



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

JENNIFER COHAN
SECRETARY

July 13, 2020

Mr. Joe Caloggero
The Traffic Group, Inc.
9900 Franklin Square Drive
Suite H
Baltimore, MD 21236

Dear Mr. Caloggero:

The enclosed Traffic Impact Study (TIS) review letter for the proposed **Twin Cedars** (Protocol Tax Parcel 533-11.00-42.00) 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 letter and concurs with the recommendations. If you have any questions concerning this letter or the enclosed review letter, please contact me at (302) 760-2167.

Sincerely,

Troy Brestel
Project Engineer

TEB:km

Enclosures

cc with enclosures: Ms. Constance C. Holland, Office of State Planning Coordination
Mr. Jamie Whitehouse, Sussex County Planning and Zoning
Mr. Andrew Parker, McCormick Taylor, Inc.
Mr. Kevin Hickman, Johnson, Mirmiran & Thompson, Inc.
DelDOT Distribution

DelDOT Distribution

Brad Eaby, Deputy Attorney General
J. Marc Coté, Director, Planning
Shanté Hastings, Director, Transportation Solutions (DOTS)
Mark Luszcz, Deputy Director, DOTS
Michael Simmons, Assistant Director, Project Development South, DOTS
Todd Sammons, Assistant Director, Development Coordination
T. William Brockenbrough, Jr., County Coordinator, Development Coordination
Peter Haag, Chief Traffic Engineer, Traffic, DOTS
Chris Sylvester, Traffic Studies Manager, Traffic, DOTS
Alistair Probert, South District Engineer, South District
Gemez Norwood, South District Public Works Supervisor, South District
Jared Kaufmann, Service Development Planner, Delaware Transit Corporation
Tremica Cherry, Service Development Planner, Delaware Transit Corporation
Susanne Laws, Sussex Review Coordinator, Development Coordination
Anthony Aglio, Planning Supervisor, Statewide & Regional Planning
James Argo, Sussex Plan Reviewer, South District
Mark Galipo, Traffic Engineer, Traffic, DOTS
Claudy Joinville, Project Engineer, Development Coordination



July 10, 2020

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

RE: Agreement No. 1946F
Traffic Impact Study Services
Task No. 1A Subtask 01A – Twin Cedars

Dear Mr. Brestel:

McCormick Taylor has completed its review of the Traffic Impact Study (TIS) for the Twin Cedars residential development prepared by The Traffic Group, Inc. dated March 9, 2020. The Traffic Group prepared the report in a manner generally consistent with DelDOT's Development Coordination Manual.

The TIS evaluates the impacts of the proposed Twin Cedars residential development, proposed to be located along Delaware Route 20 (Zion Church Road / Sussex Road 382) between Deer Run Road (Sussex Road 388) and Bayard Road (Sussex Road 384) / Johnson Road (Sussex Road 382A) in Sussex County, Delaware. The proposed development would consist of 44 single-family detached houses, 44 townhouses, and 168 apartments. One full-access driveway is proposed on Delaware Route 20. Construction is expected to be complete by 2026.

The subject land is located on an approximately 64.22-acre parcel. The land is currently split zoned as C-1 (General Commercial) and GR (General Residential), and the developer is seeking a residential planned community (RPC) overlay for the GR portion in Sussex County.

Currently, there is one active DelDOT project within the study area. The project involves planned improvements at the intersection of Delaware Route 20 and Bayard Road/Johnson Road. In late 2018 and early 2019, DelDOT's Traffic Studies Section conducted a traffic study and solicited public input to evaluate possible safety improvements at this unsignalized two-way stop-controlled intersection. Through this process, DelDOT determined that a traffic signal is recommended for this intersection. This recommendation and the associated documentation has been sent to DelDOT's Traffic Design Section to start programming the design work. The construction date is to be determined.

Based on our review, 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:

<i>Intersection</i>	<i>Existing Traffic Control</i>	<i>Situations for which deficiencies occur</i>
Delaware 20 and Bayard Road / Johnson Road	Unsignalized	2019 Existing summer Saturday (Case 1); 2026 without Twin Cedars summer Saturday (Case 2); 2026 with Twin Cedars summer Saturday (Case 3)

Delaware Route 20 and Bayard Road / Johnson Road

This unsignalized intersection experiences LOS deficiencies in the Saturday midday peak hour for 2019 existing conditions, 2026 conditions without Twin Cedars, and 2026 conditions with Twin Cedars. DelDOT has evaluated various improvement options for this intersection and determined that a traffic signal is recommended; to this end, the developer should make an equitable share contribution toward the installation of a traffic signal, as described below in Item No. 2.

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

1. The developer should construct the full-movement site access on Delaware Route 20. The proposed configuration is shown in the table below. This proposed site driveway should be constructed directly across from the existing Bayside Mini Storage driveway.

Approach	Existing Configuration	Proposed Configuration
Eastbound Delaware Route 20	One shared left-turn/through lane	One left-turn lane, one through lane, and one right-turn lane
Westbound Delaware Route 20	One shared through/right-turn lane	One left-turn lane and one shared through/right-turn lane
Northbound Site Access	Approach does not exist	One shared left-turn/through lane and one right-turn lane
Southbound Bayside Mini Storage driveway	One shared left/right-turn lane	One shared left/through/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 Delaware Route 20	50 feet *	290 feet **
Westbound Delaware Route 20	210 feet **	N/A
Northbound Site Access	N/A	50 feet ***
Southbound Bayside Mini Storage driveway	N/A	N/A

- * Turn lane is not warranted per DelDOT’s *Auxiliary Lane Worksheet*, but is recommended for safety to shadow the required westbound left-turn lane.
- ** Initial turn-lane length based on DelDOT’s *Auxiliary Lane Worksheet*.
- *** Initial turn-lane length based on storage length per queuing analysis, with 50-foot minimum

2. The developer should coordinate with DelDOT regarding an equitable share contribution toward a DelDOT project to install a traffic signal at the intersection of Delaware Route 20 and Bayard Road / Johnson Road. The amount of the contribution should be determined through coordination with DelDOT’s Development Coordination Section. At least one other developer is required to contribute to this improvement as well.
3. The following bicycle and pedestrian improvements should be included:
 - a. Adjacent to the proposed right-turn lane on eastbound Delaware Route 20 at the proposed site entrance, 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 frontage along Delaware Route 20.

- f. Within the easement along the Delaware Route 20 site frontage, a minimum of a ten-foot wide shared-use path that meets current AASHTO and ADA standards should be constructed. The shared-use path should meet AASHTO and ADA standards and should have a minimum of a five-foot buffer from the roadway. At the property boundaries, the shared-use path should connect to the adjacent property or to the shoulder 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 the details of the shared-use path 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 proposed shared-use path along Delaware Route 20.
- i. Where internal sidewalks are located alongside of parking spaces, a buffer should be added to prevent vehicular overhang onto the sidewalk.

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: March 9, 2020

Prepared by: The Traffic Group, Inc.

Prepared for: Bay Developers, LLC

Tax parcel: 533-11.00-42.00

Generally consistent with DelDOT's Development Coordination Manual: Yes

Project Description and Background

Description: The proposed Twin Cedars development consists of 44 single-family detached houses, 44 townhouses, and 168 apartments.

Location: The site is located along Delaware Route 20 (Zion Church Road / Sussex Road 382) between Deer Run Road (Sussex Road 388) and Bayard Road (Sussex Road 384) / Johnson Road (Sussex Road 382A) in unincorporated Sussex County. A site location map is included on page 6.

Amount of land to be developed: approximately 64.22 acre parcel

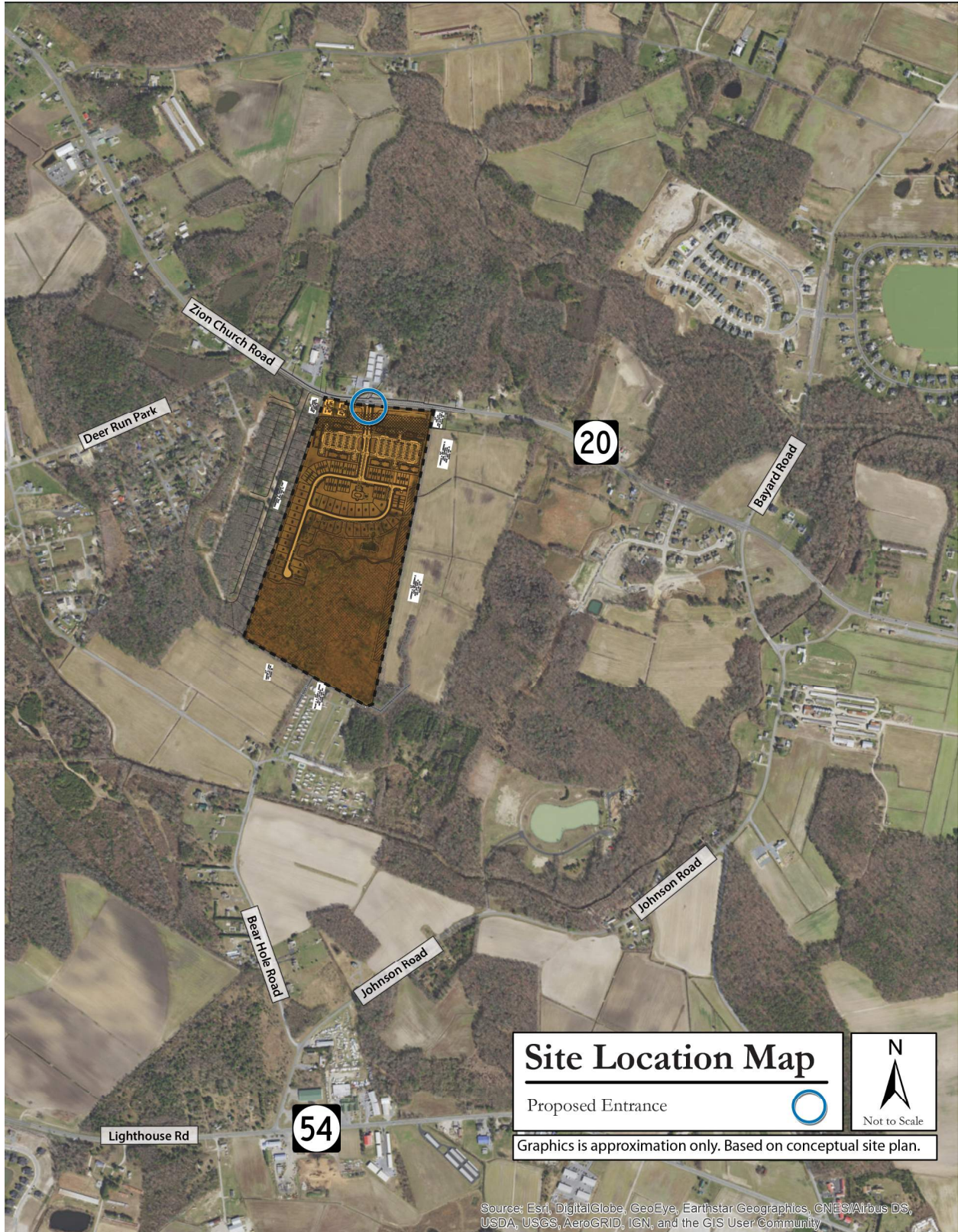
Land use approval(s) needed: Subdivision approval. The land is currently split zoned as C-1 (General Commercial) and GR (General Residential), and the developer is seeking a residential planned community (RPC) overlay for the GR portion in Sussex County.

Proposed completion year: 2026

Proposed access locations: One full-access driveway is proposed on Delaware Route 20.

Daily Traffic Volumes (per DelDOT Traffic Summary 2019):

- 2019 Average Annual Daily Traffic on Delaware Route 20: 6,635 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 proposed Twin Cedars residential development is located within Investment Level 3.

Investment Level 3

Investment Level 3 reflects areas where growth is anticipated by local, county, and state plans in the longer-term future. 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, but where development is not necessary to accommodate expected short-term population growth. The second category includes lands that are adjacent to fast-growing Investment Level 1 and 2 areas but are often impacted by environmentally sensitive features, agricultural-preservation issues, or other infrastructure issues. In these instances, development and growth may be appropriate in the near term, but the resources on the site and in the surrounding area should be carefully considered and accommodated by state Agencies and local governments with land-use authority.

Generally, Investment Level 3 areas should not be developed until surrounding Investment Level 1 and 2 areas are substantially built out. From a housing perspective, Investment Level 3 areas are characterized by low density and rural homes. New housing developments in the short term would, in most cases, represent leap-frog development, which is undesirable. Higher density housing in Investment Level 3 areas is more appropriate once Level 2 areas are built out and utilities are available.

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

The proposed Twin Cedars residential development includes 44 single-family detached houses, 44 townhouses, and 168 apartments located within an Investment Level 3 area. Investment Level 3 reflects areas where growth is anticipated by the county in the long-term. Given that the location is in a Growth Area as defined by Sussex County and that the anticipated opening date for this development is three years out, the proposed development generally appears to comply with the guidelines of Investment Level 3 areas as described in the 2015 "Strategies for State Policies and Spending."

Comprehensive Plan

Sussex County Comprehensive Plan:

(Source: Sussex County Comprehensive Plan, March 2019)

The Sussex County Comprehensive Plan Future Land Use Map indicates that the proposed development parcel is within a Coastal Area (categorized as a Growth Area).

Growth Areas, including the Coastal Area, are designed to accommodate concentrated levels of development. Sussex County has designated the areas around Rehoboth Bay, Indian River Bay, and Little Assawoman Bay (the inland bays) as Coastal Areas. Coastal Areas generally encompass areas on the south-eastern side of Sussex County within what was previously referred to as the Environmentally Sensitive Developing Areas of prior Comprehensive Plans. The updated name more accurately reflects the function of this land use classification. While the Coastal Area is a

Growth Area, additional considerations should be taken into account in this Area that may not apply in other Growth Areas.

The Coastal Area designation is intended to recognize two characteristics. First, this region is among the most desirable locations in Sussex County for new housing, as is reflected in new construction data and real estate prices. Second, this region contains ecologically important and sensitive characteristics as well as other coastal lands which help to absorb floodwaters and provide extensive habitat for native flora and fauna. This area also has significant impact upon water quality within the adjacent bays and inlets as well as upon natural the region's various habitats. And, these factors are themselves part of the reason that this Area is so desirable-making the protection of them important to both the environment and the economy.

The County has significant initiatives to extend public sewer service to replace inadequate on-site systems. Careful control of stormwater runoff is also an important concern in keeping sediment and other pollutants out of the Inland Bays.

The challenge in this region is to safeguard genuine natural areas and mitigate roadway congestion without stifling the tourism and real estate markets which: a) provide many jobs; b) create business for local entrepreneurs; and c) help keep local tax rates low.

The following guidelines should apply to future growth in Coastal Areas:

Permitted Uses – Coastal Areas are areas that can accommodate development provided special environmental concerns are addressed. A range of housing types should be permitted in Coastal Areas, including single-family homes, townhouses, and multi-family units. Retail and office uses are appropriate but larger shopping centers and office parks should be confined to selected locations with access along arterial roads. Appropriate mixed-use development should also be allowed. In doing so, careful mixtures of homes with light commercial, office and institutional uses can be appropriate to provide for convenient services and to allow people to work close to home. Major new industrial uses are not proposed in these areas.

Densities – Sussex County's base density of 2 units per acre is appropriate throughout this classification; however, medium and higher density (4-12 units per acre) can be appropriate in certain locations. Medium and higher density could be supported in areas: where there is central water and sewer; near sufficient commercial uses and employment centers; where it is in keeping with the character of the area; where it is along a main road or at/or near a major intersection; where there is adequate Level of Service; or where other considerations exist that are relevant to the requested project and density. A clustering option permitting smaller lots and additional flexibility in dimensional standards is encouraged on tracts of a certain minimum size, provided significant permanent common open space is preserved and the development is connected to central water and sewer service. The preservation of natural resources or open space is strongly encouraged in this land use classification. The County should revisit environmental protection in the Coastal Areas.

Specific regulations governing cluster developments are designated by zoning district. There currently is an option where density can be increased with optional density bonuses for certain

zoning districts. Those optional bonuses may involve payment of fees that fund permanent land preservation elsewhere in the County, or other options. RPC's are encouraged to allow for a mix of housing types and to preserve open space and natural areas/resources. Cluster development that allows for smaller lots and flexibility in dimensional standards is encouraged if the developer uses a cluster option that results in permanent preservation of a substantial percentage of the tract and/or natural areas/resources. Master planning should be encouraged especially for large-scale developments on large parcels or groups of parcels, higher density and mixed-use developments to provide flexibility in site design.

All applicants for developments of a minimum size (as specified in zoning) should continue to be required to provide information that analyzes the development's potential environmental impacts, including effects on stormwater runoff, nitrogen and phosphorous loading, wetlands, woodlands, wastewater treatment, water systems, and other matters that affect the ecological sensitivity of the inland bays.

Infrastructure – Central water and sewer facilities are strongly encouraged. If central utilities are not possible, permitted densities should be limited to two units per acre provided a septic permit can be approved.

Proposed Development's Compatibility with Comprehensive Plan: The proposed Twin Cedars residential development includes 44 single-family detached houses, 44 townhouses, and 168 apartments on a 64.22-acre parcel (a gross density of just under 4 units per acre). The land is currently split zoned as C-1 (General Commercial) and GR (General Residential), and the developer is seeking a residential planned community (RPC) overlay for the GR portion in Sussex County. The Sussex County Comprehensive Plan Future Land Use Map indicates that the proposed development parcel is within the Coastal Area (categorized as a Growth Area). The proposed development appears to comply with the characteristics and *Permitted Uses* for the Coastal Area. However, due to the some small lot sizes and overall density greater than 2 units per acre, along with the potential RPC overlay, this development raises questions regarding consistency with Sussex County regulations; therefore additional discussion may be required.

Relevant Projects in the DelDOT Capital Transportation Program

Currently, there is one active DelDOT project within the study area. The project involves planned improvements at the intersection of Delaware Route 20 and Bayard Road/Johnson Road. In late 2018 and early 2019, DelDOT's Traffic Studies Section conducted a traffic study and solicited public input to evaluate possible safety improvements at this unsignalized two-way stop-controlled intersection. Through this process, DelDOT determined that a traffic signal is recommended for this intersection. This recommendation and the associated documentation has been sent to DelDOT's Traffic Design Section to start programming the design work. The construction date is to be determined.

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 use was utilized to estimate the amount of new traffic generated for this development:

- 44 Single-Family Detached Homes (ITE Land Use Code 210)
- 44 Multi-Family Housing Units, Low-Rise (ITE Land Use Code 220)
- 168 Multi-Family Housing Units, Mid-Rise (ITE Land Use Code 221)

Table 1
TWIN CEDARS PEAK HOUR TRIP GENERATION

Land Use	Weekday AM Peak Hour			Weekday PM Peak Hour			Saturday Peak Hour		
	In	Out	Total	In	Out	Total	In	Out	Total
44 Single-Family Detached	9	27	36	29	17	46	30	25	55
44 Multi-Family Housing, Low-Rise	5	17	22	18	10	28	8	6	14
168 Multi-Family Housing, Mid-Rise	15	42	57	45	28	73	38	39	77
TOTAL TRIPS	29	86	115	92	55	147	76	70	146

Overview of TIS

Intersections examined:

- 1) Delaware Route 20 & Site Access
- 2) Delaware Route 20 & Deer Run Road
- 3) Delaware Route 20 & Bayard Road / Johnson Road

Conditions examined:

- 1) 2019 existing (Case 1)
- 2) 2026 without Twin Cedars (Case 2)
- 3) 2026 with Twin Cedars (Case 3)

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

Committed developments considered:

- 1) Orr Property (a.k.a. Miller Creek) (135 single-family detached houses)
- 2) Estuary (284 single-family detached houses)
- 3) Fox Haven I (76 single-family detached houses; 4 unbuilt)
- 4) Fox Haven II (99 single-family detached houses)

Intersection Descriptions

1) Delaware Route 20 & Site Access

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

Eastbound Approach: (Delaware Route 20) existing one through lane; proposed one through lane and one right-turn lane

Westbound Approach: (Delaware Route 20) existing one through lane; proposed one left-turn lane and one through lane

Northbound Approach: (Site Access) proposed one shared left-turn/right-turn lane, stop control

2) Delaware Route 20 & Deer Run Road

Type of Control: unsignalized

Eastbound Approach: (Delaware Route 20) one shared through/right-turn lane

Westbound Approach: (Delaware Route 20) one left-turn/through lane

Northbound Approach: (Deer Run Road) one shared left-turn/right-turn lane, stop control

3) Delaware Route 20 & Bayard Road / Johnson Road

Type of Control: existing two-way stop; DelDOT traffic study proposes a traffic signal

Eastbound Approach: (Delaware Route 20) one left-turn lane, one through lane, one bicycle lane, and one right-turn lane

Westbound Approach: (Delaware Route 20) one shared left-turn/through/right-turn lane

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

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

Safety Evaluation

Crash Data: Per current DelDOT policy, review of crash data was not conducted at this time.

Sight Distance: The proposed site access on Delaware Route 20 is located between two horizontal curves, so sight distance is limited looking in either direction (especially to the left) from the proposed northbound driveway approach. As always adequacy of available sight distance should be confirmed during the site plan review process for all proposed movements at the site accesses.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: Based on the current DART Bus Stop Map, the Delaware Transit Corporation (DTC) does not currently operate any fixed-route transit bus service in the area of the proposed Twin Cedars residential development.

Planned transit service: The TIS provided documentation of correspondence with a DTC representative who stated that no transit amenities are needed at this time. DTC has no plans to provide transit service to the area in the near future.

Existing bicycle and pedestrian facilities: The following study area roadways are identified as “Bicycling Routes” on the *Sussex County Bicycle Map* published by DelDOT:

- Delaware Route 20:
 - Regional Bicycle Route with bikeway
 - Over 5,000 vehicles daily
- Bayard Road: Connector bicycle route without bikeway
- Johnson Road: Connector bicycle route without bikeway

There are no existing sidewalks or exclusive pedestrian facilities in the immediate area of the proposed site entrance on Delaware Route 20. There are however new pedestrian facilities and bike lanes at the Delaware Route 20 & Bayard / Johnson Road intersection in the eastbound direction.

Planned bicycle and pedestrian facilities: The TIS provided documentation of correspondence with a representative from DelDOT’s Local Systems Planning Section who was contacted to determine requested accommodations for bicycles and pedestrians. It is requested that a 10-foot-wide Multi-Use Pathway would be needed across the frontage.

Previous Comments

In a review letter dated February 5, 2020, DelDOT indicated that the revised Preliminary TIS was acceptable as submitted.

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.

General HCS Analysis Comments

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

- 1) Both The Traffic Group, Inc. and McCormick Taylor utilized Highway Capacity Software (HCS) version 7.8 to complete the traffic analyses.
- 2) As per HCM methodologies, The Traffic Group and McCormick Taylor applied percent heavy vehicles (HV) by lane at all-way stop control 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.

Table 2
Peak Hour Levels of Service (LOS)
Based on Twin Cedars Traffic Impact Study – March 2020
Prepared by The Traffic Group, Inc.

Unsignalized Intersection ¹ One-Way Stop (T-Intersection)	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Summer Saturday	Weekday AM	Weekday PM	Summer Saturday
Delaware Route 20 & Site Access						
2026 with Twin Cedars (Case 3)						
Westbound DE 20 – Left	A (7.9)	A (8.3)	A (8.6)	A (7.9)	A (8.3)	A (8.6)
Northbound Site Access	B (12.9)	B (14.1)	C (19.8)	B (12.9)	B (14.1)	C (19.8)

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 3
Peak Hour Levels of Service (LOS)
Based on Twin Cedars Traffic Impact Study – March 2020
Prepared by The Traffic Group, Inc.

Unsignalized Intersection ² One-Way Stop (T-Intersection)	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Summer Saturday	Weekday AM	Weekday PM	Summer Saturday
Delaware Route 20 & Deer Run Road						
2019 Existing (Case 1)						
Westbound DE 20 – Left	A (7.8)	A (7.9)	A (8.2)	A (7.8)	A (7.9)	A (8.2)
Northbound Deer Run Road	B (10.8)	B (10.8)	B (12.5)	B (10.8)	B (10.8)	B (12.5)
2026 without Twin Cedars (Case 2)						
Westbound DE 20 – Left	A (7.9)	A (8.0)	A (8.3)	A (7.9)	A (8.0)	A (8.3)
Northbound Deer Run Road	B (11.3)	B (11.2)	B (13.0)	B (11.3)	B (11.2)	B (13.0)
2026 with Twin Cedars (Case 3)						
Westbound DE 20 – Left	A (7.9)	A (8.1)	A (8.4)	A (7.9)	A (8.1)	A (8.4)
Northbound Deer Run Road	B (11.6)	B (11.6)	B (13.4)	B (11.6)	B (11.6)	B (13.4)

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.

Table 4
Peak Hour Levels of Service (LOS)
Based on Twin Cedars Traffic Impact Study – March 2020
Prepared by The Traffic Group, Inc.

Unsignalized Intersection ³ Two-Way Stop	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Summer Saturday	Weekday AM	Weekday PM	Summer Saturday
Delaware Route 20 & Bayard Road / Johnson Road						
2019 Existing (Case 1)						
Eastbound DE 20 – Left	A (7.8)	A (8.0)	A (8.6)	A (7.8)	A (8.0)	A (8.6)
Westbound DE 20 – Left	A (7.7)	A (7.8)	A (8.1)	A (7.7)	A (7.8)	A (8.1)
Northbound Johnson Road	B (14.9)	C (16.6)	D (30.3)	B (14.9)	C (16.7)	D (30.6)
Southbound Bayard Road	C (17.1)	C (18.3)	F (70.9)	C (17.6)	C (18.9)	F (82.6)
2026 without Twin Cedars (Case 2)						
Eastbound DE 20 – Left	A (7.9)	A (8.1)	A (8.8)	A (7.9)	A (8.1)	A (8.8)
Westbound DE 20 – Left	A (7.7)	A (7.8)	A (8.2)	A (7.7)	A (7.8)	A (8.2)
Northbound Johnson Road	C (16.4)	C (19.8)	E (47.2)	C (16.5)	C (19.9)	E (49.1)
Southbound Bayard Road	C (21.2)	C (24.1)	F (206.3)	C (22.1)	D (25.4)	F (238.9)
2026 with Twin Cedars (Case 3)						
Eastbound DE 20 – Left	A (8.0)	A (8.2)	A (8.9)	A (8.0)	A (8.2)	A (8.9)
Westbound DE 20 – Left	A (7.8)	A (7.9)	A (8.2)	A (7.8)	A (7.9)	A (8.2)
Northbound Johnson Road	C (18.6)	C (23.5)	F (76.2)	C (18.6)	C (23.6)	F (86.1)
Southbound Bayard Road	D (25.5)	D (29.1)	F (310.7)	D (27.5)	D (31.1)	F (354.3)

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