



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

NICOLE MAJESKI
SECRETARY

June 17, 2021

Mr. Michael Kaszyski
Duffield Associates, Inc.
5400 Limestone Road
Wilmington, DE 19808

Dear Mr. Kaszyski:

The enclosed Traffic Impact Study (TIS) review letter for the proposed **Garrett Woods** (Tax Parcels 10-028.00-052 and 10.028.00-030) development 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 Development Coordination Manual and other accepted practices and procedures for such studies. DelDOT accepts this letter and concurs with the recommendations. If you have any questions concerning this letter or the enclosed review letter, please contact me at (302) 760-2124.

Sincerely,

Claudy Joinville
Project Engineer

CJ:km

Enclosures

cc with enclosures: Mr. David Cantera, Owner Trustee
Mr. Larry Tarabicos, Tarabicos Grosso
Mr. David Edgell, 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. Mark Wolanski, New Castle County Department of Land Use
Mr. Mir Wahed, Johnson, Mirmiran & Thompson, Inc.
Ms. Joanne Arellano, Johnson, Mirmiran & Thompson, Inc.
DelDOT Distribution

DelDOT Distribution

Brad Eaby, Deputy Attorney General

Shanté Hastings, Deputy Secretary

J. Marc Coté, Director, Planning

Mark Luszcz, Deputy Director, DOTS

Todd Sammons, Assistant Director, Development Coordination

T. William Brockenbrough, Jr., County Coordinator, Development Coordination

Peter Haag, Chief Traffic Engineer, Traffic, DOTS

Brian Schilling, Canal District Engineer, Canal District

Matthew Vincent, Canal District Public Works Engineer, Canal District

Jared Kaufmann, Service Development Planner, Delaware Transit Corporation

Anthony Aglio, Planning Supervisor, Statewide & Regional Planning

Wendy Polasko, Subdivision Engineer, Development Coordination

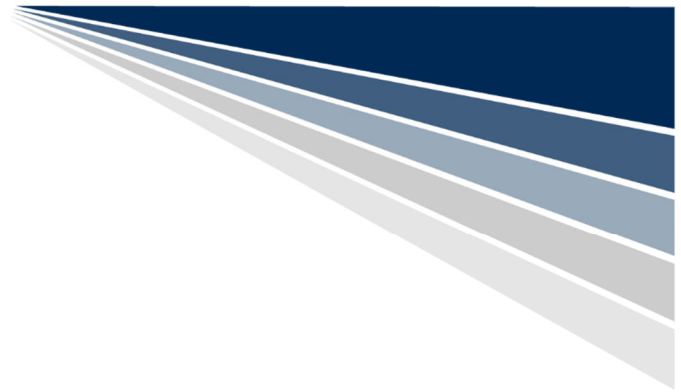
Sireen Muhtaseb, New Castle Review Coordinator, Development Coordination

Pao Lin, Subdivision Manager, Development Coordination

Mark Galipo, Traffic Engineer, Traffic, DOTS

Claudy Joinville, Project Engineer, Development Coordination

Annamaria Fumato, Project Engineer, Development Coordination



June 17, 2021

Mr. Troy E. Brestel
Project Engineer
Development Coordination, Division of Planning
800 Bay Road
Dover, DE 19901

RE: Agreement No. 1945F
Project Number T202069012
Traffic Impact Study Services
Task 17A – Garrett Woods

Dear Mr. Brestel:

Johnson, Mirmiran and Thompson (JMT) has completed a review of the Traffic Impact Study (TIS) for Garrett Woods, which was prepared by Duffield Associates, Inc. in October 2020. This review was assigned as Task Number 17A. The report is prepared in a manner generally consistent with DelDOT's *Development Coordination Manual*.

The TIS evaluates the impacts of a proposed residential development in New Castle County, Delaware. The development would be comprised of 38 single-family detached houses, 28 twin houses, and 104 mid-rise townhouses. The site is located on the southeast corner of the Delaware Route 273 and northbound Delaware Route 1 Ramp intersection, in New Castle County. The subject property is on an approximately 50.6-acre assemblage of parcels that is zoned as ST (Suburban Transition) and the developer does not plan to rezone the land. A single right-in/right-out/left-in access point (Case 3a) was proposed on Delaware Route 273. Construction is anticipated to be complete in 2024.

DelDOT is currently implementing the reconstruction of the Delaware Route 273 intersections with Wedgefield Drive, Appleby Road, and Airport Road as part of DelDOT's *HSIP NCC, SR 273, Appleby Road to Airport Road* project (Contract No. T200900704). As part of this project, dual left turn lanes will be implemented along eastbound Delaware Route 273 to Airport Road, and an additional through lane will be installed along westbound Delaware Route 273, starting as a lane addition from the southbound Airport Road right turn and extending just west of Appleby Road. In addition, the existing left turn lane along eastbound Delaware Route 273 at Wedgefield Drive will be eliminated. The project will also provide bike lanes, and new sidewalks along both sides of Delaware Route 273 within the project limits. Bus stops within the project area are being consolidated as part of this project, and new bus pads and shelters are being constructed along Delaware Route 273 as well. The existing mid-block pedestrian crossing along Delaware Route 273 at Wedgefield Drive will also be removed. Construction of this project is anticipated to be completed in Fall 2021.

DelDOT's *SR 1 Widening, Road A to Tybouts Corner* project is currently investigating improvement alternatives at the Delaware Route 273 intersections with Delaware Route 7 and the



Delaware Route 1 ramps. The project is currently in the conceptual planning stage and DelDOT is expecting the preferred alternative to be identified by late 2021. The anticipated date of construction is currently unknown. Based on the preferred alternative selected, this improvement project may have significant impacts to the Garrett Woods site layout and may result in a total acquisition of the site or changes to the proposed access point geometry. Additional information regarding this improvement project can be found on DelDOT’s website located at <https://deldot.gov/information/projects/sr1/sr1-wide/>.

Based on our review of the TIS, we have the following comments and recommendations: The table below shows intersections which exhibit level of service (LOS) deficiencies without the implementation of any physical roadway and/or traffic control improvements. This table incorporates the traffic analysis for Cases 2 and 3 conditions (with and without the development) with the improvements from the *HSIP NCC, SR 273, Appleby Road to Airport Road* project. The table does not include any signalized intersections that exhibit LOS deficiencies under Case 1, 2, or 3 due to the utilization of splits from the DelDOT Timing Plans that can be mitigated with signal timing split optimization while maintaining the existing signal cycle lengths as the developer would not be recommended to do any additional improvements to the signal timing splits.

Intersection	LOS Deficiencies Occur		Case
	AM	PM	
Appleby Road/1 st Entrance to Community Plaza		X	Case 1- 2019 Existing
		X	Case 2- 2024 without development
		X	Case 3- 2024 with development
Delaware Route 273/Delaware Route 7/E. Main Street (New Castle Road 18A)		X	Case 2- 2024 without development
		X	Case 3- 2024 with development

The existing unsignalized intersection of Appleby Road with the 1st Entrance to Community Plaza exhibits LOS deficiencies during the PM peak hour under existing and future conditions with and without the proposed development. These deficiencies occur along the westbound 1st Entrance approach of Community Plaza with delays of up to 67.1 seconds per vehicle and 95th percentile queues up to approximately 135 feet.

To mitigate the LOS deficiencies, reconfiguring the intersection as a roundabout or signal could be investigated but, due to the proximity of the adjacent Delaware Route 273 and Appleby Road intersection, neither of these options appear to be feasible at this location. Adding an additional through lane along the southbound Appleby Road approach could also mitigate the capacity constraints, but would require roadway widening and potential right-of-way acquisitions. In addition, it is anticipated that the number of vehicles making a left from the 1st Entrance to



Community Plaza will reduce with the completion of the DelDOT improvement project, which would in turn lessen the time delay at the intersections of Delaware Route 273 and Appleby and Airport Roads. This improvement will also eliminate the need for left turning vehicles at these intersections to cut through the shopping center to avoid the delay. Based on these factors, we do not recommend the developer implement any improvements at this intersection.

The signalized intersection of Delaware Route 273 with Delaware Route 7/E. Main Street (New Castle Road 18A) exhibits LOS deficiencies during the PM peak hour under future conditions with or without the proposed development, with delays of up to 79.0 seconds per vehicle during the PM peak hour. A few improvement scenarios such as reconfiguring the southbound Delaware Route 7/E. Main Street approach and providing a lane addition from the eastbound Delaware Route 273 right turn onto southbound Delaware Route 7, were investigated to mitigate the deficiencies. Based on the initial analyses conducted and provided in the TIS Review Letter dated December 4, 2020, LOS deficiencies remain at the intersection despite these improvements.

Since the initial analyses was conducted, Duffield Associates, Inc. submitted an additional gap study which justified the reduction of headways at the intersection. With these reduced headways, the Delaware Route 273 intersection with Delaware Route 7/E. Main Street would operate at acceptable LOS with the reconfiguration of the southbound approach and provision of an additional lane from the eastbound Delaware Route 273 right turn onto southbound Delaware Route 7. To further validate the findings of the gap study, JMT conducted a supplemental Synchro analysis which confirmed the intersection can operate at acceptable LOS with the improvements identified above. Additionally, DelDOT's *SR 1 Widening, Road A to Tybouts Corner* project is currently investigating improvements at the intersection to allow for acceptable LOS. Based on this improvement project, we do not recommend the developer implement any additional improvements at this intersection. It is recommended that the developer coordinate with DelDOT on the implementation and equitable cost sharing of the DelDOT SR 1 widening project.

The site access will be constructed along eastbound Delaware Route 273, approximately 850 feet east of the Delaware Route 273 intersection with the NB Delaware Route 1 Ramps. A single right-in/right-out/left-in access point (Case 3a) was initially proposed on Delaware Route 273 when the TIS was originally scoped between DelDOT and the developer. However, based on additional correspondence between JMT and DelDOT on November 30, 2020, JMT was asked to investigate implementing a right-in/right-out only access point (Case 3b) along Delaware Route 273. Based on both alternatives operating with acceptable LOS and the low number of left turns expected to access the site with upstream signal metering, the left-in is recommended to be implemented. However, the developer should confirm that adequate sight distances exist for the left turn movement and coordinate with DelDOT regarding the *SR 1 Widening, Road A to Tybouts Corner* project to determine the feasibility of this geometry.

DelDOT's *SR 1 Widening, Road A to Tybouts Corner* project may require significant acquisitions of the Garrett Woods property which may make development of the site infeasible or may require the site access to be reconfigured. Should the DelDOT project allow the Garrett Woods parcels to be developed and New Castle County approves 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. DelDOT's *SR 1 Widening, Road A to Tybouts Corner* project may require major acquisitions within the development area. Until a preferred alternative is selected as part of this capital project, all the impacts related to the SR 1 widening project cannot be identified. The developer should continue to coordinate with DelDOT to determine these impacts as early as possible in development of their plans for the proposed subdivision.
2. The developer should provide a bituminous concrete overlay to the existing travel lanes along the Delaware Route 273 site frontage in the area affected by entrance plan construction, including any auxiliary lanes, at DelDOT's discretion. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer, if necessary.
3. The developer should construct a rights-in/rights-out/lefts-in access site entrance for the proposed Garrett Woods development to be consistent with the lane configurations shown in the table below.

The treatment of this access should be coordinated with the *SR 1 Widening, Road A to Tybouts Corner* project before it is approved. This entrance configuration is based on the existing geometry at the entrance and may not be possible due to the proposed DelDOT project. In addition, the developer should ensure adequate sight lines are provided for the left turn lane along westbound Delaware Route 273 and a stop sign should be installed along this movement. If a sight distance constraint exists for this left turn movement or the DelDOT project does not allow for the lefts in, the developer should construct the site entrance as right-in/right-out only access. In the Plan review process, DelDOT will require a sight distance evaluation.

Approach	Current Configuration	Proposed Configuration
Eastbound Delaware Route 273	Two through lanes	Two through lanes, and one right-turn lane
Westbound Delaware Route 273	Two through lanes, and one left-turn lane	Two through lanes, and one left-turn lane
Northbound Site Entrance	Approach does not exist	One channelized right-turn lane

Based on DelDOT's *Development Coordination Manual*, the recommended minimum storage lengths along Delaware Route 273 is 350 feet (excluding taper) on the eastbound approach right turn lane and 235 feet (excluding taper) on the westbound approach left turn lane. The calculated queue lengths from the HCS analysis can be accommodated within the recommended storage lengths



4. In addition to the entrance along Delaware Route 273, the developer should investigate an alternative connection to Tax Parcel 10-028.00-055.
5. The developer should enter into an agreement with DelDOT to fund an equitable portion of the improvements to the Delaware Route 273 and Delaware Route 7 intersection as part of the *SR 1 Widening, Road A to Tybouts Corner* project. The developer should coordinate with DelDOT on the implementation and equitable cost sharing of these intersection improvements. To satisfy the County Code, the developer shall include a note to the plans that states that “No building permits may be issued until DelDOT’s *SR 1 Widening, Road A to Tybouts Corner* project is awarded or under construction.” Alternatively, the Developer may choose to construct improvements necessary to achieve LOS D or better at their expense. In either case, building permits would be limited until a contract for such improvements has either been awarded or is under construction.
6. The following bicycle, pedestrian, and transit improvements should be included:
 - a. A minimum fifteen-foot wide permanent easement from the edge of the right-of-way should be dedicated to DelDOT along the Delaware Route 273 site frontage. The developer should construct a ten-foot wide shared use path. The path should be constructed to meet AASHTO and ADA standards, placed behind utility poles where feasible. The developer should coordinate with DelDOT’s Development Coordination section during the plan review process to identify the exact location of the SUP.
 - b. An internal connection from the SUP along eastbound Delaware Route 273 into the site should be installed.
 - c. Coordinate with DART to determine if additional transit stops would be needed for the Garrett Woods development.
 - d. Where internal sidewalks are located alongside of parking spaces, a buffer, physical barrier, or signage should be added to eliminate vehicular overhang onto the sidewalk.
 - e. Per the DCM, a shoulder shall be provided with any roadway improvement matching the roadway functional classification or existing conditions.
 - f. ADA compliant curb ramps and marked crosswalks should be provided along the Site Entrance approach to Delaware Route 273. The use of diagonal curb ramps is discouraged. The curb ramps should be designed to accommodate the SUP.
 - g. A minimum five-foot wide bicycle lane should be incorporated in the right turn lane and shoulder along the Delaware Route 273 approaches to the site entrance.



- h. Utility covers should be moved outside of any designated bicycle lanes and any proposed sidewalks/shared-use paths or should be flush with the pavement.

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

Improvements in this TIS may be considered "significant" under DeIDOT's *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DeIDOT's website at https://www.deldot.gov//Publications/manuals/de_mutcd/index.shtml. For any additional information regarding the work zone impact and mitigation procedures during construction please contact Mr. Don Weber, Assistant Director for Traffic Operations and Management. Mr. Weber can be reached at (302) 659-4651 or by email at Don.Weber@delaware.gov.

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

Sincerely,
Johnson, Mirmiran, and Thompson, Inc.

Mir Wahed
Mir Wahed, P.E., PTOE

cc: Joanne M. Arellano, P.E., PTOE

Enclosure

General Information

Report date: October 2020

Prepared by: Duffield Associates, Inc.

Prepared for: David M. Cantera Trustee, & Matthew G. Jackson

Tax Parcels: 10-028.00-052 and 10.028.00-030

Generally consistent with DelDOT's *Development Coordination Manual (DCM)*: Yes

Project Description and Background

Description: The developer seeks to develop 38 single-family detached houses, 28 twin houses, and 104 mid-rise townhouses.

Location: The subject site is located on the southeast corner of the intersection of Delaware Route 273 and the Northbound Delaware Route 1 Ramp, in New Castle County.

Amount of Land to be developed: An approximately 50.6-acre assemblage of parcels

Land Use approval(s) needed: Entrance Plan.

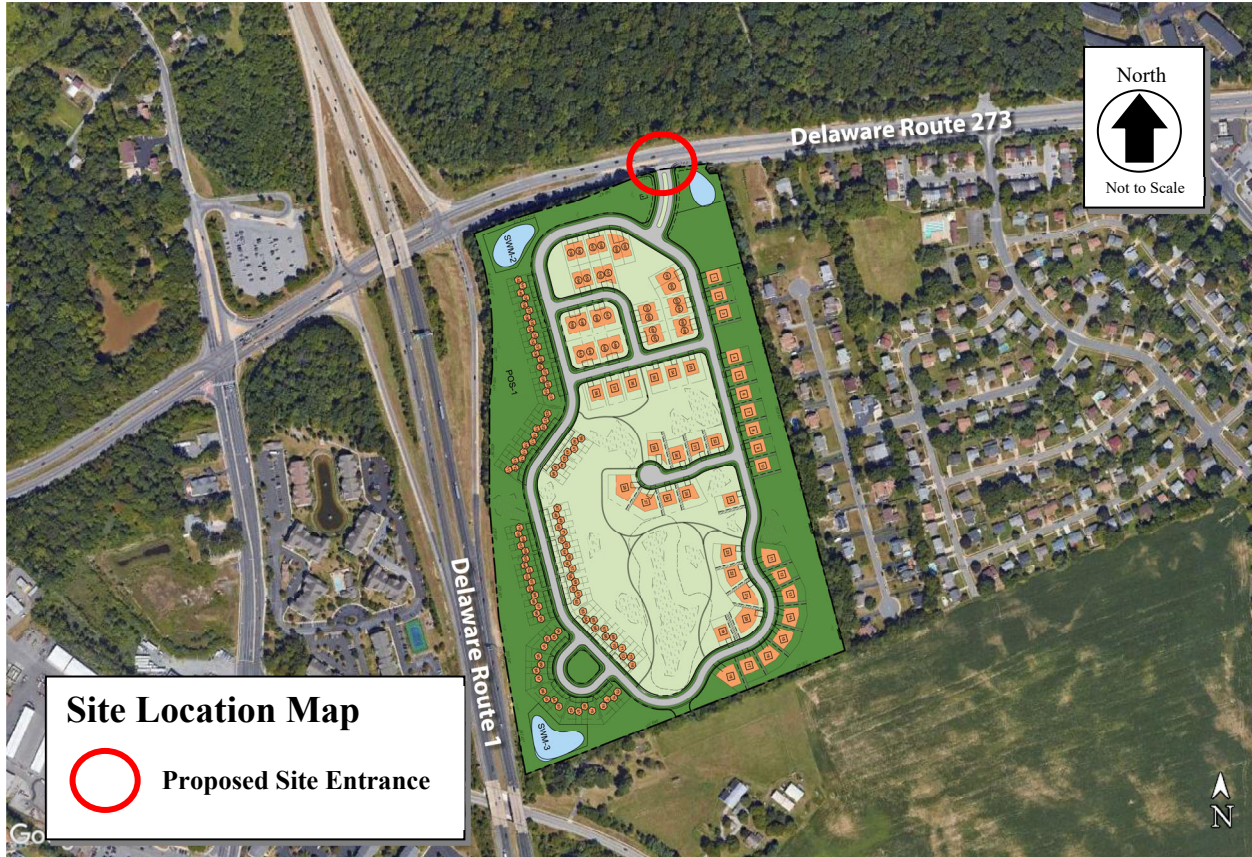
Proposed completion date: 2024.

Proposed access location: One rights-in/rights-out/lefts-in access point is proposed on Delaware Route 273 as originally scoped between the developer and DelDOT (Case 3a). Based on additional coordination between JMT and DelDOT on 11/30/2020, JMT was tasked with investigating a right-in/right-out only access point (Case 3b).

Daily Traffic Volumes:

- 2019 Average Annual Daily Traffic on Delaware Route 273 EB: 17,947 (Summer)
- 2019 Average Annual Daily Traffic on Delaware Route 273 WB: 18,793 (Summer)
- 2019 Average Annual Daily Traffic on Delaware Route 273: 36,740 (Summer)

Site Map



**Graphic is an approximation based on the Conceptual Site Plan prepared by Duffield Associates, Inc. dated September 18, 2019.*

Relevant and On-going Projects

DelDOT is currently implementing the reconstruction of the Delaware Route 273 intersections with Wedgefield Drive, Appleby Road, and Airport Road as part of DelDOT's *HSIP NCC, SR 273, Appleby Road to Airport Road* project (Contract No. T200900704). As part of this project, dual left turn lanes will be implemented along eastbound Delaware Route 273 to Airport Road, and an additional through lane will be installed along westbound Delaware Route 273, starting as a lane addition from the southbound Airport Road right turn and extending just west of Appleby Road. In addition, the existing left turn lane along eastbound Delaware Route 273 at Wedgefield Drive will be eliminated. The project will also provide bike lanes, and new sidewalks along both sides of Delaware Route 273 within the project limits. Bus stops within the project area are being consolidated as part of this project, and new bus pads and shelters are being constructed along Delaware Route 273 as well. The existing mid-block pedestrian crossing along Delaware Route 273 at Wedgefield Drive will also be removed. Construction of this project is anticipated to be completed in Fall 2021.

DelDOT's *SR 1 Widening, Road A to Tybouts Corner* project is currently investigating improvement alternatives at the Delaware Route 273 intersections with Delaware Route 7 and the

Delaware Route 1 ramps. The project is currently in the conceptual planning stage and DelDOT is expecting the preferred alternative to be identified by late 2021. The anticipated date of construction is currently unknown. Based on the preferred alternative selected, this improvement project may have significant impacts to the Garrett Woods site layout and may result in a total acquisition of the site or changes to the proposed access point geometry. Additional information regarding this improvement project can be found on DelDOT's website located at <https://deldot.gov/information/projects/sr1/sr1-wide/>.

Livable Delaware

(Source: Delaware Strategies for State Policies and Spending, 2020)

Location with respect to the Strategies for State Policies and Spending Map of Delaware:

The proposed development is located within the Investment Level 1 and Level 2 area.

Investment Level 1

These areas are often municipalities, towns, or urban/urbanizing places in counties where density is generally higher than in surrounding areas. In Investment Level 1 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. Overall, it is the state's intent to use its spending and management tools to maintain and enhance community character, and to promote well-designed and efficient new growth in Investment Level 1 Areas.

In Level 1 Areas the state's first priority will be for preserving existing facilities and making safety improvements. Level 1 areas will also be the highest priority for context sensitive transportation system capacity enhancements, transit-system enhancements, ADA accessibility, and for closing gaps in the pedestrian system, including the Safe Routes to School projects. Investment Level 1 Areas are ideal locations for Transportation Improvement Districts as well as Complete Community Enterprise Districts. Further, Level 1 areas are the first priority for planning projects and studies, bicycle facilities, signal-system enhancements, and the promotion of interconnectivity of neighborhoods and public facilities.

Investment Level 2

These areas can be composed of less developed areas within municipalities, rapidly growing areas in the counties that have or will have public water and wastewater services and utilities, areas that are generally adjacent to or near Investment Level 1 Areas, smaller towns and rural villages that should grow consistently with their historic character, and suburban areas with public water, wastewater, and utility services. They serve as transition areas between Level 1 and the state's more open, less populated areas. They generally contain a limited variety of housing types, predominantly detached single-family dwellings.

In Investment Level 2 Areas, like Investment Level 1 Areas, state investments and policies should support and encourage a wide range of uses and densities, promote other transportation options,

foster efficient use of existing public and private investments and enhance community identity and integrity. Investments should encourage departure from the typical single-family-dwelling developments and promote a broader mix of housing types and commercial sites encouraging compact, mixed-use development where applicable. Level 2 Areas share similar priorities as with the Level 1 Areas where the aim remains to: make context sensitive transportation system capacity enhancements, preserve existing facilities, make safety enhancements, make transportation system capacity improvements, create transit system enhancements, ensure ADA accessibility, and close gaps in the pedestrian system, including the Safe Routes to School projects. Other priorities for Level 2 Areas include: Corridor Capacity Preservation, off-alignment multi-use paths, interconnectivity of neighborhoods and public facilities, and signal-system enhancements.

Proposed Development's Compatibility with Livable Delaware:

The proposed development is located in both Investment Level 1 and 2 areas. According to Livable Delaware, Level 1 areas support and encourage a wide range of uses and enhance community identity and integrity, with Level 2 encouraging a broader mix of housing types beyond single family homes. The proposed project is a residential development with detached single-family homes, twin homes, and midrise townhouses planned. This project will support the ongoing development in the surrounding area and has diversified residential units. Therefore, the proposed development is generally consistent with the 2020 update of the Livable Delaware "Strategies for State Policies and Spending."

Comprehensive Plans

(Source: New Castle County July 2012)

New Castle County Comprehensive Plan:

Per the *New Castle County Comprehensive Plan Future Land Use Map*, the proposed development is in an area designated as a "Medium Density Residential" (3-9 Dwelling Units per acre). Per the *New Castle County Comprehensive Plan Future Zoning Districts Map* the proposed development is in an area designated as suburban transition.

Proposed Development's Compatibility with the New Castle County Comprehensive Plan:

Per the *New Castle Comprehensive Plan Future Land Use Map*, the proposed development is in an area designated as "Medium Density Residential" which dictates a density range of 3 to 9 dwellings per acre; the proposed project's density falls within this range. Per the *New Castle County Comprehensive Plan Future Zoning Districts Map* the proposed development is in an area designated as "suburban transition". Suburban transition includes areas of high-quality full range residential land use. Therefore, the proposed development is generally consistent with the *New Castle County July 2012 Comprehensive Plan*.

Trip Generation

The trip generation for the proposed development was determined by using the comparable land use and rates/equations contained in the *Trip Generation, 10th Edition: An ITE Informational Report*, published by the Institute of Transportation Engineers (ITE) for ITE Land Use Code 210 (Single-Family Detached Housing) and Land Use Code 221 (Multifamily Mid-Rise Housing). The trip generation was approved by DelDOT during the PTIS review.

Table 1
Garrett Woods Trip Generation

Land Use	ADT	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
66 Single-Family homes (ITE Code 210)	709	13	39	52	44	25	69
104 Multifamily Mid-Rise Houses (ITE Code 221)	566	10	27	37	29	17	46
Total Trips	1275	23	66	89	73	42	115

Overview of TIS

Intersections examined:

1. Site Entrance / Delaware Route 273
2. Delaware Route 273 / Wedgefield Drive
3. Delaware Route 273 / Appleby Road (New Castle Road 343) / Villas Drive
4. Appleby Road (New Castle Road 343) / 1st Entrance to Community Plaza
5. Delaware Route 273 / Airport Road (New Castle Road 340 / Community Plaza
6. Delaware Route 273 / NB Delaware Route 1 Ramps
7. Delaware Route 273 / SB Delaware Route 1 Ramps
8. Delaware Route 273 / Delaware Route 7 / E. Main Street (New Castle Road 18A)

Conditions examined:

1. Case 1 – Existing (2019)
2. Case 2 – 2024 without development
3. Case 3a – 2024 with development and right-in/left-in/right-out site access
4. Case 3b – 2024 with development and right-in/right-out site access

It should be noted, Case 3b was included as part of this TIS review letter based on correspondence with DelDOT on 11/30/2020 that was not originally scoped out for the TIS.

Committed Developments considered:

1. Lincoln Center (SR 7 east side, south of Newtown Road): Unbuilt 181,470 square feet retail + 10,000 square feet/600-seat restaurant + 499,863 square feet office + 80,004

- square feet/230-room hotel + 10,000 square feet 205 student/17-employee daycare+ 326 apartments + 182 townhouses.
2. Governors Square Commercial (Songsmith Drive both sides, east of SR 7): Unbuilt 96,936 square feet retail building.
 3. Newtown Square (SR 7 west side & Newtown Road north side): Unbuilt 6,200 SF 220 seat restaurant + 2,500 SF bank w/ drive-thru.
 4. Dasher Farm (School Bell Road south side, east of Dasher Avenue): Unbuilt 48 single family detached houses.
 5. Highway Word of Faith Church & Daycare (SR 273 south side, east of SR 37): Unbuilt 19,775 square feet church/daycare building w/ 6,676 square feet assembly space.
 6. Christiana Fashion Center (Road A east end, east of SR 1): Unbuilt 358,196 square feet out of total 915,000 square feet retail/restaurant buildings.
 7. Promenade at Christiana (Eagle Run Road north side, east of SR 273): Unbuilt 286,498 square feet retail/restaurant buildings.
 8. Market Place at Christiana (Old Route 7 west side, north of Eagle Run Road): Unbuilt 220,000 SF retail buildings + 62,400 SF/119-room hotel w/ 15,600 SF office + 5,000 SF restaurant.
 9. Christiana Town Center (Main Street north side, east of SR 273): Unbuilt 16,000 square feet restaurant buildings.
 10. Christiana Town Center II (north of Christiana Town Center): Unbuilt 200,000 square feet retail.
 11. School Bell Center Phase 1 (US 40 north side, east of School Bell Road): Unbuilt 19,998 square feet retail building.
 12. School Bell Crossing Shopping Center (US 40 south side, across from School Bell Road): Unbuilt 69,679 square feet supermarket + 41,800 square feet retail building.
 13. Dover Federal Credit Union (US 40 north side & Appleby Road east side): Unbuilt 24,000 square feet shopping center.
 14. Soneji Property (Appleby Road east side, south of Old Forge Road): Unbuilt 20 apartments.

Peak hours evaluated: Weekday morning and Weekday evening.

Intersection Descriptions

1. Site Entrance / Delaware Route 273

Type of Control: Proposed minor stop-controlled intersection (T-Intersection)

Eastbound Approach: (Delaware Route 273) Existing two through lanes; proposed two through lanes and one channelized right turn lane

Westbound Approach: (Delaware Route 273) Existing two through lane and one left turn lane; based on correspondence with DelDOT regarding the *SR 1 Widening, Road A to Tybouts Corner* project, left turn lane may be eliminated

Northbound Approach: (proposed site entrance) Proposed channelized right-turn lane, stop controlled

2. DE Route 273 / Wedgefield Drive

Type of Control: Existing stop-controlled intersection (T-Intersection)

Eastbound Approach: (Delaware Route 273) Existing one left turn lane, two through lanes and one channelized right turn lane

Westbound Approach: (Delaware Route 273) Existing two through lanes and one left turn lane

Northbound Approach: (Wedgefield Drive) Existing channelized right-turn lane, stop controlled.

3. Delaware Route 273 / Appleby Road (New Castle Road 343) / Villas Drive

Type of Control: Existing signalized intersection (four-legged)

Eastbound Approach: (Delaware Route 273) Existing one left turn lane, two through lanes, and one channelized right turn lane.

Westbound Approach: (Delaware Route 273) Existing one left turn lane, two through lanes, and one right turn lane.

Northbound Approach: (Appleby Road) Existing one left-turn, one shared left turn/through lane, and one channelized right turn lane

Southbound Approach: (Villas Drive) Existing one left turn, and one shared through/right turn lane

4. Appleby Road (New Castle Road 343) / 1st Community Plaza Entrance

Type of Control: Existing stop-controlled intersection (T-Intersection)

Westbound Approach: (1st Community Plaza Entrance) Existing one left turn lane and one right-turn lane, stop controlled

Northbound Approach: (Appleby Road) Existing one through lane and one shared through/right turn lane

Southbound Approach: (Appleby Road) Existing one shared left turn/through lane

5. Delaware Route 273/Airport Road (New Castle Road 340) / Community Plaza Entrance

Type of Control: Existing signalized intersection (four-legged)

Eastbound Approach: (Delaware Route 273) Existing one left-turn lane, two through lanes and one channelized right turn lane

Westbound Approach: (Delaware Route 273) Existing one left-turn lane, two through lanes and one channelized right turn lane

Northbound Approach: (Community Plaza Entrance) Existing one left turn lane, one shared left turn lane, and one right turn lane.

Southbound Approach: (Airport Road) Existing one left-turn lane, one through lane and one channelized right turn lane.

6. Delaware Route 273/Northbound Delaware Route 1 Ramps

Type of Control: Existing signalized intersection (four-legged)

Eastbound Approach: (Delaware Route 273) Existing two left turn lanes, two through lanes.

Westbound Approach: (Delaware Route 273) Existing two through lanes and one channelized right turn lane.

Northbound Approach: (Delaware Route 1 NB exit ramp) Existing one shared left turn/through lane, and one right turn lane

7. Delaware Route 273/Southbound Delaware Route 1 Ramps

Type of Control: Existing signalized intersection (four-legged)

Eastbound Approach: (Delaware Route 273) Existing two through lanes and one channelized right turn.

Westbound Approach: (Delaware Route 273) Existing one left turn lane and two through lanes.

Southbound Approach: (Delaware Route 1 SB exit ramp) Existing one shared left turn/through lane, and one right-turn lane

8. Delaware Route 273/Delaware Route 7/Main Street (New Castle Road 18A)

Type of Control: Existing signalized intersection (four-legged)

Eastbound Approach: (Delaware Route 273) Existing one left turn lane, two through lanes, and one channelized right turn lane

Westbound Approach: (Delaware Route 273) Existing two left turn lanes, two through lanes, and one channelized right turn lane

Northbound Approach: (Delaware Route 7) Existing two left turn lanes, one through lane and one right turn lane

Southbound Approach: (Main Street) Existing one left turn lane, one shared left turn/through lane, one through lane, and one channelized right turn lane

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: Per DelDOT Gateway, Delaware Transit Corporation (DTC) currently provides existing services within the study area via DART Routes 10, 13, 40, 51, and 54. Additionally, 7 bus stop exists within the study area. On the northeast corner of study intersection 8 (Delaware Route 273/Delaware Route 7/Main Street) exists a park and ride that services DART Routes 10, 40, and 54. On westbound Delaware Route 273, between Delaware Route 7 and Delaware Route 1 northbound ramps, exists a bus stop for DART Route 10. Two bus stops exist at the intersection of Delaware Route 273 and Wedgefield Drive, one on the westbound side of Delaware Route 273 and the other on the eastbound side; both provide service to Dart Routes 10 and 51. One bus stop exists at the intersection of Appleby Road and 1st Community Plaza Entrance; the stop is adjacent to the southbound Appleby Road lane and services DART Route 13. The last

two bus stops exist on the westbound and eastbound sides of Delaware Route 273 between Appleby Road and Airport Road. The westbound stop services Dart Route 51 and the eastbound stop services DART Routes 10, 13, and 51.

As for the routes themselves: DART Route 10 provides 24 round trips from 5:30 am to 11:18 pm on weekdays and 10 round trips from 7:10 am to 8:22 pm on Saturdays. DART Route 13 provides 37 round trips from 4:35 am to 12:22 am on weekdays, 29 round trips from 6:25 am to 11:04 pm on Saturdays, and 13 round trips from 7:15 am to 8:56 pm on Sundays. DART Route 40 provides 36 round trips from 4:31 am to 11:59 pm on weekdays, 16 round trips from 6:20 am to 11:06 pm on Saturdays, and 13 round trips from 6:55 am to 7:47 pm on Sundays. DART Route 51 provides 16 round trips from 5:30 am to 9:55 pm on weekdays. DART Route 54 provides 20 round trips from 5:25 am to 10:34 pm on weekdays and 9 round trips from 7:15 am to 8:50 pm on Saturdays.

Planned transit service: Stephen Ottinger of DelDOT was contacted on November 3, 2020 and November 16, 2020 to obtain planned transit services in the site limits. A response was not received prior to submission deadline.

Although a response was not received, DelDOT's *HSIP NCC, SR 273, Appleby Road to Airport Road* project is currently making updates to transit stops along Delaware Route 273. The existing stop located along westbound Delaware Route 273 at Wedgefield Drive is being relocated to just west of Appleby Road. Additionally, the stop located eastbound Delaware Route 273 just east of Airport Road is being consolidated with the stop located at the HAWK signal east of Airport Road.

Existing bicycle and pedestrian facilities: According to DelDOT's *New Castle County Bicycle Map*, Regional and Connector Bicycle Route exist within the study area. One Regional Bicycle Route travels along the Delaware Route 7. Another Regional Bicycle Route travels along Delaware Route 273, traversing through 7 study intersections (Delaware Route 7/E. Main Street, SB Delaware Route 1 Ramps, NB Delaware Route 1 Ramps, Site Entrance, Wedgefield Drive, Appleby Road/Villas Drive and Airport Road/Community Plaza Entrance). One Connector Bicycle Route exist along the Airport Road. Another Connector Bicycle Route exist along the Appleby Road, traversing the intersection with 1st Entrance to Community Plaza. The pedestrian facilities exist at Delaware Route 273 intersections with Delaware Route 7/E. Main Street, Wedgefield Drive, Appleby Road/ Villas Drive and Airport Road. Another pedestrian facility exists at Appleby Road intersection with 1st Entrance to Community Plaza.

Planned bicycle and pedestrian facilities: Per email correspondence on November 16, 2020, from Mr. John Fiori, DelDOT's Bicycle Coordinator, the following improvements were recommended:

- Construct a 10' wide shared-use path along the property frontage of Delaware Route 273.
- Per the Development Coordination Manual (DCM) the site shall dedicate right-of-way per the roadway classification and establish a 15' wide permanent easement along the property frontage.
- All entrance, roadway and/or intersection improvements (including for the Delaware Route 1 ramps) required shall incorporate bicycle and pedestrian facilities. Per the DCM, if the right turn lane is warranted, then a bike lane shall be incorporated along the right turn lane;

if a left turn lane is required any roadway improvements shall include a shoulder matching the roadway functional classification or existing conditions.

Bicycle Level of Traffic Stress in Delaware: Researchers with the Mineta Transportation Institute developed a framework to measure low-stress connectivity, which can be used to evaluate and guide bicycle network planning. Bicycle LTS analysis uses factors such as the speed of traffic, volume of traffic, and the number of lanes to rate each roadway segment on a scale of 1 to 4, where 1 is a low-stress place to ride and 4 is a high-stress place to ride. It analyzes the total connectivity of a network to evaluate how many destinations can be accessed using low-stress routes. Developed by planners at the Delaware Department of Transportation (DelDOT), the bicycle Level of Traffic Stress (LTS) model will be applied to bicycle system planning and evaluation throughout the state. The Bicycle LTS for the roadways under existing conditions along the site frontage are summarized below. The Bicycle LTS was determined utilizing the map on the DelDOT Gateway.

- Delaware Route 273 Eastbound – LTS: 4
Delaware Route 273 Westbound – LTS: 4

Crash Evaluation

Per the crash data included in the TIS from November 23, 2016 to December 23, 2019 and provided by the Delaware Crash Analysis Reporting (CAR) System, a total of 389 crashes were reported within the study area. Based on the data provided in the TIS, it does not appear crash data was included at the intersection of Appleby Road and 1st Community Plaza Entrance. Of these 389 crashes, 88 resulted in personal injuries. Three crashes occurred within the study area which involved either pedestrians or bicyclists with one of these crashes accounting for the single fatality in the project area. An intersection breakdown of the crash data was not provided by the TIS. The crash data does not indicate any unusual concerns or safety issues within the study area that is not being addressed as part of DelDOT's *HSIP NCC, SR 273, Appleby Road to Airport Road* project.

It should be noted, Site O from DelDOT's 2015 Hazard Elimination Program (HEP) is located within the study area along Appleby Road from Winburne Drive to Delaware Route 273. This HEP study recommended improved signal ahead signage along Delaware Route 273, upgrading stop signs along Winburne Drive and 1st Community Plaza Entrance, and increasing the yellow times at Delaware Route 273 and Appleby Road.

Previous Comments

All comments from DelDOT for the Preliminary Traffic Impact Study (PTIS) have been addressed in the Final TIS.

General HCS Analysis Comments

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

1. For the intersection analyses, the TIS used HCS7 version 7.8, whereas JMT used HCS7 version 7.9.
2. Per DelDOT's *Development Coordination Manual*, JMT and the TIS used a heavy vehicle percentage of 3% for each movement greater than 100 vph in the Case 2 and Case 3 future scenario analyses, unless the existing heavy vehicle percentage was greater than 3% and there was no significant increase of vehicles along that movement, in which case the existing heavy vehicle percentage was used for analysis of future scenarios.
3. Per DelDOT's *Development Coordination Manual* and coordination with DelDOT Planning, JMT used a heavy vehicle percentage of 5% for each movement less than 100 vph along roadways and site entrances, whereas the TIS did not.
4. Per DelDOT's *Development Coordination Manual*, JMT and the TIS utilized the existing PHF for the Case 1 scenario and a future PHF for Cases 2 and 3 scenarios of 0.80 for roadways with less than 500 vph, 0.88 for roadways between 500 and 1,000 vph, and 0.92 for roadways with more than 1,000 vph or the existing PHF, whichever was higher.
5. For the signalized HCS analyses, JMT utilized field measured timings for the timing splits whereas the TIS did not.

Table 2
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Garrett Woods
Report Dated: October 2020
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Site Entrance/Delaware Route 273				
2024 with development and right- in/left-in/right-out site access (Case 3a) ²				
Westbound Delaware Route 273 Left Turn	B (13.1)	C (16.0)	B (13.3)	C (16.3)
Northbound Site Entrance Approach	C (17.2)	C (18.9)	C (17.4)	C (19.2)
2024 with development and right- in/right-out site access (Case 3b) ³				
Northbound Site Entrance Approach	-	-	C (17.4)	C (19.2)

¹ For signalized and unsignalized analysis, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

² JMT utilized a through volume of 1,556 along eastbound Delaware Route 273 during the PM peak hour consistent with the existing counts whereas the TIS did not.

³ This scenario includes converting the Site Entrance from rights-in/rights-out/lefts-in to rights-in/rights-out only and rerouting the left-in volumes from westbound Delaware Route 273 to perform a U-turn at the Delaware Route 273 intersection with Southbound Delaware Route 1 Ramp to access to the proposed site.

Table 3
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Garrett Woods
Report Dated: October 2020
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Delaware Route 273 /Wedgefield Drive				
2019 Existing (Case 1)				
Eastbound Delaware Route 273 Left Turn	C (19.4)	D (30.2)	C (19.5)	D (31.7)
Westbound Delaware Route 273 Left Turn	B (12.0)	B (11.7)	B (12.1)	B (11.6)
Northbound Wedgefield Drive Approach	B (14.7)	B (13.3)	B (14.8)	B (13.6)

Table 3 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Garrett Woods
Report Dated: October 2020
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Delaware Route 273 /Wedgefield Drive ⁴				
2024 without development (Case 2) ⁵				
Eastbound Delaware Route 273 Left Turn	C (24.5)	E (41.5)	-	-
Westbound Delaware Route 273 Left Turn	B (13.0)	B (13.6)	B (13.2)	B (13.6)
Northbound Wedgefield Drive Approach	C (16.0)	C (15.3)	C (16.2)	C (15.6)
2024 with development (Case 3) ⁵				
Eastbound Delaware Route 273 Left Turn	D (27.9)	E (48.9)	-	-
Westbound Delaware Route 273 Left Turn	B (13.4)	B (13.8)	B (13.7)	B (14.0)
Northbound Wedgefield Drive Approach	C (16.5)	C (15.5)	C (16.9)	C (16.0)

⁴ JMT utilized the through movement volumes consistent with existing count along the eastbound Delaware Route 273 whereas the TIS did not.

⁵ JMT included improvements from the *DelDOT HSIP NCC, SR 273, Appleby Road to Airport Road Improvement* project (DelDOT Contract No. T200900704) which prohibits the U-turn movement along eastbound Delaware Route 273 whereas the TIS maintained this movement.

Table 4
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Garrett Woods
Report Dated: October 2020
Prepared by Duffield Associates, Inc.

Signalized Intersection ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Delaware Route 273/Appleby Road (New Castle Road 343)/Villas Drive ^{6, 7, 8, 9, 10}				
2019 Existing (Case 1) ¹¹	-	-	F (194.4)	F (136.1)
2019 Existing (Case 1) <i>with Signal Timing Optimization</i> ¹²	C (26.4)	C (25.9)	C (27.2)	C (25.4)
2024 without development (Case 2)	C (27.6)	C (30.5)	-	-
2024 with development (Case 2) <i>with DelDOT Improvement</i> ¹³	-	-	C (32.1)	D (35.1)
2024 with development (Case 3)	C (27.6)	C (31.0)	-	-
2024 without development (Case 3) <i>with DelDOT Improvement</i> ¹³	-	-	C (32.4)	D (35.2)

⁶ JMT modeled the Delaware Route 273 intersections with Appleby Road (New Castle Road 343)/Villas Drive and Airport Road (New Castle Road 340)/Community Plaza Entrance as one signalized corridor, whereas the TIS modeled the intersections individually.

⁷ JMT included the right turn on red movements in the analysis consistent with the existing count data whereas the TIS modeled the right turns as unsignalized movements with 0 seconds of delay.

⁸ JMT utilized maximum recall mode along the Delaware Route 273 eastbound and westbound approaches consistent with the DelDOT Signal Timing Plan, whereas the TIS did not.

⁹ JMT included the pedestrian volumes consistent with the existing count data whereas the TIS did not.

¹⁰ JMT's future case analysis incorporated the *DelDOT HSIP NCC, SR 273, Appleby Road to Airport Road Improvement* project (DelDOT Contract No. T200900704) whereas the TIS analysis did not.

¹¹ JMT modeled the intersection using a signal cycle length and phase split lengths consistent with the DelDOT Signal Timing Plan, whereas the TIS did not.

¹² Signal timing optimization scenario includes optimizing the phase split lengths while maintaining the existing cycle length.

¹³ The improvement scenario incorporates the *DelDOT HSIP NCC, SR 273, Appleby Road to Airport Road Improvement* project (DelDOT Contract No. T200900704). This includes providing an additional through lane along the westbound Delaware Route 273 approach with protected left turn phases along the eastbound and westbound approaches with a cycle length of 120 seconds during the AM and PM peak hours.

Table 5
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Garrett Woods
Report Dated: October 2020
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Appleby Road/1st Entrance to Community Plaza				
2019 Existing (Case 1) ¹⁴				
Westbound 1 st Entrance to Community Plaza Approach	C (20.8)	F (53.8)	C (21.2)	F (59.6)
Southbound Appleby Road Left Turn	B (10.2)	A (9.0)	B (10.2)	A (9.0)
2024 without development (Case 2) ¹⁵				
Westbound 1 st Entrance to Community Plaza Approach	C (21.9)	F (66.1)	C (22.2)	F (66.5)
Southbound Appleby Road Left Turn	B (10.3)	A (9.1)	B (10.4)	A (9.1)
2024 without development (Case 2) <i>with Improvement</i> ¹⁶				
Westbound 1 st Entrance to Community Plaza Approach	-	-	C (21.3)	D (32.9)
Southbound Appleby Road Left Turn	-	-	B (10.5)	A (9.2)

¹⁴ JMT modeled the southbound Appleby Road approach with a shared left turn/through lane consistent with existing condition whereas the TIS included a separate left turn lane.

¹⁵ During the future cases, the TIS and JMT modeled the southbound Appleby Road approach with a left turn lane and a through lane to incorporate improvements from the *DelDOT HSIP NCC, SR 273, Appleby Road to Airport Road Improvement* project (DelDOT Contract No. T200900704).

¹⁶ Improvement scenario includes providing an additional through lane along the southbound Appleby Road approach.

Table 5 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Garrett Woods
Report Dated: October 2020
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Appleby Road/1st Entrance to Community Plaza				
2024 with development (Case 3) ¹⁵				
Westbound 1 st Entrance to Community Plaza Approach	C (22.0)	F (66.7)	C (22.3)	F (67.1)
Southbound Appleby Road Left Turn	B (10.3)	A (9.1)	B (10.4)	A (9.1)
2024 with development (Case 3) <i>with Improvement</i> ¹⁶				
Westbound 1 st Entrance to Community Plaza Approach	-	-	C (21.3)	D (33.1)
Southbound Appleby Road Left Turn	-	-	B (10.5)	A (9.2)

Table 6
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Garrett Woods
Report Dated: October 2020
Prepared by Duffield Associates, Inc.

Signalized Intersection ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Delaware Route 273/Airport Road (New Castle Road 340)/Community Plaza Entrance 6, 7, 8, 9, 10				
2019 Existing (Case 1)	-	-	E (66.5)	F (120.2)
2019 Existing (Case 1) <i>With Signal Timing Optimization</i> ¹²	B (18.6)	B (18.2)	C (27.0)	C (26.0)
2024 without development (Case 2)	C (20.7)	B (17.4)	-	-
2024 without development (Case 2) <i>with DelDOT Improvement</i> ¹⁷	-	-	C (30.0)	D (38.8)
2024 with development (Case 3)	C (20.8)	B (17.6)	-	-
2024 with development (Case 3) <i>with DelDOT Improvement</i> ¹⁷	-	-	C (30.1)	D (39.6)

¹⁷ Improvement scenario incorporates the *DelDOT HSIP NCC, SR 273, Appleby Road to Airport Road Improvement* project (DelDOT Contract No. T200900704). This includes providing an additional left turn lane along the eastbound Delaware Route 273 approach and protected left turn phases for the eastbound and westbound Delaware Route 273 approaches. The project also configures the northbound Community Plaza Entrance as a left turn lane, through lane and a channelized right turn lane with protected-permissive phase along the northbound and southbound approaches with 120 second cycle length during the AM and PM peak hours. The TIS did not consider this improvement project.

Table 7
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Garrett Woods
Report Dated: October 2020
Prepared by Duffield Associates, Inc.

Signalized Intersection ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Delaware Route 273/NB Delaware Route 1 Ramps ^{7, 8, 9, 11, 18}				
2019 Existing (Case 1)	-	-	D (41.4)	C (22.7)
2019 Existing (Case 1) <i>with Signal Timing Optimization</i> ¹²	C (23.2)	B (19.4)	C (32.0)	C (23.1)
2024 without development (Case 2)	-	-	D (43.1)	C (31.2)
2024 without development (Case 2) <i>with Signal Timing Optimization</i> ¹²	C (24.4)	C (24.0)	C (30.6)	C (21.9)
2024 with development (Case 3)	-	-	D (43.5)	C (30.4)
2024 with development (Case 3a) <i>with Signal Timing Optimization</i> ¹²	C (24.5)	C (24.3)	C (31.1)	C (27.5)
2024 with development (Case 3b) <i>with Signal Timing Optimization</i> ^{3, 12}	-	-	C (31.3)	C (27.6)

¹⁸ JMT modeled the Delaware Route 273 intersections with the NB Delaware Route 1 Ramps, the SB Delaware Route 1 Ramps, and Delaware Route 7/E. Main Street (New Castle Road 18A) as one signalized corridor, whereas the TIS modeled the intersections individually.

Table 8
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Garrett Woods
Report Dated: October 2020
Prepared by Duffield Associates, Inc.

Signalized Intersection ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Delaware Route 273/SB Delaware Route 1 Ramps ^{67, 8, 9, 11, 18}				
2019 Existing (Case 1)	-	-	B (18.9)	C (31.3)
2019 Existing (Case 1) <i>with Signal Timing Optimization</i> ¹²	B (13.8)	C (23.0)	B (14.5)	C (22.7)
2024 without development (Case 2)	-	-	B (19.4)	C (34.2)
2024 without development (Case 2) <i>with Signal Timing Optimization</i> ¹²	B (16.5)	C (27.9)	B (18.6)	C (22.0)
2024 with development (Case 3)	-	-	B (19.6)	D (36.1)
2024 with development (Case 3a) <i>with Signal Timing Optimization</i> ¹²	B (17.1)	C (31.4)	B (19.2)	C (30.7)
2024 with development (Case 3b) <i>with Signal Timing Optimization</i> ^{3, 12}	-	-	B (19.9)	C (33.7)

Table 9
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Garrett Woods
Report Dated: October 2020
Prepared by Duffield Associates, Inc.

Signalized Intersection ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Delaware Route 273/Delaware Route 7/E. Main Street (New Castle Road 18A) ^{7, 8, 9, 11, 18, 19}				
2019 Existing (Case 1)	-	-	D (45.1)	D (54.6)
2019 Existing (Case 1) <i>with Signal Timing Optimization</i> ¹²	C (27.8)	C (31.9)	D (38.2)	D (47.0)
2024 without development (Case 2)	-	-	E (57.8)	F (89.2)
2024 without development (Case 2) <i>with Signal Timing Optimization</i> ¹²	C (30.9)	E (63.9)	D (43.0)	E (75.8)
2024 without development (Case 2) <i>with Signal Timing Optimization and Improvement Option I</i> ^{12, 20}	C (29.0)	D (53.4)	D (49.0)	E (72.7)
2024 without development (Case 2) <i>with Signal Timing Optimization and Improvement Option II</i> ^{12, 21}	-	-	D (46.5)	E (66.7)
2024 with development (Case 3)	-	-	E (57.8)	F (90.8)
2024 with development (Case 3) <i>with Signal Timing Optimization</i> ¹²	C (32.8)	E (63.4)	D (43.2)	E (79.0)
2024 with development (Case 3) <i>with Signal Timing Optimization and Improvement Option I</i> ^{12, 20}	C (29.0)	D (54.5)	D (50.7)	E (77.2)

¹⁹ TIS utilized the right turns as a unsignalized movements with a delay of 10 seconds per vehicle along all the approaches whereas JMT includes the right turns on red consistent with existing count data.

²⁰ Improvement Option I configure the southbound Delaware Route 7 approach with two left turn lanes, two through lanes and a channelized right turn lane. In addition, protected left turn phases are provided along the northbound and southbound approaches with right turn overlap phases for all the left turns.

²¹ Improvement Option II configures the eastbound Delaware Route 273 approach with a right turn lane which adds a third through lane along southbound Delaware Route 7.

Table 9 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Garrett Woods
Report Dated: October 2020
Prepared by Duffield Associates, Inc.

Signalized Intersection ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Delaware Route 273/Delaware Route 7/E. Main Street (New Castle Road 18A) ^{7, 8, 9, 11, 18, 19}				
2024 with development (Case 3) with Signal Timing Optimization and Improvement Option II ^{12, 21}	-	-	D (51.0)	E (70.3)
2024 with development (Case 3) with Signal Timing Optimization, Improvement Option II, and Headway Modification ^{12, 21}	-	D (54.7)	-	-
2024 with development (Case 3) with Signal Timing Optimization and Improvement Option II; Supplemental Synchro Analysis ^{12, 21, 22}	-	-	D (40.0)	D (54.5)

²² The supplemental Synchro analysis was conducted for the PM peak hour using HV% consistent with the existing peak hour count data to be consistent with updated analysis submitted by Duffield Associates, Inc.