.0)	A (8.4)	A (9.8)	A (9.1)
Southbound Site Entrance Left	C (22.3)	F (103.4)	F (53.5)	D (25.1)	F (163.2)	F (73.2)
Southbound Site Entrance Right	B (10.8)	B (14.1)	B (11.9)	A (9.6)	B (11.1)	B (10.2)
Southbound Site Entrance Approach	C (18.5)	F (72.0)	E (38.9)	C (19.9)	F (109.7)	F (51.2)
2017 with development of TLBT, Inc. Smyrna (Case 3b)						
Southbound Site Entrance Right	B (10.7)	B (13.5)	B (11.4)	A (9.6)	B (10.7)	A (9.9)
2017 with development of TLBT, Inc. Smyrna (Case 3c)						
Eastbound South Carter Road Left	-	-	-	A (8.4)	A (9.8)	A (9.1)
Southbound Site Entrance Right	-	-	-	A (9.8)	B (12.6)	B (11.4)

Signalized Intersection[1] (T-Intersection)	**LOS per TOA**			**LOS per JMT**		
Site Entrance / South Carter Road	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2017 with development of TLBT, Inc. Smyrna (Case 3a) *with Mitigation*[5]	-	-	-	A (5.7)	B (11.4)	B (12.6)

[1] For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.
[2] The TOA modeled the westbound South Carter Road approach with one through lane and one right turn lane, whereas JMT modeled this approach with two through lanes (per field conditions) and one right turn lane.
[3] Since a south leg does not exist at the intersection, both the TOA and JMT did not model the eastbound South Carter Road right turn lane and the westbound South Carter Road left turn lane.
[4] The TOA utilized a volume of 612 vehicles for the westbound South Carter Road through movement for the PM peak hour, whereas JMT utilized a volume of 621 vehicles per Case 3A volumes (Exhibit 12) of the TOA.
[5] Mitigation scenario includes the installation of a traffic signal with a 120 second cycle length.

Table 3
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Final Traffic Operational Analysis for the TLBT, Inc. Smyrna Development
Report Dated March 8, 2016
Prepared by The Traffic Group

Signalized Intersection[6]	**LOS per TOA**			**LOS per JMT**		
US Route 13 / South Carter Road[7,8,9,10,11]	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2015 Existing (Case 1)[12]	C (20.3)	C (24.9)	C (20.4)	C (27.6)	C (31.3)	C (24.9)
2017 without development of TLBT, Inc. Smyrna (Case 2)	C (21.9)	C (27.5)	C (21.3)	C (29.7)	C (34.8)	C (27.3)
2017 without development of TLBT, Inc. Smyrna (Case 2) *with Mitigation*[13]	B (19.9)	C (29.1)	C (23.0)	-	-	-
2017 with development of TLBT, Inc. Smyrna (Case 3a/3b/3c)	C (23.3)	C (31.3)	C (25.0)	C (31.0)	D (38.7)	C (30.5)
2017 with development of TLBT, Inc. Smyrna (Case 3a/3b) *with Mitigation*[13]	C (20.8)	C (32.0)	C (25.9)	-	-	-

[6] For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.
[7] The TOA used green times less than the minimum values, whereas JMT utilized minimum green times based on the DelDOT timing plans.
[8] Both the TOA and JMT omitted the eastbound South Carter Road right turn movement from the analysis, due to the provision of channelization with an acceleration lane.
[9] The TOA utilized arbitrary right turn on red volumes whereas JMT modeled right turn on red volumes based on existing count data and proportionally increased for future conditions.
[10] The TOA utilized an Arrival Type 4 along US Route 13, whereas JMT utilized an Arrival Type 3 for each approach to the intersection.
[11] JMT incorporated peak hour pedestrian volumes into the analysis based on the existing traffic count data for the PM peak hour, whereas the TOA did not.
[12] For the PM peak hour, JMT utilized 3% HV for the northbound right turns and 1% HV for the southbound right turns per the existing traffic count data, whereas the TOA utilized 0% HV for these movements.
[13] JMT did not provide a mitigation scenario as no issues were noted at the intersection. However, the TOA provided a mitigation scenario as their results calculated 95th percentile queue lengths longer than the provided storage along the eastbound South Carter Road left turn lane. The mitigation includes the modification of the eastbound South Carter Road approach to provide one left turn lane, one shared through/left turn lane, and one channelized right turn lane with split phasing along South Carter Road.

Table 4
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Final Traffic Operational Analysis for the TLBT, Inc. Smyrna Development
Report Dated March 8, 2016
Prepared by The Traffic Group

Unsignalized Intersection[14] Two-Way Stop Control (T-Intersection)	**LOS per TOA**			**LOS per JMT**		
South Carter Road / Bon Ayre Lane[15]	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2015 Existing (Case 1)						
Westbound South Carter Road Left	A (8.9)	A (8.6)	A (8.3)	A (8.9)	A (8.7)	A (8.3)
Northbound Bon Ayre Lane Left	C (21.1)	D (29.6)	C (19.5)	C (18.4)	C (24.5)	C (17.2)
Northbound Bon Ayre Lane Right	B (12.2)	B (11.8)	B (11.3)	B (12.2)	B (11.8)	B (11.3)
Northbound Bon Ayre Lane Approach	C (15.8)	C (15.4)	B (12.3)	B (14.7)	B (14.4)	B (12.0)
2017 without development of TLBT, Inc. Smyrna (Case 2)[16]						
Westbound South Carter Road Left	A (9.3)	A (8.9)	A (8.5)	A (9.3)	A (9.0)	A (8.5)
Northbound Bon Ayre Lane Left	D (34.5)	E (44.8)	C (22.8)	D (27.6)	D (34.4)	C (19.8)
Northbound Bon Ayre Lane Right	B (12.7)	B (12.7)	B (11.6)	B (12.6)	B (12.8)	B (11.7)
Northbound Bon Ayre Lane Approach	C (23.9)	D (25.5)	B (14.7)	C (20.4)	C (21.4)	B (14.0)
2017 with development of TLBT, Inc. Smyrna (Case 3a)[17]						
Westbound South Carter Road Left	A (9.5)	A (9.1)	A (8.7)	A (9.3)	A (9.1)	A (8.8)
Northbound Bon Ayre Lane Left	E (37.8)	F (53.6)	D (27.9)	D (27.1)	E (39.8)	C (23.5)
Northbound Bon Ayre Lane Right	B (13.0)	B (13.2)	B (12.4)	B (12.6)	B (13.3)	B (12.5)
Northbound Bon Ayre Lane Approach	D (25.4)	D (28.9)	C (16.3)	C (19.9)	C (23.6)	C (15.3)

[14] For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.
[15] JMT utilized the HCS 2010 default values for critical headways whereas the TOA arbitrarily increased them for the northbound Bon Ayre Lane left turn movement.
[16] The TOA utilized the existing 0.87 PHF during the AM peak hour, whereas JMT utilized a 0.88 PHF per DelDOT's *Development Coordination Manual.*
[17] The TOA utilized the existing 0.87 PHF during the AM peak hour, whereas JMT utilized a 0.92 PHF per DelDOT's *Development Coordination Manual.*

Table 4 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Final Traffic Operational Analysis for the TLBT, Inc. Smyrna Development
Report Dated March 8, 2016
Prepared by The Traffic Group

Unsignalized Intersection[14] Two-Way Stop Control	**LOS per TOA**			**LOS per JMT**		
South Carter Road / Bon Ayre Lane / Site Entrance	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2017 with development of TLBT, Inc. Smyrna (Case 3b)[15,17,18,19]						
Eastbound South Carter Road Left	A (8.1)	A (9.0)	A (8.4)	A (8.0)	A (9.0)	A (8.4)
Westbound South Carter Road Left	A (9.3)	A (8.8)	A (8.5)	A (9.2)	A (8.9)	A (8.5)
Northbound Bon Ayre Lane Left	-	-	-	E (35.4)	F (72.3)	D (33.8)
Northbound Bon Ayre Lane Through/Left	E (41.3)	F (72.0)	D (33.1)	-	-	-
Northbound Bon Ayre Lane Through	-	-	-	C (24.7)	E (35.7)	D (25.8)
Northbound Bon Ayre Lane Right	B (12.7)	B (12.4)	B (11.6)	B (12.3)	B (12.5)	B (11.7)
Northbound Bon Ayre Lane Approach	D (27.6)	E (36.6)	C (18.6)	C (24.2)	E (36.4)	C (18.4)
Southbound Site Entrance Left	-	-	-	E (35.2)	F (299.9)	F (125.9)
Southbound Site Entrance Through/Left	E (41.1)	F (306.9)	F (128.3)	-	-	-
Southbound Site Entrance Through	-	-	-	C (24.6)	E (35.7)	D (25.9)
Southbound Site Entrance Right	B (10.3)	B (12.8)	B (11.1)	B (10.2)	B (12.8)	B (11.2)
Southbound Site Entrance Approach	E (35.0)	F (237.6)	F (100.1)	D (29.9)	F (233.3)	F (100.6)

[18] The TOA modeled the northbound and southbound approaches with a shared through/left turn lane and separate right turn lane. However, JMT modeled these approaches with a separate left turn, through, and right turn lane consistent with the recommendations from the July 6, 2010 review letter prepared by JMT for the Liborio Commercial development.
[19] The TOA and JMT modeled the eastbound and westbound approaches of South Carter Road with one left turn lane, one through lane, and one right turn lane.

Table 4 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Final Traffic Operational Analysis for the TLBT, Inc. Smyrna Development
Report Dated March 8, 2016
Prepared by The Traffic Group

Unsignalized Intersection[14] Two-Way Stop Control	**LOS per TOA**			**LOS per JMT**		
South Carter Road / Bon Ayre Lane	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2017 with development of TLBT, Inc. Smyrna (Case 3c)[20]						
Westbound South Carter Road Left	-	-	-	A (9.3)	A (9.6)	A (9.3)
Northbound Bon Ayre Lane Left	-	-	-	D (28.1)	E (47.0)	D (26.8)
Northbound Bon Ayre Lane Right	-	-	-	B (12.6)	B (13.3)	B (12.5)
Northbound Bon Ayre Lane Approach	-	-	-	C (20.4)	D (26.4)	C (16.1)

[20] For the U-Turns on the westbound South Carter Road approach, JMT utilized a base critical headway of 6.9 seconds from Exhibit 19-10 and a base follow-up headway of 3.1 seconds from Exhibit 19-11 of the 2010 Highway Capacity Manual.

Table 4 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Final Traffic Operational Analysis for the TLBT, Inc. Smyrna Development
Report Dated March 8, 2016
Prepared by The Traffic Group

Roundabout[14]	**LOS per TOA**			**LOS per JMT**		
South Carter Road / Bon Ayre Lane / Site Entrance	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2017 with development of TLBT, Inc. Smyrna (Case 3b) *with Mitigation*[21]						
Eastbound South Carter Road	-	-	-	B (12.9)	C (16.2)	B (13.3)
Westbound South Carter Road	-	-	-	A (8.4)	B (14.9)	A (9.5)
Northbound Bon Ayre Lane	-	-	-	A (8.4)	A (9.6)	A (8.3)
Southbound Site Entrance	-	-	-	A (6.0)	B (11.1)	A (8.8)
Overall Intersection	-	-	-	B (10.7)	B (14.7)	B (11.0)

Signalized Intersection[14]	**LOS per TOA**			**LOS per JMT**		
South Carter Road / Bon Ayre Lane / Site Entrance	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2017 with development of TLBT, Inc. Smyrna (Case 3b) *with Mitigation*[22]	-	-	-	B (10.5)	B (15.7)	B (15.6)

[21] Mitigation scenario includes the installation of a single lane roundabout.
[22] Mitigation scenario includes the installation of a traffic signal with a 120 second cycle length during the weekday AM and PM peak hours and a 100 second cycle length during the Saturday peak hour. In addition, each approach to the intersection would provide one left turn lane, one through lane, and one right turn lane.