



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

JENNIFER COHAN
SECRETARY

January 14, 2020

Mr. Dev Sitaram
Karins and Associates, Inc.
17 Polly Drummond Center
Suite 201
Newark, DE 19711

Dear Mr. Sitaram:

The enclosed Traffic Impact Study (TIS) review letter for the proposed **Woods at Hidden Creek** (Tax Parcels 25-004.00-121.00 and 14-016.00-051.00) 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 review letter and concurs with the recommendations. If you have any questions concerning this letter or the enclosed review letter, please contact me at (302) 760-2167.

Sincerely,

Troy Brestel
Project Engineer

TEB:km
Enclosures

cc with enclosures: Mr. Rob Allen, Handler Corporation, Inc.
Ms. Constance C. Holland, Office of State Planning Coordination
Mr. Anthony Mangeri, Town Manager, Town of Townsend
Mr. Andrew Parker, McCormick Taylor, Inc.
DelDOT Distribution

DelDOT Distribution

Brad Eaby, Deputy Attorney General
Shanté Hastings, Director, Transportation Solutions (DOTS)
Drew Boyce, Director, Planning
Mark Luszcz, Deputy Director, DOTS
Pamela Steinebach, Assistant Director, Project Development North, DOTS
J. Marc Coté, Assistant Director, Development Coordination
T. William Brockenbrough, Jr., County Coordinator, Development Coordination
Peter Haag, Chief Traffic Engineer, Traffic, DOTS
Kevin Canning, Canal District Engineer, Canal District
Matthew Vincent, Canal District Public Works Engineer, Canal District
Sireen Muhtaseb, New Castle Subdivision Review Coordinator, Development Coordination
David Dooley, Service Development Planner, Delaware Transit Corporation
Mark Galipo, Traffic Engineer, Traffic, DOTS
Anthony Aglio, Planning Supervisor, Statewide & Regional Planning
Pao Lin, New Castle Subdivision Reviewer, Development Coordination
Claudy Joinville, Project Engineer, Development Coordination



January 10, 2020

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

RE: Agreement No. 1773
Traffic Impact Study Services
Task No. 1 Subtask 21A – The Woods at Hidden Creek

Dear Mr. Brestel:

McCormick Taylor has completed its review of the Traffic Impact Study (TIS) for the Woods at Hidden Creek residential development prepared by Karins and Associates dated April 2019. Karins and Associates prepared the report in a manner generally consistent with DelDOT's Development Coordination Manual.

The TIS evaluates the impacts of the proposed Woods at Hidden Creek residential development. The site is located on the east side of South Street (New Castle Road 36) and the southwest side of Summit Bridge Road (Delaware Route 71 / New Castle Road 14), in the Town of Townsend, New Castle County, Delaware. The proposed development would consist of 222 single-family detached homes. Full Buildout is anticipated to be complete by 2025.

Two unsignalized driveways are proposed. "Site Access A" is located on Summit Bridge Road approximately 2,000 feet south of Pine Tree Road (New Castle Road 25), and "Site Access B" is located on South Street approximately 1,500 feet south of Main Street (New Castle Road 25). At the proposed Site Access B, South Street is one-way southbound so the allowed movements to and from the driveway are lefts in and lefts out only.

The subject land consists of two parcels totaling 106 acres. The land is zoned R-2 (Residential) within the Town of Townsend. No rezoning is needed or sought to permit the proposed development.

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

Based on our review, 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:

<i>Intersection</i>	<i>Existing Traffic Control</i>	<i>Situations for which deficiencies occur</i>
Summit Bridge Road and Money Road	Unsignalized	2025 without Woods at Hidden Creek weekday PM (Case 2); 2025 with Woods at Hidden Creek weekday PM (Case 3)

Summit Bridge Road and Money Road

This unsignalized intersection experiences LOS deficiencies in the weekday PM peak hour under the 2025 without and with The Woods at Hidden Creek scenarios.

The westbound Money Road approach is expected to operate at LOS E in these scenarios. The total volume on the approach is projected to be less than 50 vehicles in the PM peak hour, and the 95th percentile queue length is projected to be two less than vehicles.

The LOS deficiency occurs even without The Woods at Hidden Creek development, and the resulting queue length is relatively short. Adding a separate turn lane on the westbound approach would not resolve the deficiencies (and would be very challenging due to utility conflicts), and installation of a traffic signal is not warranted or desired. For all these reasons, no mitigation is recommended at this intersection.

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

1. The developer should construct “Site Access A” on Summit Bridge Road. The proposed configuration is shown in the table below. The developer should also improve Summit Bridge Road within the limits of construction of the northbound left-turn lane and the southbound right-turn lane as needed to provide twelve-foot travel lanes and eight-foot shoulders. The developer should provide a bituminous concrete overlay to the existing travel 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.

Approach	Existing Configuration	Proposed Configuration
Eastbound Site Access A	Approach does not exist	One left-turn lane and one right-turn lane
Northbound Summit Bridge Rd	One through lane	One left-turn lane and one through lane
Southbound Summit Bridge Rd	One through lane	One through lane and one right-turn lane

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

Approach	Left-Turn Lane	Right-Turn Lane
Eastbound Site Access A	N/A	50 feet *
Northbound Summit Bridge Rd	310 feet **	N/A
Southbound Summit Bridge Rd	N/A	400 feet **

* Initial turn-lane length based on storage length per queuing analysis, with 50-foot minimum.

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

2. The developer should construct "Site Access B" on South Street. The proposed configuration is shown in the table below. The developer should also improve South Street within the limits of the site entrance construction by providing a bituminous concrete overlay to the existing travel 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.

Approach	Existing Configuration	Proposed Configuration
Westbound Site Access B	Approach does not exist	One left-turn-only lane
Southbound South Street	One through lane	One shared left-turn/through lane

3. The following bicycle, pedestrian, and transit improvements should be included:
 - a. Adjacent to the proposed right-turn lane on southbound Summit Bridge Road at proposed Site Access A, a minimum of a five-foot bicycle lane should be dedicated and striped with appropriate markings for bicyclists through the turn lane in order to facilitate safe and unimpeded bicycle travel.
 - b. Appropriate bicycle symbols, directional arrows, pavement markings, and signing should be included along bicycle facilities and turn lanes within the project limits.
 - c. Utility covers should be made flush with the pavement.
 - d. If clubhouses or other community facilities are constructed as shown on the site plan, bicycle parking should be provided near building entrances. Where building architecture provides for an awning, other overhang, or indoor parking, the bicycle parking should be covered.

- e. A minimum 15-foot wide permanent easement from the edge of the right-of-way should be dedicated to DelDOT within the site frontages along Summit Bridge Road and South Street.
- f. Within the easement along Summit Bridge Road, a minimum of a ten-foot wide shared-use path (SUP) that meets current AASHTO and ADA standards should be constructed along the site frontage. The SUP should have a minimum of a five-foot buffer from the roadway. At both ends of the site frontage, the SUP should connect to the shoulder of Summit Bridge Road in accordance with DelDOT's *Shared Use Path and/or Sidewalk Termination Reference Guide* dated August 1, 2018. The developer should coordinate with DelDOT's Development Coordination Section to determine details of the SUP connections at the property boundaries.
- g. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances. Type 3 curb ramps are discouraged.
- h. Internal sidewalks for pedestrian safety and to promote walking as a viable transportation alternative should be constructed within the development. These sidewalks should each be a minimum of five-feet wide (with a minimum of a five-foot buffer from the roadway) and should meet current AASHTO and ADA standards. Internal sidewalks in the development should connect to the existing sidewalk along South Street and to the future shared-use path along Summit Bridge Road.
- i. Where internal sidewalks are located alongside of parking spaces, a buffer should be added to prevent vehicular overhang onto the sidewalk.
- j. The developer should coordinate with the Delaware Transit Corporation (DTC) regarding the possibility of including bus stop(s) to be located near the site entrance on Summit Bridge Road.

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 http://deldot.gov/Publications/manuals/de_mutcd/index.shtml.

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 site plan review process.



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

Sincerely,

McCormick Taylor, Inc.

A handwritten signature in black ink, appearing to read "Andrew J. Parker".

Andrew J. Parker, PE, PTOE
Project Manager

Enclosure

General Information

Report date: April 2019

Prepared by: Karins and Associates

Prepared for: Route 71 Investments, LLC

Tax parcels: 25-004.00-121.00 and 14-016.00-051.00

Generally consistent with DelDOT's Development Coordination Manual: Yes

Project Description and Background

Description: The proposed Woods at Hidden Creek development consists of 222 single-family detached homes.

Location: The site is located on the east side of South Street (New Castle Road 36) and the southwest side of Summit Bridge Road (Delaware Route 71 / New Castle Road 14), in the Town of Townsend, New Castle County, Delaware. A site location map is included on Page 7.

Amount of land to be developed: Approximately 106 acres

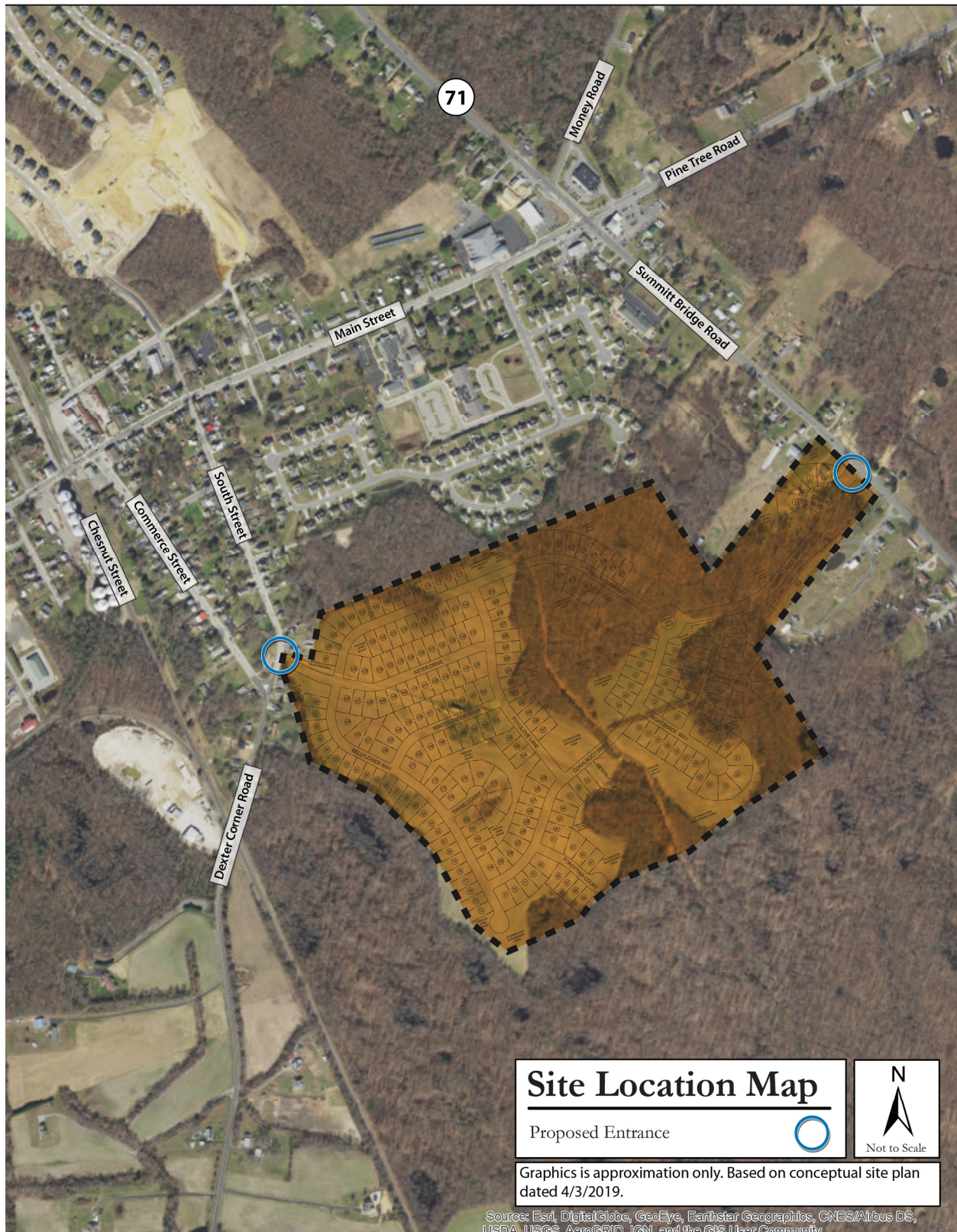
Land use approval(s) needed: Subdivision approval. The land is zoned R-2 (Residential) within the Town of Townsend. No rezoning is needed or sought to permit the proposed development.

Proposed completion year: 2025

Proposed access locations: Two unsignalized driveways are proposed. "Site Access A" is located on Summit Bridge Road approximately 2,000 feet south of Pine Tree Road (New Castle Road 25), and "Site Access B" is located on South Street approximately 1,500 feet south of Main Street (New Castle Road 25). At the proposed Site Access B, South Street is one-way southbound so the allowed movements to and from the driveway are lefts in and lefts out only.

Daily Traffic Volumes (per DelDOT Traffic Summary 2017):

- 2017 Average Annual Daily Traffic on Summit Bridge Road: 8,572 vehicles/day
- 2017 Average Annual Daily Traffic on South Street: 603 vehicles/day



2015 Delaware Strategies for State Policies and Spending

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

The majority of the proposed Woods at Hidden Creek residential development is located within Investment Levels 1 and 2. A very small portion of the development is located in Investment Level 3, with no houses planned for that area.

Investment Level 1

Investment Level 1 Areas are often municipalities, towns, or urban/urbanizing places in counties. Density is generally higher than in the surrounding areas. There are a variety of transportation opportunities available. Buildings may have mixed uses, such as a business on the first floor and apartments above.

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, to promote well-designed and efficient new growth, and to facilitate redevelopment in Investment Level 1 Areas. These areas would be a prime location for designating "pre-permitted areas" to help steer development where the local government and citizens are most prepared to accept it.

Investment Level 2

This investment level has many diverse characteristics. 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. These areas have been shown to be the most active portion of Delaware's developed landscape. They serve as transition areas between Level 1 and the more open, less populated areas. They generally contain a limited variety of housing types, predominantly detached single-family dwellings.

In Investment Level 2, 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. Overall, the State's intent is to use spending and management tools to promote well-designed development in these areas. Such development provides for a variety of housing types, user-friendly transportation systems, and provides essential open spaces and recreational facilities, other public facilities, and services to promote a sense of community. Investment Level 2 areas are prime locations for designating "pre-permitted areas."

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

The proposed Woods at Hidden Creek development consists of 222 single-family detached homes on an approximately 106 acres located within Investment Level 1 and 2 areas. The land to be developed is open space/farmland. Investment Level 1 reflects areas where growth is anticipated by local, county, and State plans in the near-term future. The proposed development is located in the Town of Townsend, near existing transportation facilities, and will be served by public water and sewer systems. As such, the proposed development generally appears to comply with the guidelines for Investment Levels as described in the 2015 "Strategies for State Policies and Spending", although further discussion may be warranted since this development is proposed to consist entirely of single-family detached houses.

Comprehensive Plan

Town of Townsend Comprehensive Plan:

(Source: Town of Townsend Comprehensive Plan, August 2010)

The August 2010 Town of Townsend Comprehensive Plan Future Land Use Map currently delineates the parcel as a residential zone.

Proposed Development's Compatibility with Comprehensive Plan:

The proposed Woods at Hidden Creek residential development appears to comply with the Town of Townsend's Comprehensive Plan as well as the R-2 (Residential) zoning.

Relevant Projects in the DelDOT Capital Transportation Program

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

Trip Generation

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

- 222 single-family detached homes (ITE Land Use Code 210)

Table 1
WOODS AT HIDDEN CREEK PEAK HOUR TRIP GENERATION

Land Use	Weekday AM Peak Hour			Weekday PM Peak Hour		
	In	Out	Total	In	Out	Total
222 Single-family detached homes	41	122	163	138	81	219

Table 2
WOODS AT HIDDEN CREEK DAILY TRIP GENERATION

Land Use	Weekday Daily		
	In	Out	Total
222 Single-family detached homes	1083	1083	2166

Overview of TIS

Intersections examined:

- 1) Summit Bridge Road & Pine Tree Road
- 2) Summit Bridge Road & Money Road (New Castle Road 457)
- 3) Summit Bridge Road & Green Giant Road (New Castle Road 458)
- 4) Pine Tree Road & Harris Road
- 5) US Route 13 & Pine Tree Road / Blackbird Landing Road (New Castle Road 455)
- 6) Summit Bridge Road & Ratledge Road (New Castle Road 460)
- 7) US Route 13 & Summit Bridge Road
- 8) Site Access A & Summit Bridge Road
- 9) Site Access B & South Street

Conditions examined:

- 1) 2018 existing (Case 1)
- 2) 2025 without development (Case 2)
- 3) 2025 with development (Case 3)

Peak hours evaluated:

- Weekday AM and PM peak hours

Committed developments considered:

- Townsend Village I (244 single-family detached houses; 55 unbuilt)
- Estates at St. Annes (468 single-family detached houses; 75 unbuilt)

Intersection Descriptions

1) Summit Bridge Road & Pine Tree Road

Type of Control: Signalized

Eastbound Approach: (Main Street) one shared left-turn/through lane and one channelized right-turn lane

Westbound Approach: (Pine Tree Road) one shared left-turn/through lane and one channelized right-turn lane

Northbound Approach: (Summit Bridge Road) one shared left-turn/through lane and one channelized right-turn lane

Southbound Approach: (Summit Bridge Road) one shared left-turn/through lane and one channelized right-turn lane

2) Summit Bridge Road & Money Road

Type of Control: Two-way stop control

Eastbound Approach: (Dollar General Driveway) one shared left-turn/through/right-turn lane, stop control

Westbound Approach: (Money Road) one shared left-turn/through/right-turn lane, stop control

Northbound Approach: (Summit Bridge Road) one shared left-turn/through lane and one right-turn lane

Southbound Approach: (Summit Bridge Road) one shared left-turn/through/right-turn lane

3) Summit Bridge Road & Green Giant Road

Type of Control: one-way stop (T-intersection)

Eastbound Approach: (Green Giant Road) one shared left-turn/through/right-turn lane, stop control

Northbound Approach: (Summit Bridge Road) one shared left-turn/through lane and one bypass lane

Southbound Approach: (Summit Bridge Road) one through lane and one right-turn lane

4) Pine Tree Road & Harris Road

Type of Control: one-way stop (T-intersection)

Eastbound Approach: (Pine Tree Road) one shared left-turn/through lane

Westbound Approach: (Pine Tree Road) one shared through/right-turn lane

Southbound Approach: (Harris Road) one shared left-turn/right-turn lane, stop control

5) US Route 13 & Pine Tree Road / Blackbird Landing Rd

Type of Control: Signalized

Eastbound Approach: (Pine Tree Road) one left-turn lane, one through lane and one channelized right-turn lane

Westbound Approach: (Blackbird Landing Road) one left-turn lane, one through lane and one channelized right-turn lane

Southbound Approach: (US Route 13) one left-turn lane, two through lanes, and one channelized right-turn lane

Northbound Approach: (US Route 13) one left-turn lane, two through lanes, and one channelized right-turn lane

6) Summit Bridge Road & Ratledge Road

Type of Control: one-way stop (T-intersection)

Eastbound Approach: (Ratledge Road) one shared left-turn/right-turn lane, stop control

Northbound Approach: (Summit Bridge Road) one shared left-turn/through lane and one bypass lane

Southbound Approach: (Summit Bridge Road) one through lane and one right-turn lane

7) US Route 13 & Summit Bridge Road

Type of Control: Signalized associated with four unsignalized intersections

7a) Summit Bridge Road Left turn to Northbound US Route 13

Type of Control: One-way stop control (T-intersection)

Eastbound Approach: (Summit Bridge Road) one left turn lane.

Northbound Approach: (US Route 13) two through lanes

7b) Summit Bridge Road Left turn through Southbound US Route 13

Type of Control: One-way stop control

Eastbound Approach: (Summit Bridge Road) one through lane, stop control

Southbound Approach: (US Route 13) two through lanes

7c) US Route 13 Right turn to Northbound Summit Bridge Road

Type of Control: One-way stop control (T-intersection)

Westbound Approach: (US Route 13) one right turn lane, stop control

Northbound Approach: (Summit Bridge Road) one through lane

Southbound Approach: (Summit Bridge Road) one shared left-turn/through lane

7d) US Route 13 Left turn to Southbound Summit Bridge Road

Type of Control: One-way stop control (T-intersection)

Westbound Approach: (US Route 13) one left-turn lane, stop control

Southbound Approach: (Summit Bridge Road) one through lane

7e) US Route 13 Left turn to Summit Bridge Road

Type of Control: Signalized

Northbound Approach: (US Route 13) one left-turn lane and two through lanes

Southbound Approach: (US Route 13) two through lanes

8) Site Access A & Summit Bridge Road

Type of Control: proposed one-way stop (T-intersection)

Eastbound Approach: (Site Access A) proposed one left-turn lane and one right-turn lane, stop control

Northbound Approach: (Summit Bridge Road) proposed one left-turn lane and one through lane

Southbound Approach: (Summit Bridge Road) proposed one through lane and one right-turn lane

9) Site Access B & South Street

Type of Control: proposed one-way stop (T-intersection)

Westbound Approach: (Site Access B) proposed left-turn lane, stop control

Southbound Approach: (South Street) one shared through/left-turn lane

Safety Evaluation

Crash Data: McCormick Taylor reviewed the Delaware Crash Analysis Reporting System (CARS) data that was provided in Appendix F of the TIS. The data includes reportable crashes within a 0.10-mile radius of each study intersection from November 19, 2015 to November 19, 2018.

Of particular concern for safety evaluations are fatal crashes and crashes involving pedestrians or pedalcyclists. During the study period, two fatal crashes were reported, and two crash involving pedestrians or pedalcyclists. A breakdown of all crashes by intersection is provided below.

During the study period, there were:

- 134 total reportable crashes
 - 2 fatal crashes
 - 34 personal injury crashes
 - 98 property damage only crashes
- 1 pedestrian crashes
- 1 pedalcycle crashes
- 1 crash involving alcohol or driving under the influence (DUI)

Intersection crash summaries are provided below. Each intersection was also evaluated to determine the extent to which they meet relevant DelDOT, AASHTO, and MUTCD standards for geometry and traffic control devices.

1) Summit Bridge Road & Pine Tree Road/Money Road

2) Summit Bridge Road & Money Road

Within the three-year study period, 43 crashes occurred at this signalized intersection. Crashes that occurred at Summit Bridge Road and Money Road are included due its close proximity to the intersection.

At this intersection, there was a total of 43 crashes over the three-year study period. 12 crashes (28%) resulted in personal injury. None of these crashes involved a pedestrian or pedalcyclist. None of the crashes were alcohol related. The main manner of impact of these crashes were front to rear crashes (44%), front to front (12%), and angle crashes (33%). 7% of the crashes were not between two vehicles. Crashes occurred on mainly dry surface conditions (74%) and 14% wet. The most common primary contributing circumstances included failing to yield right of way (37%) and driver inattention, distraction, or fatigue (23%).

3) Summit Bridge Road & Green Giant Road

At this intersection, there was a total of 11 crashes within the three-year study period. Two (18%) of these crashes resulted in personal injury and nine (82%) resulted in property damage only. None of these crashes were alcohol related or involved pedestrians or pedalcyclists. There were two (18%) front to rear crashes, two (18%) angle crashes, and five (45%) crashes that did not occur between two vehicles. Ten (90%) crashes occurred during dry surface conditions and 9 (82%) of the crashes occurred during clear weather. This intersection in particular does not seem to have a main primary contributing circumstance to the crashes. Two (18%) of the crashes included were due to failing to yield right of way, one (9%) was due to improper passing, one (9%) due to following too close, two (18%) due to driver inattention, distraction or fatigue. One (8%) due to mechanical defects, two (18%) were due to animals in the road (deer) and one (9%) due to roadway circumstances.

4) Pine Tree Road & Harris Road

At this intersection, there was a total of 6 crashes within the three-year study period. Of the total 6 crashes that occurred within the 0.10 mile radius of the intersection, only two actually occurred on roads within our study area. It appears on the crash report that 4 crashes occurred on Korean War Veterans Memorial Highway (US 1), which is not included in study area. Only one crash (17%) of the six resulted in personal injury. None of the crashes resulted in fatality. None of the crashes involve a pedestrian or pedalcyclist. The types of crashes were front to rear (17%), angle (17%), sideswipe same direction (17%), sideswipe opposite direction (17%), and 2 crashes (33%) were not between two vehicles. 83% of the crashes occurred during dry surface conditions. Five (83%) of the crashes also occurred during clear weather conditions, one (17%) occurred in rain. The most common primary contributing circumstances included driver inattention, distraction, or fatigue (50%), following too close (17%), driving in a careless or reckless manner (17%).

5) US Route 13 & Pine Tree Road/Blackbird Landing Rd

At this intersection, there was a total of 34 crashes within the three-year study period. Ten (29%) of the crashes resulted in personal injury and one (3%) resulted in fatality. None of these crashes involve a pedestrian or pedalcyclist and none are alcohol related. Nine crashes were front to rear (26%), one front to front crash (3%), ten angle crashes (29%), three sideswipes (9%). Nine crashes were not a collision between two vehicles (26%). 82% of crashes occurred in dry surface conditions and 18% occurred in wet surface conditions. The most common primary contributing circumstances included driver inattention/distraction/fatigue (18%), driving in a careless or reckless manner (18%), and failure to yield right of way (18%). Four crashes were also due to deer in the roadway (12%).

Based on a Delaware Online news article (updated 7/2/2016), the fatal crash occurred on Sunday July 1, 2016 at approximately 3:30pm. Police report that a Honda making a westbound left turn onto southbound US 13 was struck by a jeep traveling northbound on US 13 that failed to stop for a red light. The driver of the turning vehicle sustained fatal injuries in the crash.

McCormick Taylor has done its own research of the study area and has found another crash at this intersection that resulted in fatality. Based on a Delaware Online article (updated 4/23/2019) the crash occurred on April 16, 2019. A woman in the crash died a week later due to injuries. She was turning left onto US 13 when struck by a vehicle that failed to stop at a red light. The manner of impact for both fatal crashes at this intersection are the same.

6) Summit Bridge Road & Ratledge Road

At this intersection, there was a total of five crashes. None of these crashes resulted in personal injury and none of them resulted in fatality. None of the crashes involved a pedestrian or pedalcyclist. One of the five crashes were alcohol related (20%). The types of crashes were front to rear (20%), sideswipe same direction (20%), sideswipe opposite direction (20%), and two of the crashes were not between two vehicles (40%). All of the crashes occurred in the PM, and all of the crashes occurred during clear weather conditions (100%). The crashes occurred on surface conditions including dry (80%), and wet (20%). The most common primary contributing circumstances included driver inattention/distraction/fatigue (40%), driving in a careless or reckless manner (20%) and deer in roadway (20%).

7) US Route 13 & Summit Bridge Road

At this intersection, there was a total of 35 crashes within the three-year study period. 9 of the crashes resulted in personal injury (26%), 26 resulted in property damage only (74%), and one resulted in fatality (1%). None of the crashes include a pedestrian and one includes a pedalcyclist. There were no alcohol related crashes at this intersection. The types of crashes were front to rear (26%), angled (26%), sideswipe same direction (1%). The crashes occurred on surface conditions including dry (86%), and wet (11%). 26 crashes also occurred during clear weather conditions (74%). The most common primary contributing circumstances included failing to field right of way (17%), following too close (11%) and deer in roadway (14%).

8) Site Access A & Summit Bridge Road

Crash data specifically for the proposed site access location was not provided by DelDOT. The provided crash data covers Summit Bridge Road from Pine Tree Road to US route 13. Crashes that occurred in the immediate area of the proposed site access could not be easily determined.

9) Site Access B & South Street

Crash data was not provided by DelDOT.

Sight Distance: Based on a field visit conducted during May 2019, there is limited sight distance at the intersection of Pine Tree Road and Harris Road, for motorists on the southbound Harris Road approaching looking to the west. This is due to vegetation combined with how far the stop bar is set back from Pine Tree Road. There is also limited sight distance at the intersection of Summit Bridge Road and Ratledge Road. Motorists on eastbound Ratledge Road looking to the south have limited sight distance, primarily due to vegetation on the southwest corner.

Sight distance is not anticipated to be a problem at the proposed site accesses, but as always adequacy of available sight distance should be confirmed during the site plan review process for all proposed movements at the site accesses. The designer must verify that adequate sight distance will be provided for both ingress and egress movements at the proposed site driveways.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: Based on the DART Bus Stop Map, the Delaware Transit Corporation (DTC) currently operates one fixed-route transit bus service in the immediate area of the proposed Woods at Hidden Creek residential development. There are northbound and southbound stops for DART bus route 302 (Intercounty Dover-Newark) near the intersection of Summit Bridge Road & Pine Tree Road. These stops do not have a bench or shelter.

There is also a “Park and Ride” facility located near the site on the northwest corner of US Route 13 & Pine Tree Road/Blackbird Landing Road.

No trip reductions were assumed due to transit, carpooling, or non-motorized transportation options.

Planned transit service: No evidence of correspondence with DTC was found in the TIS. McCormick Taylor attempted to contact a DTC representative to confirm future transit needs; DTC did not respond or provide any comments.

Existing bicycle and pedestrian facilities: Several study area roadways are identified as “Bicycling Routes” on the *New Castle County Bicycle Map* published by DelDOT.

- Summit Bridge Road
 - Connector bicycle route with bikeway
- South Street
 - Statewide bicycle route without bikeway
- US Route 13
 - Connector bicycle route with bikeway
 - Over 10,000 vehicles daily

The study area has limited and non-contiguous sidewalks. There are existing sidewalks at the intersection of Summit Bridge Road & Pine Tree Road, Summit Bridge Road & Money Road, Summit Bridge Road & Ratledge Road. Notably, there are existing sidewalks on both sides of South Street from Main Street to Commerce Street, a stretch includes the location of proposed Site Access B.

Planned bicycle and pedestrian facilities: According to the TIS, a shared use path or sidewalk will be built along the site frontages of the site and sidewalks are planned for all proposed internal subdivision streets.

At this time, there are no existing and/or planned bicycle and pedestrian facilities along the project area by DelDOT.

As per the Development Coordination Manual section 3.5.4.2, shared-use path/sidewalk construction shall be required for all projects that generate a total of 2,000 Average Daily Trips (ADT) or more, and are requesting an Entrance Plan Approval (EPA) or Entrance Permit in all Investment Level Areas. Based on the trip generation for this development, shared-use path/sidewalk construction shall be required.

Per the Development Coordination Manual, the site shall dedicate right-of-way per the roadway classification and establish a 15' wide permanent easement along all property frontages. All entrance, roadway and/or intersection improvements required shall incorporate bicycle and pedestrian facilities. Per the Development Coordination Manual, if a 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 classification or existing conditions.

Previous Comments

It appears that all substantive comments from DelDOT's TIS Scoping Memorandum, Traffic Count Review, Preliminary TIS review, and other correspondence were addressed in the Final TIS submission. Further coordination regarding future transit service will be needed with the appropriate agencies.

General HCS Analysis Comments

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

- 1) Both Karins & Associates and McCormick Taylor utilized Highway Capacity Software (HCS) version 7 to complete the traffic analyses. McCormick Taylor used the most up-to-date release of the software available at the time of the review (version 7.8). Karins & Associates used version 7.3 for signalized intersection 7E at US Route 13 and Summit Bridge Road.
- 2) As per HCM methodologies, Karins and Associates and McCormick Taylor applied percent heavy vehicles (HV) by movement at two-way stop control and roundabout intersections, HV by lane at all-way stop control intersections, and HV by lane group at signalized intersections. In general, existing HV were applied to future conditions as well. For new intersections, 3% was assumed as per the DelDOT Development Coordination Manual section 2.2.8.11.6.H.
- 3) For existing conditions, the TIS and McCormick Taylor determined overall intersection peak hour factors (PHF) for each intersection based on the turning movement counts. Future PHFs were determined as per the DelDOT Development Coordination Manual section 2.2.8.11.6.F.
- 4) For analyses of signalized intersections, Karins & Associates and McCormick Taylor used a base saturation flow rate of 1,750 pc/hr/ln per DelDOT's Development Coordination Manual section 2.2.8.11.6.I.

- 5) The TIS and McCormick Taylor used different signal timings when analyzing the signalized intersections in some cases.
- 6) McCormick Taylor used field-measured roadway grades in all analyses. It appears that Karins & Associates assumed 0% roadway grades throughout the study area.
- 7) This project is located in a developed, developing, or planned development area. As per the DelDOT Development Coordination Manual section 2.2.8.12, deterioration up to 55 seconds (bottom of LOS D) will be allowed at signalized intersections and the maximum allowable delay for each movement at unsignalized intersections shall be 35 seconds (bottom of LOS D) in the future with development condition.

Table 3
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc.

Signalized Intersection ¹	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Summit Bridge Road & Pine Tree Road				
2018 Existing (Case 1)	A (8.2)	A (8.1)	A (9.8)	A (8.8)
2025 without Woods at Hidden Creek (Case 2)	A (9.1)	A (9.3)	B (11.5)	B (10.1)
2025 with Woods at Hidden Creek	A (9.4)	A (9.8)	B (12.0)	B(11.3)

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

Table 4
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc

Unsignalized Intersection ^{2,3} One-Way Stop (T-Intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Summit Bridge Road & Money Road				
2018 Existing (Case 1)				
Eastbound Retail Driveway	C (22.6)	C (23.4)	C (22.7)	C (23.6)
Westbound Money Road	C (18.3)	C (24.2)	C (19.8)	D (27.1)
Northbound Summit Bridge Road - Left	A (8.2)	A (8.6)	A (8.2)	A (8.6)
Southbound Summit Bridge Road - Left	A (9.0)	A (8.8)	A (9.0)	A (8.9)
2025 without Woods at Hidden Creek (Case 2)				
Eastbound Retail Driveway	D (28.8)	D (31.9)	D (28.7)	D (31.4)
Westbound Money Road	C (22.5)	D (34.8)	C (24.9)	E (41.3)
Northbound Summit Bridge Road - Left	A (8.4)	A (8.9)	A (8.4)	A (8.9)
Southbound Summit Bridge Road - Left	A (9.4)	A (9.3)	A (9.4)	A (9.3)
2025 with Woods at Hidden Creek (Case 3)				
Eastbound Retail Driveway	D (30.5)	D (34.5)	D (30.3)	D (34.6)
Westbound Money Road	C (23.7)	E (38.3)	D (26.4)	E (45.9) ⁴
Northbound Summit Bridge Road - Left	A (8.4)	A (9.0)	A (8.5)	A (9.1)
Southbound Summit Bridge Road - Left	A (9.5)	A (9.4)	A (9.5)	A (9.4)

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

³ The westbound Money Road approach will have deficiencies in the future PM peak hour. A right turn lane may be considered for westbound Money Road, however there are significant utility conflicts, therefore mitigation by developer is not recommended.

⁴ 95th percentile queue length is anticipated to be less than 2 vehicles (approximately 50 feet).

Table 5
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared Karins & Associates, Inc.

Unsignalized Intersection ⁵ One-Way Stop (T-Intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Summit Bridge Road & Green Giant Road				
2018 Existing (Case 1)				
Eastbound Green Giant Road	C (19.9)	C (15.8)	C (20.3)	C (15.5)
Northbound Summit Bridge Road - Left	A (8.6)	A (8.9)	A (8.6)	A (3.4)
2025 without Woods at Hidden Creek (Case 2)				
Eastbound Green Giant Road	D (26.8)	C (20.1)	D (28.4)	D (26.5)
Northbound Summit Bridge Road - Left	A (8.9)	A (9.4)	A (8.9)	A (9.9)
2025 with Woods at Hidden Creek (Case 3)				
Eastbound Green Giant Road	D (28.6)	C (21.7)	D (30.9)	D (29.9)
Northbound Summit Bridge Road - Left	A (9.0)	A (9.6)	A (9.0)	B (10.1)

⁵ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 6
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc.

Unsignalized Intersection ⁶ One-Way Stop (T-Intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Pine Tree Road & Harris Road				
2018 Existing (Case 1)				
Eastbound Pine Tree Road - Left	A (9.2)	A (9.4)	A (7.8)	A (8.0)
Southbound Harris Road	B (11.8)	B (12.4)	B (11.7)	B (11.4)
2025 without Woods at Hidden Creek (Case 2)				
Eastbound Pine Tree Road - Left	A (9.3)	A (9.5)	A (7.9)	A (8.0)
Southbound Harris Road	B (12.3)	B (13.2)	B (12.2)	B (13.2)
2025 with Woods at Hidden Creek (Case 3)				
Eastbound Pine Tree Road - Left	A (9.4)	A (9.7)	A (7.9)	A (8.2)
Southbound Harris Road	B (12.8)	B (14.1)	B (12.8)	B (14.1)

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

Table 7
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc.

Signalized Intersection ⁷	LOS per TIS ⁸		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
US Route 13 & Pine Tree Road / Blackbird Landing Road				
2018 Existing (Case 1)	E (60.5)	E (62.6)	B (19.1)	C (21.6)
2025 without Woods at Hidden Creek (Case 2)	B (19.4)	C (22.3)	C (20.0)	C (21.7)
2025 with Woods at Hidden Creek	B (19.3)	C (21.7)	C (21.3)	C (22.8)

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

⁸ Case 1 (2018 Existing) results per TIS analyses indicate LOS deficiencies. It appears that this is due to incorrect cycle lengths and splits coded in the HCS files.

Table 8
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc.

Unsignalized Intersection ⁹ One-Way Stop (T-Intersection)	LOS per TIS		LOS per McCormick Taylor	
Summit Bridge Road & Ratledge Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2018 Existing (Case 1)				
Eastbound Ratledge Road	B (12.8)	B (14.1)	B (13.4)	B (14.9)
Northbound Summit Bridge Road - Left	A (8.2)	A (8.5)	A (8.2)	A (8.5)
2025 without Woods at Hidden Creek (Case 2)				
Eastbound Ratledge Road	B (14.4)	C (16.3)	C (15.3)	C (17.5)
Northbound Summit Bridge Road - Left	A (8.4)	A (8.8)	A (8.5)	B (8.9)
2025 with Woods at Hidden Creek (Case 3)				
Eastbound Ratledge Road	C (15.1)	C (17.2)	C (16.1)	C (18.7)
Northbound Summit Bridge Road - Left	A (8.6)	A (8.9)	A (8.6)	A (9.0)

⁹ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 9
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc.

Unsignalized Intersection ¹⁰ One-Way Stop	LOS per TIS		LOS per McCormick Taylor	
Summit Bridge Road Left Turn to Northbound US Route 13	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2018 Existing (Case 1)				
Eastbound Summit Bridge Road - Left	B (11.1)	B (10.6)	B (11.3)	B (10.6)
2025 without Woods at Hidden Creek (Case 2)				
Eastbound Summit Bridge Road - Left	B (11.4)	B (10.7)	B (11.6)	B (10.8)
2025 with Woods at Hidden Creek (Case 3)				
Eastbound Summit Bridge Road - Left	B (11.4)	B (10.7)	B (11.6)	B (10.8)

¹⁰ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 10
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc.

Unsignalized Intersection ¹¹ One-Way Stop	LOS per TIS		LOS per McCormick Taylor	
Summit Bridge Road Left Turn through Southbound US Route 13	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2018 Existing (Case 1)				
Eastbound Summit Bridge Road - Thru	B (12.6)	C (16.3)	B (12.8)	C (16.8)
2025 without Woods at Hidden Creek (Case 2)				
Eastbound Summit Bridge Road - Thru	B (13.0)	C (17.3)	B (13.3)	C (17.9)
2025 with Woods at Hidden Creek (Case 3)				
Eastbound Summit Bridge Road - Thru	B (13.0)	C (17.3)	B (13.3)	C (17.9)

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

Table 11
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc

Unsignalized Intersection ¹² One-Way Stop (T-Intersection)	LOS per TIS		LOS per McCormick Taylor	
US Route 13 Right Turn to Northbound Summit Bridge Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2018 Existing (Case 1)				
Westbound Summit Bridge Road - Right	B (12.1)	B (11.5)	B (12.1)	B (11.5)
Southbound Summit Bridge Road - Left	A (8.7)	A (8.4)	A (8.7)	A (8.4)
2025 without Woods at Hidden Creek (Case 2)				
Westbound Summit Bridge Road - Right	B (12.6)	B (12.1)	B (12.6)	B (12.2)
Southbound Summit Bridge Road - Left	A (8.9)	A (8.7)	A (8.9)	A (8.8)
2025 with Woods at Hidden Creek (Case 3)				
Westbound Summit Bridge Road - Right	B (12.7)	B (12.6)	B (12.7)	B (12.6)
Southbound Summit Bridge Road - Left	A (8.9)	A (8.8)	A (8.9)	A (8.8)

¹² For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

Table 12
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc.

Unsignalized Intersection ¹³ One-Way Stop	LOS per TIS		LOS per McCormick Taylor	
US Route 13 Left Turn to Southbound Summit Bridge Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2018 Existing (Case 1)				
Westbound US Route 13 - Left	B (10.8)	B (11.4)	B (11.1)	B (11.8)
2025 without Woods at Hidden Creek (Case 2)				
Westbound US Route 13 - Left	B (11.4)	B (12.1)	B (11.8)	B (12.7)
2025 with Woods at Hidden Creek (Case 3)				
Westbound US Route 13 - Left	B (11.7)	B (12.3)	B (12.2)	B (13.0)

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

Table 13
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc.

Signalized Intersection ¹⁴	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Northbound US Route 13 Left-Turn to Summit Bridge Road ¹⁵				
2018 Existing (Case 1)	C (23.2)	C (22.1)	A (1.3)	A (2.2)
2025 without Woods at Hidden Creek (Case 2)	B (18.4)	C (21.1)	A (1.5)	A (4.4)
2025 with Woods at Hidden Creek	B (18.9)	C (27.8)	A (1.5)	A (7.0)

¹⁴ For both unsignalized and signalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.

¹⁵ Lane configurations used by McCormick Taylor reflect the existing configuration in the field. A protected-permitted left turn phasing was used in our analysis, as it is in the field. The TIS appeared to use protected-prohibited phasing and incorrect cycle lengths.

Table 14
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc.

Unsignalized Intersection ¹⁶ One-Way Stop (T-Intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Site Access A & Summit Bridge Road				
2025 with Woods at Hidden Creek (Case 3)				
Eastbound Site Access A – Left/Right	D (26.8)	D (31.0)	D (26.0)	C (23.6)
Northbound Summit Bridge – Left	A (8.6)	A (9.2)	A (8.6)	A (8.6)

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

Table 15
Peak Hour Levels of Service (LOS)
Based on Woods at Hidden Creek Traffic Impact Study - April 2019
Prepared by Karins & Associates, Inc.

Unsignalized Intersection ¹⁷ One-Way Stop (T-Intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2025 with Woods at Hidden Creek (Case 3)				
Westbound Site Access B – Left	A (8.8)	A (8.9)	A (8.7)	A (8.9)
Southbound South Street –Left	A (7.2)	A (7.3)	A (7.2)	A (7.2)

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