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**Last revised June 2, 2020**
Revised April 24, 2020
December 11, 2019

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

RE: Agreement No. 1774
Project Number T201769002
Traffic Impact Study Services
**Subtask 1A-2-Warrington Property TIS**

Dear Mr. Brestel:

Johnson, Mirmiran and Thompson (JMT) has completed the review of the Traffic Impact Study (TIS) for Warrington Property, prepared by Davis, Bowen & Friedel, Inc. dated June 2019. This task was assigned as Task Number 1A-2. The report is prepared in a manner generally consistent with DelDOT's *Development Coordination Manual*.

This revised letter incorporates updated recommendations per discussions between DelDOT and the developer. The updated recommendations were due to results from a 2019 HEP Task I meeting held in January 2020 regarding the Delaware Route 54 and Hudson Road intersection. Details regarding the results from the meeting are discussed below.

The TIS evaluates the impacts of a proposed residential development in the Town of Selbyville, Sussex County, Delaware. The development would be comprised of 99 single-family detached houses. The site is located on the southeast corner of the intersection of Delaware Route 54 (Sussex Road 58/Lighthouse Road) with Hudson Road (Sussex Road 387). One full access point is proposed along Hudson Road. The subject property is on an approximately 46.38-acre portion of a 56.38-acre parcel that is zoned as R-4 (Residential) and no rezoning is proposed. Construction is anticipated to be complete in 2022.

DelDOT currently has one relevant and ongoing pavement rehabilitation project along Delaware Route 54 from Selbyville to Delaware Route 20 (Contract #T201706305). The project includes the resurfacing of Delaware Route 54 and traverses through one of the study intersections (Delaware Route 54 and Hudson Road). Construction began in the Spring of 2018 and construction is anticipated to be complete by Spring of 2021.

Additionally, the intersection of Delaware Route 54 and Hudson Road has been included in the 2019 Hazard Elimination Program (HEP). The intersection was recently evaluated by the program,

and at the 2019 HEP Task I meeting held on January 30, 2020 it was recommended to design and construct a roundabout at this location. At this time, the design details and the schedule for design and construction are not yet known.

Based on our review of the traffic impact study, we have the following comments and recommendations: The following intersections exhibit level of service (LOS) deficiencies without the implementation of physical roadway and/or traffic control improvements.

| ***Intersection*** | ***Situations for which LOS deficiencies occur*** |
|---|---|
| Delaware Route 54/Hudson Road | 2022 Saturday without development (Case 2)<br>2022 Saturday with development (Case 3) |

The unsignalized intersection of Delaware Route 54 and Hudson Road exhibits LOS deficiencies under future conditions with or without the proposed development during the Summer Saturday peak period. The deficiencies take place along the southbound Hudson Road approach with LOS E (46.4 seconds of delay per vehicle) and a calculated 95$^{th}$ percentile queue length of approximately 70 feet.

As discussed above, at the 2019 HEP Task I meeting held on January 30, 2020 it was recommended to design and construct a roundabout at the Delaware Route 54 and Hudson Road intersection. As such, we recommend the developer be responsible to fund an equitable contribution toward a future DelDOT project based on the estimated cost of installing a roundabout at this intersection. This contribution would satisfy any obligation the developer has in regards to this intersection.

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 should reconstruct Hudson Road to provide two eleven-foot travel lanes and two five-foot shoulders from the north end of the site frontage, plus the additional distance required to accommodate the bypass lane, to the south end of the site frontage, plus the additional distance required to accommodate the required turn lanes and transitions. At DelDOT's discretion, the developer should provide a bituminous concrete overlay to the existing travel lanes. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer, if necessary.

2. The developer should construct a full access site entrance for the proposed Warrington Property development on Hudson Road. The proposed configuration is shown in the table below; per direction from DelDOT, a bypass lane should be provided along the southbound Hudson Road approach.

| Approach | Current Configuration | Proposed Configuration |
|---|---|---|
| Westbound Site Entrance | Approach does not exist | One shared left turn/right turn lane |
| Northbound Hudson Road | One through lane | One through lane and one right turn lane |
| Southbound Hudson Road | One through lane | One through lane and one bypass lane |

The developer should coordinate with DelDOT's Development Coordination Section to determine the final design of the right turn lane and bypass lane during the plan review process.

3. The developer should enter into an agreement with DelDOT to make an equitable contribution towards the future DelDOT project determined from the 2019 HEP at the intersection of Delaware Route 54 and Hudson Road. We understand that DelDOT has determined the amount of this contribution will not exceed $104,040.28. If DelDOT determines to extend their intersection project south to tie into the developer's improvements, the developer shall contribute an additional amount toward that project, not to exceed $2,800.00. The developer should coordinate with DelDOT's Development Coordination Section regarding the implementation of the project and final amount of the contribution during the plan review process.

4. 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 Hudson Road site frontage. Within the easement, the developer should construct a ten-foot wide shared-use path that meets current AASHTO and ADA standards. A minimum five-foot setback should be maintained from the edge of the pavement to the shared-use path. If feasible, the shared-use path should be placed behind utility poles and street trees should be provided within the buffer area. The developer should coordinate with DelDOT's Development Coordination section during the plan review process to identify the exact location of the shared-use path.

   b. Sidewalks should be provided on both sides of all internal roads.

   c. ADA compliant curb ramps and marked crosswalks should be provided along the Site Entrance approach to Hudson Road. The use of diagonal curb ramps is discouraged.

d. Minimum five-foot wide bicycle lanes should be incorporated in the right turn lane and shoulder along the Hudson Road approaches to the Site Entrance.

e. 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 DelDOT's Plan Review process.

Improvements in this TIS may be considered "significant" under DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DelDOT's website at 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.

Joanne M. Arellano, P.E., PTOE

cc: Mir Wahed, P.E., PTOE

Enclosure

## General Information

**Report date:** June 2019
**Prepared by:** Davis, Bowen & Friedel, Inc.
**Prepared for:** Bunting Macks, LLC
**Tax Parcels:** 533-17.00-182.00
**Generally consistent with DelDOT's *Development Coordination Manual*:** Yes

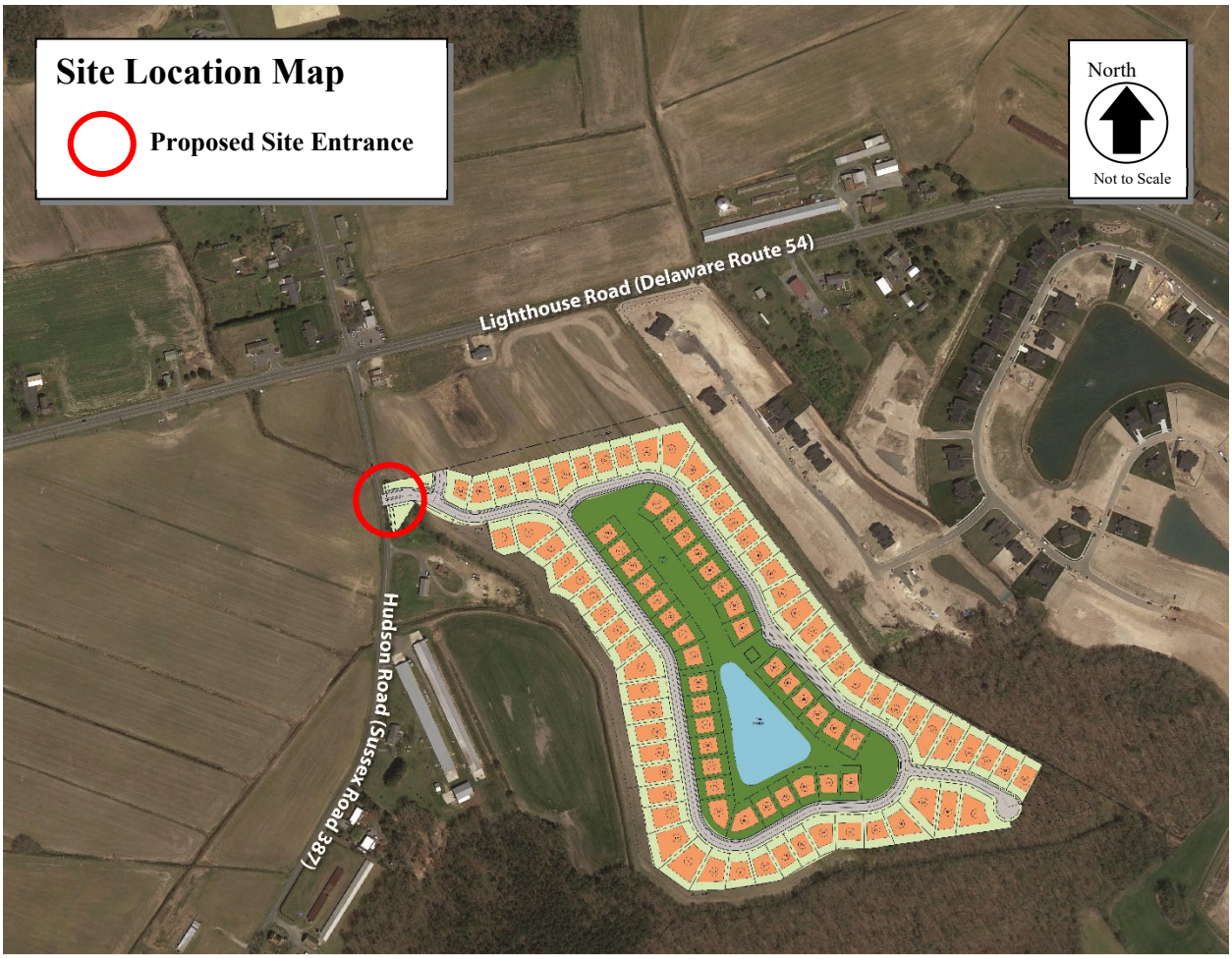
## Project Description and Background

**Description:** The developer seeks to develop 99 single-family detached houses.
**Location:** The subject site is located on the southeast corner of the intersection of Delaware Route 54 (Lighthouse Road) and Hudson Road (Sussex Road 387), in the Town of Selbyville.
**Amount of Land to be developed:** Approximately 46.38-acre portion of a 56.38-acre parcel.
**Land Use approval(s) needed:** Entrance Plan.
**Proposed completion date:** 2022.
**Proposed access location:** One full access is proposed along Hudson Road.

**Daily Traffic Volumes:**

- 2018 Average Annual Daily Traffic on Hudson Road: 3,197 vehicles per day.

## Site Map




**Graphic is an approximation based on the Site Plan prepared by Davis, Bowen & Friedel, Inc. dated October 2018.*

## Relevant and On-going Projects

DelDOT currently has one relevant and ongoing pavement rehabilitation project along Delaware Route 54 from Selbyville to Delaware Route 20 (Contract #T201706305). The project includes the resurfacing of Delaware Route 54 and traverses through one of the study intersections (Delaware Route 54 and Hudson Road). Construction began in the Spring of 2018 and construction is anticipated to be complete by Spring of 2021.

Additionally, the intersection of Delaware Route 54 and Hudson Road has been included in the 2019 Hazard Elimination Program (HEP). The intersection was recently evaluated by the program, and at the 2019 HEP Task I meeting held on January 30, 2020 it was recommended to design and construct a roundabout at this location. At this time, the design details and the schedule for design and construction are not yet known.

**Livable Delaware**
*(Source: Delaware Strategies for State Policies and Spending, 2015)*

**Location with respect to the Strategies for State Policies and Spending Map of Delaware:**
The proposed development is located within the Investment Level 2 and 3 areas.

***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.

***Investment Level 3***

Investment Level 3 Areas generally fall into two categories. The first category covers lands that are in the long-term growth plans of counties or municipalities where development is not necessary to accommodate expected population growth during a five-year planning period (or longer). The second category includes lands that are adjacent to or intermingled with fast-growing areas within counties or municipalities that are otherwise categorized as Investment Levels 1 or 2. Investment Level 3 is further characterized by areas with new development separated from existing development by a substantial amount of vacant land that is not contiguous with existing infrastructure, areas that are experiencing some development pressure, areas with existing but disconnected development, and possible lack of adequate infrastructure.

The state will consider investing in infrastructure within Investment Level 3 Areas once the Investment Level 1 and 2 Areas are substantially built out, or when the infrastructure or facilities are logical extensions of existing systems and deemed appropriate to serve a particular area. The priorities in the Level 3 Areas are for DelDOT to focus on regional movements between towns and other population centers. Local roadway improvements will be made by developers and property owners as development occurs. Lower priority is given to transportation system–capacity improvements and transit-system enhancements.

**Proposed Development's Compatibility with Livable Delaware:**

The proposed development is located in the Investment Level 2 and 3 areas. According to Livable Delaware, Level 2 areas generally contain detached single-family dwellings and Level 3 areas may be desirable for a variety of housing types in conjunction with local government comprehensive plans. Therefore, the proposed development is generally consistent with the 2015 update of the Livable Delaware "Strategies for State Policies and Spending."

## Comprehensive Plans

*(Source: Sussex County 2019 Comprehensive Plan)*

**Sussex County Comprehensive Plan:**
The subject property is zoned as R-4 (Residential) and the developer does not plan to rezone the land. Per the *Sussex County Comprehensive Plan Future Land Use Map,* the proposed development is in an area designated as Town Center.

**Proposed Development's Compatibility with the Sussex County Comprehensive Plan:**
Per the *Sussex County Comprehensive Plan Future Land Use Map,* the proposed development is in an area designated as Town Center. A range of housing types are appropriate in Town Centers, including single-family homes. Therefore, the proposed development is generally consistent with the *Sussex County 2019 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).

**Table 1**
Warrington Property Trip Generation

| Land Use | ADT | AM Peak Hour | | | PM Peak Hour | | | SAT Peak Hour | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | In | Out | Total | In | Out | Total | In | Out | Total |
| 99 Units Single-Family Detached Housing (ITE Code 210) | 1,030 | 19 | 56 | 75 | 64 | 37 | 101 | 55 | 46 | 101 |

## Overview of TIS

**Intersections examined:**

1. Site Entrance/Hudson Road (Sussex Road 387)
2. Delaware Route 54/Hudson Road

**Conditions examined:**

1. Case 1 – 2018 Existing
2. Case 2 – 2022 without development
3. Case 3 – 2022 with development

**Committed Developments considered:**

1. Selbyville Town Village (129 single-family detached houses and 53 townhome units)*
2. Lighthouse Lakes (158 unbuilt single-family detached houses)
3. Strawberry Ridge (132 single-family detached houses)

*Note: Selbyville Town Village information was obtained from the Record Plan dated December 20, 2018, and supersedes the information contained within the June 27, 2018 DelDOT Scoping Meeting Memorandum.

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

## Intersection Descriptions

1. **Site Entrance/Hudson Road (Sussex Road 387)**
   **Type of Control:** Proposed two-way stop controlled intersection (T-intersection);
   **Westbound Approach:** (Site Entrance) Proposed one shared left turn/right turn lane, stop controlled
   **Northbound Approach:** (Hudson Road) Existing one through lane; proposed one through lane and one right turn lane

**Southbound Approach:** (Hudson Road) Existing one through lane; proposed one bypass lane and one through lane

2. **Delaware Route 54/Hudson Road**
   **Type of Control:** Existing two-way stop controlled intersection (four-leg intersection)
   **Eastbound Approach:** (Delaware Route 54) Existing one shared left turn/through/right turn lane
   **Westbound Approach:** (Delaware Route 54) Existing one shared left turn/through lane/right turn lane
   **Northbound Approach:** (Hudson Road) Existing one shared left turn/through/right turn lane, stop controlled
   **Southbound Approach:** (Hudson Road) Existing one shared left turn/through/right turn lane, stop controlled

## Transit, Pedestrian, and Bicycle Facilities

**Existing transit service**: Delaware Transit Corporation (DTC) currently does not provide any service in the study area.

**Planned transit service**: JMT contacted Mr. Jared Kauffman, Fixed-Route Planner at the DTC. Per email correspondence on July 23, 2019 from Mr. Kauffman, no transit improvements are recommended in this area at this time.

**Existing bicycle and pedestrian facilities**: According to DelDOT's *Sussex County Bicycle Map*, a Regional Bicycle Route exists within the study area. The Regional Bicycle Route exists along Delaware Route 54 and traverses through one of the project's intersections (Delaware 54 and Hudson Road). Pedestrian facilities do not exist within the study area.

**Planned bicycle and pedestrian facilities**: Per email correspondence on July 15, 2019 from Ms. Maria Andaya, DelDOT's Pedestrian Coordinator, the following improvements were recommended:

- A 10-foot wide shared use path with a minimum 5-foot buffer the from edge of pavement should be provided along the Hudson Road site frontage.
- All entrance, roadway and/or intersection improvements required shall incorporate bicycle and pedestrian facilities.
- The site shall dedicate right-of-way per the roadway classification and establish a 15-foot wide permanent easement along the Hudson Road site frontage.

**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 new bicycle Level of Traffic Stress (LTS) model will be applied to bicycle system planning and evaluation throughout the state. The Bicycle LTS for the roadway under existing conditions along the site frontage are summarized below. The Bicycle LTS was determined utilizing the map on the DelDOT Gateway.

- Hudson Road – LTS: 4

**Previous Comments**
None.

**General HCS Analysis Comments**

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

1. For the intersection analyses, the TIS and JMT used HCS7 version 7.7 whereas JMT used HCS7 version 7.8.

2. 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 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 whereas the TIS utilized arbitrary heavy vehicle percentages.

3. Per DelDOT's *Development Coordination Manual*, JMT used a heavy vehicle percentage of 5% for each movement less than 100 vph whereas the TIS used arbitrary heavy vehicle percentages.

4. Per DelDOT's *Development Coordination Manual,* JMT 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. The TIS assumed 0.92 for all existing and future scenarios.

5. JMT utilized updated Cases 2 and 3 volumes. As discussed with DelDOT, the updated volumes were created to address some volume development inconsistencies identified in the TIS report.

Table 2
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Warrington Property
Report Dated: June 2019
Prepared by Davis, Bowen & Friedel, Inc.

| **Unsignalized Intersection Two-Way Stop Control (T-Intersection)** [1] | **LOS per TIS** | | | **LOS per JMT** | | |
|---|---|---|---|---|---|---|
| **Site Entrance/Hudson Road (Sussex Road 387)** | Weekday AM | Weekday PM | Saturday Peak | Weekday AM | Weekday PM | Saturday Peak |
| 2022 with Development (Case 3) | | | | | | |
| Westbound Site Entrance Approach | A (9.9) | B (10.2) | B (10.1) | A (9.9) | B (10.3) | B (10.2) |
| Southbound Hudson Road Left Turn | A (7.6) | A (7.8) | A (7.7) | A (7.6) | A (7.9) | A (7.7) |

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

Table 3
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Warrington Property
Report Dated: June 2019
Prepared by Davis, Bowen & Friedel, Inc.

| **Unsignalized Intersection Two-Way Stop Control [1]** | **LOS per TIS** | | | **LOS per JMT** | | |
|---|---|---|---|---|---|---|
| **Delaware Route 54/Hudson Road** | Weekday AM | Weekday PM | Saturday Peak | Weekday AM | Weekday PM | Saturday Peak |
| 2018 Existing (Case 1) | | | | | | |
| Eastbound Delaware Route 54 Left Turn | A (7.5) | A (7.6) | A (7.7) | A (7.5) | A (7.6) | A (7.7) |
| Westbound Delaware Route 54 Left Turn | A (7.9) | A (7.7) | A (8.0) | A (7.9) | A (7.7) | A (8.0) |
| Northbound Hudson Road Approach | B (13.0) | B (12.9) | B (13.3) | B (13.0) | B (12.9) | B (13.3) |
| Southbound Hudson Road Approach | C (16.9) | B (14.0) | C (21.8) | C (16.9) | B (14.0) | C (21.9) |
| | | | | | | |
| 2022 without Development (Case 2) | | | | | | |
| Eastbound Delaware Route 54 Left Turn | A (7.7) | A (7.8) | A (7.9) | A (7.7) | A (7.9) | A (7.9) |
| Westbound Delaware Route 54 Left Turn | A (8.1) | A (8.0) | A (8.3) | A (8.2) | A (8.0) | A (8.3) |
| Northbound Hudson Road Approach | C (15.9) | C (16.2) | C (16.2) | C (16.1) | C (16.3) | C (16.5) |
| Southbound Hudson Road Approach | C (24.0) | C (19.1) | D (33.5) | C (24.3) | C (19.6) | E (35.3) |
| | | | | | | |
| 2022 without Development (Case 2) *with southbound left turn lane* | | | | | | |
| Eastbound Delaware Route 54 Left Turn | - | - | - | A (7.7) | A (7.9) | A (7.9) |
| Westbound Delaware Route 54 Left Turn | - | - | - | A (8.2) | A (8.0) | A (8.3) |
| Northbound Hudson Road Approach | - | - | - | C (16.1) | C (16.3) | C (16.5) |
| Southbound Hudson Road Approach | - | - | - | C (22.6) | C (17.8) | D (28.3) |

Table 3 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Warrington Property
Report Dated: June 2019
Prepared by Davis, Bowen & Friedel, Inc.

| **Unsignalized Intersection Two-Way Stop Control [1]** | **LOS per TIS** | | | **LOS per JMT** | | |
|---|---|---|---|---|---|---|
| **Delaware Route 54/Hudson Road** | Weekday AM | Weekday PM | Saturday Peak | Weekday AM | Weekday PM | Saturday Peak |
| 2022 with Development (Case 3) | | | | | | |
| Eastbound Delaware Route 54 Left Turn | A (7.7) | A (7.8) | A (7.9) | A (7.7) | A (7.9) | A (7.9) |
| Westbound Delaware Route 54 Left Turn | A (8.2) | A (8.0) | A (8.4) | A (8.2) | A (8.0) | A (8.4) |
| Northbound Hudson Road Approach | C (22.0) | C (20.1) | C (24.6) | C (22.4) | C (20.3) | D (26.2) |
| Southbound Hudson Road Approach | D (25.9) | C (22.5) | E (43.4) | D (26.3) | C (23.2) | E (46.4) |
| | | | | | | |
| 2022 with Development (Case 3) *with southbound left turn lane* | | | | | | |
| Eastbound Delaware Route 54 Left Turn | - | - | - | A (7.7) | A (7.9) | A (7.9) |
| Westbound Delaware Route 54 Left Turn | - | - | - | A (8.2) | A (8.0) | A (8.4) |
| Northbound Hudson Road Approach | - | - | - | C (22.4) | C (20.3) | D (26.2) |
| Southbound Hudson Road Approach | - | - | - | C (24.1) | C (20.2) | D (33.9) |

Table 3 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Warrington Property
Report Dated: June 2019
Prepared by Davis, Bowen & Friedel, Inc.

| **Unsignalized Intersection All-Way Stop Control [1]** | **LOS per TIS** | | | **LOS per JMT** | | |
|---|---|---|---|---|---|---|
| **Delaware Route 54/Hudson Road** | Weekday AM | Weekday PM | Saturday Peak | Weekday AM | Weekday PM | Saturday Peak |
| 2022 without Development (Case 2) | | | | | | |
| Eastbound Delaware Route 54 Approach | - | - | - | B (12.3) | B (11.3) | B (12.3) |
| Westbound Delaware Route 54 Approach | - | - | - | B (13.0) | B (13.5) | C (19.1) |
| Northbound Hudson Road Approach | - | - | - | A (9.9) | B (10.4) | B (10.2) |
| Southbound Hudson Road Approach | - | - | - | B (10.2) | A (9.6) | B (10.3) |
| Overall Intersection | - | - | - | B (11.9) | B (11.9) | C (15.2) |
| | | | | | | |
| 2022 with Development (Case 3) | | | | | | |
| Eastbound Delaware Route 54 Approach | B (13.0) | B (12.0) | B (13.2) | B (13.2) | B (12.2) | B (13.6) |
| Westbound Delaware Route 54 Approach | B (13.8) | B (14.9) | C (21.9) | B (14.1) | C (15.3) | C (23.2) |
| Northbound Hudson Road Approach | B (10.9) | B (11.3) | B (11.1) | B (11.1) | B (11.4) | B (11.3) |
| Southbound Hudson Road Approach | B (10.6) | B (10.1) | B (10.8) | B (10.7) | B (10.2) | B (10.9) |
| Overall Intersection | B (12.6) | B (12.8) | C (16.8) | B (12.8) | B (13.1) | C (17.5) |

Table 3 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Warrington Property
Report Dated: June 2019
Prepared by Davis, Bowen & Friedel, Inc.

| **Roundabout** [1] | **LOS per TIS** | | | **LOS per JMT** | | |
|---|---|---|---|---|---|---|
| **Delaware Route 54/Hudson Road** | Weekday AM | Weekday PM | Saturday Peak | Weekday AM | Weekday PM | Saturday Peak |
| 2022 without Development (Case 2) | | | | | | |
| Eastbound Delaware Route 54 Approach | - | - | - | A (6.3) | A (5.1) | A (6.4) |
| Westbound Delaware Route 54 Approach | - | - | - | A (5.3) | A (5.7) | A (6.6) |
| Northbound Hudson Road Approach | - | - | - | A (5.1) | A (5.4) | A (5.0) |
| Southbound Hudson Road Approach | - | - | - | A (5.0) | A (4.7) | A (5.6) |
| Overall Intersection | - | - | - | A (5.6) | A (5.4) | A (6.2) |
| | | | | | | |
| 2022 with Development (Case 3) | | | | | | |
| Eastbound Delaware Route 54 Approach | - | - | - | A (6.5) | A (5.5) | A (6.7) |
| Westbound Delaware Route 54 Approach | - | - | - | A (5.7) | A (6.0) | A (7.0) |
| Northbound Hudson Road Approach | - | - | - | A (5.6) | A (5.7) | A (5.4) |
| Southbound Hudson Road Approach | - | - | - | A (5.2) | A (5.0) | A (5.8) |
| Overall Intersection | - | - | - | A (5.9) | A (5.7) | A (6.6) |

Table 3 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Warrington Property
Report Dated: June 2019
Prepared by Davis, Bowen & Friedel, Inc.

| **Signalized Intersection** [1] | **LOS per TIS** | | | **LOS per JMT** | | |
|---|---|---|---|---|---|---|
| **Delaware Route 54/Hudson Road** [2,3] | Weekday AM | Weekday PM | Saturday Peak | Weekday AM | Weekday PM | Saturday Peak |
| 2022 without Development (Case 2) | - | - | - | B (17.3) | B (18.8) | B (19.3) |
| | | | | | | |
| 2022 with Development (Case 3) | - | - | - | B (18.3) | B (19.6) | B (19.9) |

[2] JMT configured the intersection as one left turn lane and one shared through/right turn lane along all approaches.
[3] JMT analyzed the intersection as a signalized intersection with a 60 second cycle length and protected and permissive left turn phasing along all approaches.