



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

NICOLE MAJESKI
SECRETARY

May 5, 2023

Mr. D.J. Hughes, II, P.E.
Davis, Bowen & Friedel, Inc.
1 Park Avenue
Milford, DE 19963

Dear Mr. Hughes,

The enclosed Traffic Impact Study (TIS) review letter for the **Raley Property** (Tax Parcels: 234-15.00-3.20, 3.21, 9.00, 10.00, 11.01, 13.00, 14.00, and 15.00) residential 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 DeIDOT's Development Coordination Manual and other accepted practices and procedures for such studies. DeIDOT 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
TIS Group Project Engineer

CJ:km

Enclosures

cc with enclosures: Mr. Greg Tobias, Schell Brothers
Mr. Jamie Sechler, Davis, Bowen & Friedel, Inc.
Mr. David Edgell, Office of State Planning Coordination
Mr. Jamie Whitehouse, Sussex County Planning & Zoning
Ms. Joanne M. Arellano, Johnson, Mirmiran, & Thompson, Inc.
Mr. Mir Wahed, Johnson, Mirmiran, & Thompson, Inc.
DeIDOT Distribution

DelDOT Distribution

Brad Eaby, Deputy Attorney General
Shanté Hastings, Deputy Secretary / Director of Transportation Solutions (DOTS)
Pamela Steinebach, Director, Planning
Mark Luszcz, Deputy Director, DelDOT Traffic, DOTS
Michael Simmons, Assistant Director, Project Development South, DOTS
Peter Haag, Chief Traffic Engineer, DelDOT Traffic, DOTS
Wendy Carpenter, Traffic Calming & Subdivision Relations Manager, DelDOT Traffic, DOTS
Sean Humphrey, Traffic Engineer, DelDOT Traffic, DOTS
Todd Sammons, Assistant Director, Development Coordination, Planning
Wendy Polasko, Subdivision Engineer, Development Coordination, Planning
Kevin Hickman, Sussex County Review Coordinator, Development Coordination, Planning
Brian Yates, Sussex County Subdivision Reviewer, Development Coordination, Planning
Sireen Muhtaseb, TIS Group Manager, Development Coordination, Planning
Annamaria Furfato, TIS Group Project Engineer, Development Coordination, Planning
Philip Lindsey, TIS Group Project Engineer, Development Coordination, Planning
Matt Schlitter, South District Public Works Engineer, Maintenance & Operations
Jared Kauffman, Service Development Planner, Delaware Transit Corporation
Tremica Cherry, Service Development Planner, Delaware Transit Corporation
Anthony Aglio, Planning Supervisor, Statewide & Regional Planning, Planning



May 5, 2023

Mr. Claudy Joinville
Project Engineer
Delaware Department of Transportation
Development Coordination, Division of Planning
800 Bay Road
Dover, DE 19901

RE: Agreement No. 1945F
Project Number T202069012/PO#611882
Traffic Impact Study Services
Task 11-8A – Raley Property TIS

Dear Mr. Joinville:

Johnson, Mirmiran, and Thompson (JMT) has completed a review of the Traffic Impact Study (TIS) for the Raley Property residential development, which was prepared by Davis, Bowen & Friedel, Inc., dated November 2022. This review was assigned as Task Number 11-8A. 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 Sussex County, Delaware. The proposed development would consist of 704 senior adult detached homes on an approximately 359.74-acre parcel. The land is currently zoned as AR-1 (Agricultural Residential) with a cluster development overlay in Sussex County, and the developer does not plan to rezone the land.

The site is located on the northwest corner of Lawson Road (Sussex Road 296) and Zoar Road (Sussex Road 48), southwest of Avalon Road (Sussex Road 302A), approximately ¼ of a mile west of Lawson Road. Two full access points are proposed: one on Lawson Road and one on Avalon Road. Construction is expected to be complete in 2038.

DelDOT does not have any relevant and ongoing improvement projects within the study area. However, the Hollyville Road and Zoar Road/Harmons Hill Road intersection was included in DelDOT's 2013 Hazard Elimination Program (HEP) as Site G. Site G is a 0.30-mile corridor along Zoar Road/Hollyville Road from 0.06 miles west of Avalon Road to 0.10 miles north of Harmons Hill Road. The Site G Task I Report included a crash evaluation and a sight distance review of the Hollyville Road and Zoar Road/Harmons Hill Road intersection. The Task I Report recommended that an additional study be performed at the Hollyville Road intersection with Zoar Road/Harmons Hill Road to determine improvements to reduce the potential for angle crashes.

The Site G Task II Report included additional evaluations to determine improvements at the Hollyville Road intersection with Zoar Road/Harmons Hill Road. The additional evaluations included a multi-way stop control warrant analysis, a traffic signal warrant analysis, a capacity and queue assessment, and a roundabout evaluation. The Task II Report recommended the interim



improvement of an all-way stop control with warning beacons and signage, and the ultimate improvement of a roundabout in conjunction with the developments in the area. Under existing conditions, the intersection is all-way stop-controlled.

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

The following intersection exhibits level of service (LOS) deficiencies without the implementation of physical roadway and/or traffic control improvements.

Intersection	LOS Deficiencies Occur		Case
	AM	PM	
Zoar Road/Hollyville Road (Sussex Road 48)/Harmons Hill Road (Sussex Road 302)	X	X	Case 2 – 2038 without Development
	X	X	Case 3 – 2038 with Development

The unsignalized all-way stop-controlled Hollyville Road intersection with Zoar Road and Harmons Hill Road would exhibit LOS deficiencies during the AM and PM peak hours under future conditions with or without the proposed development. Specifically, during the PM peak hour under future conditions with the proposed development (Case 3), the intersection would exhibit LOS deficiencies along the southbound Hollyville Road approach with a delay of 154.8 seconds per vehicle with a calculated 95th percentile queue length of approximately 575 feet.

The all-way stop-controlled intersection could be mitigated by modifying the southbound Hollyville Road approach to provide one shared left turn/through lane and one right turn lane, and the eastbound Zoar Road approach to provide one left turn lane and one shared through/right turn lane. With these turn lane improvements, the intersection would improve to operate at acceptable LOS D with a delay of 34.6 seconds per vehicle during the PM peak hour under Case 3 conditions. Additionally, the calculated 95th percentile queue length along the southbound Hollyville Road approach would reduce to approximately 135 feet.

The deficiencies could also be mitigated by the provision of a single lane roundabout. With this improvement, the intersection would improve to operate at acceptable LOS B with a delay of 10.1 seconds per vehicle during the PM peak hour under Case 3 conditions. Additionally, with a roundabout the calculated 95th percentile queue length along the southbound Hollyville Road approach would be approximately 115 feet.

To maintain consistency with the HEP Site G, the ultimate design of the intersection should be a roundabout. As an interim improvement until a roundabout is installed either through a future DelDOT project or a future development improvement, it is recommended that the Raley Property developer improve the existing all-way-stop-control unsignalized Hollyville Road intersection with Zoar Road and Harmons Hill Road by modifying the southbound Hollyville Road approach to provide one shared left turn/through lane and one channelized right turn lane, and the eastbound Zoar Road approach to provide one left turn lane and one shared through/right turn lane. The intersection improvements should be designed to have minimal sight distance constraints.



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

1. The developer shall improve Lawson Road, Avalon Road, and Zoar Road within the limits of their frontage to meet DeIDOT’s standards for their Functional Classification as found in Section 1.1 of the *Development Coordination Manual* and elsewhere therein. The improvements shall include both directions of travel, regardless of whether the developer’s lands are on one or both sides of the road. Frontage is defined in Section 1 of the *Development Coordination Manual*, which states “This length includes the length of roadway perpendicular to lines created by the projection of the outside parcel corners to the roadway.” Questions on or appeals of this requirement should be directed to the DeIDOT Subdivision Review Coordinator in whose area the development is located.
2. The developer should construct an unsignalized full access for the proposed Raley Property development along Lawson Road, approximately 725 feet north of the intersection with Zoar Road. The intersection should be consistent with the lane configurations shown in the table below.

Approach	Current Configuration	Proposed Configuration
Eastbound Site Entrance A	Approach does not exist	One left turn lane and one channelized right turn lane
Northbound Lawson Road	One through lane	One left turn lane and one through lane
Southbound Lawson Road	One through lane	One through lane and one right turn lane

Based on DeIDOT’s *Development Coordination Manual*, the recommended minimum storage length (excluding taper) of the southbound right turn lane is 145 feet and the recommended minimum storage length (excluding taper) of the northbound left turn lane is 185 feet. The projected queues from the HCS analysis can be accommodated within the recommended storage lengths.

3. The developer should construct an unsignalized full access for the proposed Raley Property development along Avalon Road, approximately 2,000 feet west of the intersection with Lawson Road. The intersection should be consistent with the lane configurations shown in the table below.



Approach	Current Configuration	Proposed Configuration
Eastbound Avalon Road	One through lane	One through lane and one right turn lane
Westbound Avalon Road	One through lane	One shared left turn/through lane and one bypass lane
Northbound Site Entrance B	Approach does not exist	One left turn lane and one channelized right turn lane

Based on DelDOT's *Development Coordination Manual*, the recommended minimum storage length (excluding taper) of the eastbound right turn lane is 110 feet and the recommended minimum storage length of the westbound bypass lane is 50 feet with an approach taper of 155 feet and a departure taper of 80 feet. The projected queues from the HCS analysis can be accommodated within the recommended storage lengths.

- The developer should enter into an agreement to improve the existing all-way-stop control intersection of Zoar Road/Hollyville Road (Sussex Road 48)/Harmons Hill Road (Sussex Road 302) by providing one shared left turn/through lane and one channelized right turn lane along the southbound Hollyville Road approach, and one left turn lane and one shared through/right turn lane along the eastbound Zoar Road approach. The intersection should be designed to have minimal sight distance constraints. The intersection should be consistent with the lane configurations shown in the table below.

Approach	Current Configuration	Proposed Configuration
Eastbound Zoar Road	One shared left turn/through/right turn lane	One left turn lane and one shared through/right turn lane
Westbound Harmons Hill Road	One shared left turn/through/right turn lane	No Change
Northbound Hollyville Road	One shared left turn/through/right turn lane	No Change
Southbound Hollyville Road	One shared left turn/through/right turn lane	One shared left turn/through lane and one channelized right turn lane

Based on DelDOT's *Development Coordination Manual* and the projected queues from the HCS analysis, the recommended minimum storage length (excluding taper) of the eastbound Zoar Road left turn lane is 100 feet and the recommended minimum storage length (excluding taper) of the southbound Hollyville Road right turn lane is 190 feet. The projected queues from the HCS analysis can be accommodated within the recommended storage lengths.



5. The following bicycle, pedestrian, and transit improvements should be included:
 - a. A minimum of fifteen-foot wide permanent easement from the edge of the right-of-way should be dedicated to DeIDOT along the Lawson Road, Avalon Road, and Zoar Road site frontages. Within the easement, the developer should construct a ten-foot wide shared-use path (SUP). The SUP should be designed to meet current AASHTO and ADA standards. A minimum five-foot setback should be maintained from the edge of the pavement to the SUP. If feasible, the SUP should be placed behind utility poles and street trees should be provided within the buffer area. The developer should coordinate with DeIDOT's Development Coordination Section during the plan review process to identify the exact location of the SUP.
 - b. At least one internal connection of a sidewalk or SUP in the vicinity of the site entrance from the SUP along Lawson Road, Avalon Road, and Zoar Road should be provided.
 - c. ADA compliant curb ramps and marked crosswalks should be provided along the site entrance.
 - d. Minimum five-foot wide bicycle lanes should be incorporated in the right turn lane and shoulder along the Lawson Road, Avalon Road, and Zoar Road approaches to the site entrance.
 - e. Utility covers should be moved outside of any designated bicycle lanes and any proposed sidewalks/SUP 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. Jeff VanHorn, Assistant Director for Traffic Operations and Management. Mr. VanHorn can be reached at (302) 659-4606 or by email at Jeffrey.VanHorn@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.

A handwritten signature in black ink, appearing to read 'Joanne M. Arellano', is written above the printed name.

Joanne M. Arellano, P.E., PTOE

cc: Mir Wahed, P.E., PTOE
Tanner Chiamprasert, E.I.T.

Enclosure

General Information

Report date: November 2022

Prepared by: Davis, Bowen & Friedel, Inc.

Prepared for: DE Land Devco LLC

Tax Parcel: 234-15.00-3.20, 3.21, 9.00, 10.00, 11.01, 13.00, 14.00, and 15.00

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

Project Description and Background

Description: The proposed residential development consists of 704 senior-adult detached houses.

Location: The site is located on the northwest corner of Lawson Road (Sussex Road 296) and Zoar Road (Sussex Road 48), southwest of Avalon Road (Sussex Road 302A), and west of Lawson Road, in Sussex County, Delaware.

Amount of Land to be developed: An approximately 359.74-acre assemblage of parcels.

Land Use approval(s) needed: Entrance Plan.

Proposed completion date: 2038.

Proposed access locations: Two full access points are proposed: one on Lawson Road and one on Avalon Road.

Daily Traffic Volumes:

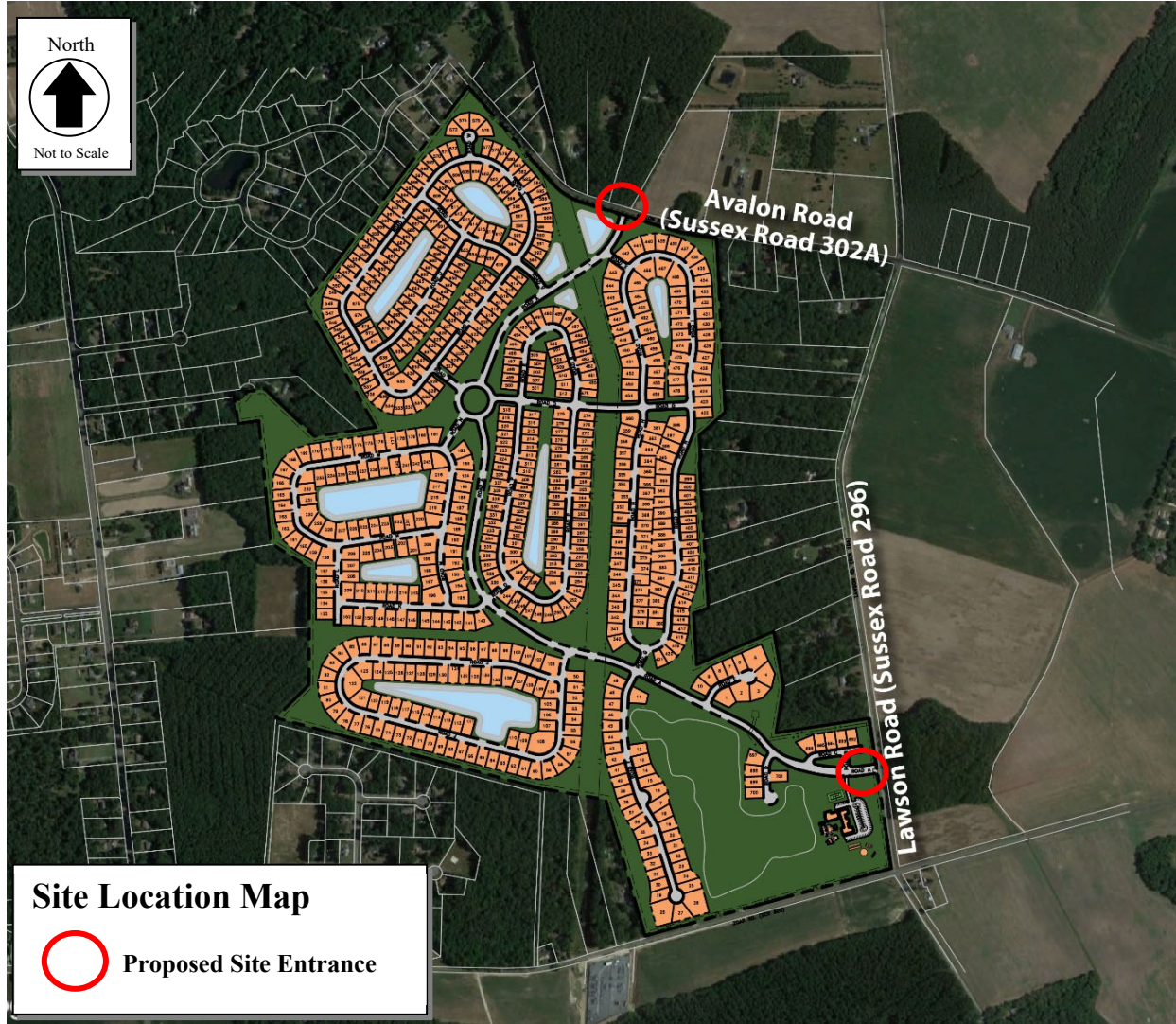
- 2022 Average Annual Daily Traffic on Lawson Road: 360 vehicles per day

*AADT is sourced from ATR data provided by the TIS report. Data taken from six full days starting June 2, 2022.

- 2022 Average Annual Daily Traffic on Avalon Road: 461 vehicles per day

*AADT is sourced from ATR data provided by the TIS report. Data taken from six full days starting May 20, 2022.

Site Map



**Graphic is an approximation based on the Raley Farm Preliminary Plans prepared by Davis, Bowen & Friedel, Inc. dated May 2022.*

Relevant and On-going Projects

There are no DelDOT Projects in the study area.

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 Investment Level 4.

Investment Level 4

Delaware's Investment Level 4 Areas are rural in nature and are where the bulk of the state's open space/natural areas and agricultural industry is located. These areas contain agribusiness activities, farm complexes, and small settlements. They typically include historic crossroads or points of trade, often with rich cultural ties. Delaware's Investment Level 4 Areas are also the location of scattered residential uses, featuring almost entirely single-family detached residential structures. Delaware's Investment Level 4 Areas also include many unincorporated communities, typically with their own distinctive character and identity. Investment Level 4 Areas depend on a transportation system primarily of secondary roads linked to roadways used as regional thoroughfares for commuting and trucking.

It is the state's intent to discourage additional urban and suburban development in Investment Level 4 Areas unrelated to agriculture and to the areas' needs. In Investment Level 4 Areas, the state's investments and policies should retain the rural landscape and preserve open spaces and farmlands, support farmland-related industries, and establish defined edges to more concentrated development. The focus for the Level 4 Areas will be to preserve and maintain existing facilities in safe working order, corridor-capacity preservation, and the enhancement of transportation facilities to support agricultural business. The lowest priority is given to transit system enhancements.

Proposed Development's Compatibility with Livable Delaware:

The proposed site is located within Investment Level 4. Investment Level 4 areas consist of scattered residential uses for individuals that value quiet and isolation provided by locations away from more developed settings. Therefore, the proposed development is consistent with the 2020 update of the Livable Delaware "Strategies for State Policies and Spending."

Comprehensive Plan

(Source: Sussex County Comprehensive Plan, 2019)

Sussex County Comprehensive Plan:

Per the *Sussex County Comprehensive Plan Existing Land Uses Map*, the proposed development appears to be currently zoned as Agricultural and Undeveloped Land. Per the *Sussex County Comprehensive Plan Future Land Use Map*, the proposed development is in an area designated as Low Density Rural.

Proposed Development's Compatibility with the Sussex County Comprehensive Plan:

The *Sussex County Comprehensive Plan* states that Low Density Rural areas are permitted for single family detached homes with certain portions permanently preserved for common open space. Therefore, the proposed development is generally consistent with the *Sussex County 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 11th Edition of the ITE *Trip Generation Manual*, published by the Institute of Transportation Engineers (ITE) for ITE Land Use Code 251 (Senior Adult Detached Houses). Trip generation was reviewed by DelDOT as part of the Preliminary TIS (PTIS) submission.

Table 1
Raley Property Trip Generation

Land Use	ADT	Weekday AM Peak Hour			Weekday PM Peak Hour		
		In	Out	Total	In	Out	Total
704 Units - Senior Adult Detached Houses (ITE – 251)	3,113	56	115	171	124	79	203

Overview of TIS

Intersections examined:

1. Site Entrance A / Lawson Road (Sussex Road 296)
2. Site Entrance B / Avalon Road (Sussex Road 302A)
3. Zoar Road (Sussex Road 48) / Lawson Road
4. Lawson Road / Avalon Road
5. Avalon Road / Avalon Drive
6. Zoar Road / Avalon Road
7. Zora Road / Hollyville Road (Sussex Road 48) / Harmons Hill Road (Sussex Road 302)

Conditions examined:

1. Case 1 – 2022 existing
2. Case 2 – 2038 without development
3. Case 3 – 2038 with development

Committed Developments considered:

1. Unity Branch (195 single-family detached houses)
2. Liberty West (181 single-family detached houses)
3. Wetherby (126 single-family detached houses)
4. Liberty East (121 single-family detached houses)

*Note: Committed development information provided in the Final TIS supersedes the information provided in the May 3, 2022, DelDOT Scoping Meeting Memorandum.

Peak hours evaluated: Weekday morning and weekday evening.

Intersection Descriptions

1. Site Entrance A / Lawson Road (Sussex Road 296)

Type of Control: Proposed two-way stop-controlled intersection (T-intersection).

Eastbound Approach: (Site Entrance A) Proposed one shared left turn/right turn lane, stop-controlled.

Northbound Approach: (Lawson Road) Existing one through lane; proposed one left turn lane and one through lane.

Southbound Approach: (Lawson Road) Existing one through lane; proposed one through lane and one right turn lane.

2. Site Entrance B / Avalon Road (Sussex Road 302A)

Type of Control: Proposed two-way stop-controlled intersection (T-intersection).

Eastbound Approach: (Avalon Road) Existing one through lane; proposed one through lane and one right turn lane.

Westbound Approach: (Avalon Road) Existing one through lane.

Northbound Approach: (Site Entrance B) Proposed one shared left turn/right turn lane, stop-controlled.

3. Zoar Road (Sussex Road 48) / Lawson Road

Type of Control: Existing two-way stop-controlled intersection (Four-legged).

Eastbound Approach: (Zoar Road) Existing one shared left turn/through/right turn lane.

Westbound Approach: (Zoar Road) Existing one shared left turn/through/right turn lane.

Northbound Approach: (Lawson Road) Existing one shared left turn/through/right turn lane, stop-controlled.

Southbound Approach: (Lawson Road) Existing one shared left turn/through/right turn lane, stop-controlled.

4. Lawson Road / Avalon Road

Type of Control: Existing two-way stop-controlled intersection (Four-legged).

Eastbound Approach: (Avalon Road) Existing one shared left turn/through/right turn lane.

Westbound Approach: (Avalon Road) Existing one shared left turn/through/right turn lane.

Northbound Approach: (Lawson Road) Existing one shared left turn/through/right turn lane, stop-controlled.

Southbound Approach: (Lawson Road) Existing one shared left turn/through/right turn lane, stop-controlled.

5. Avalon Road / Avalon Drive

Type of Control: Existing two-way stop-controlled intersection (T-intersection).

Eastbound Approach: (Avalon Road) Existing one shared through/right turn lane.

Westbound Approach: (Avalon Road) Existing one shared left turn/through lane.

Northbound Approach: (Avalon Drive) Existing one shared left turn/right turn lane, stop-controlled.

6. Zoar Road / Avalon Road

Type of Control: Existing two-way stop-controlled intersection (T-intersection).

Eastbound Approach: (Avalon Road) Existing one shared left turn/right turn lane, stop-controlled.

Northbound Approach: (Zoar Road) Existing one shared left turn/through lane.

Southbound Approach: (Zoar Road) Existing one shared through/right turn lane.

7. Zoar Road / Hollyville Road (Sussex Road 48) / Harmons Hill Road (Sussex Road 302)

Type of Control: All-way stop-controlled intersection (Four-legged).

Eastbound Approach: (Zoar Road) Existing one shared left turn/through/right turn lane, stop-controlled.

Westbound Approach: (Harmons Hill Road) Existing one shared left turn/through/right turn lane, stop-controlled.

Northbound Approach: (Hollyville Road) Existing one shared left turn/through/right turn lane, stop-controlled.

Southbound Approach: (Hollyville Road) Existing one shared left turn/through/right turn lane, stop-controlled.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: Per DelDOT Gateway, there are no bus routes that run through the study area.

Planned transit service: Per email correspondence on November 17, 2022, with Mr. Jared Kauffman, Fixed-Route Planner for DART, the Delaware Transit Corporation does not have any transit specific comments for this project.

Existing bicycle and pedestrian facilities: According to DelDOT's Sussex County Bicycle Map, Hollyville Road is considered a connector bicycle route.

Planned bicycle and pedestrian facilities: Per email correspondence on December 15, 2022, with Ms. Linda Osiecki, DelDOT's Pedestrian Coordinator, the following improvements were recommended:

- Provide shared use path (SUP) on their frontages which includes crossing all entrances
- Connect proposed internal subdivision sidewalk to the frontage SUP at all entrances
- Extend the SUP to crossings of the following roads which are already stop controlled:

- Lawson Road at Zoar Road
- Lawson Road at Avalon Road
- Avalon Drive at Avalon Road
- Avalon Road at Zoar Road
- Zoar Road at Hollyville Road

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 Bicycle On-Road Network Level of Traffic Stress map from the April 2018 Blueprint for a Bicycle-Friendly Delaware document which can be found on the following website:

<https://deldot.gov/Publications/plans/bikeandped/pdfs/DelDOTBikePlan043018FINAL.pdf>

- Lawson Road LTS: 4
- Avalon Road LTS: 4
- Zoar Road LTS: 3

Crash Evaluation

Per the crash data included in the TIS from October 28, 2019, to October 28, 2022, provided by the Delaware Department of Transportation (DelDOT), a total of 28 crashes were reported within the study area. Of the 28 crashes reported, no fatalities occurred.

The Zoar Road and Lawson Road intersection had six crashes reported including five not a collision between two vehicles.

The Zoar Road, Hollyville Road and Harmons Hill Road intersection had 11 crashes reported including one rear-end, one head on, one angle, one sideswipe, and seven not a collision between two vehicles.

The remaining intersections each reported less than six incidents within the three-year study period.

Previous Comments

All comments from the PTIS have been addressed in the Final TIS.

Sight Distance Evaluation

No sight distance constraints were noted at the proposed site entrance locations per a field visit conducted on November 21, 2022.

General HCS Analysis Comments

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

- 1) The TIS used version 7.9.5 of HCS7, whereas JMT used version 7.9.6 of HCS7 to complete the analysis.
- 2) Per DelDOT's *Development Coordination Manual*, JMT utilized the existing PHF for the existing condition (Case 1) whereas the TIS used different values.
- 3) Per DelDOT's *Development Coordination Manual*, JMT utilized the future intersection PHF 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 used the existing PHF if higher, whereas the TIS used different values.
- 4) JMT utilized the existing heavy vehicle percentage for each movement greater than 100 vph in the Case 1 existing scenario.
- 5) Per DelDOT's *Development Coordination Manual*, JMT used a heavy vehicle percentage of 3% for each movement greater than 100 vph in the Case 2 and Case 3 future scenario analysis, 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 the analysis of future scenarios.
- 6) 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 in the analyses.
- 7) JMT included pedestrians counted during the traffic data collection in the analysis.
- 8) JMT utilized an approach grade of 0% for all applicable minor approaches, whereas the TIS utilized a 2% grade.

Table 2
Peak Hour Levels Of Service (LOS)
Based on Final Traffic Impact Study for the Raley Property
Report Dated: November 2022
Prepared by: Davis, Bowen & Friedel, Inc

Unsignalized Intersection Two-Way Stop Control ¹ (T-Intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Site Entrance / Lawson Road (Sussex Road 296)				
2038 with Development (Case 3) ^{2,3,4}				
Eastbound Site Entrance Approach	A (9.0)	A (9.0)	A (8.8)	A (8.9)
Northbound Lawson Road Left Turn	A (7.4)	A (7.5)	A (7.4)	A (7.4)

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

² The TIS modeled the northbound approach as a shared left turn/through lane while JMT modeled the northbound approach as one left turn lane and one through lane.

³ The TIS modeled the southbound approach as a shared through/right turn lane while JMT modeled the southbound approach as one through lane and one right turn lane.

⁴ The TIS modeled the eastbound approach as a shared left turn/right turn lane while JMT modeled the eastbound approach as one left turn lane and one channelized right turn lane.

Table 3
Peak Hour Levels Of Service (LOS)
Based on Final Traffic Impact Study for the Raley Property
Report Dated: November 2022
Prepared by: Davis, Bowen & Friedel, Inc

Unsignalized Intersection Two-Way Stop Control ¹ (T-Intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Site Entrance / Avalon Road (Sussex Road 302A) ⁵				
2038 with Development (Case 3) ^{6,7,8}				
Westbound Avalon Road Left Turn	A (7.5)	A (7.4)	A (7.4)	A (7.4)
Northbound Site Entrance Approach	A (9.2)	A (9.0)	A (8.9)	A (9.0)

⁵ The TIS utilized AM volumes for the PM analysis and PM values for the AM analysis whereas JMT did not.

⁶ The TIS modeled the westbound approach as a shared left turn/through lane while JMT modeled the westbound approach as one left turn lane and one through lane.

⁷ The TIS modeled the eastbound approach as a shared through/right turn lane while JMT modeled the eastbound approach as one through lane and one right turn lane.

⁸ The TIS modeled the northbound approach as a shared left turn/right turn lane while JMT modeled the northbound approach as one left turn lane and one channelized right turn lane.

Table 4
Peak Hour Levels Of Service (LOS)
Based on Final Traffic Impact Study for the Raley Property
Report Dated: November 2022
Prepared by: Davis, Bowen & Friedel, Inc

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Zoar Road (Sussex Road 48) / Lawson Road (Sussex Road 296)				
2022 Existing (Case 1)				
Eastbound Zoar Road Left Turn	A (7.7)	A (8.0)	A (7.7)	A (8.0)
Westbound Zoar Road Left Turn	A (8.0)	A (7.6)	A (8.0)	A (7.6)
Northbound Lawson Road Approach	B (14.4)	B (13.9)	B (13.8)	B (13.4)
Southbound Lawson Road Approach	B (11.9)	B (11.3)	B (11.6)	B (11.1)
2038 without Development (Case 2)				
Eastbound Zoar Road Left Turn	A (7.9)	A (8.3)	A (7.9)	A (8.3)
Westbound Zoar Road Left Turn	A (8.2)	A (7.8)	A (8.2)	A (7.8)
Northbound Lawson Road Approach	C (17.4)	C (16.8)	C (16.3)	C (15.8)
Southbound Lawson Road Approach	B (13.2)	B (12.4)	B (12.8)	B (12.1)
2038 with Development (Case 3)				
Eastbound Zoar Road Left Turn	A (8.0)	A (8.4)	A (8.0)	A (8.4)
Westbound Zoar Road Left Turn	A (8.2)	A (7.8)	A (8.2)	A (7.8)
Northbound Lawson Road Approach	C (20.1)	C (20.6)	C (18.6)	C (19.1)
Southbound Lawson Road Approach	C (17.2)	C (17.2)	C (16.2)	C (16.2)

Table 5
Peak Hour Levels Of Service (LOS)
Based on Final Traffic Impact Study for the Raley Property
Report Dated: November 2022
Prepared by: Davis, Bowen & Friedel, Inc

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Avalon Road (Sussex Road 302A) / Lawson Road (Sussex Road 296)				
2022 Existing (Case 1)				
Eastbound Avalon Road Left Turn	A (7.7)	A (7.3)	A (7.7)	A (7.3)
Westbound Avalon Road Left Turn	A (7.3)	A (7.3)	A (7.3)	A (7.3)
Northbound Lawson Road Approach	A (9.2)	A (8.9)	A (9.2)	A (8.9)
Southbound Lawson Road Approach	A (9.4)	A (9.0)	A (9.3)	A (9.0)
2038 without Development (Case 2)				
Eastbound Avalon Road Left Turn	A (7.3)	A (7.3)	A (7.3)	A (7.3)
Westbound Avalon Road Left Turn	A (7.3)	A (7.3)	A (7.3)	A (7.3)
Northbound Lawson Road Approach	A (9.4)	A (9.1)	A (9.3)	A (9.1)
Southbound Lawson Road Approach	A (9.6)	A (9.2)	A (9.5)	A (9.2)
2038 with Development (Case 3)				
Eastbound Avalon Road Left Turn	A (7.4)	A (7.4)	A (7.3)	A (7.4)
Westbound Avalon Road Left Turn	A (7.4)	A (7.4)	A (7.4)	A (7.4)
Northbound Lawson Road Approach	B (10.0)	A (9.8)	A (9.9)	A (9.7)
Southbound Lawson Road Approach	A (9.8)	A (9.5)	A (9.7)	A (9.4)

Table 6
Peak Hour Levels Of Service (LOS)
Based on Final Traffic Impact Study for the Raley Property
Report Dated: November 2022
Prepared by: Davis, Bowen & Friedel, Inc

Unsignalized Intersection Two-Way Stop Control ¹ (T-Intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Avalon Road (Sussex Road 302A) / Avalon Drive				
2022 Existing (Case 1)				
Westbound Avalon Road Left Turn	A (7.3)	A (7.3)	A (7.3)	A (7.3)
Northbound Avalon Drive Approach	A (8.6)	A (8.7)	A (8.6)	A (8.7)
2038 without Development (Case 2)				
Westbound Avalon Road Left Turn	A (7.3)	A (7.4)	A (7.3)	A (7.4)
Northbound Avalon Drive Approach	A (8.7)	A (8.9)	A (8.7)	A (8.9)
2038 with Development (Case 3)				
Westbound Avalon Road Left Turn	A (7.3)	A (7.4)	A (7.4)	A (7.4)
Northbound Avalon Drive Approach	A (8.9)	A (9.0)	A (8.8)	A (9.0)

Table 7
Peak Hour Levels Of Service (LOS)
Based on Final Traffic Impact Study for the Raley Property
Report Dated: November 2022
Prepared by: Davis, Bowen & Friedel, Inc

Unsignalized Intersection Two-Way Stop Control ¹ (T-Intersection)	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Zoar Road (Sussex Road 48) / Avalon Road (Sussex Road 302A)				
2022 Existing (Case 1)				
Eastbound Zoar Road Left Turn	A (7.7)	A (8.2)	A (7.7)	A (8.2)
Southbound Avalon Road Approach	B (13.5)	B (13.3)	B (12.9)	B (12.7)
2038 without Development (Case 2)				
Eastbound Zoar Road Left Turn	A (8.0)	A (8.5)	A (8.0)	A (8.5)
Southbound Avalon Road Approach	C (16.4)	C (16.9)	C (15.4)	C (15.9)
2038 with Development (Case 3)				
Eastbound Zoar Road Left Turn	A (8.0)	A (8.7)	A (8.0)	A (8.7)
Southbound Avalon Road Approach	C (18.0)	C (18.6)	C (16.7)	C (17.2)

Table 8
Peak Hour Levels Of Service (LOS)
Based on Final Traffic Impact Study for the Raley Property
Report Dated: November 2022
Prepared by: Davis, Bowen & Friedel, Inc

Unsignalized Intersection All-Way Stop Control ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Zoar Road (Sussex Road 48)/ Hollyville Road (Sussex Road 48)/Harmons Hill Road (Sussex Road 302)				
2022 Existing (Case 1)				
Eastbound Zoar Road Approach	C (23.5)	B (12.1)	C (23.5)	B (12.1)
Westbound Harmon Hill Road Approach	B (13.9)	B (13.6)	B (13.9)	B (13.6)
Northbound Hollyville Road Approach	C (16.4)	B (11.3)	C (16.4)	B (11.3)
Southbound Hollyville Road Approach	B (13.0)	C (15.7)	B (13.0)	C (15.7)
Overall	C (18.0)	B (13.7)	C (18.0)	B (13.7)
2038 without Development (Case 2)				
Eastbound Zoar Road Approach	F (78.8)	D (27.7)	F (79.4)	D (28.0)
Westbound Harmon Hill Road Approach	D (28.9)	E (39.7)	D (28.1)	E (40.2)
Northbound Hollyville Road Approach	E (44.2)	D (27.0)	E (44.7)	D (27.2)
Southbound Hollyville Road Approach	C (23.5)	F (112.5)	C (23.6)	F (113.7)
Overall	E (48.3)	F (61.0)	E (48.7)	F (61.8)
2038 without Development (Case 2) <i>with additional turn lanes</i> ⁹				
Eastbound Zoar Road Approach	-	-	C (20.2)	C (18.0)
Westbound Harmon Hill Road Approach	-	-	D (28.1)	E (43.6)
Northbound Hollyville Road Approach	-	-	E (45.1)	D (28.7)
Southbound Hollyville Road Approach	-	-	C (16.1)	C (22.4)
Overall	-	-	D (28.0)	D (28.0)

⁹ JMT conducted an additional analysis with the southbound Hollyville Road approach with one shared left turn/through lane and one right turn lane, and the eastbound Zoar Road approach with one left turn lane and one shared through/right turn lane.

Table 8 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Final Traffic Impact Study for the Raley Property
Report Dated: November 2022
Prepared by: Davis, Bowen & Friedel, Inc

Unsignalized Intersection All-Way Stop Control ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Zoar Road (Sussex Road 48)/ Hollyville Road (Sussex Road 48)/Harmons Hill Road (Sussex Road 302)				
2038 with Development (Case 3)				
Eastbound Zoar Road Approach	F (107.5)	E (35.8)	F (108.4)	E (36.3)
Westbound Harmon Hill Road Approach	D (30.0)	F (56.0)	D (30.1)	F (56.2)
Northbound Hollyville Road Approach	E (44.8)	D (31.1)	E (45.7)	D (31.2)
Southbound Hollyville Road Approach	C (24.1)	F (154.0)	C (24.3)	F (154.8)
Overall	F (59.3)	F (81.8)	F (60.0)	F (82.3)
2038 with Development (Case 3) <i>with additional turn lanes⁹</i>				
Eastbound Zoar Road Approach	-	-	C (23.2)	C (20.2)
Westbound Harmon Hill Road Approach	-	-	D (32.3)	F (61.1)
Northbound Hollyville Road Approach	-	-	F (50.5)	D (32.7)
Southbound Hollyville Road Approach	-	-	C (16.8)	D (25.2)
Overall	-	-	D (31.2)	D (34.6)

Table 8 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Final Traffic Impact Study for the Raley Property
Report Dated: November 2022
Prepared by: Davis, Bowen & Friedel, Inc

Roundabout ¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Zoar Road (Sussex Road 48)/ Hollyville Road (Sussex Road 48)/Harmons Hill Road (Sussex Road 302)¹⁰				
2038 without Development (Case 2)				
Eastbound Zoar Road Approach	-	-	A (8.8)	A (7.6)
Westbound Harmon Hill Road Approach	-	-	A (10.0)	A (8.1)
Northbound Hollyville Road Approach	-	-	B (11.8)	A (6.8)
Southbound Hollyville Road Approach	-	-	A (6.4)	B (12.6)
Overall	-	-	A (9.4)	A (9.4)
2038 with Development (Case 3)				
Eastbound Zoar Road Approach	-	-	A (9.5)	A (8.0)
Westbound Harmon Hill Road Approach	-	-	B (10.5)	A (8.7)
Northbound Hollyville Road Approach	-	-	B (12.7)	A (7.1)
Southbound Hollyville Road Approach	-	-	A (6.6)	B (13.9)
Overall	-	-	B (10.0)	B (10.1)

¹⁰ JMT analyzed the intersection as a one lane roundabout.

Table 8 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Final Traffic Impact Study for the Raley Property
Report Dated: November 2022
Prepared by: Davis, Bowen & Friedel, Inc

Signalized Intersection¹	LOS per TIS		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Zoar Road (Sussex Road 48)/ Hollyville Road (Sussex Road 48)/Harmons Hill Road (Sussex Road 302)				
2038 without Development (Case 2) ¹¹	B (14.6)	B (17.1)	C (21.2)	C (21.6)
2038 with Development (Case 3) ¹²	B (15.1)	B (17.9)	C (21.9)	C (22.8)

¹¹ JMT utilized a cycle length of 90 sec with concurrent side streets and permitted left turns for AM and PM peak hours, whereas the TIS utilized a signal length of 52 sec in the AM and 53 sec in the PM.

¹² JMT utilized a cycle length of 90 sec with concurrent side streets and permitted left turns for AM and PM peak hours, whereas the TIS utilized a signal length of 64 sec in the AM and PM.