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

SHANTÉ A. HASTINGS
SECRETARY

July 3, 2025

Mr. Ring Lardner, P.E
Davis, Bowen & Friedel, Inc.
1 Park Avenue
Milford, DE 19963

Dear Mr. Lardner,

The enclosed Traffic Operational Analysis (TOA) review letter for the **Northstar** (Tax Parcel: 334-5.00-175.00) mixed use 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 TOA 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 Annamaria.Furmato@delaware.gov.

Sincerely,

Annamaria Furmato
TIS Review Engineer

AF:km
Enclosures
cc with enclosures: Jonathan Hoffman, Janice CRP3 LLC
Cliff Mumford, Davis, Bowen & Friedel, Inc.
Dawn Riggi, Davis, Bowen & Friedel, Inc.
David L. Edgell, Office of State Planning Coordination
Jamie Whitehouse, Sussex County Planning & Zoning
Andrew J. Parker, McCormick Taylor, Inc.
Tucker Smith, McCormick Taylor, Inc.
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Lanie Clymer, Deputy Secretary
Mark Luszcz, Chief Engineer, Transportation Solutions (DOTS)
Brad Eaby, Deputy Attorney General, DOTS
Michael Simmons, Chief Project Development South, DOTS
Peter Haag, Chief Traffic Engineer, DOTS
Wendy Carpenter, Traffic Calming & Subdivision Relations Manager, Traffic, DOTS
Sean Humphrey, Traffic Engineer, Traffic, DOTS
Alastair Probert, South District Engineer, M&O
Matt Schlitter, South District Public Works Engineer, M&O
Jared Kauffman, Service Development Planner, DTC
Tremica Cherry, Service Development Planner, DTC
Anthony Aglio, Planning Supervisor, Active Transportation & Community Connections, Planning
Anson Gock, Planner, Statewide & Regional Planning, Planning
Sarah Coakley, TID Coordinator, Statewide & Regional Planning, Planning
Todd Sammons, Assistant Director, Development Coordination
Wendy Polasko, Subdivision Engineer, Development Coordination
John Pietrobono, Acting Sussex Review Coordinator, Development Coordination
Kevin Hickman, Sussex Review Engineer, Development Coordination
Sireen Muhtaseb, TIS Engineer, Development Coordination
Ben Fisher, TIS Review Engineer, Development Coordination
Tijah Jones, TIS Review Engineer, Development Coordination

July 3, 2025

Ms. Sireen Muhtaseb, PE
TIS Engineer
DelDOT Division of Planning
P.O. Box 778
Dover, DE 19903

RE: Agreement No. 2139S
Traffic Impact Study Services
Task No. 2 Subtask 1 – Northstar

Dear Ms. Muhtaseb:

McCormick Taylor has completed the Traffic Operational Analysis (TOA) for the proposed Northstar development. McCormick Taylor prepared the report in a manner generally consistent with DelDOT's Development Coordination Manual.

The TOA evaluates the impacts of the proposed Northstar development to be located on the southeast side of US Route 9 (Sussex Road 18) and on both sides of Beaver Dam Road (Sussex Road 285), approximately 700 feet northeast of the intersection of Beaver Dam Road and Dairy Farm Road (Sussex Road 261), in Sussex County, Delaware. The proposed development would consist of 758 single-family houses, 94 units of multi-family low-rise housing, and 96,118 square feet of retail space. Access to the site is proposed via six access points. Three access points are proposed on existing roadways: two on US Route 9 (the right-in/right-out/left-in western access serving a residential portion of the site and the right-in/right-out eastern access serving the retail portion of the site) and one full-movement access on Beaver Dam Road opposite Coastal Club Road. Three additional full-movement access points are proposed on the Mulberry Knoll Road Extension (a section of north-south roadway that currently doesn't exist but is a scheduled improvement within the Henlopen TID). The developer, in consultation with Sussex County and DelDOT, has agreed to complete some of the TID-required improvements as outlined in this letter in lieu of paying a fee as currently required by the TID. Improvements that would be constructed by the developer that are creditable against the TID fee include the portion of the Mulberry Knoll Road Extension within the Northstar property, excluding the site accesses on that road. Additional creditable improvements to be constructed by the developer include the intersection where existing Beaver Dam Road meets the proposed Mulberry Knoll Road Extension, the southern leg of the intersection of US Route 9 and Old Vine Boulevard where the proposed Mulberry Knoll Road Extension meets US Route 9, and the additional cost of a roundabout at Site Entrance D on Beaver Dam Road at Coastal Club Road that exceeds the cost of a traffic signal in that location. Construction of the development is anticipated to be completed in 2032.

The proposed project is located on approximately 399.62 acres of the total 433.72-acre parcel. The subject land is currently zoned as AR-1 (Agricultural Residential) in Sussex County. The developer plans to rezone a portion of the land to MR (Medium-Density Residential) and C-3 (Heavy Commercial).

Relevant and On-Going Projects and Studies

Currently, DelDOT has several relevant and ongoing projects within the area of study.

The proposed development is located within the boundary of the operational Henlopen Transportation Improvement District (TID). The TID is a planning concept that seeks to proactively align transportation infrastructure spending and improvements with land use projections and future development within the designated district. The intersections in the study area of the proposed development are within the TID boundary. The proposed land use for Northstar is consistent with the future 2045 TID buildout projection for this site. As such, the developer is required to pay the TID fee or complete TID identified projects in lieu of performing a Traffic Impact Study (TIS). However, a Traffic Operational Analysis (TOA) was still required for Northstar to determine the detailed layout of the site entrances and other intersections associated with the development.

DelDOT's *US 9 Widening - Old Vine Boulevard to SR 1* (State Contract No. T202212902) project will widen US Route 9 from Delaware Route 1 through the Old Vine Boulevard intersection to provide two 11-foot travel lanes, turn lanes, curbed shoulders, and bike lanes in each direction along with associated intersection improvements. The western terminus of the project is within the Northstar property frontage along US Route 9. The project will provide additional capacity to accommodate design year traffic volumes and improve the safety of the US Route 9 corridor. The project is currently in the Final Design phase with construction anticipated to begin in Fall 2027 and end in Fall 2030, prior to Northstar's expected site full build out year of 2032. Note that at US Route 9 and Old Vine Boulevard, Northstar would be responsible for certain improvements that are beyond the scope of the DelDOT project, including building Mulberry Knoll Road Extension as the fourth leg of the signalized intersection and making additional intersection modifications (design of improvements and construction sequence/schedule to be coordinated with the DelDOT project). More details about the DelDOT project are available at the following link: US 9 Widening (Old Vine Rd. to SR 1) Project Website - DelDOT

DelDOT's *US 9 Widening (Phase 2) – Old Vine Boulevard to Dairy Farm Road* project will widen US Route 9 from just west of Old Vine Boulevard to Dairy Farm Road, essentially extending the US Route 9 widening project described above further to the west. The project is expected to upgrade the pavement section to four 11-foot travel lanes with shoulders and turn lanes. It will implement DelDOT's Complete Streets Policy, provide transit, biking, and pedestrian amenities, and drainage where appropriate, and provide shared-use paths along the corridor.

DelDOT's *Beaver Dam Road Widening – SR 1 to Dairy Farm Road* project will widen Beaver Dam Road to provide two 11-foot travel lanes, turn lanes, and bike lanes in each direction of Beaver Dam Road from Delaware Route 1 to Dairy Farm Road, including associated intersection improvements. The project area includes the entire frontage of the Northstar property along Beaver Dam Road. The project is included in the FY 23-FY 28 CTP which was approved by the Council on Transportation (COT) on February 24, 2022. The need for the project was identified by the Henlopen Transportation Improvement District technical analysis. Preliminary Engineering is

anticipated to start in FY 26. DelDOT currently anticipates that this project will begin construction no sooner than Northstar's expected site full build out year of 2032.

DelDOT's *Mulberry Knoll Road Extension – Cedar Grove Road to US 9 at Old Vine Boulevard* project will extend Mulberry Knoll Road northward from its current terminus at Cedar Grove Road to US Route 9 at Old Vine Boulevard. The project was identified in the Five Points Study Working Group and the Henlopen TID technical analysis recommendations, and is intended to connect communities, alleviate congestion on parallel routes and provide improved mobility for local traffic. Mulberry Knoll Road Extension will have one through lane in each direction. The northern portion of Mulberry Knoll Road Extension within the boundaries of the Northstar property (from US Route 9 to approximately 900 feet south of Beaver Dam Road) will be built by the developer in time for Northstar's site full build out year, anticipated to be 2032. The remaining portion of Mulberry Knoll Road Extension (from the southern border of the Northstar site down to Cedar Grove Road) will be built by DelDOT sometime after 2032. DelDOT anticipates it will be completed by the 2045 TID Buildout Year. The project is included in the FY 23-FY 28 CTP which was approved by the Council on Transportation (COT) on February 24. 2022. Preliminary Engineering is anticipated to start in FY 28.

Summary of Analysis Results

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:

Intersection	***Existing Traffic Control***	***Situations for which deficiencies occur***
7. US Route 9 & Sheffield Drive / Site Entrance E	Unsignalized	2032 with Northstar AM and PM (Case 1) 2045 with Northstar AM and PM (Case 2)

7. US Route 9 & Sheffield Drive / Site Entrance E (See Recommendation 8 & Table 7, page 38)
This unsignalized site entrance intersection would experience LOS deficiencies during the AM and PM peak hours in both 2032 (Case 1) and 2045 (Case 2) with the Northstar development. Evaluated as a full-movement unsignalized two-way stop-control intersection, during the 2045 PM peak hour the southbound Sheffield Drive approach would operate at LOS F with 1,050 seconds of delay, the northbound Site Entrance E approach would operate at LOS F with 775 seconds of delay, and queues on both of these minor street approaches are expected to be approximately 115 feet long. McCormick Taylor conducted a Traffic Signal Justification Study (TSJS) at this intersection to determine if a traffic signal would be warranted in future conditions and to evaluate alternative traffic control measures. The TSJS found that a traffic signal would not be warranted at this intersection in either 2032 or 2045 with the Northstar development. Alternative means of mitigation were considered at this intersection including all-way stop-

control, single-lane roundabout and multi-lane roundabout. All-way stop-control and a single-lane roundabout would each fail to mitigate the LOS deficiency. A multi-lane roundabout would mitigate the LOS deficiency, but is not recommended because it would be unsuitable for this location due to the characteristics of the US Route 9 corridor with higher speed limits and signals at many nearby intersections. Additionally, DelDOT does not plan to widen US Route 9 this far west by 2045 so the US Route 9 approaches would have only one shared lane entering the roundabout. To mitigate the LOS deficiency on the northbound Site Entrance E approach in the two-way stop-control scenario, turning movement restrictions are recommended that would prohibit northbound left turns and through movements. As discussed in the preceding paragraph, site trips for Site Entrance E left and through egress movements were redistributed to eastbound Site Entrance B left turns onto Mulberry Knoll Road Extension. With the proposed configuration of right-out only on the northbound Site Entrance E approach, during the 2045 PM peak hour the northbound approach is expected to operate at LOS D with 26 seconds of delay, a delay reduction of approximately 750 seconds per vehicle. The 95th percentile queue length on the northbound Site Entrance E approach right-turn only movement is expected to be less than 25 feet long. Note that eastbound and westbound US Route 9 left-in movements would be provided and would operate at LOS B in the 2045 AM and PM peak hours. Also note that the southbound Sheffield Drive approach is proposed to remain as one shared left/right-turn lane as it exists today (the southbound through movement to the new fourth leg would also be made from this shared lane). This results in a significant LOS deficiency with 1,050 seconds of delay on the southbound approach during the 2045 PM peak hour, but the Northstar developer should not be responsible for restricting any existing movements on the Sheffield Drive approach since it would operate at LOS F regardless of whether or not the Northstar development is constructed. DelDOT may wish to evaluate possible restriction of southbound Sheffield Drive approach movements as a separate project from construction of the Northstar development Site Entrance E, or DelDOT will reassess southbound Sheffield Drive as part of the *US 9 Widening (Phase 2) – Old Vine Boulevard to Dairy Farm Road* project.

Two additional intersections would not have level of service (LOS) deficiencies as proposed, but because they were considered for potential signalization, further information about the analysis and recommendations for these two intersections is provided below.

1. Beaver Dam Road & Mulberry Knoll Road Extension (See Recommendations 2 and 3 & Table 2, page 33)

and

5. Beaver Dam Road & Coastal Club Road / Site Entrance D (See Recommendation 7 & Table 5, page 36)

McCormick Taylor completed Traffic Signal Justification Studies (TSJS) for the intersections of Beaver Dam Road at the future Mulberry Knoll Road Extension and Beaver Dam Road at Coastal

Club Road / Site Entrance D. The studies were conducted to determine if the warrants for a traffic signal would be met by the TID buildout year of 2045 and/or the Northstar site full build out year of 2032, and to evaluate alternative traffic control at each intersection. Warrant 1 (eight-hour vehicular volume), Warrant 2 (four-hour vehicular volume), and Warrant 7 (crash experience) were evaluated for each intersection.

Both study intersections meet the Delaware MUTCD warrants for a traffic signal from a volume standpoint only, based on forecasted traffic volumes in 2032 with the Northstar development. However, based on operational and safety analysis conducted in the TSJS, the recommendation for each intersection is for the developer to construct a roundabout that would have the footprint of a multilane roundabout but would initially function as a single-lane roundabout by the 2032 site full build out year. Compared to a traffic signal, a roundabout will typically have reduced vehicular delays, shorter queues, and fewer predicted crashes. Additionally, the reason for building each of these intersections as a single-lane roundabout with the footprint of a multilane roundabout is to facilitate, as easily as possible, a change to multilane roundabout operations when DelDOT's *Beaver Dam Road Widening – SR 1 to Dairy Farm Road* project is constructed.

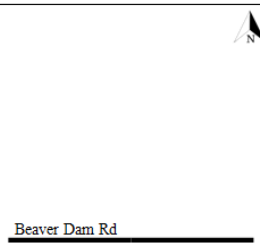
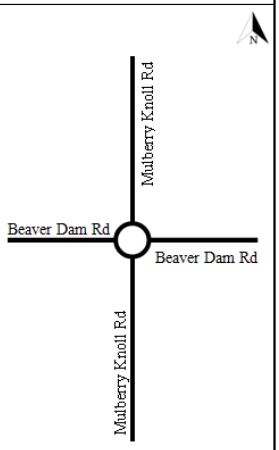
Development Improvements

Should Sussex County approve the proposed development, the following items should be incorporated into the site design and reflected on the record plan, entrance plans or construction plans by note or illustration, unless a Design Deviation is requested and approved by the Department. 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. The following items should be implemented at the same time as site construction once all agency approvals and permits are secured and completed in accordance with DelDOT's Standards and Specifications.

1. The developer shall improve the State-maintained roads on which they front (US Route 9), within the limits of their frontage. The improvements shall include both directions of travel, regardless of whether the developer's lands are on one or both sides of the road. "Frontage" means the length along the state right-of-way of a single property tract where an entrance is proposed or required. If a single property tract has frontage along multiple roadways, any segment of roadway including an entrance shall be improved to meet DelDOT's Functional Classification criteria as found in Section 1.1 of the Development Coordination Manual and elsewhere therein, and/or improvements established in the Traffic Operational Analysis and/or Traffic Impact Study. "Secondary Frontage" means the length along the state right-of-way of a single property tract where no entrance is proposed or required. The segment of roadway may be upgraded by improving the pavement condition of the existing roadway width. The Pavement Management Section and Subdivision Section will determine the requirements to improve the pavement condition.

2. The developer should design and construct the Mulberry Knoll Road Extension through their entire property, from US Route 9 at Old Vine Boulevard to the southern border of their property (approximately 900 feet south of Beaver Dam Road). This section of the Mulberry Knoll Road Extension will eventually connect to Cedar Grove Road once DelDOT's *Mulberry Knoll Road Extension – Cedar Grove Road to US 9 at Old Vine Boulevard* project is constructed after Northstar opens. The section of the Mulberry Knoll Road Extension being constructed by the developer should consist of a 12-foot landscaped median, one 11-foot through lane, a 5-foot shoulder, and a 2-foot gutter with 8-inch curb in each direction. Mulberry Knoll Road Extension should also include a 10-foot wide shared-use path with a 5-foot buffer from the roadway on both sides of the road for its entire length within the Northstar site. Mulberry Knoll Road Extension should be designed for a 35-mph design speed and have a 35-mph posted speed limit. The segment of the Mulberry Knoll Road Extension between Site Entrance A and US Route 9 will include a northbound left-turn lane and northbound right-turn lane approaching US Route 9 in addition to the cross section described above, as detailed in Item No. 10 below. The 12-foot landscaped median should be constructed all the way up to US Route 9, so it could potentially be converted to a second northbound left-turn lane at US Route 9 if needed in the future. Mulberry Knoll Road Extension shall be designed and constructed to state standards and dedicated to public use. It must also be accepted into state maintenance. The developer should coordinate with DelDOT's Subdivision Section to determine details regarding design, functional classification, schedule, and construction of the roadway. Elements of the Mulberry Knoll Road Extension to be constructed by the developer within the DelDOT right-of-way, except for turn lanes where required (at Site Entrance C) and site entrance elements, are considered to be TID improvements, as are the shared-use paths on both sides of the road. The developer will be credited against their TID fee for the TID improvements.

3. The developer should design and construct a roundabout on Beaver Dam Road at the intersection with the Mulberry Knoll Road Extension (road to be constructed by the developer as described in Item No. 2 above). The roundabout should be constructed with the footprint of a multilane roundabout, but it would initially function as a single-lane roundabout. The proposed configuration is shown in the table below.

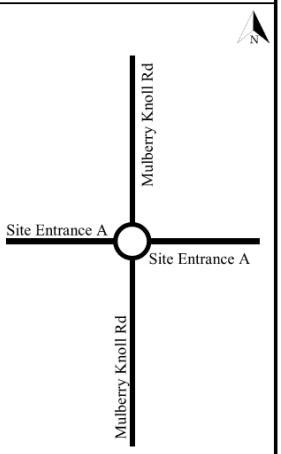
Approach	Current Configuration		Approach	Proposed Configuration	
Eastbound Beaver Dam Road	One Through Lane.		Eastbound Beaver Dam Road	One approach lane to single-lane roundabout	
Westbound Beaver Dam Road	One Through Lane.		Westbound Beaver Dam Road	One approach lane to single-lane roundabout	
Northbound	Approach does not exist.		Northbound Mulberry Knoll Road Extension	One approach lane to single-lane roundabout	
Southbound	Approach does not exist.		Southbound Mulberry Knoll Road Extension	One approach lane to single-lane roundabout	

Marked crossings should be provided on all approaches to the roundabout.

It is anticipated that this single-lane roundabout will later function as a multilane roundabout when DelDOT's *Beaver Dam Road Widening – SR 1 to Dairy Farm Road* project is constructed. At that time, the Beaver Dam Road approaches will each enter the roundabout with two lanes while the Mulberry Knoll Road approaches will continue to enter the roundabout with one lane. As such, the initial roundabout design and construction must account for the future Beaver Dam Road widening and must be set up to facilitate, as easily as possible, a change to multilane roundabout operations. The developer should coordinate with DelDOT's Development Coordination Section to determine design details during the site plan review. The developer will be credited against their TID fee for this work.

4. The developer should design and construct a single-lane roundabout at proposed Site Entrance A on the future Mulberry Knoll Road Extension. Site Entrance A should be located approximately 500 feet south of US Route 9. The proposed configuration is shown in the table below.

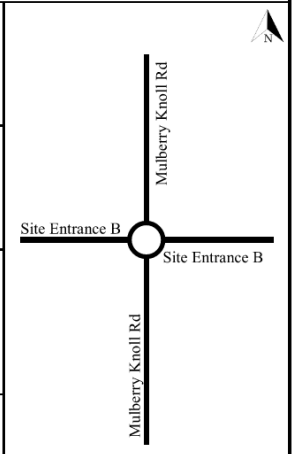
Approach	Current Configuration		Approach	Proposed Configuration	
Eastbound	Approach does not exist.		Eastbound Site Entrance A	One approach lane to single-lane roundabout	
Westbound	Approach does not exist.		Westbound Site Entrance A	One approach lane to single-lane roundabout	
Northbound	Approach does not exist.		Northbound Mulberry Knoll Road Extension	One approach lane to single-lane roundabout	
Southbound	Approach does not exist.		Southbound Mulberry Knoll Road Extension	One approach lane to single-lane roundabout	



Marked crossings should be provided on all approaches to the roundabout.

The developer should coordinate with DelDOT's Development Coordination Section to determine design details during the site plan review.

5. The developer should design and construct a single-lane roundabout at proposed Site Entrance B on the future Mulberry Knoll Road Extension. Site Entrance B should be located approximately 600 feet north of Beaver Dam Road. The proposed configuration is shown in the table below.

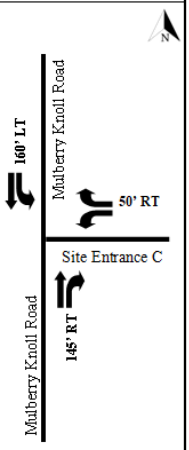
Approach	Current Configuration		Approach	Proposed Configuration	
Eastbound	Approach does not exist.		Eastbound Site Entrance B	One approach lane to single-lane roundabout	
Westbound	Approach does not exist.		Westbound Site Entrance B	One approach lane to single-lane roundabout	
Northbound	Approach does not exist.		Northbound Mulberry Knoll Road Extension	One approach lane to single-lane roundabout	
Southbound	Approach does not exist.		Southbound Mulberry Knoll Road Extension	One approach lane to single-lane roundabout	

Marked crossings should be provided on all approaches to the roundabout.

The developer should coordinate with DelDOT's Development Coordination Section to determine design details during the site plan review.

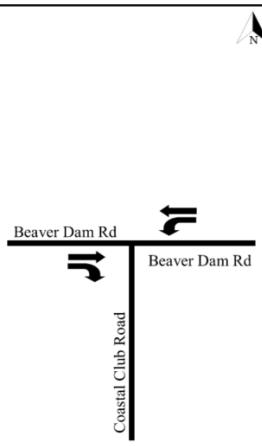
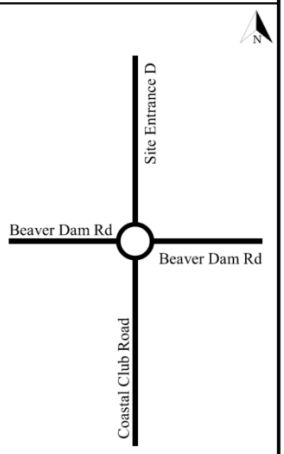
6. The developer should design and construct the full-movement Site Entrance C on the future Mulberry Knoll Road Extension. Site Entrance C should be located at least 500 feet south of Beaver Dam Road. The proposed configuration is shown in the table below.

Approach	Current Configuration		Approach	Proposed Configuration	
Eastbound	Approach does not exist.		Eastbound	No Change	
Westbound	Approach does not exist.		Westbound Site Entrance C	One left turn lane and one right turn lane. Stop Control.	
Northbound	Approach does not exist.		Northbound Mulberry Knoll Road Extension	One through lane and one right turn lane.	
Southbound	Approach does not exist.		Southbound Mulberry Knoll Road Extension	One left turn lane and one through lane.	



At the proposed Site Entrance C intersection, a southbound left-turn lane and a northbound right-turn lane are each warranted on the Mulberry Knoll Road Extension based on DelDOT's Auxiliary Lane Worksheet. Initial recommended minimum turn lane lengths (excluding taper) are: 160-foot southbound left-turn lane and 145-foot northbound right-turn lane on Mulberry Knoll Road Extension. The westbound right-turn lane on the Site Entrance C approach to the Mulberry Knoll Road Extension should be 50-feet long (excluding taper). The developer should coordinate with DelDOT's Development Coordination Section to determine final turn lane lengths and other design details during the site plan review.

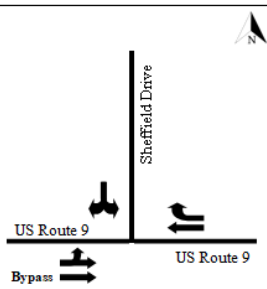
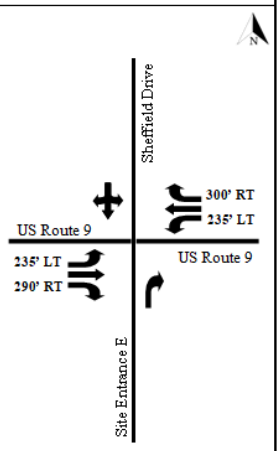
7. The developer should design and construct Site Entrance D on Beaver Dam Road across from Coastal Club Road by converting the existing three-leg intersection to a four-leg roundabout. The roundabout should be constructed with the footprint of a multilane roundabout, but it would initially function as a single-lane roundabout. The proposed configuration is shown in the table below.

Approach	Current Configuration		Approach	Proposed Configuration	
Eastbound Beaver Dam Road	One through lane and one right turn lane.		Eastbound Beaver Dam Road	One approach lane to single-lane roundabout	
Westbound Beaver Dam Road	One left turn lane and one through lane.		Westbound Beaver Dam Road	One approach lane to single-lane roundabout	
Northbound Coastal Club Road	One left turn lane and one right turn lane.		Northbound Coastal Club Road	One approach lane to single-lane roundabout	
Southbound	Approach does not exist.		Southbound Site Entrance D	One approach lane to single-lane roundabout	

Marked crossings should be provided on all approaches to the roundabout.

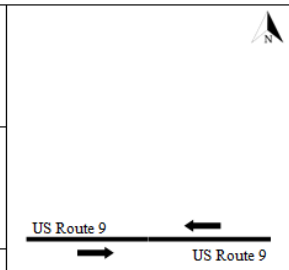
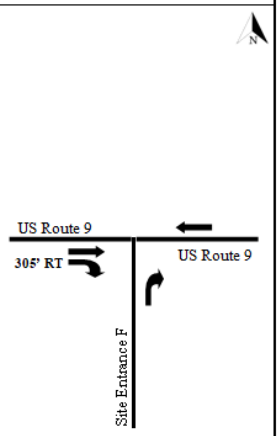
It is anticipated that this single-lane roundabout will later function as a multilane roundabout when DelDOT's *Beaver Dam Road Widening – SR 1 to Dairy Farm Road* project is constructed. At that time, the Beaver Dam Road approaches will each enter the roundabout with two lanes while the Coastal Club Road and Site Entrance D approaches will continue to enter the roundabout with one lane. As such, the initial roundabout design and construction must account for the future Beaver Dam Road widening and must be set up to facilitate, as easily as possible, a change to multilane roundabout operations. After the developer has exhausted all efforts to acquire the necessary right-of-way to construct this roundabout, if they are unable to acquire the right-of-way, then DelDOT may assist the developer with condemnation. The developer should coordinate with DelDOT's Development Coordination Section to determine design details during the site plan review. This roundabout, to be constructed by the developer, is considered to be a TID improvement and the developer will be partially credited against their TID fee for the part within the DelDOT right-of-way. Improvement costs that are creditable include the additional cost of this roundabout that exceeds the cost of a traffic signal in this location. The cost of the site entrance connecting to this roundabout is not creditable.

8. The developer should design and construct the right-in/right-out/left-in Site Entrance E on the US Route 9 across from Sheffield Drive. The proposed configuration is shown in the table below.

Approach	Current Configuration		Approach	Proposed Configuration	
Eastbound US Route 9	One shared left / through lane and one bypass lane.		Eastbound US Route 9	One left turn lane, one through lane, and one right turn lane.	
Westbound US Route 9	One through lane and one right turn lane.		Westbound US Route 9	One left turn lane, one through lane, and one right turn lane.	
Northbound	Approach does not exist.		Northbound Site Entrance E	One right turn lane. Stop or Yield Control.	
Southbound Sheffield Drive	One shared left / right turn lane. Stop Control.		Southbound Sheffield Drive	No Change.	

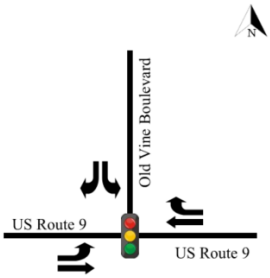
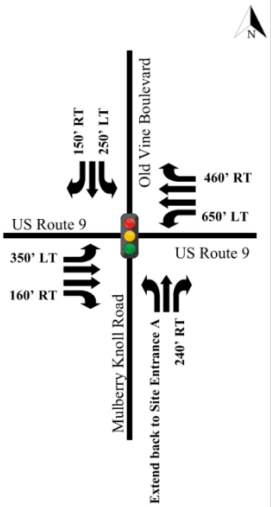
At the proposed Site Entrance E intersection on US Route 9 opposite Sheffield Drive, separate left-turn and right-turn lanes are warranted on the eastbound and westbound US Route 9 approaches based on DelDOT's Auxiliary Lane Worksheet. Initial recommended minimum turn lane lengths (excluding taper) are: 235-foot eastbound left-turn lane, 290-foot eastbound right-turn lane, 235-foot westbound left-turn lane, and 300-foot westbound right-turn lane on US Route 9. Note that the length of the existing westbound right-turn lane exceeds 300 feet so it does not need to be lengthened. Signage and physical measures such as a channelization island should be included at the Site Entrance E intersection with US Route 9 to restrict prohibited northbound left turns leaving the site via Site Entrance E. The developer should coordinate with DelDOT's Development Coordination Section to determine final turn lane lengths and other design details during the site plan review.

9. The developer should design and construct the right-in/right-out Site Entrance F on US Route 9, near the western end of the retail portion of the site. The proposed configuration is shown in the table below.

Approach	Current Configuration		Approach	Proposed Configuration	
Eastbound US Route 9	One through lane.		Eastbound US Route 9	One through lane and one right turn lane.	
Westbound US Route 9	One through lane.		Westbound US Route 9	No Change.	
Northbound	Approach does not exist.		Northbound Site Entrance F	One right turn lane. Stop or Yield Control.	
Southbound	Approach does not exist.		Southbound	No Change.	

At the proposed Site Entrance F intersection, an eastbound right-turn lane is warranted on US Route 9 based on DelDOT's Auxiliary Lane Worksheet. The initial recommended minimum turn lane length (excluding taper) is 305 feet for the eastbound right-turn lane on US Route 9. As the western terminus of DelDOT's *US 9 Widening - Old Vine Boulevard to SR 1* (State Contract No. T202212902) project is very close to the proposed Site Entrance F location, the developer should coordinate with DelDOT to determine final turn-lane lengths and other design details and to coordinate schedules for the DelDOT project and the site entrance construction.

10. The developer should design and construct improvements at the intersection of US Route 9 and Old Vine Boulevard to include the addition of the Mulberry Knoll Road Extension as the fourth leg of the signalized intersection. The proposed configuration is shown in the table below.

Approach	Current Configuration		Approach	Proposed Configuration	
Eastbound US Route 9	One left turn lane and one through lane.		Eastbound US Route 9	One left turn lane, two through lanes, and one right turn lane.	
Westbound US Route 9	One through lane and one right turn lane.		Westbound US Route 9	One left turn lane, two through lanes, and one right turn lane.	
Northbound	Approach does not exist.		Northbound Mulberry Knoll Road Extension	One left turn lane, one through lane, and one right turn lane.	
Southbound Old Vine Boulevard	One left turn lane and one right turn lane.		Southbound Old Vine Boulevard	One left turn lane, one through lane, and one right turn lane.	

At the intersection of US Route 9 and Old Vine Boulevard, DelDOT's *US 9 Widening - Old Vine Boulevard to SR 1* project would add a second through lane in each direction of US Route 9. The developer would be responsible for constructing the Mulberry Knoll Road Extension as the fourth leg of the signal and making additional intersection modifications as described below and shown in the table above.

The new Mulberry Knoll Road Extension should be constructed as the south leg of the intersection, forming the northbound approach to US Route 9 with a 12-foot landscaped median and separate left-turn, through, and right-turn lanes on that approach. The 12-foot landscaped median on Mulberry Knoll Road Extension should be constructed all the way up to US Route 9, so it could potentially be converted to a second northbound left-turn lane at US Route 9 if needed in the future. The developer would also add a left-turn lane on the westbound approach of US Route 9 and a right-turn lane on the eastbound approach of US Route 9. The turn lanes should be designed to accommodate the 95th percentile queues plus the deceleration length. Where existing turn lane lengths exceed the calculated length, existing lengths are recommended. Initial recommended minimum left-turn lane lengths (excluding tapers) include: one 350-foot eastbound left-turn lane (existing length is sufficient), one 160-foot eastbound right-turn lane, one 650-foot westbound left-turn lane, one 460-foot westbound right-turn lane (existing length is sufficient), one northbound left-turn lane that extends back to Site Entrance A on Mulberry Knoll Road Extension (approximately 500 feet south of US Route 9), and one 240-foot northbound right-turn lane. The required length of the northbound left-turn lane based on queuing analysis is 485

feet, excluding taper, however as stated above the full-width turn lane should extend all the way to Site Entrance A. Additionally, a separate through lane must be provided on southbound Old Vine Boulevard, but that approach is currently wide enough to accommodate a through lane because the future fourth leg was already planned for when this intersection was initially constructed. The developer should coordinate with DelDOT's Development Coordination and Traffic Sections to determine final turn lane lengths and other design details during the site plan review.

Finally, as this intersection will be modified by DelDOT's *US 9 Widening - Old Vine Boulevard to SR 1* project, the developer should coordinate with DelDOT's Project Development South regarding construction plans and schedules for the *US 9 Widening - Old Vine Boulevard to SR 1* (State Contract No. T202212902) project, and to determine if there are opportunities to incorporate any improvements that are the developer's responsibility into the DelDOT project, depending on project schedules and other factors. The developer will be credited against their TID fee for this improvement.

11. The developer should enter into a traffic signal agreement with DelDOT for the intersection of US Route 9 and Old Vine Boulevard / Mulberry Knoll Road Extension to cover the physical improvements described above in Item No. 10. The agreement should include pedestrian signals, crosswalks, interconnection, and ITS equipment such as CCTV cameras at DelDOT's discretion.

12. The developer shall reserve the necessary right-of-way for the proposed Mulberry Knoll Road Extension within the Northstar property limits as part of the minor subdivision plan, and then subsequently dedicate the future roadway as a state-maintained roadway prior to the roadway being opened to traffic. The right-of-way shall be deeded to the State of Delaware. The developer should coordinate with DelDOT's Development Coordination Section and DelDOT's Subdivision Section to determine details of the right-of-way reservation and eventual deeding of the right-of-way to the State of Delaware prior to the roadway being opened to traffic. The fee can be discussed at the time of deed as to whether it will be a credit or payment to the developer.

13. The developer shall reserve right-of-way along the US Route 9 site frontage to allow for future US Route 9 widening. This reservation is for the right-of-way needs anticipated for the US Route 9 Widening projects, beyond the fifteen-foot-wide permanent easement dedication required by DelDOT's Development Coordination Manual. The developer should coordinate with DelDOT's Development Coordination Section and DelDOT's Subdivision Section to determine details of the right-of-way reservation.

14. The developer shall reserve right-of-way along the Beaver Dam Road site frontage to allow for potential future Beaver Dam Road widening. This reservation is for the right-of-way needs anticipated for the *Beaver Dam Road Widening – SR 1 to Dairy Farm Road* project, beyond the fifteen-foot-wide permanent easement dedication required by DelDOT's Development Coordination Manual. The developer should coordinate with DelDOT's Development Coordination Section and DelDOT's Subdivision Section to determine details of the right-of-way reservation.

15. The developer should coordinate with DelDOT's Project Development South regarding construction plans and schedules for the *US 9 Widening - Old Vine Boulevard to SR 1* (State Contract No. T202212902) project.

16. The developer should coordinate with DelDOT's Project Development South regarding construction plans and schedules for the *Beaver Dam Road Widening – SR 1 to Dairy Farm Road* project.

17. The developer should coordinate with DelDOT's Project Development South regarding construction plans and schedules for the *Mulberry Knoll Road Extension – Cedar Grove Road to US 9 at Old Vine Boulevard* project.

18. The developer shall enter into a TID and recoupment agreement for the Henlopen TID.

19. The following bicycle and pedestrian improvements should be included:

    a. Per the DelDOT Development Coordination Manual section 5.2.9.2, bicycle lanes are required where right-turn lanes are being installed.

    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 moved outside of any designated bicycle lanes and any proposed SUP/sidewalks, and should be flush with the pavement.

    d. A minimum fifteen-foot-wide permanent easement should be dedicated to DelDOT within the site frontages along US Route 9 and Beaver Dam Road. The fifteen-foot-wide permanent easement would consist of ten feet outside of the reserved right-of-way and five feet within the reserved right-of-way. Along the frontages, a minimum of a 10-foot wide shared-use path 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 Development Coordination Manual. The developer shall coordinate with DelDOT's Development Coordination Section through the plan review process to determine the details of the shared-use path design and connections/terminations at or before the boundaries of the

property. The developer will be credited against their TID fee for all shared-use path installation along US Route 9, Beaver Dam Road, and the Mulberry Knoll Road Extension.

e. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances. Type 3 curb ramps are discouraged.

f. 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 SUP/sidewalk along the site frontages.

g. The developer should construct pedestrian crossings on all approaches of the proposed roundabouts at the intersections of Beaver Dam Road & Mulberry Knoll Road Extension and Beaver Dam Road & Coastal Club Road / Site Entrance D. Crossings must connect to adjacent shared-use paths.

Improvements in this TOA 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 study 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.

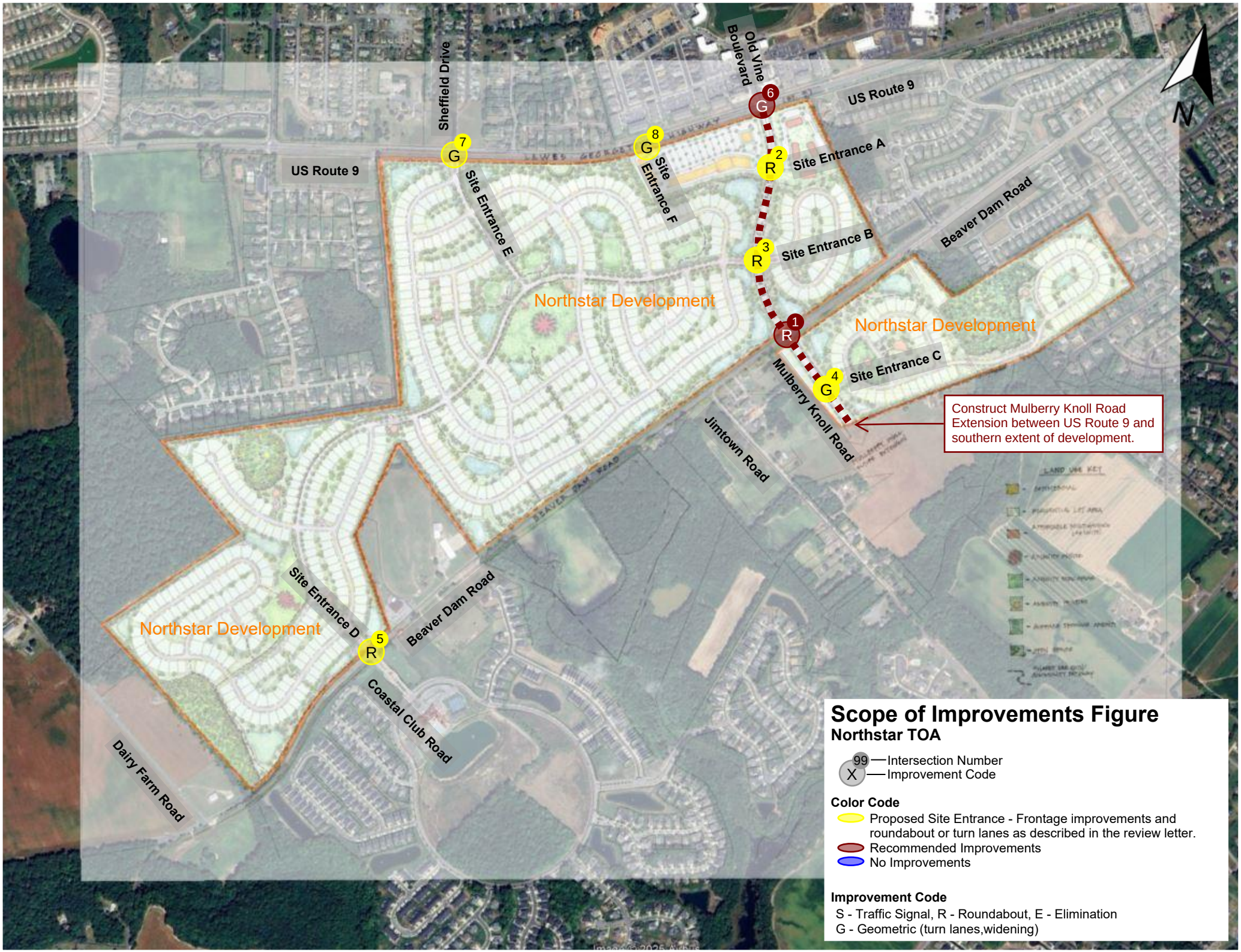
Additional details regarding this TOA are attached. Please contact me at (610) 640-3500 or through e-mail at ajparker@mccormicktaylor.com if you have any questions concerning this TOA.

Sincerely,

McCormick Taylor, Inc.

Andrew J. Parker, PE, PTOE
Project Manager

Enclosure


Sheffield Drive
Old Vine Boulevard
US Route 9
US Route 9
Site Entrance E
Site Entrance F
Site Entrance A
Site Entrance B
Site Entrance C
Site Entrance D
Beaver Dam Road
Beaver Dam Road
Northstar Development
Northstar Development
Northstar Development
Mulberry Knoll Road
Jimtown Road
Coastal Club Road
Dairy Farm Road
Construct Mulberry Knoll Road Extension between US Route 9 and southern extent of development.
N
Scope of Improvements Figure
Northstar TOA
99 — Intersection Number
X — Improvement Code
Color Code
Proposed Site Entrance - Frontage improvements and roundabout or turn lanes as described in the review letter.
Recommended Improvements
No Improvements
Improvement Code
S - Traffic Signal, R - Roundabout, E - Elimination
G - Geometric (turn lanes,widening)

General Information

Report date: March 2025
Prepared by: McCormick Taylor, Inc.
Prepared for: Northstar Property, LLC
Tax parcel: 334-5.00-175.00

Project Description and Background

Description: The proposed Northstar development consists of 758 single-family houses, 94 units of multi-family low-rise housing, and 96,118 square feet of retail space.
Location: The site is located on the southeast side of US Route 9 (Sussex Road 18) and on both sides of Beaver Dam Road (Sussex Road 285), approximately 700 feet northeast of the intersection of Beaver Dam Road and Dairy Farm Road (Sussex Road 261), in Sussex County, Delaware. A site location map is included on page 20, along with a concept site plan on page 21.
Amount of land to be developed: approximately 399.62 acres of the total 433.72-acre parcel
Land use approval(s) needed: The land is currently zoned as AR-1 (Agricultural Residential) in Sussex County. The developer plans to rezone a portion of the land to MR (Medium-Density Residential) and C-3 (Heavy Commercial).
Proposed completion date: 2032
Proposed access locations: Six access points are proposed. Three access points are proposed on existing roadways: two on US Route 9 (right-in/right-out/left-in western access serving residential and right-in/right-out eastern access serving retail) and one full access on Beaver Dam Road opposite Coastal Club Road. Three additional full-movement access points are proposed on the Mulberry Knoll Road Extension (a section of new roadway that will be constructed by the developer within their property). The developer will also construct the intersection where existing Beaver Dam Road meets the proposed Mulberry Knoll Road Extension.
Average Daily Traffic Volumes (per DelDOT Traffic Summary 2023):

- US Route 9: 17,057 vehicles/day
- Beaver Dam Road: 3,710 vehicles/day


US Route 9
Beaver Dam Road
NORTHSTAR
Robinsonville Road
C
Mulberry Knoll Rd Ext.
Jimtown Road
A
B
F
Beaver Dam Road
E
Coastal Club Rd.
D
US Route 9
Dairy Farm Road
Site Location Map
Proposed Entrance


US Route 9
Beaver Dam Road
Mulberry Knoll
Road Extension
Beaver Dam Road
LAND USE KEY
NORTHSTAR
LEWES, DE
DAVIS BOWEN & FRIEDEL, INC.
N

2020 Delaware Strategies for State Policies and Spending

Location with respect to the Strategies for State Policies and Spending Map of Delaware:
The proposed Northstar development is located within Investment Levels 2 and 3 (mostly in Level 2).

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."

Investment Level 3
Investment Level 3 generally falls 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 Northstar development falls within Investment Levels 2 and 3 (mostly in Level 2) and is to be developed as 758 single-family house, 94 units of multi-family low-rise housing, and 96,118 square feet of retail space. The proposed development appears to be consistent with the character of Investment Levels 2 and 3, especially since neither the high-density housing nor the retail portion of the site are within Investment Level 3. It is therefore concluded that the proposed development appears to generally comply with the policies stated in the 2020 "Strategies for State Policies and Spending."

Comprehensive Plan

Sussex County Comprehensive Plan:
(Source: Sussex County Comprehensive Plan, March 2019)

The Sussex County Comprehensive Plan 2045 Future Land Use Map indicates that the proposed Northstar development is within a Coastal Area, which is categorized as a Growth Area.

Coastal Area: 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 Northstar development is planned to include 758 single-family houses, 94 units of multi-family low-rise housing, and 96,118 square feet of retail space on approximately 433.72 acres. This amounts to a gross density of 1.96 units per acre. The site is currently zoned as AR-1 (Agricultural Residential), and the developer plans to rezone a portion of the land to MR (Medium-Density Residential) and C-3 (Heavy Commercial).

The purpose of the MR district is to provide for medium-density residential development in areas which are or which are expected to become generally urban in character, but where sanitary sewers and public water supplies may or may not be available at the time of construction, together with such churches, recreational facilities and accessory uses as may be necessary or are normally compatible with residential surroundings. The district is located to protect existing development of this character and contains vacant land considered appropriate for such development in the future.

The purpose of the C-3 district is generally for larger scale auto-oriented retail and service businesses along major arterial roads that serve local and regional residents as well as the travelling public. In addition to most commercial uses found in this zone, automobile, truck, recreational vehicle and boat sales, rental and major repair facilities may also be located in this district.

The proposed development appears to comply with the characteristics of Medium Density Residential (if one classifies this location as, or expected to become, generally urban in character) and Heavy Commercial districts, as well as with the Permitted Uses and Densities for a Coastal Area. While the type of uses proposed for this site appear to be permitted in this location by the Comprehensive Plan, there are specific regulations that must be followed. For these reasons this development raises questions regarding consistency with Sussex County regulations; therefore, additional discussion may be required.

Relevant Projects in the DelDOT Capitol Transportation Program

Currently, DelDOT has several relevant and ongoing projects within the area of study.

The proposed development is located within the boundary of the operational Henlopen Transportation Improvement District (TID). The TID is a planning concept that seeks to proactively align transportation infrastructure spending and improvements with land use projections and future development within the designated district. The intersections in the study area of the proposed development are within the TID boundary. The proposed land use for Northstar is consistent with the future 2045 TID buildout projection for this site. As such, the developer is required to pay the TID fee or complete TID identified projects in lieu of performing a Traffic Impact Study (TIS). However, a Traffic Operational Analysis (TOA) was still required for Northstar to determine the detailed layout of the site entrances and other intersections associated with the development.

DelDOT's *US 9 Widening - Old Vine Boulevard to SR 1* (State Contract No. T202212902) project will widen US Route 9 from Delaware Route 1 through the Old Vine Boulevard intersection to provide two 11-foot travel lanes, turn lanes, bike lanes in each direction, and curbed shoulders along with associated intersection improvements. The western terminus of the project is within the Northstar property frontage along US Route 9. The project will provide additional capacity to accommodate design year traffic volumes and improve the safety of the US Route 9 corridor. The project is currently in the Final Design phase with construction anticipated to begin in Fall 2027 and end in Fall 2030, prior to Northstar's expected site full build out year of 2032. Note that at US Route 9 and Old Vine Boulevard, Northstar would be responsible for certain improvements that are beyond the scope of the DelDOT project, including building Mulberry Knoll Road Extension as the fourth leg of the signalized intersection and making additional intersection modifications (design of improvements and construction sequence/schedule to be coordinated with the DelDOT project). More details about the DelDOT project are available at the following link: US 9 Widening (Old Vine Rd. to SR 1) Project Website - DelDOT

DelDOT's *US 9 Widening (Phase 2) – Old Vine Boulevard to Dairy Farm Road* project will widen US Route 9 from just west of Old Vine Boulevard to Dairy Farm Road, essentially extending the US Route 9 widening project described above further to the west. The project is expected to upgrade the pavement section to four 11-foot travel lanes with shoulders and turn lanes. It will implement DelDOT's Complete Streets Policy, provide transit, biking, and pedestrian amenities, and drainage where appropriate, and provide shared-use paths along the corridor.

DelDOT's *Beaver Dam Road Widening – SR 1 to Dairy Farm Road* project will widen Beaver Dam Road to provide two 11-foot travel lanes, turn lanes, and bike lanes in each direction of Beaver Dam Road from Delaware Route 1 to Dairy Farm Road, including associated intersection improvements. The project area includes the entire frontage of the Northstar property along Beaver Dam Road. The project is included in the FY 23-FY 28 CTP which was approved by the Council on Transportation (COT) on February 24, 2022. The need for the project was identified by the Henlopen Transportation Improvement District technical analysis. Preliminary Engineering is anticipated to start in FY 26. DelDOT currently anticipates that this project will begin construction no sooner than Northstar's expected site full build out year of 2032.

DelDOT's *Mulberry Knoll Road Extension – Cedar Grove Road to US 9 at Old Vine Boulevard* project will extend Mulberry Knoll Road northward from its current terminus at Cedar Grove Road to US Route 9 at Old Vine Boulevard. The project was identified in the Five Points Study Working Group and the Henlopen TID technical analysis recommendations, and is intended to connect communities, alleviate congestion on parallel routes and provide improved mobility for local traffic. Mulberry Knoll Road Extension will have one through lane in each direction. The northern portion of Mulberry Knoll Road Extension within the boundaries of the Northstar property (from US Route 9 to approximately 900 feet south of Beaver Dam Road) will be built by the developer in time for Northstar's site full build out year, anticipated to be 2032. The remaining portion of Mulberry Knoll Road Extension (from the southern border of the Northstar site down to Cedar Grove Road) will be built by DelDOT sometime after 2032. DelDOT anticipates it will be completed by the 2045 TID Buildout Year. The project is included in the FY 23-FY 28 CTP which was approved by the Council on Transportation (COT) on February 24. 2022. Preliminary Engineering is anticipated to start in FY 28.

Trip Generation

Trip generation for the proposed development was computed using comparable land uses and equations contained in Trip Generation, Tenth and Eleventh Editions, 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:

- 758 single family houses (ITE Land Use Code 210)
- 94 units low-rise multi-family housing (ITE Land Use Code 220)
- 96,118 square-foot retail space (ITE Land Use Code 820 (10th) and 821 w/o supermarket (11th))

Table 1
NORTHSTAR TRIP GENERATION

ITE Land Use Code	Trip Type	Daily Trips [1]	Weekday AM Peak Hour [2]			Weekday PM Peak Hour [1]		
			In	Out	Total	In	Out	Total
210 & 220	Gross	7,372	145	438	583	482	284	766
	Internal Capture	-	-11	-40	-51	-68	-20	-88
	Net	-	134	398	532	414	264	678
820/821 [3]	Gross	5,852	103	63	166	253	284	527
	Internal Capture	-	-40	-11	-51	-20	-68	-88
	Pass-by	-	0	0	0	-80	-71	-151
	Net	-	63	52	115	153	135	288
Total Trips		**13,224**	**197**	**450**	**647**	**563**	**399**	**966**

[1] Provided by DelDOT, per ITE Trip Generation 10th Edition
[2] Per ITE Trip Generation 11th Edition
[3] Daily and PM trips based on LUC 820 in ITE 10th Ed., AM trips based on LUC 821 in ITE 11th Ed.

Overview of TOA

Intersections examined:

1) Mulberry Knoll Road Extension & Beaver Dam Road
2) Mulberry Knoll Road Extension & Site Entrance A
3) Mulberry Knoll Road Extension & Site Entrance B
4) Mulberry Knoll Road Extension & Site Entrance C
5) Beaver Dam Road & Coastal Club Road / Site Entrance D
6) US Route 9 & Old Vine Boulevard / Mulberry Knoll Road Extension
7) US Route 9 & Sheffield Drive / Site Entrance E
8) US Route 9 & Site Entrance F

Conditions examined:

1) 2032 site buildout year with Northstar (Case 1) –
   Case 1 assumes construction of Mulberry Knoll Road Extension within the Northstar property only. Full extension of Mulberry Knoll Road to Cedar Grove Road is not assumed in Case 1. For intersections 1, 5 and 7, capacity analyses were conducted as part of the required Traffic Signal Justification Studies (TSJS) to determine if traffic signals would be warranted in the site build out year 2032 conditions.

2) 2045 TID build out year with Northstar (Case 2) –
   Case 2 assumes full buildout of TID improvements including Mulberry Knoll Road Extension down to Cedar Grove Road. The configuration of intersections 4 and 8 as unsignalized T-intersections was determined during the scoping of the TOA. DelDOT's Auxiliary Lane Worksheet / analyses were completed for these two intersections to determine if turn lanes would be needed, and if so, how long they would be.

Peak hours evaluated: Weekday morning and evening peak hours

Committed developments considered and volume development:

This TOA utilized 2045 volumes developed as part of the Henlopen TID, so all of the future developments assumed to be within TID boundary when the TID was established were accounted for in the development of those volumes. Therefore, a specific list of committed developments was not provided by DelDOT. Projected turning movement volumes used for analysis in this TOA were based on balancing adjacent intersections covered by the TID forecast, trip assignments for the Northstar site (provided by DelDOT), and estimated trip generation and distribution for select existing sites.

Intersection Descriptions

1) Mulberry Knoll Road Extension & Beaver Dam Road
Type of Control: Proposed roundabout (four-leg intersection)
Eastbound approach: (Beaver Dam Road) existing one through lane; proposed single lane approach to roundabout (in Northstar's site full build out year, assumed 2032)
Westbound approach: (Beaver Dam Road) existing one through lane; proposed single lane approach to roundabout (in Northstar's site full build out year, assumed 2032)
Northbound approach: (Mulberry Knoll Road Extension) proposed single lane approach to roundabout
Southbound approach: (Mulberry Knoll Road Extension) single lane approach to roundabout
Note: this intersection is anticipated to function as a multilane roundabout when DelDOT's Beaver Dam Road Widening Project is constructed. At that time, the Beaver Dam Road approaches will each enter the roundabout with two lanes while the Mulberry Knoll Road approaches will continue to enter the roundabout with one lane.

2) Mulberry Knoll Road Extension & Site Entrance A
Type of Control: Proposed single-lane roundabout (four-leg intersection)
Eastbound approach: (Site Entrance A) proposed single-lane approach to roundabout
Westbound approach: (Site Entrance A) proposed single-lane approach to roundabout
Northbound approach: (Mulberry Knoll Road Extension) proposed single-lane approach to roundabout
Southbound approach: (Mulberry Knoll Road Extension) proposed single-lane approach to roundabout

3) Mulberry Knoll Road Extension & Site Entrance B
Type of Control: Proposed single-lane roundabout (four-leg intersection)
Eastbound approach: (Site Entrance B) proposed single-lane approach to roundabout
Westbound approach: (Site Entrance B) proposed single-lane approach to roundabout
Northbound approach: (Mulberry Knoll Road Extension) proposed-single lane approach to roundabout
Southbound approach: (Mulberry Knoll Road Extension) proposed-single lane approach to roundabout

4) Mulberry Knoll Road Extension & Site Entrance C

Type of Control: Proposed one-way stop-controlled T-intersection
Westbound approach: (Site Entrance C) proposed one left-turn and one right-turn lane; stop controlled
Northbound approach: (Mulberry Knoll Road Extension) proposed one through lane and one right-turn lane
Southbound approach: (Mulberry Knoll Road Extension) proposed one left-turn lane and one through lane

5) Beaver Dam Road & Coastal Club Road / Site Entrance D

Type of Control: Existing one-way stop-controlled T-intersection; proposed roundabout (four-leg intersection)
Eastbound approach: (Beaver Dam Road) existing one through lane and one right-turn lane; proposed single lane approach to roundabout (in Northstar's site full build out year, assumed 2032)
Westbound approach: (Beaver Dam Road) existing one left-turn lane and one through lane; proposed single lane approach to roundabout (in Northstar site full build out year, assumed 2032)
Northbound approach: (Coastal Club Road) existing one shared left/right-turn lane; proposed single lane approach to roundabout
Southbound approach: (Site Entrance D) proposed single lane approach to roundabout
Note: this intersection is anticipated to function as a multilane roundabout when DelDOT's Beaver Dam Road Widening Project is constructed. At that time, the Beaver Dam Road approaches will each enter the roundabout with two lanes while the Coastal Club Road and Site Entrance D approaches will continue to enter the roundabout with one lane.

6) US Route 9 & Old Vine Boulevard / Mulberry Knoll Road Extension

Type of Control: Existing signalized three-leg intersection; proposed signalized four-leg intersection
Eastbound approach: (US Route 9) existing one left-turn lane and one through lane; proposed one left-turn lane, two through lanes, and one right-turn lane
Westbound approach: (US Route 9) existing one through lane and one right-turn lane; proposed one left-turn lane, two through lanes, and one right-turn lane.
Northbound approach: (Mulberry Knoll Road Extension) proposed one left-turn lane, one through lane, and one right-turn lane
Southbound approach: (Old Vine Boulevard) existing one left-turn lane and one right-turn lane; proposed one left-turn lane, one through lane, and one right-turn lane
Note: this intersection will be improved by DelDOT's US 9 Widening - Old Vine Boulevard to SR 1 Project which will add a second through lane in each direction of US Route 9. Northstar would be responsible for building Mulberry Knoll Road Extension as the fourth leg of the signal and making the other intersection modifications (design of improvements and construction sequence/schedule to be coordinated with the DelDOT project).

7) US Route 9 & Sheffield Drive / Site Entrance E

Type of Control: Existing one-way stop-controlled T-intersection; proposed two-way stop-controlled four-leg intersection with turning movement restrictions
Eastbound approach: (US Route 9) existing one shared left/through lane and one bypass lane; proposed one left-turn lane, one through lane, and one right-turn lane
Westbound approach: (US Route 9) existing one through lane and one right-turn lane; proposed one left-turn lane, one through lane, and one right-turn lane
Northbound approach: (Site Entrance E) proposed one right-turn-only lane, stop or yield controlled
Southbound Approach: (Sheffield Drive) existing one shared left/right-turn lane; proposed one shared left/through/right-turn lane, stop-controlled

8) US Route 9 & Site Entrance F

Type of Control: Proposed right-in/right-out intersection
Eastbound approach: (US Route 9) existing one through lane; proposed one through lane and one right-turn lane
Westbound approach: (US Route 9) existing one through lane; proposed one through lane
Northbound approach: (Site Entrance F) proposed one right-turn-only lane; stop or yield controlled

Safety Evaluation

Crash Data: McCormick Taylor requested and evaluated crash data from the Delaware Crash Analysis Reporting System (CARS) over a three-year period from February 14, 2022, through February 14, 2025. The study area included a 0.1-mile radius around the three existing TOA study intersections: US Route 9 at Sheffield Drive, US Route 9 at Old Vine Boulevard, and Beaver Dam Road at Coastal Club Road. The crash data indicates that 31 crashes occurred within the study area over that timeframe, with 17 of those crashes occurring at the intersection of US Route 9 at Old Vine Boulevard. At this intersection the most common crash type was Front-to-Rear (12) which is common for signalized intersections. One fatal crash occurred within the study area, but not at one of the study intersections.

The fatal crash occurred at the intersection of US Route 9 at Ebb Tide Drive. This crash was a head-on crash that occurred when an eastbound vehicle swerved into oncoming traffic to avoid hitting a stopped vehicle waiting to make an eastbound left into Ebb Tide Drive. The crash occurred during clear weather, on dry roadway in daylight.

The intersection of US Route 9 at Sheffield Drive experienced a high proportion of Fatal or Personal Injury Crashes compared to other intersections in the area. Of the 7 crashes that were reported at this intersection, 71 percent were Fatal or Personal Injury Crashes. Additionally, Angle crashes were the most common type of crash.

Sight Distance: The study area generally consists of relatively flat roadways and there are few visual obstructions. As always, the 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) currently operates one fixed-route transit bus service in the area of the proposed Northstar development. Bus Route 206 runs along US Route 9, providing service between Georgetown Transit Hub and Lewes Transit Center with service approximately every sixty (60) minutes on weekdays and Saturdays. The nearest stops to the proposed development are located at the intersection of US Route 9 & Sheffield Drive and just east of US Route 9 & Old Vine Boulevard.

Planned transit service: Based on coordination with Delaware Transit Corporation (DTC) representatives, there are no additional transit amenities proposed or required at this time. There is a recommendation to adjust locations of bus stops at the intersection of US Route 9 & Old Vine Boulevard, which is planned to occur in conjunction with DelDOT *US 9 Widening - Old Vine Boulevard to SR 1* project.

Existing bicycle and pedestrian facilities: According to DelDOT's Sussex County Bicycle Map, US Route 9 is designated as a Regional Bicycle Route with Bikeway. This route is classified as a high traffic roadway (over 5,000 vehicles daily). West of Minos Conway Drive is part of the American Discovery Trail which intersects with the Georgetown to Lewes Trail, an off-road paved bike trail. Beaver Dam Road is designated as a Statewide Bicycle Route with Bikeway. There are no existing sidewalks or shared-use paths on any of the proposed Northstar site frontages.

Planned bicycle and pedestrian facilities: Anthony Aglio with DelDOT's Statewide and Regional Planning Section was contacted to determine recommended pedestrian and bicycle accommodations for the proposed development. Mr. Aglio recommended the developer implement a 10-foot wide shared-use path with a five-foot buffer from the roadway along their frontages of US Route 9, Beaver Dam Road, and the new Mulberry Knoll Road Extension. The pathways should include safe accessways to any commercial buildings.

General HCS Analysis Comments
(See table footnotes on the following pages for specific comments)

1) McCormick Taylor applied a 3% heavy vehicle factor (HV) for all movements at every intersection based on the DelDOT Development Coordination Manual section 2.2.8.11.6.H.

2) McCormick Taylor determined and utilized an overall intersection peak hour factor (PHF) of 0.92 for every intersection based on the DelDOT Development Coordination Manual section 2.2.8.11.6.F.

3) McCormick Taylor used a base saturation flow rate of 1,750 pc/hr/ln for every intersection based on the DelDOT Development Coordination Manual section 2.2.8.11.6.I.

4) McCormick Taylor assumed 0% grade for all movements at every intersection.

Table 2
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on the Northstar Traffic Operational Analysis
Prepared by McCormick Taylor, Inc. – March 2025

Four-Leg Intersection [4]	**LOS**	
1. Mulberry Knoll Road Extension & Beaver Dam Road	Weekday AM	Weekday PM
2032 Build (Case 1) – Signal		
Overall	C (23.1)	C (26.1)
2045 Build (Case 2) – Signal		
Overall	C (34.2)	D (53.1)
2032 Build (Case 1) – Single Lane Roundabout		
Eastbound Beaver Dam Road	C (16.6)	A (10.0)
Westbound Beaver Dam Road	A (7.0)	B (13.8)
Northbound Mulberry Knoll Road Extension	A (9.5)	A (7.3)
Southbound Mulberry Knoll Road Extension	A (7.1)	C (16.7)
Overall	B (12.4)	B (12.9)
2045 Build (Case 2) – Multi-Lane Roundabout		
Eastbound Beaver Dam Road	C (15.8)	B (13.5)
Westbound Beaver Dam Road	B (14.4)	D (30.9)
Northbound Mulberry Knoll Road Extension	F (68.5)	C (15.1)
Southbound Mulberry Knoll Road Extension	B (10.8)	F (60.7)
Overall	C (24.0)	D (29.3)

[4] 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 the Northstar Traffic Operational Analysis
Prepared by McCormick Taylor, Inc. – March 2025

Four-Leg Single-Lane Roundabout [5]	**LOS**	
2. Mulberry Knoll Road Extension & Site Entrance A	Weekday AM	Weekday PM
2045 Build (Case 2)		
Eastbound Site Entrance A	A (4.5)	A (8.7)
Westbound Site Entrance A	A (5.2)	A (5.1)
Northbound Mulberry Knoll Road Extension	A (7.5)	A (7.1)
Southbound Mulberry Knoll Road Extension	A (5.8)	B (11.2)
Overall	A (6.6)	A (9.5)

[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 4
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on the Northstar Traffic Operational Analysis
Prepared by McCormick Taylor, Inc. – March 2025

Four-Leg Single-Lane Roundabout [6]	**LOS**	
3. Mulberry Knoll Road Extension & Site Entrance B	Weekday AM	Weekday PM
2045 Build (Case 2)		
Eastbound Site Entrance B	A (5.7)	A (7.8)
Westbound Site Entrance B	A (5.6)	A (5.3)
Northbound Mulberry Knoll Road Extension	A (8.6)	A (7.5)
Southbound Mulberry Knoll Road Extension	A (5.6)	B (10.8)
Overall	A (7.1)	A (9.1)

[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 5
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on the Northstar Traffic Operational Analysis
Prepared by McCormick Taylor, Inc. – March 2025

Four-Leg Intersection [7]	**LOS**	
5. Beaver Dam Road & Coastal Club Road / Site Entrance D	Weekday AM	Weekday PM
2032 Build (Case 1) – Signal		
Overall	B (19.6)	B (10.3)
2045 Build (Case 2) – Signal		
Overall	B (15.8)	A (8.5)
2032 Build (Case 1) – Single Lane Roundabout		
Eastbound Beaver Dam Road	B (12.5)	B (12.0)
Westbound Beaver Dam Road	A (7.1)	C (20.4)
Northbound Coastal Club Road	C (16.7)	A (7.8)
Southbound Site Entrance D	A (6.5)	B (10.1)
Overall	B (11.2)	C (16.2)
2045 Build (Case 2) – Multi-Lane Roundabout		
Eastbound Beaver Dam Road	B (11.3)	A (9.4)
Westbound Beaver Dam Road	A (6.3)	B (12.0)
Northbound Coastal Club Road	F (52.0)	B (10.6)
Southbound Site Entrance D	A (8.3)	C (16.0)
Overall	B (14.3)	B (11.2)

[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.

Table 6
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on the Northstar Traffic Operational Analysis
Prepared by McCormick Taylor, Inc. – March 2025

Signalized Intersection [8]	**LOS**	
6. US Route 9 & Old Vine Boulevard / Mulberry Knoll Road Ext.	Weekday AM	Weekday PM
2045 Build (Case 2)		
Overall	D (45.7)	D (54.8)

[8] 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 the Northstar Traffic Operational Analysis
Prepared by McCormick Taylor, Inc. – March 2025

Unsignalized Intersection [9] **Two-Way Stop Control**	**LOS**	
7. US Route 9 & **Sheffield Drive / Site Entrance E**	Weekday AM	Weekday PM
2032 Build (Case 1) – TWSC		
Eastbound US Route 9 – Left	B (10.2)	B (11.5)
Westbound US Route 9 – Left	B (11.1)	B (11.2)
Northbound Site Entrance E	F (221.8)	F (297.9)
Southbound Sheffield Drive	F (334.7)	F (354.7)
2045 Build (Case 2) – TWSC		
Eastbound US Route 9 – Left	B (11.2)	B (12.9)
Westbound US Route 9 – Left	B (12.6)	B (12.5)
Northbound Site Entrance E	F (647.4)	F (774.9)
Southbound Sheffield Drive	F (1176.1)	F (1050.0)
2032 Build (Case 1) – TWSC w/ Turning Movement Restrictions		
Eastbound US Route 9 – Left	B (10.2)	B (11.5)
Westbound US Route 9 – Left	B (11.1)	B (11.2)
Northbound Site Entrance E – Right Turn Only	C (23.1)	C (20.2)
Southbound Sheffield Drive	F (334.7)	F (354.7)
2045 Build (Case 2) – TWSC w/ Turning Movement Restrictions		
Eastbound US Route 9 – Left	B (11.2)	B (12.9)
Westbound US Route 9 – Left	B (12.6)	B (12.5)
Northbound Site Entrance E – Right Turn Only	D (32.7)	D (25.6)
Southbound Sheffield Drive	F (1176.1)	F (1050.0)

[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.