

STATE OF DELAWARE

DEPARTMENT OF TRANSPORTATION

800 BAY ROAD P.O. BOX 778 Dover, Delaware 19903

JENNIFER COHAN SECRETARY

September 25, 2017

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

Dear Ms. Tustin:

The enclosed Traffic Impact Study (TIS) review letter for the Newark - LIDL (Tax Parcels (11-002-40.366 & 11-006-20.112) redevelopment has been completed under the responsible charge of a registered professional engineer whose firm is authorized to work in the State of Delaware. They have found the TIS to conform to DelDOT's <u>Development</u> <u>Coordination Manual</u> and other accepted practices and procedures for such studies. DelDOT accepts this review letter and concurs with 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. George Haggerty, New Castle County Department of Land Use Mr. Owen Robatino, New Castle County Department of Land Use Mr. Marco Boyce, New Castle County Department of Land Use Mr. Andrew Parker, McCormick Taylor, Inc. DelDOT Distribution



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Annie Cordo, Deputy Attorney General Robert McCleary, Director, Transportation Solutions (DOTS) Drew Boyce, Director, Planning Mark Luszcz, Chief Traffic Engineer, Traffic, DOTS Mark Tudor, Assistant Director, Project Development North, DOTS J. Marc Coté, Assistant Director, Development Coordination T. William Brockenbrough, Jr., County Coordinator, Development Coordination Adam Weiser, Safety Engineer, Traffic, DOTS Peter Haag, Traffic Studies Manager, Traffic, DOTS Kevin Canning, Canal District Engineer, North District Matthew Lichtenstein, Canal District Public Works Engineer, Canal District David Dooley, Service Development Planner, Delaware Transit Corporation Erin Osborne, New Castle Subdivision Coordinator, Development Coordination Pao Lin, New Castle Subdivision Manager, Development Coordination Mark Galipo, Traffic Engineer, Traffic, DOTS Anthony Aglio, Planning Supervisor, Statewide & Regional Planning Claudy Joinville, Project Engineer, Development Coordination



September 25, 2017

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

RE: Agreement No. 1773 Traffic Impact Study Services Task No. 1A Subtask 4A – TLBT, LLC – Newark

Dear Mr. Brestel:

McCormick Taylor has completed its review of the Traffic Impact Study (TIS) for the TLBT, LLC – Newark development prepared by The Traffic Group, dated May 17, 2017. The Traffic Group prepared the report in a manner generally consistent with DelDOT's *Development Coordination Manual* [formerly *Standards and Regulations for Subdivision Streets*, incorporated by reference into the New Castle County Unified Development Code 40.11.130].

The TIS evaluates the impacts of the TLBT, LLC – Newark development, proposed to be located on the southwest corner of the intersection of Delaware Route 4 (New Castle Road 366) and Gender Road (New Castle Road 354) in New Castle County. The location of the proposed development lies outside the corporate limits of the City of Newark. The proposed development would include a 35,962 square-foot grocery store and a 5,000 square-foot high-turnover sit-down restaurant. The proposed development would replace an existing recreational/amusement center.

One full-movement access point is proposed on Gender Road, and one right-in/right-out access point is proposed along Delaware Route 4. Construction is anticipated to be complete in 2018.

The proposed development would be built on two parcels that are currently split-zoned as CN (Commercial Neighborhood) and S (Suburban) in New Castle County. The developer proposes to rezone a portion of the site from S to CN.

Currently, there are no DelDOT capital projects within the area of study.

Based on our review, we have the following comments and recommendations:

The proposed development would meet the New Castle County Level of Service (LOS) Standards as stated in Section 40.11.210 of the Unified Development Code (UDC).

However, as shown in the table below, based on the criteria listed in Chapter 2 of DelDOT's *Development Coordination Manual*, three intersections identified by DelDOT as being required for study would exhibit LOS deficiencies without the implementation of physical roadway and/or traffic control improvements. These include two signalized intersections that were not

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part of New Castle County's scope of study, along with the stop-controlled minor street approaches at one unsignalized intersection. Because the unsignalized intersection is controlled only by stop signs on the minor street approaches, the deficiencies pertain to those approaches only, and the intersection is not subject to New Castle County's concurrency requirements.

Intersection	Existing Traffic Control	Situations for which deficiencies occur
Delaware Route 4 and Delaware Route 72 (New Castle Road 356)	Signalized	2017 existing PM (Case 1); 2018 without development PM (Case 2); 2018 with development PM (Case 3)
Delaware Route 4 and Salem Church Road (New Castle Road 348)	Signalized	2017 existing AM & PM (Case 1); 2018 without development AM & PM (Case 2); 2018 with development AM & PM (Case 3)
Marrows Road (New Castle Road 351) and Kensington Lane / Brookside Plaza Entrance	Unsignalized	2017 existing PM (Case 1); 2018 without development PM and SAT (Case 2); 2018 with development PM and SAT (Case 3)

The intersection of Delaware Route 4 and Delaware Route 72 exhibits existing and future operational deficiencies, operating at LOS E during the PM peak hour due to the high traffic volumes traveling through the intersection. Each approach of the intersection currently consists of two exclusive left-turn lanes, two exclusive through lanes, and one exclusive right-turn lane. Mitigation of LOS deficiencies would require the addition of a third exclusive through lane to one or more of the approaches. While adding these lanes would mitigate the poor LOS and improve overall operation, the proximity of development on each corner of this intersection makes the construction of these lanes impossible without significant social, economic, and environmental impacts. For these reasons, we are not recommending any improvements be made to this intersection.

The intersection of Delaware Route 4 and Salem Church Road exhibits existing and future operational deficiencies, operating at LOS E during the AM and PM peak hours due to the high traffic volumes traveling through the intersection. Mitigation of LOS deficiencies would require the addition of a third exclusive through lane along each approach of Delaware Route 4. While adding these lanes would mitigate the poor LOS and improve overall operation, the proximity of development on the northwest and southeast corners of this intersection makes the construction of these lanes impossible without significant social, economic, and environmental impacts. For these reasons, we are not recommending any improvements be made to this intersection.

The intersection of Marrows Road and Kensington Lane / Brookside Plaza Entrance exhibits LOS deficiencies in existing and future conditions, including LOS F on the westbound approach. To mitigate the expected LOS issues, the developer of TLBT, LLC is proposing to re-configure this intersection as an all-way stop with an added southbound left-turn lane. Due to safety concerns about the proposed intersection modifications, and because a significant portion of increased vehicular delay at this intersection would be due to the proposed expansion of the

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Brookside Plaza shopping center, we are recommending that no improvements be made to this intersection at this time. Any potential mitigation measures, which could include managing left turns from the minor approaches, should be implemented by DelDOT as the need arises.

Should the County choose to approve the proposed development, the following items should be incorporated into the site design and reflected on the record plan by note or illustration. 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 provide a bituminous concrete overlay to Gender Road at DelDOT's discretion, sufficient to address the area affected by the striping changes necessary for their entrance construction. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer if necessary. The final TIS review letter for the proposed Chestnut Hill Preserve (a.k..a. Our Lady of Grace) development indicates that its developer is also required to mill and overlay Gender Road from Delaware Route 4 to their site access. Therefore, the developer should coordinate with DelDOT's Development Coordination Section during the site plan review process to determine the responsibility of each developer in the required mill and overlay of Gender Road. The developer should coordinate with DelDOT's Development Coordination Section during the site plan review process to determine the responsibility of each developer in the required mill and overlay along with design and implementation responsibilities and other details for this overlay.
- 2. The developer should construct the proposed right-in/right-out Site Access A on Delaware Route 4, approximately 575 feet west of Gender Road. The proposed configuration is shown in the table below. Note that proposed Site Access A is located in approximately the same location as the existing right-in/right-out driveway for the existing recreational/amusement center.

Approach	Current Configuration	Proposed Configuration
Eastbound Delaware Route 4	Two thru lanes and one shoulder/defacto right- turn lane	Two thru lanes and one right-turn lane
Northbound Site Access A	One right-turn lane	One right-turn lane

Initial recommended minimum turn-lane lengths (excluding tapers) of the separate turn lanes are listed below. The developer should coordinate with DelDOT's Development Coordination Section to determine final design details, including exact entrance location and final turn-lane lengths, during the site plan review process.



Approach	Left-Turn Lane	Right-Turn Lane
Eastbound Delaware Route 4	N/A	350 feet *
Northbound Site Access A	N/A	N/A
* initial turn lane length based (n DelDOT's Auriliam Lane Wor	kshoot

initial turn-lane length based on DelDOT's Auxiliary Lane Worksheet.

To reinforce that only right-turns are permitted from the northbound site egress, one-way and turn restriction signs should be installed in accordance with the Delaware MUTCD.

- 3. The developer should construct the proposed full-access Site Access B on Gender Road. The location and design of this access must be acceptable to DelDOT, and the details must be coordinated with DelDOT's Development Coordination Section prior to any submission into DelDOT's site plan review process.
- 4. The following bicycle, pedestrian, and transit improvements should be included:
 - a. A right-turn yield to bikes sign (MUTCD R4-4) should be added at the start of the right-turn lanes added to eastbound Delaware Route 4 at proposed Site Access A and southbound Gender Road at proposed Site Access B.
 - b. If a right-turn lane is constructed on southbound Gender Road at proposed Site Access B, a bicycle lane should be dedicated and striped with appropriate markings for bicyclists through the turn lane in order to facilitate safe and unimpeded bicycle travel. The developer should coordinate with DelDOT's Development Coordination Section during the site plan review process to determine design details of the bicycle lane
 - c. Appropriate bicycle symbols, directional arrows, striping (including stop bars), and signing should be included along bicycle facilities and right-turn lanes within the project limits.
 - d. Bike parking should be provided near the building entrances within this development. If the building architecture provides for an awning or other overhang, the bike parking should be covered.
 - e. Utility covers should be made flush with the pavement.
 - f. A minimum 15-foot wide easement from the edge of the right-of-way should be dedicated to DelDOT within the site frontage along Delaware Route 4.
 - g. While sidewalk exists along the site frontage on Delaware Route 4, the developer will be required to reconstruct the sidewalk and curb where the existing facilities will be removed for construction. The curb ramps and crosswalk at the site entrance should be ADA compliant.
 - h. A minimum 15-foot wide easement from the edge of the right-of-way should be dedicated to DelDOT within the site frontage along Gender Road.
 - i. Within the easement along Gender Road, a minimum of a five-foot wide sidewalk that meets current AASHTO and ADA standards should be constructed along the site frontage. The sidewalk path should have a minimum of a five-foot buffer from the



roadway. At the property boundaries, the sidewalk should connect to the shoulder of Gender Road to the south in accordance with DelDOT's *Shared Use Path and/or Sidewalk Termination Policy* dated June 19, 2014, and to the existing pedestrian facilities at the intersection of Delaware Route 4 and Gender Road to the north. The developer should coordinate with DelDOT's Development Coordination Section to determine exact locations and details of the sidewalk connections at the property boundaries.

- j. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances. Type 3 curb ramps are discouraged.
- k. In addition to the site frontage sidewalks described above, internal sidewalks for pedestrian safety and to promote walking as a viable transportation alternative should be constructed within the development. These sidewalks should each be a minimum of five feet wide and should meet current UDC, DelDOT, AASHTO and ADA standards. These internal sidewalks should connect the building entrances to the frontage sidewalks on Delaware Route 4 and Gender Road, including to the DART bus stops on Delaware Route 4.
- 1. Where internal sidewalks are located alongside of parking spaces, a buffer should be added to eliminate vehicular overhang onto the sidewalk.
- m. The developer should coordinate with the Delaware Transit Corporation (DTC) regarding transit facilities which could include modifications to existing bus stops and/or the addition of one or more new bus stops. The developer should coordinate with the DTC regarding the details and implementation of the transit-related improvements.

Improvements in this TIS may be considered "significant" under DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DelDOT's website at <u>http://deldot.gov/Publications/manuals/de_mutcd/index.shtml</u>. 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 <u>Adam.Weiser@state.de.us</u>.

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.



Additional details on our review of this TIS are attached. Please contact me at (610) 640-3500 or through e-mail at <u>ajparker@mccormicktaylor.com</u> if you have any questions concerning this review.

Sincerely, McCormick Taylor, Inc.

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Andrew J. Parker, P.E., PTOE Project Manager

Enclosure

General Information

Report date: May 17, 2017 Prepared by: The Traffic Group Prepared for: Lidl US Operations, LLC Tax parcel: 11-002-40.366 & 11-006-20.112 Generally consistent with DelDOT's *Development Coordination Manual*: Yes

Project Description and Background

Description: The proposed development would include a 35,962 square-foot grocery store and a 5,000 square-foot high-turnover sit-down restaurant. The proposed development would replace an existing recreational/amusement center.

Location: The development is proposed to be located on the southwest corner of the intersection of Delaware Route 4 (New Castle Road 366) and Gender Road (New Castle Road 354) in New Castle County. A site location map is included on Page 8.

Amount of land to be developed: approximately 5.36 acres to be developed, with a total lot size for both parcels of 17.5 acres

Land use approval(s) needed: Subdivision and rezoning approval. The proposed development would be built on two parcels that are currently split-zoned as CN (Commercial Neighborhood) and S (Suburban) within New Castle County. The developer proposes to rezone a portion of the site from S to CN. The site also appears to have a deed restriction that limits the use of the property to "indoor amusement facilities." This deed restriction would need to be removed by New Castle County.

Proposed completion date: 2018

Proposed access locations: One full-movement access point is proposed on Gender Road, and one right-in/right-out access point is proposed along Delaware Route 4.

Average Annual Daily Traffic Volumes (per DelDOT Traffic Summary 2016):

- Delaware Route 4: 25,808
- Gender Road: 3,817

Detailed TIS Review by McCormick Taylor, Inc.



2015 Delaware Strategies for State Policies and Spending

Location with respect to the Strategies for State Policies and Spending Map of Delaware: The proposed TLBT, LLC - Newark development is located within an Investment Level 1 area.

Investment Level 1

Areas of the state designated as Investment Level 1 are most prepared for growth and are where the state can make cost-effective infrastructure investments in schools, roads, and public safety. In these areas, state investments and policies should support and encourage a wide range of uses and densities, promote a variety of transportation options, foster efficient use of existing public and private investments, and enhance community identity and integrity. Investment Level 1 areas are often municipalities, towns, or urban/urbanizing places. Density is generally higher than in the surrounding areas. Overall, it is the state's intent to use its spending and management tools to maintain and enhance community character, to promote well-designed and efficient new growth, and to facilitate redevelopment in Investment Level 1 Areas.

Proposed Development's Compatibility with Strategies for State Policies and Spending:

The proposed TLBT, LLC - Newark development is located within an Investment Level 1 area; the proposed development would replace an existing recreational/amusement center with a grocery store and a restaurant. Nearby land uses along the Delaware Route 4 corridor primarily include medium density residential, retail/service businesses, restaurants, educational, and places of worship.

The proposed development is generally consistent with neighboring land uses and the character of Investment Level 1 areas. The *Strategies for State Policies and Spending* document encourages making use of existing infrastructure through infill development and redevelopment of underutilized tracts in Level 1 areas. The proposed development is consistent with these guidelines. The proposed development appears to generally comply with the policies stated in the 2015 "Strategies for State Policies and Spending."

Comprehensive Plan

New Castle County Comprehensive Plan:

(Source: New Castle County 2012 Comprehensive Plan)

The *2012 Comprehensive Plan* indicates that the proposed development is within the "Greater Newark" planning district. The Future Land Use Map indicates that the proposed development is located in an area that is split between both office/commercial/industrial development area (OCI) and low density residential (1-3 dwelling units per acre).

The land is currently split-zoned as CN (commercial neighborhood) and S (suburban) in New Castle County. The existing CN zoning aligns with the OCI future land use; the existing S zoning aligns with the low density residential future land use. The developer proposes to rezone a portion of the site from S to CN. According to Section 40.02.231 of the New Castle County Unified Development Code (UDC), characteristics of CN zoning are as follows:

- This district has a suburban character
- The scale and intensity of the development is regulated to ensure that uses primarily serve the surrounding residential neighborhoods. Roof design and landscaping are intended to reinforce the compatibility of these uses with the neighborhoods.
- Size and spacing of this district is regulated to ensure this district does not promote strip commercial development that serves highway traffic or regional uses.

Proposed Development's Compatibility with Comprehensive Plan: The proposed TLBT, LLC – Newark development is planned as a 35,962 square-foot Lidl grocery store and a 5,000 square-foot café/high-turnover sit-down restaurant. It appears that the proposed development is generally compatible with CN zoning and OCI future land use. However, since part of the land is currently zoned S and designated for future residential land use, this development will require additional discussion and approval by New Castle County in order to proceed to construction.

Relevant Projects in the DelDOT Capital Transportation Program

Currently, there are no DelDOT capital projects within the area of study.

Trip Generation

Trip generation for the proposed development was computed using comparable land uses and equations contained in <u>Trip Generation</u>, Ninth Edition, published by the Institute of Transportation Engineers (ITE). The following land uses were utilized to estimate the amount of new traffic generated for this development:

- Proposed 35,962 SF Lidl Grocery Store: ITE Land Use Code 850 (Supermarket)
- Proposed 5,000 SF cafe: ITE Land Use Code 932 (High-Turnover Sit-Down Restaurant)

Additional notes regarding the trip generation for the proposed development:

- No trip credits are taken for the existing recreational/amusement center
- No internalization is considered for the proposed development

Land Use	Weekday AM		Weekday PM			Saturday Book Hour			
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	In	Out	Total	In	Out	Total	In	Out	Total
35,962 SF Lidl Grocery Store (LU #850)	76	46	122	174	167	341	195	188	383
Pass-By Trips				-63	-60	-123			
5,000 SF café (LU #932)	30	24	54	29	20	49	37	33	70
Pass-By Trips				-12	-9	-21			
TOTAL "NEW" TRIPS	106	70	176	128	118	246	232	221	453

 Table 1

 TLBT, LLC - NEWARK PEAK HOUR TRIP GENERATION

Table 2TLBT, LLC - NEWARK TOTAL DAILY TRIP GENERATION

I and Use	W	eekday A	DT	Saturday ADT		
Land Use	In	Out	Total	In	Out	Total
35,962 SF Lidl Grocery Store (LU #850)	1838	1838	3676	3193	3193	6386
5,000 SF café (LU #932)	318	318	636	396	396	792
TOTAL "NEW" TRIPS	2156	2156	4312	3589	3589	7178

Overview of TIS

Intersections examined:

- 1) Delaware Route 4 & Delaware Route 72 (New Castle Road 356) *
- 2) Delaware Route 4 & Kingston Road
- 3) Delaware Route 4 & Marrows Road (New Castle Road 351)
- 4) Delaware Route 4 & Martindale Drive/Chestnut Hill Plaza
- 5) Delaware Route 4 & Prestbury Square/Gender Road
- 6) Delaware Route 4 & Malvern Avenue
- 7) Delaware Route 4 & Signalized U-Turn (west of Old Newark Road)
- 8) Delaware Route 4 & Old Newark Road (New Castle Road 350) *
- 9) Delaware Route 4 & Brennen Drive/Pearson Drive *
- 10) Delaware Route 4 & Augusta Drive *
- 11) Delaware Route 4 & Salem Church Road (New Castle Road 348) *
- 12) Delaware Route 4 & Delaware Route 273 Off-Ramps *
- 13) Marrows Road & Kensington Lane
- 14) Gender Road & Site Access B
- 15) Delaware Route 4 & Site Access A

* Indicates intersection is not required to meet New Castle County UDC Standards

Conditions examined:

- 1) 2017 existing conditions
- 2) 2018 without TLBT, LLC Newark development
- 3) 2018 with TLBT, LLC Newark development

Peak hours evaluated: Weekday morning and evening peak hours, Saturday mid-day peak hour

Committed developments considered:

- 1) Brookside Plaza Shopping Center (22,000 SF of retail)
- 2) CVS Pharmacy and Retail Center (1,500 SF of retail)
- 3) Modi Professional Plaza (10,888 SF of medical office space)

Intersection Descriptions

1) Delaware Route 4 & Delaware Route 72

Type of Control: signalized four-leg intersection **Northbound approach:** (Delaware Route 72) two left-turn lanes, two thru lanes, one channelized right-turn lane

Southbound approach: (Delaware Route 72) two left-turn lanes, two thru lanes (second thru lane added on this approach), one channelized right-turn lane

Eastbound Approach: (Delaware Route 4) two left-turn lanes, two thru lanes, one channelized right-turn lane

Westbound approach: (Delaware Route 4) two left-turn lanes, two thru lanes, one channelized right-turn lane

2) Delaware Route 4 & Kingston Road

Type of Control: signalized four-leg intersection Northbound approach: (Kingston Road) one right-turn lane Southbound Approach: (Kingston Road) one right-turn lane Eastbound Approach: (Delaware Route 4) one left-turn lane, two thru lanes, one rightturn lane

Westbound approach: (Delaware Route 4) one left-turn lane, two thru lanes, one rightturn lane

3) Delaware Route 4 & Marrows Road

Type of Control: signalized four-leg intersection
Northbound approach: (Marrows Road) one left-turn lane, two thru lanes, one channelized right-turn lane
Southbound Approach: (Marrows Road) two left-turn lanes, one thru lane, one channelized right-turn lane
Eastbound Approach: (Delaware Route 4) two left-turn lanes, two thru lanes, one channelized right-turn lane
Westbound approach: (Delaware Route 4) two left-turn lanes, two thru lanes, one channelized right-turn lane

 Delaware Route 4 & Martindale Drive/Chestnut Hill Plaza Type of Control: unsignalized four-leg intersection Northbound approach: (Chestnut Hill Plaza) one right-turn lane, yield controlled Southbound approach: (Martindale Drive) one right-turn lane, stop controlled Eastbound approach: (Delaware Route 4) one left-turn lane (stop controlled), two thru lanes, one channelized right-turn lane Westbound approach: (Delaware Route 4) one left-turn lane (stop controlled), two thru lanes, one right-turn lane

5) Delaware Route 4 & Prestbury Square/Gender Road

Type of Control: signalized four-leg intersection

Northbound approach: (Gender Road) one shared left-turn/thru lane, one channelized right-turn lane

Southbound approach: (Prestbury Square) one shared left-turn/thru lane, one right-turn lane

Eastbound approach: (Delaware Route 4) one left-turn lane, two thru lanes, one channelized right-turn lane

Westbound approach: (Delaware Route 4) one left-turn lane, two thru lanes, one right-turn lane

6) Delaware Route 4 & Malvern Avenue

Type of Control: unsignalized three-leg intersection **Southbound approach:** (Malvern Avenue) one right-turn lane, stop-controlled **Eastbound approach:** (Delaware Route 4) one left-turn lane (stop-controlled), two thru lanes

Westbound approach: (Delaware Route 4) two thru lanes, one right-turn lane

7) Delaware Route 4 & Signalized U-Turn

Type of Control: signalized U-turn intersection **Eastbound approach:** (Delaware Route 4) two thru lanes **Westbound approach:** (Delaware Route 4) one U-turn lane, two thru lanes

8) Delaware Route 4 & Old Newark Road

Type of Control: unsignalized three-leg intersection **Southbound approach:** (Old Newark Road) one right-turn lane, stop-controlled **Eastbound approach:** (Delaware Route 4) one left-turn lane (stop-controlled), two thru lanes

Westbound approach: (Delaware Route 4) two thru lanes, one right-turn lane

9) Delaware Route 4 & Brennan Drive/Pearson Drive

Type of Control: signalized four-leg intersection

Northbound approach: (Pearson Drive) one shared left-turn/thru lane, one right-turn lane

Southbound approach: (Brennen Drive) one shared left-turn/thru lane, one right-turn lane

Eastbound approach: (Delaware Route 4) one left-turn lane, two thru lanes, one right-turn lane

Westbound approach: (Delaware Route 4) one left-turn lane, two thru lanes, one right-turn lane

10) Delaware Route 4 & Augusta Drive/Augusta Square

Type of Control: signalized four-leg intersection

Northbound approach: (Augusta Square) one shared left-turn/thru lane, one right-turn lane

Southbound approach: (Augusta Drive) one shared left-turn/thru lane, one channelized right-turn lane

Eastbound approach: (Delaware Route 4) one left-turn lane, two thru lanes, one right-turn lane

Westbound approach: (Delaware Route 4) one left-turn lane, two thru lanes, one right-turn lane

11) Delaware Route 4 & Salem Church Road/ DE 273 Off-Ramp

Type of Control: signalized four-leg intersection

Northbound approach: (Salem Church Road) one left-turn lane, two thru lanes, one channelized right-turn lane

Southbound approach: (DE 273 Off-Ramp) two left-turn lanes, two thru lanes, one channelized right-turn lane

Eastbound approach: (Delaware Route 4) two left-turn lanes, two thru lanes, one channelized right-turn lane

Westbound approach: (Delaware Route 4) two left-turn lanes, two thru lanes, one channelized right-turn lane

12) Delaware Route 4 & Delaware Route 273 Off-Ramps

Type of Control: signalized four-leg intersection

Northbound approach: (DE 273 Off-Ramp) two left-turn lanes, one channelized right-turn lane

Southbound approach: (DE 273 Off-Ramp) two left-turn lanes, one channelized right-turn lane

Eastbound approach: (Delaware Route 4) two thru lanes

Westbound approach: (Delaware Route 4) two thru lanes

- Marrows Road & Kensington Lane/Brookside Plaza Type of Control: unsignalized four-leg intersection (two-way stop controlled) Northbound approach: (Marrows Road) one shared left-turn/thru/right-turn lane Southbound approach: (Marrows Road) one shared left-turn/thru/right-turn lane Eastbound approach: (Kensington Lane) one shared left-turn/thru lane, one right-turn lane Westbound approach: (Brookside Plaza) one shared left-turn/thru lane, one right-turn lane
- 14) Gender Road & Site Access B Type of Control: proposed unsignalized three-leg intersection Northbound approach: (Gender Road) one shared left-turn/thru lane Southbound approach: (Gender Road) one shared thru/right-turn lane Eastbound approach: (Site Access B) proposed one shared left-turn/right-turn lane
- 15) Delaware Route 4 & Site Access A
 Type of Control: proposed unsignalized right-in/right-out driveway
 Northbound approach: (Site Access A) proposed one right-turn lane
 Eastbound approach: (Delaware Route 4) two thru lanes, one right-turn lane

Safety Evaluation

Crash Data: McCormick Taylor found conflicting information in the TIS regarding crash history throughout the study area. The "Crash Data" section of the TIS states that crash data was obtained and summarized for March 16, 2014 through March 16, 2017. However, Appendix B contains crash data for July 6, 2013 through July 6, 2016. In addition, the TIS states that crash data for the intersections of Delaware Route 4 & Signalized U-Turn and Marrows Road & Kensington Lane is forthcoming. The applicant should analyze this data to check for correctable crash patterns at these locations.

McCormick Taylor reviewed the Delaware Crash Analysis Reporting System data that was provided in Appendix B of the TIS. The data includes reportable crashes that occurred within a one-tenth mile radius of the study intersections from July 6, 2013 through July 6, 2016.

Of particular concern throughout the study area are fatal crashes and crashes involving pedestrians and pedalcyclists. During the study period, there were three fatal crashes; two fatalities were motorcyclists and one fatality was a pedestrian. Six crashes involved a pedalcyclist, and four crashes involved a pedestrian. A breakdown of all crashes by intersection is provided below.

1. Delaware Route 4 & Delaware Route 72

At the intersection of Delaware Route 4 & Delaware Route 72 there were 159 total crashes. Of the total 159 crashes, 17 (11%) resulted in personal injury. Two crashes involved a pedestrian and two crashes involved a pedalcyclist. Seven of the total crashes were alcohol related, one resulting in personal injury. The most common types of crashes were rear-end crashes (64%),

angle crashes (21%), and sideswipe crashes (10%). The majority of crashes occurred during daylight (67%) or dark-lighted (26%) hours with dry (84%) surface conditions. The primary contributing circumstances include driver inattention, distraction, or fatigue (36%), following too close (18%), and driving in a careless or reckless manner (14%).

Automatic red light enforcement cameras are installed at this intersection.

2. Delaware Route 4 & Kingston Road

At the intersection of Delaware Route 4 & Kingston Road there were 11 total crashes. Of the 11 crashes, one resulted in a fatality. A Delaware News Journal article, updated March 23, 2014, describes the fatal crash that occurred at approximately 8:40 p.m. on March 22, 2014. The crash involved a motorcyclist heading eastbound in the right lane of Delaware Route 4 and a pickup truck making a left-turn from westbound Delaware Route 4 to South Kingston Road. The motorcycle struck the right rear of the pickup truck, ejecting the rider into the left eastbound lane of Delaware Route 4 where he was then struck by an SUV. The motorcycle rider sustained fatal injuries in the crash.

Of the 11 crashes, 3 (27%) resulted in personal injury. There were no crashes that involved a pedestrian or pedalcyclist. There were no alcohol related crashes. The most common types of crashes were rear-end crashes (64%), angle crashes (18%), and a collision not involving two vehicles (18%). The majority of crashes occurred during daylight (55%) or dark-not lighted (36%) hours with dry (91%) surface conditions. The primary contributing circumstances include following too close (18%) and driver inattention, distraction, or fatigue (18%).

3. Delaware Route 4 & Marrows Road

At the intersection of Delaware Route 4 & Marrows Road there were 59 total crashes. Of the 59 crashes, 10 (17%) resulted in personal injury. One crash involved a pedestrian and one involved a pedalcyclist. One non-injury crash was alcohol-related. The most common types of crashes were rear-end crashes (64%), angle crashes (20%), and sideswipe crashes (8%). The majority of crashes occurred during daylight (66%) or dark-lighted (25%) hours with dry (81%) surface conditions. The primary contributing circumstances include driver inattention, distraction, or fatigue (53%), improper lane change (7%), and failed to yield right of way (7%). There were also 5 (8%) crashes of unknown contributing circumstance.

Automatic red light enforcement cameras are installed at this intersection.

4. Delaware Route 4 & Martindale Drive/Chestnut Hill Plaza

At the intersection of Delaware Route 4 & Martindale Drive there were 22 total crashes. Of the 22 crashes, 2 (9%) resulted in personal injury. There were no crashes that involved a pedestrian or a pedalcyclist. One non-injury crash was alcohol related. The most common types of crashes were rear-end crashes (50%), angle crashes (23%), and a collision not involving two vehicles (18%). The majority of crashes occurred during daylight (64%) or dark-lighted (27%) hours with dry (73%) surface conditions. The primary contributing circumstances include driver inattention,

distraction, or fatigue (27%), following too close (23%), and driving in a careless or reckless manner (14%).

5. Delaware Route 4 & Prestbury Square/Gender Road

At the intersection of Delaware Route 4 & Gender Road there were 37 total crashes. Of the 37 crashes, one resulted in a pedestrian fatality. A Newark Post Online article, updated July 17, 2015, describes the fatal crash that occurred at approximately 10 p.m. on July 16, 2015. The incident involved a vehicle striking a pedestrian. The pedestrian was attempting to cross the westbound lanes of Delaware Route 4 from the grass center median when he was hit by an SUV traveling in the right lane. The incident happened in front of the Holy Family Church's Summerfest Carnival, which draws heavy pedestrian and vehicle traffic to the area. Vehicles are also often parked along the side of Delaware Route 4 for this event. Based on the CARS data, this crash was alcohol related.

Of the total 37 crashes, 12 (32%) resulted in personal injury. One crash involved a pedestrian; no crashes involved a pedalcyclist. There were two alcohol related crashes, one resulting in a fatality. The most common types of crashes were rear-end crashes (57%), angle crashes (22%), and sideswipe crashes (8%). The majority of crashes occurred during daylight (76%) hours with dry (89%) surface conditions. The primary contributing circumstances include driver inattention, distraction, or fatigue (30%), disregard traffic signal (14%), following too close (14%), and driving in a careless or reckless manner (14%).

6. Delaware Route 4 & Malvern Avenue

At the intersection of Delaware Route 4 & Malvern Avenue there were 4 total crashes. Of the 4 crashes, one (25%) resulted in personal injury. There were no crashes that involved a pedestrian or a pedalcyclist. There was also no alcohol related crashes. The most common types of crashes were rear-end crashes (75%) and sideswipe crashes (25%). The majority of crashes occurred during daylight (75%) hours with dry (75%) surface conditions. The primary contributing circumstances include driver inattention, distraction, or fatigue (50%) and driving in a careless or reckless manner (50%).

7. Delaware Route 4 & Signalized U-Turn

Crash data was not provided in the TIS.

8. Delaware Route 4 & Old Newark Road

At the intersection of Delaware Route 4 and Old Newark Road there were 8 total crashes. Of the 8 crashes, one (13%) resulted in personal injury. There were no crashes that involved a pedestrian and one that involved a pedalcyclist. One non-injury crash was alcohol related. The most common types of crashes were angle crashes (38%), rear-end crashes (25%), and a collision not involving two vehicles (25%). The majority of crashes occurred during daylight (88%) hours with dry (75%) surface conditions. The primary contributing circumstances include driver inattention, distraction, or fatigue (38%) and following too close (25%).

Based on information found in a 6abc online news article updated on July 23, 2016, McCormick Taylor identified an additional fatal crash that occurred on July 23, 2016 (the crash data provided in the TIS includes crashes up to July 6, 2016). This crash involved the driver of an SUV attempting to complete a left-turn from eastbound Delaware Route 4 to Old Newark Road and a westbound motorist on Delaware Route 4. The turning vehicle collided with the westbound vehicle, which police stated was speeding at the time of the crash. The driver of the westbound vehicle sustained fatal injuries as a result of the collision.

9. Delaware Route 4 & Brennen Drive/Pearson Drive

At the intersection of Delaware Route 4 & Pearson Drive there were 14 total crashes. Of the 14 crashes, 3 (21%) resulted in personal injury. There were no crashes that involved a pedestrian and one that involved a pedalcyclist. One non-injury crash was alcohol related. The most common type of crashes were rear-end crashes (71%) and angle crashes (14%). The majority of crashes occurred during daylight (86%) hours with dry (64%) or wet (29%) surface conditions. The primary contributing circumstances include driver inattention, distraction, or fatigue (36%), following too close (21%), and failed to yield right of way (14%). There were also 2 (14%) crashes of unknown contributing circumstance.

10. Delaware Route 4 & Augusta Drive

At the intersection of Delaware Route 4 & Augusta Drive there were 20 total crashes. Of the 20 crashes, one resulted in a fatality. A Delaware News Journal article, updated April 7, 2014, describes the fatal crash that occurred at approximately 10:09 p.m. on April 5, 2014. The crash involved a motorcycle colliding with an SUV. The motorcyclist was traveling eastbound on Delaware Route 4. As he approached Augusta Drive, an SUV attempted to turn left from westbound Delaware Route 4 to the Augusta Square Shopping Center. The motorcycle struck the passenger side of the SUV, ejecting the rider onto the road. The motorcycle rider sustained fatal injuries.

Of the total 20 crashes, 7 (35%) resulted in personal injury. There were no crashes that involved a pedestrian or a pedalcyclist. One non-injury crash was alcohol related. The most common type of crashes were rear-end crashes (55%), angle crashes (25%), and a collision not involving two vehicles (15%). The majority of the crashes occurred during daylight (60%) or dark-lighted (30%) hours with dry (85%) surface conditions. The primary contributing circumstances include driver inattention, distraction, or fatigue (40%), driving in a careless or reckless manner (25%), and failed to yield right of way (15%).

11. Delaware Route 4 & Salem Church Road

At the intersection of Delaware Route 4 & Salem Church Road there were 129 total crashes. Of the 129 crashes, 19 (15%) resulted in personal injury. There were no crashes that involved a pedalcyclist. There were 8 alcohol related crashes, one of which resulted in personal injury. The most common type of crashes were rear-end crashes (67%), angle crashes (17%), and sideswipe crashes (12%). The majority of the crashes occurred

during daylight (67%) or dark-lighted (29%) hours with dry (84%) surface conditions. The primary contributing circumstances include driver inattention, distraction, or fatigue (40%), following too close (16%), and driving in a careless or reckless manner (9%).

Automatic red light enforcement cameras are installed at this intersection.

12. Delaware Route 4 & Delaware Route 273 Off-Ramps

At the intersection of Delaware Route 4 & Delaware Route 273 off-ramps there were 26 total crashes. Of the 26 crashes, 4 (15%) resulted in personal injury. There were no crashes that involved a pedestrian or a pedalcyclist. Two non-injury crashes were alcohol related. The most common type of crashes were rear-end crashes (54%), a collision not involving two vehicles (23%), and angle crashes (15%). The majority of the crashes occurred during daylight (58%) or dark-lighted (38%) hours with dry (81%) surface conditions. The primary contributing circumstances include driver inattention, distraction, or fatigue (23%), following too close (23%), and driving in a careless or reckless manner (12%).

13. Marrows Road & Kensington Lane

Crash data was not provided in the TIS.

Sight Distance: The study area generally consists of straight and flat roadways, and there are few potential sight distance obstructions. Sight distance appears adequate throughout the study area.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: There are two existing DART bus stops in the immediate area of the proposed development. The stops are located on the southeast and northwest corners of the Delaware Route 4 & Gender Road/Prestbury Square intersection. The bus stops are located along existing sidewalk/trail but lack other amenities such as a shelter or bench. According to the interactive DART bus stop map, these stops are served by Route 33 (Christiana Mall/Newark). Route 33 runs seven days a week and provides service between the Newark Transit Hub and Downtown Wilmington.

DART Route 59 (Newark-Wilmington Train Connection) also runs along Delaware Route 4 through the study area. However, based on the DART interactive bus stop map, this route does not service the bus stops in the immediate area of the proposed development.

Newark Unicity bus routes N1 and N2 also run along Delaware Route 4 between Delaware Route 896 and Marrows Road, with service provided to Chestnut Hill Plaza (just to the west of the proposed development). Unicity bus service runs on weekdays only.

Planned transit service: The TIS does not include copies of correspondence with the Delaware Transit Corporation (DTC) regarding planned transit service. The TIS does note that DTC requests sidewalk along the site frontage on Delaware Route 4 with pedestrian access to the

grocery store entrance from the sidewalk. The TIS also states that "the current bus stops may have to be adjusted depending on the access design." It is unclear why the existing stops would need to be modified to accommodate the proposed development, unless this is specifically requested by DTC.

McCormick Taylor also reached out to the DTC planning section for input on existing and future transit facilities. DTC indicated that Delaware Route 4 will remain a highly served transit corridor in the future and requested pedestrian connectivity from the proposed development to both the existing DART Route 33 stops (eastbound and westbound) near the intersection of Delaware Route 4 & Gender Road.

Existing bicycle and pedestrian facilities: Based on the New Castle County Bicycle Map, Delaware Route 4 is classified as a "regional bicycle route with bikeway (high traffic)" throughout most of the study area. The East Coast Greenway (ECG) route also runs along Delaware Route 4 throughout the study area. The ECG map indicates that the bikeway runs along a trail on the north side of Delaware Route 4. There are also on-road bicycle facilities provided in both directions on Delaware Route 4. These facilities include bicycle lane markings on the shoulders and markings to guide cyclists through intersections with right-turn lanes.

Several other roadways within the study area are also identified as bicycle routes on the New Castle County Bicycle Map. Delaware Route 72 north of Delaware Route 4 is a "regional bicycle route with bikeway (high traffic)" and is also part of the ECG. Delaware Route 72 south of Delaware Route 4 is a "regional bicycle route without bikeway (high traffic and challenging for cyclists)." Old Newark Road is a "connector bicycle route without bikeway." Delaware Route 273/Salem Church Road is a "regional bicycle route with bikeway (portions challenging for cyclists)."

Existing pedestrian facilities (e.g., curb ramps, signal heads, pushbuttons, and crosswalks) generally appear to be ADA compliant and in good condition. There are existing sidewalks or paved paths along both sides of Delaware Route 4 throughout the majority of the study area. Sidewalk is provided only along the north side of Delaware Route 4 between the Delaware Route 273 ramps. Also, at the intersection of Delaware Route 4 & Augusta Drive, there is no clear path for pedestrians to cross the north leg of the intersection to continue along Delaware Route 4 or the short frontage road segment. Some segments of sidewalk in the study area are overgrown by adjacent brush and should be cleared of these obstructions. One example of this issue was noted on the south side of Delaware Route 4 between the Chestnut Hill Plaza Driveway and Gender Road.

Planned bicycle and pedestrian facilities: It is likely that the proposed development will generate both bicycle and pedestrian trips from the surrounding residential developments. Therefore, the site design and proposed access points must provide safe and efficient travel paths for these road users.

The TIS does not include copies of correspondence with DelDOT's Statewide and Regional Planning Section regarding planned or requested bicycle and pedestrian facilities in the area of this proposed development. The TIS notes that the Delaware Transit Corporation (DTC) requests

sidewalk along the site frontage on Delaware Route 4 with pedestrian access to the grocery store entrance from the sidewalk.

McCormick Taylor contacted DelDOT's Statewide and Regional Planning Section to obtain input on pedestrian and bicycle facilities in the vicinity of the proposed development. Maria Andaya provided a response via email on July 24, 2017 stating that the proposed Chestnut Hill Preserve development east of Gender Road would have a roadway connection to Gender Road south of the Holy Family Church property that will include a sidewalk out to Gender Road and connecting south to Breezewood Turn.

Previous Comments

Most comments from DelDOT's Scoping Letter, Traffic Count Review, and Preliminary TIS (PTIS) Review appear to have been addressed in the Final TIS submission. However, no evidence of coordination regarding transit, bicycle, and pedestrian facilities with DTC or DelDOT's Statewide and Regional Planning Section is included in the TIS.

General HCS Analysis Comments

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

- 1) For signalized intersections, the TIS only provides results summary sheets. Therefore, it is difficult to discern exactly what inputs may be different from those used by McCormick Taylor.
- 2) It appears that the analysis of signalized intersections in the TIS does not account for pedestrian timings. McCormick Taylor included pedestrian times in the analysis. Although pedestrian volumes are relatively low throughout the corridor, pedestrian times (when actuated) to cross Delaware Route 4 can be much longer than the time otherwise required to serve motor vehicle traffic.
- 3) The TIS utilized HCS 7, version 7.1 for all analyses. McCormick Taylor utilized an updated version of the software available at the time of the TIS review (HCS 7, version 7.2.1).
- 4) McCormick Taylor used a base saturation flow rate of 1,900 pcphpl for all analyses.
- 5) McCormick Taylor's HCS analyses incorporated field-measured approach grades. It appears that the TIS may have assumed 0% approach grades throughout the study area.
- 6) Both the TIS and McCormick Taylor assumed 3% heavy vehicle traffic entering and exiting the site. Heavy vehicle percentages at other study intersections were assumed to be the same as existing conditions.
- 7) The TIS utilized a PHF of 0.92 at all proposed site driveways. McCormick Taylor used PHFs of 0.80-0.92 based on the total projected intersection volumes and guidance found in the *DelDOT Development Coordination Manual*.

Table 3PEAK HOUR LEVELS OF SERVICE (LOS)based on Traffic Impact Study Report for TLBT, LLC - NewarkReport dated May 17, 2017Prepared by The Traffic Group

Signalized Intersection ¹	LOS per TIS			Мс	LOS per Cormick Ta	ylor
1) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Delaware Route 72	AM	PM	Mid-Day	AM	PM	Mid-Day
2017 Existing	D (44.7)	D (49.4)	D (39.8)	D (45.2)	E (56.2)	D (41.2)
2018 without Development	D (45.3)	D (50.8)	D (39.8)	D (45.8)	E (58.3)	D (41.2)
2018 with Development	D (45.6)	D (51.7)	D (39.6)	D (46.0)	E (59.4)	D (41.2)

¹ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 4 PEAK HOUR LEVELS OF SERVICE (LOS) based on Traffic Impact Study Report for TLBT, LLC - Newark Report dated May 17, 2017 Prepared by The Traffic Group

Signalized Intersection ²	LOS per TIS			Мс	LOS per Cormick Ta	ylor
2) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Kingston Road	AM	PM	Mid-Day	AM	PM	Mid-Day
2017 Existing	A (2.8)	A (3.1)	A (3.3)	A (7.5)	A (8.9)	A (8.2)
2018 without Development	A (2.7)	A (3.0)	A (3.2)	A (7.7)	A (9.2)	A (8.3)
2018 with Development	A (2.7)	A (3.0)	A (3.1)	A (7.9)	A (9.5)	A (8.5)

 $^{^{2}}$ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 5 PEAK HOUR LEVELS OF SERVICE (LOS) based on Traffic Impact Study Report for TLBT, LLC - Newark Report dated May 17, 2017 Prepared by The Traffic Group

Signalized Intersection ³	LOS per TIS			Мс	LOS per Cormick Ta	ylor
3) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Marrows Road	AM	PM	Mid-Day	AM	PM	Mid-Day
2017 Existing	B (18.1)	C (27.9)	C (26.7)	C (23.1)	C (32.4)	C (30.0)
2018 without Development	B (18.6)	C (29.3)	C (27.9)	C (23.8)	C (33.8)	C (31.3)
2018 with Development	B (19.2)	C (29.7)	C (28.4)	C (24.7)	C (34.5)	C (31.8)

³ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 6 PEAK HOUR LEVELS OF SERVICE (LOS) based on Traffic Impact Study Report for TLBT, LLC - Newark Report dated May 17, 2017 Prepared by The Traffic Group

Unsignalized Intersection ⁴	LOS per TIS			LOS per				
					McCormick Taylor			
4) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday		
Martindale Drive/Chestnut Hill Plaza ⁵	AM	PM	Mid-Day	AM	PM	Mid-Day		
2017 Existing								
Eastbound DE 4 -Left	A (9.5)	B (13.8)	A (9.6)	A (9.6)	B (13.8)	A (9.7)		
Westbound DE 4 - Left	B (14.1)	B (13.5)	A (10.0)	B (14.1)	B (13.6)	B (10.3)		
Northbound Chestnut Hill Plaza – Right	C (16.7)	C (17.1)	B (12.5)	C (16.9)	C (17.7)	B (13.3)		
Southbound Martindale Drive – Right	B (11.6)	B (14.8)	B (11.4)	B (11.6)	B (14.7)	B (11.6)		
2018 without Development								
Eastbound DE 4 -Left	A (9.6)	B (14.4)	A (9.8)	A (9.8)	B (14.3)	A (9.9)		
Westbound DE 4 - Left	B (14.5)	B (14.1)	B (10.4)	B (14.5)	B (14.3)	B (10.7)		
Northbound Chestnut Hill Plaza – Right	C (17.1)	C (17.8)	B (13.0)	C (17.4)	C (18.4)	B (13.8)		
Southbound Martindale Drive – Right	B (11.8)	C (15.3)	B (11.7)	B (11.8)	C (15.1)	B (11.9)		
2018 with Development								
Eastbound DE 4 -Left	A (9.8)	C (15.1)	B (10.4)	A (9.9)	B (15.0)	B (10.5)		
Westbound DE 4 - Left	C (15.1)	B (15.0)	B (11.2)	C (15.1)	C (15.1)	B (11.6)		
Northbound Chestnut Hill Plaza – Right	C (17.8)	C (18.9)	B (14.1)	C (18.1)	C (19.6)	C (15.1)		
Southbound Martindale Drive – Right	B (12.0)	C (15.8)	B (12.4)	B (12.1)	C (15.7)	B (12.6)		

⁴ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

⁵ The TIS utilized a Saturday mid-day PHF of 0.98. Based on the turning movement counts, McCormick Taylor calculated the Saturday mid-day PHF to be 0.93 and utilized this value in the analysis.

Table 7 PEAK HOUR LEVELS OF SERVICE (LOS) based on Traffic Impact Study Report for TLBT, LLC - Newark Report dated May 17, 2017 Prepared by The Traffic Group

Signalized Intersection ⁶		LOS per TIS LOS per McCormick Ta			ylor	
5) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Prestbury Square/Gender Road	AM	PM	Mid-Day	AM	PM	Mid-Day
2017 Existing	B (13.1)	B (10.1)	A (8.4)	B (18.9)	B (16.6)	B (13.5)
2018 without Development	B (13.2)	B (10.5)	A (8.6)	B (19.2)	B (17.2)	B (13.9)
2018 with Development	B (16.9)	B (18.3)	B (18.3)	C (23.2)	C (25.2)	C (24.3)

⁶ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 8 PEAK HOUR LEVELS OF SERVICE (LOS) based on Traffic Impact Study Report for TLBT, LLC - Newark Report dated May 17, 2017 Prepared by The Traffic Group

Unsignalized Intersection ⁷	LOS per TIS			Мс	LOS per Cormick Ta	vlor
6) Delaware Route 4 &	Weekdav	Weekday	Saturday	Weekday	Weekday	Saturday
Malvern Avenue	AM	PM	Mid-Day	AM	PM	Mid-Day
2017 Existing						
Eastbound DE 4 – Left	B (10.2)	C (15.1)	A (9.9)	B (11.1)	C (15.0)	A (9.8)
Southbound Malvern Avenue - Right	B (11.6)	C (17.2)	B (11.5)	B (11.5)	C (16.8)	B (11.4)
	•	•		•	•	•
2018 without Development						
Eastbound DE 4 – Left	B (10.4)	C (15.7)	B (10.1)	B (11.3)	C (15.6)	B (10.1)
Southbound Malvern Avenue - Right	B (11.8)	C (17.7)	B (11.8)	B (11.7)	C (17.3)	B (11.6)
2018 with Development						
Eastbound DE 4 – Left	B (10.6)	C (16.3)	B (10.6)	B (11.6)	C (16.2)	B (10.5)
Southbound Malvern Avenue - Right	B (12.0)	C (18.4)	B (12.4)	B (11.8)	C (18.0)	B (12.3)

⁷ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 9 PEAK HOUR LEVELS OF SERVICE (LOS) based on Traffic Impact Study Report for TLBT, LLC - Newark Report dated May 17, 2017 Prepared by The Traffic Group

Signalized Intersection ⁸	LOS per TIS			Мс	LOS per Cormick Ta	ylor
7) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Signalized U-Turn ^{9,10}	AM	PM	Mid-Day	AM	PM	Mid-Day
2017 Existing	A (7.3)	A (6.1)	A (6.1)	A (2.9)	A (1.8)	A (1.5)
2018 without Development	A (7.8)	A (6.2)	A (6.2)	A (3.0)	A (1.8)	A (1.6)
2018 with Development	A (8.1)	A (6.0)	A (5.8)	A (3.0)	A (1.9)	A (1.7)

⁸ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall

intersection delay. ⁹ McCormick Taylor was not able to locate signal timing information for this traffic signal in the TIS. McCormick Taylor estimated a 20-second split for the U-Turn movement. ¹⁰ It appears that the TIS did not code permitted left-turns for the westbound approach. Since turns are allowed on

flashing red with caution after stop, McCormick Taylor coded permitted westbound left-turns.

Table 10 PEAK HOUR LEVELS OF SERVICE (LOS) based on Traffic Impact Study Report for TLBT, LLC - Newark Report dated May 17, 2017 Prepared by The Traffic Group

Unsignalized Intersection ¹¹		I OS nor TIS	2		LOS per		
Unsignanzed Intersection	LOS per 115			McCormick Taylor			
8) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday	
Old Newark Road ¹²	AM	PM	Mid-Day	AM	PM	Mid-Day	
2017 Existing							
Eastbound DE 4 – Left	B (10.4)	C (19.5)	B (10.7)	B (10.3)	C (19.9)	B (10.4)	
Southbound Old Newark Road - Right	C (17.1)	D (26.2)	B (14.6)	C (16.2)	C (23.6)	B (13.5)	
	•	•	<u> </u>	•	•	· · · · ·	
2018 without Development							
Eastbound DE 4 – Left	B (10.5)	C (20.7)	B (11.0)	B (10.5)	C (21.2)	B (10.7)	
Southbound Old Newark Road - Right	C (17.7)	D (28.4)	C (15.3)	C (16.8)	D (25.3)	B (14.0)	
2018 with Development							
Eastbound DE 4 – Left	B (10.7)	C (21.9)	B (11.6)	B (10.7)	C (22.4)	B (11.3)	
Southbound Old Newark Road - Right	C (18.7)	D (30.6)	C (16.6)	C (17.6)	D (27.0)	C (15.0)	

¹¹ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

¹² The TIS utilized a Saturday mid-day PHF of 0.90. Based on the turning movement counts, McCormick Taylor calculated the Saturday mid-day PHF to be 0.94 and utilized this value in the analysis.

Table 11PEAK HOUR LEVELS OF SERVICE (LOS)based on Traffic Impact Study Report for TLBT, LLC - NewarkReport dated May 17, 2017Prepared by The Traffic Group

Signalized Intersection ¹³	LOS per TIS			LOS per McCormick Taylor		
9) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Brennen Drive/Pearson Drive ¹⁴	AM	PM	Mid-Day	AM	PM	Mid-Day
2017 Existing	B (17.5)	A (7.8)	A (7.2)	C (20.1)	B (17.6)	B (11.5)
2018 without Development	B (18.0)	A (8.1)	A (7.2)	C (20.4)	B (18.3)	B (11.7)
2018 with Development	B (18.2)	A (8.3)	A (7.3)	C (20.7)	B (18.9)	B (12.1)

¹³ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

¹⁴ During a field visit in June 2017, McCormick Taylor noted separate left-turn/thru and right-turn lanes painted on the southbound approach. McCormick Taylor's analysis included these separate lanes on the southbound approach.

Table 12PEAK HOUR LEVELS OF SERVICE (LOS)based on Traffic Impact Study Report for TLBT, LLC - NewarkReport dated May 17, 2017Prepared by The Traffic Group

Signalized Intersection ¹⁵	LOS per TIS			LOS per McCormick Taylor		
10) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Augusta Drive	AM	PM	Mid-Day	AM	PM	Mid-Day
2017 Existing	A (3.8)	A (2.9)	A (3.3)	A (9.5)	A (9.0)	A (7.4)
2018 without Development	A (3.8)	A (3.1)	A (3.5)	A (9.8)	A (9.5)	A (7.9)
2018 with Development	A (3.8)	A (3.0)	A (3.3)	A (9.9)	A (9.7)	A (7.8)

¹⁵ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 13PEAK HOUR LEVELS OF SERVICE (LOS)based on Traffic Impact Study Report for TLBT, LLC - NewarkReport dated May 17, 2017Prepared by The Traffic Group

Signalized Intersection ¹⁶	LOS per TIS			Мс	LOS per Cormick Ta	ıylor
11) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Salem Church Road	AM	PM	Mid-Day	AM	PM	Mid-Day
2017 Existing	D (43.5)	D (46.6)	C (30.3)	E (57.4)	E (65.7)	C (33.7)
2018 without Development	D (45.4)	D (50.8)	C (30.5)	E (61.0)	E (70.9)	C (34.0)
2018 with Development	D (46.2)	D (54.0)	C (30.7)	E (62.8)	E (74.4)	C (34.6)

¹⁶ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 14PEAK HOUR LEVELS OF SERVICE (LOS)based on Traffic Impact Study Report for TLBT, LLC - NewarkReport dated May 17, 2017Prepared by The Traffic Group

Signalized Intersection ¹⁷	LOS per TIS			LOS per McCormick Taylor		
12) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Delaware Route 273 Off-Ramps	AM	PM	Mid-Day	AM	PM	Mid-Day
2017 Existing	A (3.3)	A (7.5)	A (4.9)	A (7.3)	A (9.6)	A (5.2)
2018 without Development	A (3.4)	A (7.5)	A (5.0)	A (7.6)	A (9.8)	A (5.5)
2018 with Development	A (3.4)	A (7.4)	A (4.7)	A (8.2)	A (9.8)	A (5.4)

¹⁷ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 15 PEAK HOUR LEVELS OF SERVICE (LOS) based on Traffic Impact Study Report for TLBT, LLC - Newark Report dated May 17, 2017 Prepared by The Traffic Group

Unsignalized Intersection ¹⁸	LOS per TIS		LOS per			
	-		T	Mc	Cormick Ta	ylor
13) Marrows Road &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Kensington Lane / Brookside Plaza	AM	PM	Mid-Day	AM	PM	Mid-Day
Entrance	1 11/1	1 1/1			1111	
2017 Existing						
Eastbound Kensington Lane – Left/Thru	C (19.3)	D (30.0	C (23.5)	C (19.2)	C (29.6)	C (23.4)
Eastbound Kensington Lane - Right	A (9.8)	B (11.5)	B (10.5)	A (9.8)	B (11.5)	B (10.6)
Westbound Brookside Plaza – Left/Thru	C (17.6)	E (48.0)	D (32.0)	C (17.5)	E (47.5)	D (32.2)
Westbound Brookside Plaza - Right	B (10.2)	B (10.6)	B (10.6)	B (10.2)	B (10.6)	B (10.6)
Northbound Marrows Road	A (8.0)	A (8.3)	A (8.0)	A (8.0)	A (8.3)	A (8.0)
Southbound Marrows Road	A (8.1)	A (8.1)	A (8.1)	A (8.0)	A (8.1)	A (8.1)
2018 without Development						
Eastbound Kensington Lane – Left/Thru	C (22.0)	E (44.1)	E (42.4)	C (21.9)	E (43.4)	E (41.7)
Eastbound Kensington Lane – Right	A (9.8)	B (11.4)	B (10.3)	A (9.9)	B (11.4)	B (10.5)
Westbound Brookside Plaza – Left/Thru	C (20.0)	F (185.8)	F (221.8)	C (19.8)	F (181.8)	F (219.7)
Westbound Brookside Plaza – Right	B (10.4)	B (11.2)	B (11.5)	B (10.3)	B (11.2)	B (11.6)
Northbound Marrows Road	A (8.0)	A (8.3)	A (8.0)	A (8.0)	A (8.3)	A (7.9)
Southbound Marrows Road	A (8.2)	A (8.4)	A (8.6)	A (8.1)	A (8.3)	A (8.5)
2018 with Development						
Eastbound Kensington Lane – Left/Thru	C (23.4)	E (49.7)	F (54.0)	C (23.2)	E (48.7)	F (53.0)
Eastbound Kensington Lane – Right	A (10.0)	B (11.6)	B (10.7)	B (10.0)	B (11.6)	B (10.8)
Westbound Brookside Plaza – Left/Thru	C (21.1)	F (232.0)	F (335.8)	C (20.9)	F (228.4)	F (331.6)
Westbound Brookside Plaza – Right	B (10.5)	B (11.4)	B (12.0)	B (10.4)	B (11.4)	B (12.1)
Northbound Marrows Road	A (8.1)	A (8.4)	A (8.1)	A (8.1)	A (8.4)	A (8.1)
Southbound Marrows Road	A (8.2)	A (8.4)	A (8.7)	A (8.2)	A (8.4)	A (8.7)
2018 with Development						
Proposed All-Way Stop with added						
Southbound Left-Turn Lane						
Eastbound Kensington Lane – Left/Thru	B (11.1)	B (12.5)	B (12.5)	B (11.0)	B (12.5)	B (12.4)
Eastbound Kensington Lane – Right	A (8.9)	B (11.1)	B (10.8)	A (8.9)	B (11.1)	B (10.8)
Westbound Brookside Plaza – Left/Thru	B (10.7)	C (15.7)	C (16.8)	B (10.7)	C (15.7)	C (16.7)
Westbound Brookside Plaza – Right	A (9.1)	B (11.9)	B (12.0)	A (9.1)	B (11.8)	B (12.0)
Northbound Marrows Road	C (16.1)	D (30.5)	D (32.8)	C (16.1)	D (30.2)	D (32.5)
Southbound Marrows Road – Left	A (9.5)	B (12.0)	B (13.3)	A (9.5)	B (11.9)	B (13.2)
Southbound Marrows Road - Thru/Right	B (12.9)	E (39.4)	C (23.0)	B (12.9)	E (39.0)	C (22.9)
OVERALL	B (13.4)	D (27.3)	C (22.3)	B (13.3)	D (27.0)	C (22.2)

¹⁸ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Additional notes about the Marrows Road & Kensington Lane / Brookside Plaza Entrance intersection:

This is an existing, two-way stop-controlled intersection located approximately 950' north of the traffic signal at Delaware Route 4 and Marrows Road and approximately 520' south of the traffic signal at Marrows Road and Brookside Boulevard. Separate right-turn lanes are currently provided on the side-street approaches. In the 2018 without and with development cases, both the eastbound and westbound through/left-turn lanes are expected to operate at LOS E / F in the weekday PM and Saturday mid-day peak hours, with 95th percentile queue lengths on the westbound approach exceeding 300 feet long. Much of the increased delay for these movements can be attributed to the planned 22,000 square-foot expansion of the existing Brookside Plaza shopping center located on the east side of this intersection.

To mitigate the expected LOS issues, the developer of TLBT, LLC is proposing to re-configure this intersection as an all-way stop with an added southbound left-turn lane. Under this proposed condition, the previously mentioned side-street LOS issues are mitigated but the southbound through/right-turn lane is expected to operate at LOS E. We have several other concerns with the proposed configuration:

- 1. By providing multi-lane approaches on the eastbound, westbound, and southbound approaches, drivers stopped at the intersection may be unable to accurately determine what vehicle has the right-of-way, especially if two vehicles are at the stop bar on one or more approaches. Although the all-way stop control will provide for slower vehicle speeds, this may lead to an increased number of angle and/or sideswipe crashes. Thus, all-way stops are typically limited to intersections with single lane approaches. It is noted that this condition may be mitigated with sufficient advance warning signs and pavement markings.
- 2. Furthermore, all-way stops are typically used where traffic volumes on both intersecting roadways are approximately equal. However, the traffic volumes on Marrows Road are significantly higher than those on Kensington Lane / Brookside Plaza.
- 3. Finally, based on preliminary investigation using available volume data provided in the TIS, it appears that a new traffic signal is unlikely to be warranted at this intersection. Potential installation of a signal at this location, if desired after further coordination with DelDOT, would depend on the results of a Traffic Signal Justification Study.

Table 16 PEAK HOUR LEVELS OF SERVICE (LOS) based on Traffic Impact Study Report for TLBT, LLC - Newark Report dated May 17, 2017 Prepared by The Traffic Group

Unsignalized Intersection ¹⁹	LOS per TIS			Мс	LOS per Cormick Ta	ylor
14) Gender Road &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Site Access B	AM	PM	Mid-Day	AM	PM	Mid-Day
2018 with Development						
Eastbound Site Egress	B (11.1)	B (13.5)	B (11.8)	B (12.1)	B (14.6)	B (13.1)
Northbound Gender Road - Left	A (7.6)	A (8.0)	A (7.7)	A (7.6)	A (8.0)	A (7.8)

¹⁹ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 17 PEAK HOUR LEVELS OF SERVICE (LOS) based on Traffic Impact Study Report for TLBT, LLC - Newark Report dated May 17, 2017 Prepared by The Traffic Group

Unsignalized Intersection ²⁰	LOS per TIS			Мс	LOS per Cormick Ta	ylor
15) Delaware Route 4 &	Weekday	Weekday	Saturday	Weekday	Weekday	Saturday
Site Access A	AM	PM	Mid-Day	AM	PM	Mid-Day
2018 with Development						
Northbound Site Egress - Right	B (14.2)	C (15.2)	B (12.7)	C (17.3)	C (16.8)	B (13.8)

²⁰ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.