



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

December 7, 2020

Mr. Christopher Duke
Becker Morgan Group, Inc.
The Tower at STAR Campus
100 Discovery Boulevard
Suite 102
Newark, Delaware 19713

Dear Mr. Duke:

The enclosed Traffic Impact Study (TIS) review letter for the **Chappell Farm** (Tax Parcel 235-23.00-1.02) 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,

A handwritten signature in cursive script that reads "Troy Brestel".

Troy Brestel
Project Engineer

TEB:km

Enclosures

cc with enclosures: Mr. Michael Riemann, Becker Morgan Group, Inc.
Ms. Constance C. Holland, Office of State Planning Coordination
Mr. Jamie Whitehouse, Sussex County Planning and Zoning
Mr. Mir Wahed, Johnson, Mirmiran & Thompson, Inc.
Ms. Joanne Arellano, Johnson, Mirmiran & Thompson, Inc.
DelDOT Distribution

DelDOT Distribution

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Susanne Laws, Sussex Review Coordinator, Development Coordination
Mark Galipo, Traffic Engineer, Traffic, DOTS
Derek Sapp, Subdivision Manager, Development Coordination
Claudy Joinville, Project Engineer, Development Coordination



December 3, 2020

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

RE: Agreement No. 1945F
Project Number T202069012
Traffic Impact Study Services
Task 9A-Chappell Farm TIS

Dear Mr. Brestel:

Johnson, Mirmiran and Thompson (JMT) has completed the review of the Traffic Impact Study (TIS) for Chappell Farm, prepared by Becker Morgan Group, Inc. dated February 2020. This task was assigned as Task Number 9A. The report is prepared in a manner generally consistent with DelDOT's *Development Coordination Manual*.

The TIS evaluates the impacts of a proposed mixed-use development in Sussex County, Delaware. The development would be comprised of 94 apartment units, 37,000 square feet of commercial space, and a 5,068 square-foot convenience store with gas pumps. Construction is anticipated to be complete in 2023.

The site is located on the northwest corner of the intersection of Delaware Route 1 and Cave Neck Road (Sussex Road 88). Three access points are proposed: one full access along Cave Neck Road approximately 475 feet west of Delaware Route 1, one full access along Cave Neck Road approximately 900 feet west of Delaware Route 1, and a rights-in only access along southbound Delaware Route 1 approximately 600 feet north of Cave Neck Road.

The subject property is an approximately 14.9-acre parcel that is zoned as AR-1 (Agricultural Residential) and the developer plans to rezone the land to C-3 (Heavy Commercial) and MR (Medium-Density Residential).

Per the May 3, 2019 DelDOT Scoping Meeting Memorandum, additional build with development scenarios were requested that incorporate the proposed Delaware Route 1/Cave Neck Road grade-separated interchange with and without the proposed rights-in access along Delaware Route 1. However, based on a January 3, 2020 DelDOT correspondence contained within the TIS, DelDOT has allowed the TIS to be submitted without these additional cases because planned alternatives for the interchange were not finalized prior to the completion of the TIS report. Therefore, this review does not include an evaluation with the future Delaware Route 1/Cave Neck Road grade-separated interchange.



Per coordination with DelDOT, JMT included three additional scenarios incorporating only partial construction of the development. Specifically, the scenarios include the following:

- Case 4a - 2023 with development of convenience store with gas only, without rights-in access along Delaware Route 1, and with a Connector Road built between Cave Neck Road and Red Fox Lane
- Case 4b – 2023 with development of convenience store with gas only, with rights-in access along Delaware Route 1, and without a Connector Road built between Cave Neck Road and Red Fox Lane
- Case 4c – 2023 with development of convenience store and 94 apartment units, without rights-in access along Delaware Route 1, and with a Connector Road built between Cave Neck Road and Red Fox Lane

DelDOT has several relevant and ongoing improvement projects within the study area including the *Corridor Capacity Preservation Program (CCPP)*, which aims to maintain the regional importance and preserve the intended function and capacity of existing designated transportation routes within the Program. The main objectives of the program are listed below:

- Prevent the need to build an entirely new road
- Minimize the transportation impacts of increased economic growth
- Maintain an existing road's ability to handle traffic efficiently and safely
- Preserve the ability to make future improvements
- Sort local and through traffic

Delaware Route 1 is one of the highways included in the CCPP. More information regarding the CCPP can be found at: https://deldot.gov/Publications/manuals/corr_cap/index.shtml.

DelDOT is proposing to build a grade-separated interchange at the intersection of Delaware Route 1 and Cave Neck Road (DelDOT Contract No. T201912201). The selected alternative proposes Cave Neck Road to be elevated over Delaware Route 1. A new connector road would be constructed between Fox Run Lane and Cave Neck Road. This connector road would intersect Cave Neck Road at a roundabout. The southerly leg of this roundabout would provide a rights-in/rights-out access to southbound Delaware Route 1. Additionally, the Fox Run Lane and Delaware Route 1 intersection would be eliminated. A roundabout would also be added along Cave Neck Road on the easterly side of Delaware Route 1 and the southerly leg of this roundabout would provide a rights-in/rights-out access to northbound Delaware Route 1. A new frontage road would be constructed on the westerly side of Delaware Route 1 between Fox Run Lane and Pondview Drive as well as on the easterly side of Delaware Route 1 between Willow Creek Road and Cave Neck Road. Design is underway and construction is expected to start in 2025. More information regarding the *SR 1 and Cave Neck Road Grade Separated Intersection* project can be found at: <https://deldot.gov/projects/index.shtml?dc=details&projectNumber=T201912201>.



The second project within the study area is the *SR 1, Minos Conaway Road Grade Separated Intersection* project (DelDOT Contract No. T201612501), which will provide a grade separated intersection to separate through movements along Delaware Route 1 and turning movements to and from Minos Conaway Road, Nassau Road and Old Mill Road. Per the preferred alternative concept plan, shared-use paths would also be constructed along Minos Conaway Road, Nassau Road, Janice Road, and along southbound Delaware Route 1 south of Janice Road to accommodate pedestrians and bicyclists. This project intends to maintain capacity of the Delaware Route 1 corridor and improve safety at the unsignalized intersection of Delaware Route 1 and Minos Conaway Road, while improving mobility and access for local traffic. The project is expected to begin construction in 2023 and be completed in 2025. More information regarding the Delaware Route 1 and Minos Conaway Grade Separated Intersection project can be found at: <https://deldot.gov/projects/index.shtml?dc=details&projectNumber=T201612501>.

The third project within the study area is at the intersection of Delaware Route 1 and Hudson Road (Sussex Road 258)/Steamboat Landing Road (DelDOT Contract No. T201904303). As part of the project, left turns and through movements along Hudson Road and Steamboat Landing Road would be prohibited. Northbound and southbound left turning movements along Delaware Route 1 would be permitted. Design is underway with construction anticipated to start in the fall of 2020 or the spring of 2021. More information regarding *SR 1 & S258 Intersection Improvements* project can be found at: <https://deldot.gov/projects/index.shtml?dc=details&projectNumber=T201904303#project-details1>.

The fourth project within the study area is at the intersection of Delaware Route 1 and Oyster Rocks Road (Sussex Road 264) (DelDOT Contract No. T201904302). As part of the project, acceleration lanes along northbound and southbound Delaware Route 1 would be provided for the left turning movements from Eagle Crest Road and Oyster Rocks Road. Through movements between Eagle Crest Road and Oyster Rocks Road would be prohibited. Northbound and southbound left turning movements from Delaware Route 1 would also be prohibited. Design is underway with construction anticipated to start in the fall of 2020 or the spring of 2021. More information regarding the *SR 1 & S264 Intersection Improvements* project can be found at: <https://deldot.gov/projects/index.shtml?dc=details&projectNumber=T201904302>.

DelDOT's 2016 Hazard Elimination Program (HEP) identified Site H which is within the project area. Site H is a 0.30-mile corridor along Cave Neck Road from 0.29 mile west of Delaware Route 1 to the Delaware Route 1 intersection. The Site H Task I report included a crash summary and recommended to evaluate improvement options to reduce angle crashes and median confusion as part of the unsignalized crossover studies along Delaware Route 1. This area was further reviewed under Task II to evaluate several median channelization options at the Delaware Route 1 and Cave Neck Road intersection. Recommendations included accommodating northbound left-turns only and installing a partial signal at the intersection of Delaware Route 1 and Cave Neck Road to act as an interim improvement, before constructing a grade separated interchange as part of the previously mentioned CCPP Project. Also, providing a flashing red arrow phase may be considered during the off-peak hours as part of the design of these improvements. Field visits confirm that



southbound Delaware Route 1 left turning movements and eastbound Cave Neck Road left turning movements have been prohibited at the intersection.

The DelDOT *FY21-FY 26 Capital Transportation Program (CTP)* includes a future improvement project at the Cave Neck Road, Hudson Road, and Sweetbriar Road intersection. Based on the CTP, the design is scheduled to start in Fiscal Year 2025.

Additionally, DelDOT is proposing to add lighting to the Delaware Route 1 and Cave Neck Road intersection. Design has been completed and implementation is expected in the fall of 2020.

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

Intersection	LOS Deficiencies Occur			Year	Case
	AM	PM	Saturday		
Site Entrance A/Cave Neck Road (Sussex Road 88)	X	X		2023	3a
	X	X		2023	3b
Delaware Route 1/Red Fox Lane			X	2019	1
	X	X	X	2023	2
	X	X	X	2023	3
	X	X	X	2023	4a
	X	X	X	2023	4b
	X	X	X	2023	4c
Delaware Route 1/Cave Neck Road*	X	X	X	2019	1
		X	X	2023	2
		X	X	2023	3a
		X	X	2023	3b
		X	X	2023	4a
		X	X	2023	4b
		X	X	2023	4c

*The 2023 scenarios at the Delaware Route 1/Cave Neck Road intersection incorporate the restriction of left turns along the eastbound Cave Neck Road approach and the restriction of U-turns/left turns along southbound Delaware Route 1.

Note: In the table above, Cases 3, 3a, and 3b are with the full build out of the site, Cases 4a and 4b are with only the construction of the 5,068 square-foot convenience store with gas, and Case 4c is with only the construction of the 5,068 square-foot convenience store with gas and the apartment units.



Intersection	LOS Deficiencies Occur			Year	Case
	AM	PM	Saturday		
Delaware Route 1/Minos Conaway Road (Sussex Road 265)	X	X	X	2019	1
	X	X	X	2023	2
	X	X	X	2023	3
	X	X	X	2023	4a/4b
	X	X	X	2023	4c
Delaware Route 1/Nassau Road (Sussex Road 266)		X	X	2019	1
	X	X	X	2023	2
	X	X	X	2023	3
	X	X	X	2023	4a/4b
	X	X	X	2023	4c
Delaware Route 1/Eagles Crest Road/Oyster Rocks Road (Sussex Road 264)		X	X	2019	1
		X	X	2023	2
		X	X	2023	3
		X	X	2023	4a/4b
		X	X	2023	4c
Delaware Route 1/Hudson Road/Steamboat Landing Road (Sussex Road 258)	X	X	X	2019	1
	X	X	X	2023	2
	X	X	X	2023	3
	X	X	X	2023	4a/4b
	X	X	X	2023	4c
Cave Neck Road/Sweetbriar Road (Sussex Road 261)	X			2023	2
	X	X		2023	3
	X			2023	4a/4b
	X			2023	4c
Cave Neck Road/Hudson Road	X	X	X	2023	2
	X	X	X	2023	3
	X	X	X	2023	4a/4b
	X	X	X	2023	4c

Note: In the table above, Cases 3, 3a, and 3b are with the full build out of the site, Cases 4a and 4b are with only the construction of the 5,068 square-foot convenience store with gas, and Case 4c is with only the construction of the 5,068 square-foot convenience store with gas and the apartment units.



As shown in the above table, nine study intersections are identified to exhibit LOS deficiencies. It is acknowledged that some intersections projected to experience capacity constraints with the construction of the Chappell Farm site would be mitigated with the improvements proposed as part of the *SR 1 and Cave Neck Road Grade Separated Intersection* project. Therefore, it is recommended that the construction of the Chappell Farm site be split into two phases to minimize the impacts of the site traffic to intersections that are already operating with or projected to operate with capacity constraints prior to the construction of the grade separated intersection.

The first phase would include the construction of the 5,068 square-foot convenience store with gas pumps and 94 apartment units (Case 4c). The second phase would include the construction of an additional 15,635 square feet of commercial space east of the proposed connector road, as well as approximately 21,365 square feet of commercial space to the west of the proposed connector road. The second phase of the site should be constructed after the completion of the *SR 1 and Cave Neck Road Grade Separated Intersection* project.

The following section of this letter separates the analysis results based on the first phase of the site and the full build out condition.

First Phase: 5,068 square-foot convenience store with gas pumps and apartment units.

The following intersections would experience capacity constraints with the construction of only the 5,068 square-foot convenience store with gas and apartment units:

- Red Fox Lane intersection with Delaware Route 1
- Cave Neck Road intersection with Delaware Route 1
- Minos Conaway Road intersection with Delaware Route 1
- Nassau Road intersection with Delaware Route 1
- Eagles Crest Road/Oyster Rocks Road
- Hudson Road/Steamboat Landing Road intersection with Delaware Route 1
- Sweetbriar Road intersection with Cave Neck Road
- Hudson Road intersection with Cave Neck Road

The unsignalized Red Fox Lane intersection with Delaware Route 1 exhibits LOS deficiencies during the Saturday peak hour under existing conditions and during the AM, PM, and Saturday peak hours under future conditions, with or without the construction of the 5,068 square-foot convenience store with gas pumps and apartment units. The deficiencies occur along the eastbound Red Fox Lane approach, northbound Delaware Route 1 left turn, and southbound Delaware Route 1 U-turn. Delays of up to 35.1 and 69.5 seconds per vehicle are expected along the eastbound Red Fox Lane approach and southbound Delaware Route 1 U-turn, respectively, and delays of over 1,000 seconds per vehicle are expected along the northbound Delaware Route 1 left turn.

As part of the proposed Delaware Route 1/Cave Neck Road grade-separated interchange project, the intersection of Red Fox Lane and Delaware Route 1 would be eliminated. Therefore, we do not recommend that the developer implement any improvements at this intersection. However, it is recommended that the developer coordinate with DelDOT on the implementation and equitable



cost sharing of the *SR 1 and Cave Neck Road Grade Separated Intersection* project (DelDOT Contract No. T201912201).

The unsignalized Cave Neck Road intersection with Delaware Route 1 exhibits LOS deficiencies during all peak hours under existing conditions and during the PM and Saturday peak hours under future conditions, with or without the construction of the 5,068 square-foot convenience store with gas pumps and apartment units. The deficiencies occur along the eastbound Cave Neck Road left turn, northbound Delaware Route 1 left turn, and southbound Delaware Route 1 U-turn.

Since the collection of the traffic counts used for Case 1, DelDOT has implemented the restriction of eastbound Cave Neck Road left turns and southbound Delaware Route 1 U-turns. With these improvements, deficiencies would still occur along the northbound Delaware Route 1 left turn during the PM and Saturday peak hours under future conditions. Delays of up to 527.2 seconds per vehicle are expected along the northbound Delaware Route 1 left turn during the Saturday peak hour under future conditions with the proposed development. However, the improvements proposed as part of the Delaware Route 1/Cave Neck Road grade-separated interchange project would eliminate this intersection. Therefore, we do not recommend that the developer implement any improvements at this intersection. However, as stated above, it is recommended that the developer coordinate with DelDOT on the implementation and equitable cost sharing of the *SR 1 and Cave Neck Road Grade Separated Intersection* project.

The unsignalized Minos Conaway Road intersection with Delaware Route 1 exhibits LOS deficiencies during all peak hours under existing conditions and future conditions, with or without the construction of the 5,068 square-foot convenience store with gas pumps and apartment units. The deficiencies occur along the eastbound Minos Conaway Road approach, northbound Delaware Route 1 left turn, and southbound Delaware Route 1 U-turn. Delays of over 1,000 second per vehicle are expected along the eastbound Minos Conaway Road approach and northbound Delaware Route 1 left turn, and up to 106.7 seconds per vehicle along the southbound Delaware Route 1 U-turn during the Saturday peak hour under future conditions.

The unsignalized Nassau Road intersection with Delaware Route 1 exhibits LOS deficiencies during the PM and Saturday peak hours under existing conditions and during all peak hours under future conditions, with or without the construction of the 5,068 square-foot convenience store with gas pumps and apartment units. The deficiencies occur along the westbound Nassau Road approach, northbound Delaware Route 1 U-turn, and southbound Delaware Route 1 left turn. Delays of over 1,000 seconds per vehicle are expected along the westbound Nassau Road and southbound Delaware Route 1 left turn, and delays of up to 161.8 seconds per vehicle are expected along the northbound Delaware Route 1 U-turn.

The *Delaware Route 1 and Minos Conaway Road Grade Separated Intersection* project (DelDOT Contract No. T201612501), would eliminate the Delaware Route 1/Minos Conaway Road intersection as well as eliminate the stop-controlled operation at the Delaware Route 1/Nassau Road intersection. Therefore, we do not recommend that the developer implement any improvements at the Delaware Route 1 intersections with Minos Conaway Road and Nassau Road.



However, it is recommended that the developer coordinate with DelDOT on the implementation and equitable cost sharing of the *Delaware Route 1 and Minos Conaway Road Grade Separated Intersection* project.

The unsignalized Eagles Crest Road/Oyster Rocks Road intersection with Delaware Route 1 exhibits LOS deficiencies during the PM and Saturday peak hours under existing and future conditions, with or without the construction of the 5,068 square-foot convenience store with gas pumps and apartment units. The deficiencies occur along the eastbound Eagles Crest Road approach and westbound Oyster Rocks Road approach with delays of up to 169.6 and 225.6 seconds per vehicle, respectively, during the Saturday peak hour under future conditions.

The *SR 1 & S264 Intersection Improvements* project (DelDOT Contract No. T201904302) includes the restriction of northbound and southbound Delaware Route 1 left turns at the intersection of Eagles Crest Road/Oyster Rocks Road. Additionally, the project will prohibit eastbound Eagles Crest Road and westbound Oyster Road through movements and provide an acceleration lane for the left turns along both approaches. With these improvements, deficiencies would still occur along the eastbound and westbound approaches during the PM and Saturday peak hours under future conditions, with or without the proposed development. However, the delays along the eastbound Eagles Crest Road approach and westbound Oyster Rocks Road approach would be reduced to 91.5 and 68.9 seconds of delay per vehicles, respectively, during the Saturday peak hour. Additionally, the improvements proposed as part of the Delaware Route 1/Cave Neck Road grade-separated interchange project may impact traffic operations at this intersection. Therefore, we do not recommend that the developer implement any improvements at this intersection. However, it is recommended that the developer coordinate with DelDOT on the implementation and equitable cost sharing of the *SR 1 & S264 Intersection Improvements* project.

The unsignalized Hudson Road/Steamboat Landing Road intersection with Delaware Route 1 exhibits LOS deficiencies during all peak hours under existing and future conditions, with or without the construction of the 5,068 square-foot convenience store with gas pumps and apartment units. The deficiencies occur along the eastbound Hudson Road approach, westbound Steamboat Landing Road approach, and northbound Delaware Route 1 left turn with delays of over 1,000 seconds per vehicle and up to 242.6 and 37.9 seconds per vehicle, respectively, during the Saturday peak hour under future conditions.

The *SR 1 & S258 Intersection Improvements* project (DelDOT Contract No. T201904303) includes the restriction of eastbound Hudson Road and westbound Steamboat Landing Road left turn and through movements. With these improvements, deficiencies would still occur along the eastbound Hudson Road approach and northbound Delaware Route 1 left turn during the Saturday peak hour under future conditions, with or without the proposed development. However, the delays along the eastbound approach and northbound left turn will be reduced to 324.0 and 38.5 seconds of delay per vehicle, respectively, during the Saturday peak hour under future conditions with the proposed development. Additionally, the improvements proposed as part of the Delaware Route 1/Cave Neck Road grade-separated interchange may impact traffic operations at this intersection. Therefore, we do not recommend that the developer implement any improvements at this



intersection. However, it is recommended that the developer coordinate with DelDOT on the implementation and equitable cost sharing of *SR 1 & S258 Intersection Improvements* project. It is expected that the Compass Point development will contribute to the improvements at this intersection as well.

The unsignalized Sweetbriar Road intersection with Cave Neck Road exhibits LOS deficiencies during the AM peak hour under future conditions, with or without the construction of the 5,068 square-foot convenience store with gas pumps and apartment units. The deficiencies occur along the northbound Sweetbriar Road approach with delays up to 41.5 seconds per vehicle during the AM peak hour under future conditions. Sweetbriar Road intersects Cave Neck Road at a skewed angle. Furthermore, this intersection is only approximately 230 feet west of the Cave Neck Road and Hudson Road intersection.

The unsignalized Hudson Road intersection with Cave Neck Road exhibits LOS deficiencies during all peak hours under future conditions, with or without the construction of the 5,068 square-foot convenience store with gas pumps and apartment units. The deficiencies occur along the southbound Hudson Road approach with delays of up to 248.4 seconds per vehicle under future conditions.

The DelDOT *FY21-FY 26 Capital Transportation Program (CTP)* includes a future improvement project at the Cave Neck Road, Hudson Road, and Sweetbriar Road intersection. Based on the CTP, the design is scheduled to start in Fiscal Year 2025. The developer should coordinate with DelDOT on the implementation and equitable cost sharing of this future CTP project.

Per coordination with DelDOT, JMT conducted the additional Case 4a and 4b scenarios with only the development of the proposed convenience store with gas use, with or without a rights-in access along Delaware Route 1, and with or without a Connector Road built between Cave Neck Road and Red Fox Lane. JMT also conducted a Case 4c scenario with only the development of the proposed convenience store with gas use and apartment units, without a rights-in access along Delaware Route 1, and with a Connector Road built between Cave Neck Road and Red Fox Lane. Based on the results of the analyses and the proposed improvements as part of the *SR 1 and Cave Neck Road Grade Separated Intersection* project (DelDOT Contract No. T201912201), it is recommended that the rights-in access along Delaware Route 1 not be provided prior to the completion of the DelDOT project as the provision of this access would be in close proximity to the existing southbound Delaware Route 1 right turn lane onto Cave Neck Road. The existing right turn lane would be eliminated per the design of the grade separated intersection which would impact the location of the rights-in access.

Additionally, it is recommended that the developer construct the Connector Road between Cave Neck Road and Red Fox Lane at a location consistent with the DelDOT project. Furthermore, as the proposed Site Entrance along Cave Neck Road would operate without any capacity constraints, it is recommended that the developer construct the site access as a temporary unsignalized T-intersection until the roundabout is constructed as part of the DelDOT project.



Full Build Out of Site

The following intersections, which would experience capacity constraints with the construction of only the 5,068 square-foot convenience store with gas, would continue to experience capacity constraints with the full build out of the site and no additional improvements/contributions aside from those mentioned in the First Phase section are recommended:

- Red Fox Lane intersection with Delaware Route 1
- Cave Neck Road intersection with Delaware Route 1
- Minos Conaway Road intersection with Delaware Route 1
- Nassau Road intersection with Delaware Route 1
- Eagles Crest Road/Oyster Rocks Road
- Hudson Road/Steamboat Landing Road intersection with Delaware Route 1
- Sweetbriar Road intersection with Cave Neck Road
- Hudson Road intersection with Cave Neck Road

The unsignalized Site Entrance A intersection with Cave Neck Road is proposed approximately 475 feet west of Delaware Route 1 and exhibits LOS deficiencies during the AM and PM peak hours under future conditions with the proposed development. These deficiencies occur along the southbound Site Entrance A approach and can be mitigated by the provision of a roundabout. Per the *SR 1 and Cave Neck Road Grade Separated Intersection* project (DelDOT Contract No. T201912201) preferred alternative layout, a roundabout is recommended along the Cave Neck Road site frontage. As a roundabout will be constructed as part of the DelDOT project, we do not recommend that the developer implement any improvements at this intersection. However, it is recommended that the developer coordinate with DelDOT on the implementation and equitable cost sharing of the *SR 1 and Cave Neck Road Grade Separated Intersection* project (DelDOT Contract No. T201912201).

Per the May 3, 2019 DelDOT Scoping Meeting Memorandum, two build scenarios were evaluated: one with a rights-in along southbound Delaware Route 1 and one without a rights-in along southbound Delaware Route 1. Per the *SR 1 and Cave Neck Road Grade Separated Intersection* project preferred alternative plan, a frontage road is proposed to be constructed to the west of southbound Delaware Route 1 between the Red Fox Lane and Pondview Drive intersections. The rights-in for the Chappell Farm site would be constructed along this frontage road. As such, it is recommended that the rights-in access be constructed along the frontage road after the *SR 1 and Cave Neck Road Grade Separated Intersection* project is completed.

Should Sussex County approve the proposed development, the following items should be incorporated into the site design and reflected on the record plan. All applicable agreements (i.e. letter agreements for off-site improvements and traffic signal agreements) should be executed prior to entrance plan approval for the proposed development. The items have been split into two phases as the second phase of the site should be constructed when the *SR 1 and Cave Neck Road Grade Separated Intersection* project (DelDOT Contract No. T201912201) is completed.



First Phase of Site Construction – 5,068 square-foot convenience store with gas pumps and 94 apartment units

1. The developer should provide a bituminous concrete overlay to the existing travel lanes along the Cave Neck Road site frontage in the area affected by entrance plan construction at proposed Site Entrance A, including any auxiliary lanes, at DelDOT’s discretion. DelDOT should analyze the existing lanes’ pavement section and recommend an overlay thickness to the developer’s engineer, if necessary.

This requirement may be eliminated upon the selection and review of the pavement core data that can occur during the plan review process.

2. The developer should construct a full access site entrance (Site Entrance A) for the proposed Chappell Farm development on Cave Neck Road, approximately 400 feet west of Delaware Route 1 to be consistent with the lane configurations shown in the table below:

Approach	Current Configuration	Proposed Configuration
Eastbound Cave Neck Road	One through lane	One left turn lane and one through lane
Westbound Cave Neck Road	One through lane	One through lane and one right turn lane
Southbound Site Entrance A	Approach does not exist	One shared left turn/right turn lane

Based on DelDOT’s *Development Coordination Manual*, the recommended minimum storage length is 350 feet (excluding taper) for the westbound Cave Neck Road right turn lane and 210 feet (excluding taper) for the eastbound Cave Neck Road left turn lane. The calculated queue lengths from the HCS analysis can be accommodated within the recommended storage lengths. The developer should submit a plan to DelDOT’s Development Coordination section depicting the design along the site frontage. The final design of the site entrance should be determined during the Entrance Plan review process.

3. The developer should construct a Connector Road between Cave Neck Road and Fox Run Lane. The southerly leg of the Connector Road would transition to the Site Entrance A intersection with Cave Neck Road. The exact location and design of the connector road should be coordinated with DelDOT for consistency with the proposed improvements as part of the *SR 1 and Cave Neck Road Grade Separated Intersection* project (DelDOT Contract No. T201912201). The Chappell Farm entrance onto the new Connector Road should be located along an area without horizontal curvature. If the Connector Road is to be dedicated to public use, the appropriate right-of-way/permanent easements should be



dedicated to DelDOT as it will be State maintained and should be designed/constructed to State standards. The value of the construction of the Connector Road and the right-of-way that would be dedicated in this regard can be counted towards the contribution for the *SR 1 and Cave Neck Road Grade Separated Intersection* project per the discussion in Item number 8 below.

4. The *DelDOT FY21-FY26 Capital Transportation Program (CTP)* includes a future improvement project at the Cave Neck Road, Hudson Road, and Sweetbriar Road intersection. Based on the CTP, design is scheduled to start in Fiscal Year 2025. The developer should coordinate with DelDOT on the implementation and equitable cost sharing of this future CTP project.
5. The developer should enter into an agreement with DelDOT to fund an equitable portion of improvements to the intersections of Delaware Route 1 with Minos Conaway Road and Nassau Road as part of the *Delaware Route 1 and Minos Conaway Road Grade Separated Intersection* project (DelDOT Contract No. T201612501). The developer should coordinate with DelDOT on the implementation and equitable cost sharing of the improvements. The cost contribution should consider the full buildout of the Chappell Farm site.
6. The developer should enter into an agreement with DelDOT to fund an equitable portion of improvements to the intersection of Delaware Route 1 with Eagles Crest Road/Oyster Rocks Road as part of the *SR 1 & S264 Intersection Improvements* project (DelDOT Contract No. T201904302). The developer should coordinate with DelDOT on the implementation and equitable cost sharing of the improvements. The cost contribution should consider the full buildout of the Chappell Farm site.
7. The developer should enter into an agreement with DelDOT to fund an equitable portion of improvements to the intersection of Delaware Route 1 with Hudson Road/Steamboat Landing Road as part of the *SR 1 & S258 Intersection Improvements* project (DelDOT Contract No. T201904303). The developer should coordinate with DelDOT on the implementation and equitable cost sharing of the improvements. The cost contribution should consider the full buildout of the Chappell Farm site. It is expected that the Compass Point development will contribute to the improvements at this intersection as well.
8. The developer should enter into an agreement with DelDOT to fund an equitable portion of improvements to the intersections of Delaware Route 1 with Red Fox Lane and Cave Neck Road as part of the *SR 1 and Cave Neck Road Grade Separated Intersection* project (DelDOT Contract No. T201912201). The developer should coordinate with DelDOT on



the implementation and equitable cost sharing of these improvements. The cost contribution should consider the full buildout of the Chappell Farm site.

9. The following bicycle, pedestrian, and transit improvements should be included:
 - a. A minimum fifteen-foot wide permanent easement from the edge of the right-of-way should be dedicated to DelDOT along the Cave Neck Road site frontage (west of the new Connector Road). Within the easement, the developer should construct a ten-foot wide shared-use path (SUP). The SUP should be designed to meet current AASHTO and ADA standards. The developer should coordinate with DelDOT's Development Coordination section during the plan review process to identify the exact location of the SUP.
 - b. An access-way should be provided from the SUP into the site.
 - c. Where internal sidewalks are located alongside of parking spaces, a buffer, physical barrier or signage should be added to eliminate vehicular overhang onto the sidewalk.
 - d. Internal bicycle racks should be provided for the commercial use and the apartment units.
 - e. ADA compliant curb ramps and marked crosswalks should be provided along the Site Entrance A approach to Cave Neck Road. The use of diagonal curb ramps is discouraged.
 - f. Minimum five-foot wide bicycle lanes should be incorporated in the right turn lanes and shoulder along the Cave Neck Road approaches to Site Entrance A.
 - g. Utility covers should be moved outside of any designated bicycle lanes and any proposed sidewalks/shared-use paths or should be flush with the pavement.

Second Phase of Site Construction – The remaining approximately 15,635 square feet of commercial space and approximately 21,365 square feet of commercial space

It is assumed the Site Entrance A/Cave Neck Road intersection will be converted to a roundabout by DelDOT as part of the *SR 1 and Cave Neck Road Grade Separated Intersection* project (DelDOT Contract No. T201912201). As such, no additional improvements to be completed by the developer are listed for the intersection with the second phase of the site.



1. The developer should provide a bituminous concrete overlay to the existing travel lanes along the Cave Neck Road site frontage in the area affected by entrance plan construction, at proposed Site Entrance B including any auxiliary lanes, at DelDOT’s discretion. DelDOT should analyze the existing lanes’ pavement section and recommend an overlay thickness to the developer’s engineer, if necessary.
2. The developer should provide a bituminous concrete overlay to the existing travel lanes along the southbound Delaware Route 1 frontage road site frontage in the area affected by entrance plan construction, including any auxiliary lanes, at DelDOT’s discretion. DelDOT should analyze the existing lanes’ pavement section and recommend an overlay thickness to the developer’s engineer, if necessary.
3. The developer should construct a full access site entrance (Site Entrance B) for the proposed Chappell Farm development on Cave Neck Road, approximately 900 feet west of Delaware Route 1 to be consistent with the lane configurations shown in the table below:

Approach	Current Configuration	Proposed Configuration
Eastbound Cave Neck Road	One through lane	One left turn lane and one through lane
Westbound Cave Neck Road	One through lane	One through lane and one right turn lane
Southbound Site Entrance B	Approach does not exist	One shared left turn/right turn lane

Based on DelDOT’s *Development Coordination Manual*, the recommended minimum storage length is 350 feet (excluding taper) for the westbound Cave Neck Road right turn lane and 210 feet (excluding taper) for the eastbound Cave Neck Road left turn lane. However, the left turn lane storage length can be reduced to a minimum of 130 feet (excluding taper) due to the proximity of the Samuel Paynter Boulevard intersection with Cave Neck Road. The calculated queue lengths from the HCS analysis can be accommodated within the recommended storage lengths. The developer should submit a plan to DelDOT’s Development Coordination section depicting the design along the site frontage. The final design of the site entrance should be determined during the Entrance Plan review process.

4. The developer should construct a rights-in only site entrance for the proposed Chappell Farm development on the southbound Delaware Route 1 Frontage Road that would be constructed west of Delaware Route 1 as part of the *SR 1 and Cave Neck Road Grade Separated Intersection* project. The rights-in only site entrance should be constructed approximately 300 feet north of Cave Neck Road to be consistent with the lane configurations shown in the table below:



Approach	Current Configuration	Proposed Configuration
Southbound Delaware Route 1 Frontage Road	Approach does not exist	One through lane and one right turn lane

Based on Table 10-5 from Chapter 10 of AASHTO, *A Policy on Geometric Design of Highways & Streets*, 6th Edition, the recommended minimum deceleration length (excluding taper) for the right turn lane is 405 feet. The developer should submit a plan to DelDOT’s Development Coordination section depicting the design along the site frontage. The final design of the site entrance should be determined during the Entrance Plan review process.

5. The following bicycle, pedestrian, and transit improvements should be included:
 - a. A minimum fifteen-foot wide permanent easement from the edge of the right-of-way should be dedicated to DelDOT along the southbound Delaware Route 1 Frontage Road and Cave Neck Road (west of the Connector Road) site frontages. Within the easement, the developer should construct a ten-foot wide shared-use path (SUP). The developer should coordinate with DelDOT’s Development Coordination section during the plan review process to identify the exact location of the SUP.
 - b. An access-way should be provided from the SUP into the site.
 - c. A SUP is required on both sides of the Connector Road between the commercial and residential uses.
 - d. An internal connection should be provided between the uses on the easterly and westerly sides of the Connector Road.
 - e. Where internal sidewalks are located alongside of parking spaces, a buffer, physical barrier or signage should be added to eliminate vehicular overhang onto the sidewalk.
 - f. Internal bicycle racks should be provided for the commercial use.
 - g. ADA compliant curb ramps and marked crosswalks should be provided along the Site Entrance B approaches to Cave Neck Road and the Site Entrance C approach to the southbound Delaware Route 1 Frontage Road. The use of diagonal curb ramps is discouraged.



- h. Utility covers should be moved outside of any proposed sidewalks/shared-use paths or should be flush with the pavement.

Please note that this review generally focuses on capacity and level of service issues; additional safety and operational issues will be further addressed through DelDOT's Plan Review process.

Improvements in this TIS may be considered "significant" under DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DelDOT's website at https://www.deldot.gov/Publications/manuals/de_mutcd/index.shtml. For any additional information regarding the work zone impact and mitigation procedures during construction please contact Mr. Don Weber, Assistant Director for Traffic Operations and Management. Mr. Weber can be reached at (302) 659-4651 or by email at Don.Weber@delaware.gov.

Additional details on our review of the TIS are attached. Please contact me at (302) 266-9600 if you have any questions concerning this review.

Sincerely,
Johnson, Mirmiran, and Thompson, Inc.

A handwritten signature in black ink, appearing to read 'Joanne M. Arellano', is written in a cursive style.

Joanne M. Arellano, P.E., PTOE

cc: Mir Wahed, P.E., PTOE
Enclosure

General Information

Report date: February 2020

Prepared by: Becker Morgan Group, Inc.

Prepared for: Hudson Management, LLC

Tax Parcel: 235-23.00-1.02

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

Project Description and Background

Description: The developer seeks to develop 94 apartment units, a 37,000 square foot shopping center, and a 5,068 square foot super convenience store with gas pumps.

Location: The subject site is located on the northwest corner of the intersection of Delaware Route 1 and Cave Neck Road (Sussex Road 88) in Sussex County, Delaware.

Amount of Land to be developed: An approximately 14.9-acre parcel.

Land Use approval(s) needed: Rezoning and Entrance Plan.

Proposed completion date: 2023

Proposed access location: Two full access points are proposed: one along Cave Neck Road (Site Access A), approximately 475 feet west of Delaware Route 1 and the other along Cave Neck Road (Site Access B), approximately 900 feet west of Delaware Route 1. One rights-in only access is proposed along southbound Delaware Route 1 (Site Access C), approximately 600 feet north of Cave Neck Road.

Daily Traffic Volumes:

- 2019 Average Annual Daily Traffic on SR 1: 41,783 vehicles per day (non-Summer)
- 2019 Average Annual Daily Traffic on Cave Neck Road: 7,339 vehicles per day (non-Summer)

Site Map



**Graphic is an approximation based on the Conceptual Site Plan prepared by Becker Morgan Group dated March 5, 2019.*

Relevant and On-going Projects

DelDOT has several relevant and ongoing improvement projects within the study area including the *Corridor Capacity Preservation Program (CCPP)*, which aims to maintain the regional importance and preserve the intended function and capacity of existing designated transportation routes within the Program. The main objectives of the program are listed below:

- Prevent the need to build an entirely new road
- Minimize the transportation impacts of increased economic growth
- Maintain an existing road's ability to handle traffic efficiently and safely
- Preserve the ability to make future improvements
- Sort local and through traffic

Delaware Route 1 is one of the highways included in the CCPP. More information regarding the CCPP can be found at: https://deldot.gov/Publications/manuals/corr_cap/index.shtml.

DelDOT is proposing to build a grade-separated interchange at the intersection of Delaware Route 1 and Cave Neck Road (DelDOT Contract No. T201912201). The selected alternative proposes Cave Neck Road to be elevated over Delaware Route 1. A new connector road would be constructed between Fox Run Lane and Cave Neck Road. This connector road would intersect Cave Neck Road at a roundabout. The southerly leg of this roundabout would provide a rights-

in/rights-out access to southbound Delaware Route 1. Additionally, the Fox Run Lane and Delaware Route 1 intersection would be eliminated. A roundabout would also be added along Cave Neck Road on the easterly side of Delaware Route 1 and the southerly leg of this roundabout would provide a rights-in/rights-out access to northbound Delaware Route 1. A new frontage road would be constructed on the westerly side of Delaware Route 1 between Fox Run Lane and Pondview Drive as well as on the easterly side of Delaware Route 1 between Willow Creek Road and Cave Neck Road. Design is underway and construction is expected to start in 2025. More information regarding the *SR 1 and Cave Neck Road Grade Separated Intersection* project can be found at: <https://deldot.gov/projects/index.shtml?dc=details&projectNumber=T201912201>.

The second project within the study area is the *SR 1, Minos Conaway Road Grade Separated Intersection* project (DelDOT Contract No. T201612501), which will provide a grade separated intersection to separate through movements along Delaware Route 1 and turning movements to and from Minos Conaway Road, Nassau Road and Old Mill Road. Per the preferred alternative concept plan, shared-use paths would also be constructed along Minos Conaway Road, Nassau Road, Janice Road, and along southbound Delaware Route 1 south of Janice Road to accommodate pedestrians and bicyclists. This project intends to maintain capacity of the Delaware Route 1 corridor and improve safety at the unsignalized intersection of Delaware Route 1 and Minos Conaway Road, while improving mobility and access for local traffic. The project is expected to begin construction in 2023 and be completed in 2025. More information regarding the Delaware Route 1 and Minos Conaway Grade Separated Intersection project can be found at: <https://deldot.gov/projects/index.shtml?dc=details&projectNumber=T201612501>.

The third project within the study area is at the intersection of Delaware Route 1 and Hudson Road (Sussex Road 258)/Steamboat Landing Road (DelDOT Contract No. T201904303). As part of the project, left turns and through movements along Hudson Road and Steamboat Landing Road would be prohibited. Northbound and southbound left turning movements along Delaware Route 1 would be permitted. Design is underway with construction anticipated to start in the fall of 2020 or the spring of 2021. More information regarding *SR 1 & S258 Intersection Improvements* project can be found at: <https://deldot.gov/projects/index.shtml?dc=details&projectNumber=T201904303#project-details1>.

The fourth project within the study area is at the intersection of Delaware Route 1 and Oyster Rocks Road (Sussex Road 264) (DelDOT Contract No. T201904302). As part of the project, acceleration lanes along northbound and southbound Delaware Route 1 would be provided for the left turning movements from Eagle Crest Road and Oyster Rocks Road. Through movements between Eagle Crest Road and Oyster Rocks Road would be prohibited. Northbound and southbound left turning movements from Delaware Route 1 would also be prohibited. Design is underway with construction anticipated to start in the fall of 2020 or the spring of 2021. More information regarding the *SR 1 & S264 Intersection Improvements* project can be found at: <https://deldot.gov/projects/index.shtml?dc=details&projectNumber=T201904302>.

DelDOT's 2016 Hazard Elimination Program (HEP) identified Site H which is within the project area. Site H is a 0.30-mile corridor along Cave Neck Road from 0.29 mile west of Delaware Route 1 to the Delaware Route 1 intersection. The Site H Task I report included a crash summary and

recommended to evaluate improvement options to reduce angle crashes and median confusion as part of the unsignalized crossover studies along Delaware Route 1. This area was further reviewed under Task II to evaluate several median channelization options at the Delaware Route 1 and Cave Neck Road intersection. Recommendations included accommodating northbound left-turns only and installing a partial signal at the intersection of Delaware Route 1 and Cave Neck Road to act as an interim improvement, before constructing a grade separated interchange as part of the previously mentioned CCPP Project. Also, providing a flashing red arrow phase may be considered during the off-peak hours as part of the design of these improvements. Field visits confirm that southbound Delaware Route 1 left turning movements and eastbound Cave Neck Road left turning movements have been prohibited at the intersection.

The DelDOT *FY21-FY 26 Capital Transportation Program (CTP)* includes a future improvement project at the Cave Neck Road, Hudson Road, and Sweetbriar Road intersection. Based on the CTP, the design is scheduled to start in Fiscal Year 2025.

Additionally, DelDOT is proposing to add lighting to the Delaware Route 1 and Cave Neck Road intersection. Design has been completed and implementation is expected in the fall of 2020.

Livable Delaware

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

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

The proposed development is located within Investment Level 3 and Investment Level 4 areas.

Investment Level 3

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

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

Investment Level 4

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

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

Proposed Development's Compatibility with Livable Delaware:

A portion of the site (a section of the proposed convenience store with gas) would be in the Investment Level 3 area and the rest of the site would be in the Investment Level 4 area. According to Livable Delaware, the state's investments and policies should retain the rural landscape and preserve open spaces and farmlands within Level 4 areas. In addition, construction of new homes is discouraged in Level 4 areas. Therefore, the proposed development is generally not consistent with the 2015 update of the Livable Delaware "Strategies for State Policies and Spending."

Comprehensive Plans

(Source: Sussex County March 2019 Comprehensive Plan)

Sussex County Comprehensive Plan:

Per the *Sussex County Comprehensive Plan Future Land Use Map*, the proposed development is in an area designated as Low Density.

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

Per the *Sussex County Comprehensive Plan*, Sussex County hopes to retain the rural environment of Low Density areas. Therefore, the proposed development is generally not consistent with the *Sussex County March 2019 Comprehensive Plan*. However, the developer is proposing to rezone the land to heavy commercial.

Trip Generation

The trip generation for the proposed development was determined by using the comparable land use and rates/equations contained in the *Trip Generation, 10th Edition: An ITE Informational Report*, published by the Institute of Transportation Engineers (ITE) for ITE Land Use Code 220 (multi-family low rise), Land Use Code 820 (Shopping Center), and Land Use Code 960 (super

convenience market with gas station). The trip generation was approved by DelDOT during the PTIS review.

Table 1
Chappell Farm Trip Generation

Land Use	ADT	AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
94 Multi-family Housing, Low Rise (ITE Code 220)	670	10	35	45	35	21	56	34	34	68
37,000 SF Shopping Center (ITE Code 820)	3,058	105	65	170	125	135	260	147	135	282
5,068 SF Super Convenience Market w/ Gas Station (ITE Code 960)	4,247	216	216	432	175	176	351	163	164	327
Total Trips	7,975	331	316	647	335	332	667	344	333	677
Internal Capture	-	0	0	0	-25	-25	-50	-30	-30	-60
Pass-By Trips	-	-164	-164	-328	-170	-171	-341	-155	-151	-306
Net New Trips	-	167	152	319	140	136	276	159	152	311

Overview of TIS

Intersections examined:

1. Site Access A/Cave Neck Road (Sussex Road 88)
2. Site Access B/Cave Neck Road
3. Site Access C/Delaware Route 1
4. Delaware Route 1/Red Fox Lane
5. Delaware Route 1/Cave Neck Road
6. Delaware Route 1/Minos Conaway Road (Sussex Road 265)
7. Delaware Route 1/Nassau Road (Sussex Road 266)
8. Delaware Route 1/Eagles Crest Rd/Oyster Rocks Road (Sussex Road 264)
9. Delaware Route 1/Hudson Road/Steamboat Landing Road (Sussex Road 258)
10. Cave Neck Road/Samuel Paynter Boulevard
11. Cave Neck Road/E. Mill Run Road
12. Cave Neck Road/Old Grist Run
13. Cave Neck Road/Beulah Boulevard
14. Cave Neck Road/Sweetbriar Road (Sussex Road 261)
15. Cave Neck Road/Hudson Road
16. Hudson Road/Walker Road (Sussex Road 260)

Conditions examined:

1. Case 1 – 2019 Existing Condition
2. Case 2 – 2023 without development
3. Case 3a– 2023 with development and without rights-in access along Delaware Route 1
4. Case 3b – 2023 with development and with rights-in access along Delaware Route 1

Note: The Scoping Meeting Memorandum also identified additional cases to be evaluated considering the Delaware Route 1/Cave Neck Road grade separated interchange configuration with and without a rights-in access on Delaware Route 1. The preferred alternative was not selected prior to the completion of the Final TIS report. As such, DelDOT agreed to eliminate the required analysis of an interchange at Delaware Route 1/Cave Neck Road.

Committed Developments considered:

1. Overbrook Meadows Phases 1 and 2 (175 single family detached houses to be considered in Case 3)
2. Compass Point (f.k.a. Sweetbriar Road Development) (293 single-family detached houses)
3. Red Mill Pond North (343 single-family detached houses)
4. Red Mill Pond South (117 townhouses)
5. Cool Spring Farm (f.k.a. Log Cabin Hill Road) (425 single-family detached houses)
6. Sussex Consortium School (415 student elementary school)
7. Vincent Overlook (54 single-family detached houses)
8. Windstone (360 single-family detached houses)

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

Intersection Descriptions

1. Site Entrance A/Cave Neck Road (Sussex Road 88)

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

Eastbound Approach: (Cave Neck Road) Existing one through lane and proposed one left-turn lane

Westbound Approach: (Cave Neck Road) Existing one through lane and proposed one right turn lane

Southbound Approach: (Site Entrance A) Proposed one left-turn lane and one right turn lane, stop-controlled

2. Site Entrance B/Cave Neck Road

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

Eastbound Approach: (Cave Neck Road) Existing one through lane and proposed one left turn lane

Westbound Approach: (Cave Neck Road) Existing one through lane and proposed one right turn lane

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

3. Site Entrance C/Delaware Route 1

Type of Control: Proposed rights-in only access driveway

Southbound Approach: (Delaware Route 1) Proposed two through lanes and one rights-in-only lane

4. Delaware Route 1/Red Fox Lane

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

Eastbound Approach: (Red Fox Lane) Existing one right turn lane, stop-controlled

Northbound Approach: (Delaware Route 1) Existing one left turn lane and two through lanes

Southbound Approach: (Delaware Route 1) Existing one left turn lane, two through lanes, and one right-turn lane

5. Delaware Route 1/Cave Neck Road

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

Eastbound Approach: (Cave Neck Road) Existing one right turn lane (stop-controlled)

Northbound Approach: (Delaware Route 1) Existing one left turn lane and two through lanes

Southbound Approach: (Delaware Route 1) Existing two through lanes and one right turn lane

6. Delaware Route 1/Minos Conaway Road (Sussex Road 265)

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

Eastbound Approach: (Minos Conaway Road) Existing one left turn lane and one right turn lane, stop controlled

Northbound Approach: (Delaware Route 1) Existing one left turn lane and two through lanes

Southbound Approach: (Delaware Route 1) Existing one left turn lane two through lanes and one channelized right turn lane

7. Delaware Route 1/Nassau Road (Sussex Road 266)

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

Westbound Approach: (Nassau Road) Existing one shared left turn/right turn lane, stop-controlled

Northbound Approach: (Delaware Route 1) Existing one left-turn lane, two through lanes and one right-turn lane

Southbound Approach: (Delaware Route 1) Existing one left turn lane and two through lanes

8. Delaware Route 1/Eagles Crest Road/Oyster Rocks Road (Sussex Road 264)

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

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

Westbound Approach: (Oyster Rocks Road) Existing one shared left turn/through/right turn lane, stop controlled

Northbound Approach: (Delaware Route 1) Existing one left turn lane, two through lanes, and one right turn lane

Southbound Approach: (Delaware Route 1) Existing one left turn lane, two through lanes, and one right turn lane

9. Delaware Route 1/Hudson Road/Steamboat Landing Road (Sussex Road 258)

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

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

Westbound Approach: (Steamboat Landing Road) Existing one shared left turn/through/right turn lane, stop controlled

Northbound Approach: (Delaware Route 1) Existing one left turn lane, two through lanes, and one right turn lane

Southbound Approach: (Delaware Route 1) Existing one left turn lane, two through lanes, and one right turn lane

10. Cave Neck Road/Samuel Paynter Boulevard

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

Eastbound Approach: (Cave Neck Road) Existing one through lane and one right turn lane

Westbound Approach: (Cave Neck Road) Existing one left turn lane and one through lane

Northbound Approach: (Samuel Paynter Boulevard) Existing one left turn lane and one right turn lane, stop-controlled

11. Cave Neck Road/E. Mill Run Road

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

Eastbound Approach: (Cave Neck Road) Existing one through lane and one right turn lane

Westbound Approach: (Cave Neck Road) Existing one shared left turn/through lane

Northbound Approach: (E. Mill Run Road) Existing one shared left turn/right turn lane, stop-controlled

12. Cave Neck Road/Ole Grist Run/Brookstone Drive

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

Eastbound Approach: (Cave Neck Road) Existing one left turn lane, one through lane and one right turn lane

Westbound Approach: (Cave Neck Road) Existing one left turn lane, one through lane and one right turn lane

Northbound Approach: (Ole Grist Run) Existing one shared left turn/through/right turn lane, stop-controlled

Southbound Approach: (Brookstone Drive) Existing one shared left turn/through/right turn lane, stop-controlled

13. Cave Neck Road/Beulah Boulevard

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

Eastbound Approach: (Cave Neck Road) Existing one through lane and one right turn lane

Westbound Approach: (Cave Neck Road) Existing one left turn lane and one through lane

Northbound Approach: (Beulah Boulevard) Existing one shared left turn/right turn lane, stop-controlled

14. Cave Neck Road/Sweetbriar Road (Sussex Road 261)

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

Eastbound Approach: (Cave Neck Road) Existing one shared left turn/through/right turn lane

Westbound Approach: (Cave Neck Road) Existing one left turn lane and one shared through/right turn lane

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

Note: The northerly leg of the intersection is one-way northbound.

15. Cave Neck Road/Hudson Road

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

Eastbound Approach: (Cave Neck Road) Existing one shared left turn/through/right turn lane

Westbound Approach: (Cave Neck Road) Existing one shared left turn/through/right turn lane

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

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

16. Hudson Road/Walker Road (Sussex Road 260)

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

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

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

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

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: Per DelDOT Gateway, Delaware Transit Corporation (DTC) currently does not provide transit stops within the study area.

Planned transit service: Per email correspondence on April 15, 2020 with Mr. Jared Kauffman, Fixed-Route Planner at the DTC, a shared-use path (SUP) should be placed along Cave Neck Road to give DTC the option of creating bus stops in the future, if deemed necessary.

Existing bicycle and pedestrian facilities: According to DelDOT's *Sussex County Bicycle Map*, one Connector Bicycle Route and one Regional Bicycle Route exist within the study area. The Connector Bicycle Route travels along Hudson Road, traversing through two study intersections (Cave Neck Road and Walker Road). The Regional Bicycle Route exists along Sweetbriar Road and traverses through two study intersections (Cave Neck Road and Hudson Road) before continuing northwest along Cave Neck Road. There are no pedestrian facilities within the study area.

Planned bicycle and pedestrian facilities: Per email correspondence on April 15, 2020 from Mr. John Fiori, DelDOT's Bicycle Coordinator, the following improvements were recommended:

- Construct a 10-foot wide shared-use path (SUP) along both property frontages.
- An internal connection is required from the SUP along Cave Neck Road and Delaware Route 1 into the proposed site.
- A SUP will be required on both sides of the service road between the commercial and residential use.
- An internal connection will be required between the commercial and residential use.
- Internal bicycle racks for the commercial use along Delaware Route 1 and bike racks for the apartment units.
- Per the Development Coordination Manual (DCM) the site shall dedicate right-of-way per the roadway classification and establish a 15-foot wide permanent easement along the property frontages.

Bicycle Level of Traffic Stress in Delaware: Researchers with the Mineta Transportation Institute developed a framework to measure low-stress connectivity, which can be used to evaluate and guide bicycle network planning. Bicycle LTS analysis uses factors such as the speed of traffic, volume of traffic, and the number of lanes to rate each roadway segment on a scale of 1 to 4, where 1 is a low-stress place to ride and 4 is a high-stress place to ride. It analyzes the total connectivity of a network to evaluate how many destinations can be accessed using low-stress routes. Developed by planners at the Delaware Department of Transportation (DelDOT), the bicycle Level of Traffic Stress (LTS) model will be applied to bicycle system planning and evaluation throughout the state. The Bicycle LTS for the roadways under existing conditions along the site frontage are summarized below. The Bicycle LTS was determined utilizing the map on the DelDOT Gateway.

- Delaware Route 1 – LTS: 3 and 4
- Cave Neck Road – LTS: 3 and 4

Crash Evaluation

Per the crash data included in the TIS from May 14, 2016 to May 14, 2019 and provided by the Delaware Crash Analysis Reporting System, a total of 147 crashes were reported within the study area. Of the 147 crashes reported:

- 44 crashes occurred between the two unsignalized intersections of Cave Neck Road and Sweetbriar Road and Cave Neck Road and Hudson Road, which are approximately 300 feet apart from each other.
 - Of the 44 crashes at these two intersections, 34 were angle incidents. 12 of these angle crashes resulted in injuries.
- 28 crashes occurred at the unsignalized intersection of Delaware Route 1 and Hudson Road/Steamboat Landing Road.
 - Of those 28 crashes, 10 were angle incidents. 6 out of the 10 angle crashes resulted in injuries.
 - Of those 28 crashes, 7 were rear-end incidents. 4 out of the 7 rear-end crashes resulted in injuries.
- 25 crashes occurred at the unsignalized intersection of Delaware Route 1 and Minos Conaway Road.
 - Of those 25 crashes, 10 were angle incidents. 4 out of the 10 angle crashes resulted in injuries.
- 20 crashes occurred at the unsignalized intersection of Delaware Route 1 and Nassua Road.
 - Of those 20 crashes, 7 were rear-end incidents. 2 out of the 7 rear-end crashes resulted in injuries.
- No fatalities were reported within the study area during the 3-year study period.

Previous Comments

Comments provided by DeIDOT during the Preliminary TIS review have been addressed in the Final TIS.

General HCS Analysis Comments

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

1. Per DelDOT's *Development Coordination Manual*, JMT and TIS used a heavy vehicle percentage of 3% for each movement greater than 100 vph in the Case 2 and Case 3 future scenario analyses, unless the existing heavy vehicle percentage was greater than 3% and there was no significant increase of vehicles along that movement, in which case the existing heavy vehicle percentage was used for analysis of future scenarios.
2. Per DelDOT's *Development Coordination Manual* and coordination with DelDOT Planning, JMT used a heavy vehicle percentage of 5% for each movement less than 100 vph along roadways, whereas the TIS did not.
3. Per DelDOT's *Development Coordination Manual*, JMT and TIS utilized the existing PHF for the Case 1 scenario and a future PHF for Cases 2 and 3 scenarios of 0.80 for roadways with less than 500 vph, 0.88 for roadways between 500 and 1,000 vph, and 0.92 for roadways with more than 1,000 vph or the existing PHF, whichever was higher.
4. The TIS analyzed the intersections along Delaware Route 1 using Synchro software. However, per direction from DelDOT, JMT analyzed the intersections along Delaware Route 1 using HCS7 software.
5. Per coordination with DelDOT, JMT conducted the following additional scenarios:
 - a. Case 4a - 2023 with development of convenience store with gas only, without rights-in access along Delaware Route 1, and with a Connector Road built between Cave Neck Road and Red Fox Lane
 - b. Case 4b – 2023 with development of convenience store with gas only, with rights-in access along Delaware Route 1, and without a Connector Road built between Cave Neck Road and Red Fox Lane
 - c. Case 4c – 2023 with development of convenience store and 94 apartment units without rights-in access along Delaware Route 1, and with a Connector Road built between Cave Neck Road and Red Fox Lane

Table 2
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Site Entrance A/Cave Neck Road (Sussex Road 88)						
2023 with development and without rights-in access (Case 3a)						
Eastbound Cave Neck Road Left Turn	A (8.4)	A (9.4)	A (8.8)	A (8.4)	A (9.4)	A (8.8)
Southbound Site Entrance A Approach	E (48.0)	F (55.2)	D (32.9)	E (48.0)	F (55.2)	D (32.9)
2023 with development and with rights-in access (Case 3b)						
Eastbound Cave Neck Road Left Turn	A (8.1)	A (9.0)	A (8.5)	A (8.1)	A (9.0)	A (8.5)
Southbound Site Entrance A Approach	E (47.2)	F (54.2)	D (32.4)	E (47.2)	F (54.2)	D (32.4)
2023 with Convenience Store with Gas only, without rights-in access, and with a Connector Road (Case 4a)						
Eastbound Cave Neck Road Left Turn	-	-	-	A (8.1)	A (8.8)	A (8.3)
Southbound Site Entrance A Approach	-	-	-	D (26.0)	C (24.4)	C (18.5)
2023 with Convenience Store with Gas only, with rights-in access, and without a Connector Road (Case 4b)						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.9)	A (8.7)	A (8.2)
Southbound Site Entrance A Approach	-	-	-	D (25.9)	C (24.4)	C (18.5)

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

Table 2 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Site Entrance A/Cave Neck Road (Sussex Road 88)						
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Eastbound Cave Neck Road Left Turn	-	-	-	A (8.1)	A (8.9)	A (8.3)
Southbound Site Entrance A Approach	-	-	-	D (28.8)	D (25.0)	C (18.7)

Table 2 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Signalized Intersection ¹	LOS per TIS			LOS per JMT		
Site Entrance A/Cave Neck Road (Sussex Road 88) ²	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
2023 with development and without rights-in access (Case 3a)	-	-	-	B (11.4)	B (10.6)	B (10.9)
2023 with development and with rights-in access (Case 3b)	-	-	-	B (11.7)	B (11.2)	B (10.9)

² JMT analyzed the intersection as an uncoordinated signalized intersection with a 60 second cycle length and permitted left turns along the eastbound Cave Neck Road approach.

Table 2 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Roundabout ¹	LOS per TIS			LOS per JMT		
Site Entrance A/Cave Neck Road (Sussex Road 88) ³	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
2023 with development and without rights-in access (Case 3a)						
Eastbound Cave Neck Road Approach	-	-	-	B (12.3)	A (7.6)	A (8.0)
Westbound Cave Neck Road Approach	-	-	-	A (6.2)	A (9.4)	A (7.3)
Southbound Site Entrance A Approach	-	-	-	A (5.9)	A (8.7)	A (6.8)
Overall	-	-	-	A (9.0)	A (8.7)	A (7.4)
2023 with development and with rights-in access (Case 3b)						
Eastbound Cave Neck Road Approach	-	-	-	B (12.3)	A (7.6)	A (8.0)
Westbound Cave Neck Road Approach	-	-	-	A (5.3)	A (8.0)	A (6.3)
Southbound Site Entrance A Approach	-	-	-	A (5.9)	A (8.7)	A (6.8)
Overall	-	-	-	A (9.0)	A (8.0)	A (7.1)

³ JMT analyzed the intersection as a single-lane roundabout.

Table 2 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Roundabout ¹	LOS per TIS			LOS per JMT		
Site Entrance A/Cave Neck Road (Sussex Road 88) ³	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
2023 with Convenience Store with Gas only, without rights-in access, and with a Connector Road (Case 4a)						
Eastbound Cave Neck Road Approach	-	-	-	B (10.1)	A (6.2)	A (6.7)
Westbound Cave Neck Road Approach	-	-	-	A (5.1)	A (7.5)	A (6.0)
Southbound Site Entrance A Approach	-	-	-	A (5.1)	A (6.8)	A (5.6)
Overall	-	-	-	A (7.7)	A (7.0)	A (6.2)
2023 with Convenience Store with Gas only, with rights-in access, and without a Connector Road (Case 4b)						
Eastbound Cave Neck Road Approach	-	-	-	B (10.1)	A (6.2)	A (6.7)
Westbound Cave Neck Road Approach	-	-	-	A (4.6)	A (6.9)	A (5.6)
Southbound Site Entrance A Approach	-	-	-	A (5.1)	A (6.8)	A (5.6)
Overall	-	-	-	A (7.7)	A (6.7)	A (6.0)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Eastbound Cave Neck Road Approach	-	-	-	B (10.6)	A (6.3)	A (6.8)
Westbound Cave Neck Road Approach	-	-	-	A (5.2)	A (7.6)	A (6.0)
Southbound Site Entrance A Approach	-	-	-	A (5.4)	A (6.7)	A (5.6)
Overall	-	-	-	A (7.9)	A (7.0)	A (6.3)

Table 3
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Site Entrance B/Cave Neck Road						
2023 with development (Case 3)						
Eastbound Cave Neck Road Left Turn	A (7.8)	A (8.6)	A (8.2)	A (7.9)	A (8.7)	A (8.2)
Southbound Site Entrance B Approach	B (14.3)	C (15.7)	B (14.1)	B (14.8)	C (16.4)	B (14.5)

Table 4
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Red Fox Lane ⁵						
2019 Existing (Case 1)						
Eastbound Red Fox Lane Approach	B (14.0)	C (15.0)	D (29.3)	B (14.3)	B (14.6)	D (30.5)
Northbound Delaware Route 1 Left Turn	B (13.8)	B (12.2)	D (26.5)	C (20.3)	D (29.4)	F (201.9)
Southbound Delaware Route 1 U-Turn	-	-	-	B (12.5)	D (29.8)	F (54.7)
2023 without development (Case 2) ⁶						
Eastbound Red Fox Lane Approach	B (14.9)	C (16.2)	D (34.5)	C (15.1)	C (15.7)	E (35.2)
Northbound Delaware Route 1 Left Turn	B (14.7)	B (13.5)	D (32.2)	E (45.4)	F (68.5)	F (*)
Southbound Delaware Route 1 U-Turn	-	-	-	B (13.6)	E (35.2)	F (68.4)
2023 with development (Case 3) ⁶						
Eastbound Red Fox Lane Approach	C (15.3)	C (16.5)	E (35.5)	C (15.4)	C (16.0)	E (36.1)
Northbound Delaware Route 1 Left Turn	C (15.1)	B (13.7)	D (33.2)	F (50.3)	F (76.5)	F (*)
Southbound Delaware Route 1 U-Turn	-	-	-	B (14.0)	E (36.8)	F (72.1)

*HCS software reported delays longer than 1,000 seconds per vehicle.

⁴ The TIS analyzed the intersections along Delaware Route 1 utilizing Synchro software. However, per direction from DelDOT, JMT analyzed the intersections along Delaware Route 1 utilizing HCS7 software.

⁵ The TIS did not report results for the southbound Delaware Route 1 U-turn.

⁶ The adjacent Delaware Route 1/Cave Neck Road intersection was recently reconfigured to restrict eastbound left turning movements. As such, JMT has assumed that left turning movements would also be restricted along the future westerly leg. Therefore, any volumes executing westbound left turning movements at the Cave Neck Road intersection would instead execute a right turning movement and U-turn at the Red Fox Lane intersection.

Table 4 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
2023 with Convenience Store with Gas only, without rights-in access, and with a Connector Road (Case 4a) ⁶						
Eastbound Red Fox Lane Approach	-	-	-	C (15.0)	C (15.7)	E (35.1)
Northbound Delaware Route 1 Left Turn	-	-	-	E (44.9)	F (67.9)	F (*)
Southbound Delaware Route 1 U-Turn	-	-	-	B (13.7)	E (35.7)	F (69.4)
2023 with Convenience Store with Gas only, with rights-in access, and without a Connector Road (Case 4b) ⁶						
Eastbound Red Fox Lane Approach	-	-	-	C (15.2)	C (15.8)	E (35.4)
Northbound Delaware Route 1 Left Turn	-	-	-	E (46.9)	F (70.9)	F (*)
Southbound Delaware Route 1 U-Turn	-	-	-	B (13.7)	E (35.7)	F (69.4)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c) ⁶						
Eastbound Red Fox Lane Approach	-	-	-	C (15.0)	C (15.7)	E (35.1)
Northbound Delaware Route 1 Left Turn	-	-	-	E (45.2)	F (68.3)	F (*)
Southbound Delaware Route 1 U-Turn	-	-	-	B (13.8)	E (35.6)	F (69.5)

*HCS software reported delays longer than 1,000 seconds per vehicle.

Table 5
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Cave Neck Road ⁵						
2019 Existing (Case 1) ⁷						
Eastbound Cave Neck Road Left Turn	F (75.6)	D (26.2)	F (362.5)	E (36.5)	F (57.4)	F (253.2)
Northbound Delaware Route 1 Left Turn	B (13.7)	C (17.5)	F (62.3)	B (14.1)	C (17.3)	F (65.2)
Southbound Delaware Route 1 U-Turn	-	-	-	B (12.4)	D (29.8)	F (58.3)
2023 without development (Case 2) ^{8,9,10}						
Northbound Delaware Route 1 Left Turn	-	-	-	C (17.3)	E (36.5)	F (356.4)

⁷ The eastbound Cave Neck Road right turning movements were not reported as it is yield-controlled with a channelizing island and its own acceleration lane of approximately 400 feet.

⁸ For future cases, JMT incorporated the restriction of left turns along the eastbound Cave Neck Road approach. Left turning volumes along the eastbound Cave Neck Road approach were assumed to turn right at the intersection, travel southbound along Delaware Route 1, and then U-turn at the adjacent Red Mill Inn entrance. Additionally, JMT assumed that left turns would be restricted along the proposed westbound Overbrook Meadows Entrance approach. Left turning volumes along the westbound Overbrook Meadows Entrance approach were assumed to turn right at the intersection, travel northbound along Delaware Route 1, and then U-turn at the adjacent Red Fox Lane intersection.

⁹ For future cases, JMT incorporated the restriction of southbound Delaware Route 1 U-turn/left turns. JMT assumed the U-turns/left-turns would be executed at the adjacent Red Mill Inn entrance. Additionally, it was assumed the westbound Overbrook Meadows Entrance approach would be designed similar to the Cave Neck Road approach and provide a long acceleration lane onto northbound Delaware Route 1. As such, the westbound approach right turning movements were not reported.

¹⁰ The TIS did not include results for Cases 2, 3a, and 3b.

Table 5 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Cave Neck Road						
2023 with development and without rights-in access (Case 3a) ^{8, 9, 10}						
Northbound Delaware Route 1 Left Turn	-	-	-	C (22.3)	F (61.4)	F (668.2)
2023 with development and with rights-in access (Case 3b) ^{8, 9, 10}						
Northbound Delaware Route 1 Left Turn	-	-	-	C (22.3)	F (61.4)	F (668.2)
2023 with Convenience Store with Gas only, without rights-in access, and with a Connector Road (Case 4a) ^{8, 9}						
Northbound Delaware Route 1 Left Turn	-	-	-	C (20.0)	E (47.1)	F (524.0)
2023 with Convenience Store with Gas only, with rights-in access, and without a Connector Road (Case 4b) ^{8, 9}						
Northbound Delaware Route 1 Left Turn	-	-	-	C (20.0)	E (47.1)	F (524.0)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c) ^{8, 9}						
Northbound Delaware Route 1 Left Turn	-	-	-	C (20.2)	E (48.1)	F (527.2)

Table 6
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Minos Conaway Road (Sussex Road 265) ¹¹						
2019 Existing (Case 1)						
Eastbound Minos Conaway Road Left Turn	D (30.4)	D (29.4)	F (176.4)	F (54.7)	F (80.8)	F (*)
Eastbound Minos Conaway Road Right Turn	D (30.4)	D (29.4)	F (176.4)	C (23.8)	C (20.4)	F (149.7)
Eastbound Minos Conaway Road Approach	-	-	-	D (31.6)	D (33.9)	F (*)
Northbound Delaware Route 1 Left Turn	B (14.1)	C (16.3)	E (41.6)	B (14.4)	C (18.3)	F (*)
Southbound Delaware Route 1 U-Turn	-	-	-	B (13.3)	E (47.6)	F (66.8)
2023 without development (Case 2)						
Eastbound Minos Conaway Road Left Turn	E (48.7)	E (40.8)	F (336.1)	F (96.6)	F (146.7)	F (*)
Eastbound Minos Conaway Road Right Turn	E (48.7)	E (40.8)	F (336.1)	D (34.8)	C (24.7)	F (277.4)
Eastbound Minos Conaway Road Approach	-	-	-	F (50.4)	F (51.4)	F (*)
Northbound Delaware Route 1 Left Turn	C (16.9)	C (20.8)	F (64.0)	C (17.3)	C (23.5)	F (*)
Southbound Delaware Route 1 U-Turn	-	-	-	B (14.8)	F (80.9)	F (102.4)

*HCS software reported delays longer than 1,000 seconds per vehicle.

¹¹ The TIS did not provide eastbound Minos Conaway Road approach and southbound Delaware Route 1 U-turn results.

Table 6 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Minos Conaway Road (Sussex Road 265) ¹¹						
2023 with development (Case 3)						
Eastbound Minos Conaway Road Left Turn	F (61.3)	F (56.3)	F (841.8)	F (133.2)	F (214.4)	F (*)
Eastbound Minos Conaway Road Right Turn	F (61.3)	F (56.3)	F (841.8)	E (36.4)	D (25.4)	F (293.2)
Eastbound Minos Conaway Road Approach	-	-	-	F (64.9)	F (78.8)	F (*)
Northbound Delaware Route 1 Left Turn	C (17.3)	C (21.5)	F (67.1)	C (17.7)	C (24.5)	F (*)
Southbound Delaware Route 1 U-Turn	-	-	-	C (15.4)	F (85.7)	F (108.2)
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)						
Eastbound Minos Conaway Road Left Turn	-	-	-	F (105.2)	F (164.0)	F (*)
Eastbound Minos Conaway Road Right Turn	-	-	-	E (35.3)	C (24.9)	F (281.3)
Eastbound Minos Conaway Road Approach	-	-	-	F (53.7)	F (58.2)	F (*)
Northbound Delaware Route 1 Left Turn	-	-	-	C (17.4)	C (23.8)	F (*)
Southbound Delaware Route 1 U-Turn	-	-	-	B (15.0)	F (82.3)	F (103.8)

*HCS software reported delays longer than 1,000 seconds per vehicle.

Table 6 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Minos Conaway Road (Sussex Road 265) ¹¹						
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Eastbound Minos Conaway Road Left Turn	-	-	-	F (118.4)	F (163.5)	F (*)
Eastbound Minos Conaway Road Right Turn	-	-	-	E (35.7)	C (24.9)	F (281.8)
Eastbound Minos Conaway Road Approach	-	-	-	F (57.8)	F (58.9)	F (*)
Northbound Delaware Route 1 Left Turn	-	-	-	C (17.5)	C (23.8)	F (*)
Southbound Delaware Route 1 U-Turn	-	-	-	C (15.3)	F (81.0)	F (106.7)

*HCS software reported delays longer than 1,000 seconds per vehicle.

Table 7
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Nassau Road (Sussex Road 266) ¹²						
2019 Existing (Case 1)						
Westbound Nassau Road Approach	B (13.8)	F (60.0)	D (32.9)	B (13.7)	F (60.9)	F (*)
Northbound Delaware Route 1 U-Turn	-	-	-	D (32.2)	D (26.4)	F (106.2)
Southbound Delaware Route 1 Left Turn	B (10.8)	C (19.7)	F (113.1)	B (10.8)	D (28.4)	F (165.3)
2023 without development (Case 2)						
Westbound Nassau Road Approach	C (15.3)	F (135.9)	F (50.2)	C (15.1)	F (*)	F (*)
Northbound Delaware Route 1 U-Turn	-	-	-	E (46.8)	D (34.5)	F (160.3)
Southbound Delaware Route 1 Left Turn	B (11.7)	D (31.5)	F (286.9)	B (11.8)	F (*)	F (416.7)
2023 with development and without rights-in access (Case 3)						
Westbound Nassau Road Approach	C (15.9)	F (156.9)	F (58.4)	C (15.7)	F (*)	F (*)
Northbound Delaware Route 1 U-Turn	-	-	-	E (48.2)	E (35.4)	F (165.3)
Southbound Delaware Route 1 Left Turn	B (12.1)	D (34.4)	F (318.8)	B (12.1)	F (*)	F (487.2)
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)						
Westbound Nassau Road Approach	-	-	-	C (15.3)	F (*)	F (*)
Northbound Delaware Route 1 U-Turn	-	-	-	E (47.3)	D (34.8)	F (161.5)
Southbound Delaware Route 1 Left Turn	-	-	-	B (11.9)	F (*)	F (433.7)

*HCS software reported delays longer than 1,000 seconds per vehicle.

¹² The TIS did not provide northbound Delaware Route 1 results.

Table 7 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Nassau Road (Sussex Road 266)						
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Westbound Nassau Road Approach	-	-	-	C (15.4)	F (*)	F (*)
Northbound Delaware Route 1 U-Turn	-	-	-	E (47.7)	D (34.7)	F (161.8)
Southbound Delaware Route 1 Left Turn	-	-	-	B (11.9)	F (*)	F (434.7)

*HCS software reported delays longer than 1,000 seconds per vehicle

Table 8
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Eagles Crest Road/Oyster Rocks Road (Sussex Road 264)						
2019 Existing (Case 1)						
Eastbound Eagles Crest Road Approach	C (20.3)	D (30.3)	F (101.3)	C (20.4)	D (31.6)	F (110.2)
Westbound Oyster Rocks Road Approach	C (22.8)	F (53.9)	F (126.5)	C (22.5)	F (57.2)	F (139.2)
Northbound Delaware Route 1 Left Turn	B (11.6)	B (12.6)	C (24.5)	B (12.0)	B (13.1)	D (26.2)
Southbound Delaware Route 1 Left Turn	A (9.0)	B (13.2)	C (16.9)	A (9.2)	B (13.7)	C (17.8)
2023 without development (Case 2)						
Eastbound Eagles Crest Road Approach	C (22.6)	E (37.4)	F (159.3)	C (22.4)	E (37.9)	F (166.0)
Westbound Oyster Rocks Road Approach	D (26.3)	F (71.8)	F (212.9)	D (25.7)	F (73.9)	F (220.2)
Northbound Delaware Route 1 Left Turn	B (12.5)	B (14.0)	D (29.9)	B (12.6)	B (14.3)	D (30.8)
Southbound Delaware Route 1 Left Turn	A (9.4)	B (14.5)	C (19.4)	A (9.5)	B (14.7)	C (19.8)

Table 8 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Eagles Crest Road/Oyster Rocks Road (Sussex Road 264)						
2023 without development (Case 2) with <i>DelDOT Improvement Project</i> ¹³						
Eastbound Eagles Crest Road Approach	-	-	-	C (17.5)	C (20.7)	F (90.0)
Westbound Oyster Rocks Road Approach	-	-	-	B (15.0)	E (36.5)	F (67.7)
2023 with development (Case 3)						
Eastbound Eagles Crest Road Approach	C (23.3)	E (39.0)	F (171.0)	C (23.1)	E (39.6)	F (178.5)
Westbound Oyster Rocks Road Approach	D (27.8)	F (77.5)	F (238.1)	D (27.2)	F (79.9)	F (246.4)
Northbound Delaware Route 1 Left Turn	B (12.7)	B (14.4)	D (30.8)	B (12.9)	B (14.6)	D (31.8)
Southbound Delaware Route 1 Left Turn	A (9.6)	B (14.8)	C (19.9)	A (9.6)	C (15.0)	C (20.3)
2023 with development (Case 3) with <i>DelDOT Improvement Project</i> ¹³						
Eastbound Eagles Crest Road Approach	-	-	-	C (19.1)	C (21.3)	F (95.4)
Westbound Oyster Rocks Road Approach	-	-	-	C (15.5)	E (38.2)	F (72.1)

¹³ JMT modeled the intersection to reflect the improvements planned as part of the *Delaware Route 1 and Oyster Rocks Road (Sussex Road 264)* project (DelDOT Contract No. T201904302). These improvements include the restriction of northbound and southbound Delaware Route 1 left turns at the intersection of Eagles Crest Road/Oyster Rocks Road. Additionally, the project will prohibit eastbound Eagles Crest Road and westbound Oyster Road through movements and provide an acceleration lane for the left turns. The left turning volumes along the northbound and southbound approaches were assumed to travel through the intersection, U-turn at the adjacent Delaware Route 1 median opening, and then turn right at the opposite approach to the intersection. The through volumes along the eastbound and westbound approaches were assumed to turn right at the intersection, U-turn at the adjacent Delaware Route 1 median opening, and then turn right at the Delaware Route 1 approach to the intersection.

Table 8 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Eagles Crest Road/Oyster Rocks Road (Sussex Road 264)						
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)						
Eastbound Eagles Crest Road Approach	-	-	-	C (22.5)	E (38.4)	F (169.2)
Westbound Oyster Rocks Road Approach	-	-	-	D (26.2)	F (75.3)	F (225.0)
Northbound Delaware Route 1 Left Turn	-	-	-	B (12.7)	B (14.3)	D (31.0)
Southbound Delaware Route 1 Left Turn	-	-	-	A (9.5)	B (14.8)	C (20.0)
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b) <i>with DelDOT Improvement Project</i> ¹³						
Eastbound Eagles Crest Road Approach	-	-	-	C (18.7)	C (21.2)	F (91.4)
Westbound Oyster Rocks Road Approach	-	-	-	C (15.2)	E (37.0)	F (68.8)

Table 8 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Eagles Crest Road/Oyster Rocks Road (Sussex Road 264)						
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Eastbound Eagles Crest Road Approach	-	-	-	C (22.6)	E (38.5)	F (169.6)
Westbound Oyster Rocks Road Approach	-	-	-	D (26.4)	F (75.3)	F (225.6)
Northbound Delaware Route 1 Left Turn	-	-	-	B (12.7)	B (14.4)	D (31.0)
Southbound Delaware Route 1 Left Turn	-	-	-	A (9.6)	B (14.8)	C (20.0)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c) <i>with DelDOT Improvement Project</i> ¹³						
Eastbound Eagles Crest Road Approach	-	-	-	C (18.9)	C (21.2)	F (91.5)
Westbound Oyster Rocks Road Approach	-	-	-	C (15.3)	E (36.9)	F (68.9)

Table 9
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Hudson Road/ Steamboat Landing Road (Sussex Road 258)						
2019 Existing (Case 1)						
Eastbound Hudson Road Approach	F (122.6)	F (244.6)	F (*)	F (120.8)	F (238.6)	F (*)
Westbound Steamboat Landing Road Approach	C (20.5)	E (36.5)	F (127.2)	C (21.1)	E (38.4)	F (141.0)
Northbound Delaware Route 1 Left Turn	B (12.0)	B (13.6)	D (27.5)	B (12.3)	B (13.7)	D (29.5)
Southbound Delaware Route 1 Left Turn	A (9.1)	B (12.8)	C (17.9)	A (9.2)	B (13.2)	C (18.9)
2023 without development (Case 2)						
Eastbound Hudson Road Approach	F (572.6)	F (744.5)	F (*)	F (569.9)	F (737.0)	F (*)
Westbound Steamboat Landing Road Approach	C (23.4)	E (46.3)	F (212.5)	C (23.7)	E (47.7)	F (224.9)
Northbound Delaware Route 1 Left Turn	B (13.2)	C (16.1)	E (36.4)	B (13.3)	C (16.3)	E (37.6)
Southbound Delaware Route 1 Left Turn	A (9.5)	B (13.9)	C (20.6)	A (9.6)	B (14.1)	C (21.2)

*HCS software reported delays longer than 1,000 seconds per vehicle.

Table 9 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Hudson Road/ Steamboat Landing Road (Sussex Road 258)						
2023 without development (Case 2) with <i>DelDOT Improvement Project</i> ¹⁴						
Eastbound Hudson Road Approach	-	-	-	D (30.6)	D (31.6)	F (318.9)
Westbound Steamboat Landing Road Approach	-	-	-	B (12.7)	C (18.9)	D (30.6)
Northbound Delaware Route 1 Left Turn	-	-	-	B (13.4)	C (16.4)	E (38.2)
Southbound Delaware Route 1 Left Turn	-	-	-	B (10.7)	C (16.0)	C (24.2)
2023 with development (Case 3)						
Eastbound Hudson Road Approach	F (619.2)	F (788.7)	F (*)	F (616.2)	F (780.8)	F (*)
Westbound Steamboat Landing Road Approach	D (25.0)	F (51.4)	F (266.7)	D (25.2)	F (53.2)	F (284.0)
Northbound Delaware Route 1 Left Turn	B (13.4)	C (16.4)	E (37.3)	B (13.6)	C (16.6)	E (38.6)
Southbound Delaware Route 1 Left Turn	A (9.6)	B (14.2)	C (21.1)	A (9.7)	B (14.4)	C (21.7)

*HCS software reported delays longer than 1,000 seconds per vehicle.

¹⁴ JMT modeled the intersection to reflect the improvements planned as part of the *Delaware Route 1 and Oyster Rocks Road (Sussex Road 264)* project (DelDOT Contract No. T201904302). These improvements include the restriction of eastbound Hudson Road and westbound Steamboat Landing left turn and through movements. These volumes were assumed to turn right at the intersection, u-turn at the adjacent Delaware Route 1 median opening, and then travel through or turn right at the opposite approach to the intersection.

Table 9 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Hudson Road/ Steamboat Landing Road (Sussex Road 258)						
2023 with development (Case 3) with DelDOT Improvement Project ¹⁴						
Eastbound Hudson Road Approach	-	-	-	D (33.7)	D (32.0)	F (337.2)
Westbound Steamboat Landing Road Approach	-	-	-	B (12.9)	C (19.3)	D (31.9)
Northbound Delaware Route 1 Left Turn	-	-	-	B (13.7)	C (16.7)	E (39.3)
Southbound Delaware Route 1 Left Turn	-	-	-	B (10.9)	C (16.3)	C (24.8)
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)						
Eastbound Hudson Road Approach	-	-	-	F (583.7)	F (749.3)	F (*)
Westbound Steamboat Landing Road Approach	-	-	-	C (24.2)	E (49.9)	F (242.0)
Northbound Delaware Route 1 Left Turn	-	-	-	B (13.4)	C (16.4)	E (37.9)
Southbound Delaware Route 1 Left Turn	-	-	-	A (9.6)	B (14.2)	C (21.3)
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b) with DelDOT Improvement Project ¹⁴						
Eastbound Hudson Road Approach	-	-	-	D (32.4)	D (31.1)	F (323.4)
Westbound Steamboat Landing Road Approach	-	-	-	B (12.7)	C (19.0)	D (30.9)
Northbound Delaware Route 1 Left Turn	-	-	-	B (13.5)	C (16.5)	E (38.5)
Southbound Delaware Route 1 Left Turn	-	-	-	B (10.8)	C (16.1)	C (24.3)

*HCS software reported delays longer than 1,000 seconds per vehicle.

Table 9 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS ⁴			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 1/Hudson Road/ Steamboat Landing Road (Sussex Road 258)						
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Eastbound Hudson Road Approach	-	-	-	F (587.6)	F (751.8)	F (*)
Westbound Steamboat Landing Road Approach	-	-	-	C (24.3)	E (49.9)	F (242.6)
Northbound Delaware Route 1 Left Turn	-	-	-	B (13.4)	C (16.4)	E (37.9)
Southbound Delaware Route 1 Left Turn	-	-	-	A (9.7)	B (14.2)	C (21.3)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c) <i>with DelDOT Improvement Project</i> ¹⁴						
Eastbound Hudson Road Approach	-	-	-	D (32.5)	D (31.1)	F (324.0)
Westbound Steamboat Landing Road Approach	-	-	-	B (12.8)	C (19.0)	D (31.0)
Northbound Delaware Route 1 Left Turn	-	-	-	B (13.5)	C (16.5)	E (38.5)
Southbound Delaware Route 1 Left Turn	-	-	-	B (10.8)	C (16.1)	C (24.4)

*HCS software reported delays longer than 1,000 seconds per vehicle.

Table 10
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/Samuel Paynter Boulevard ¹⁵						
2019 Existing (Case 1)						
Westbound Cave Neck Road Left Turn	A (8.2)	A (7.8)	A (7.8)	A (8.2)	A (7.8)	A (7.9)
Northbound Samuel Paynter Boulevard Approach	B (11.3)	B (10.7)	B (10.2)	B (11.3)	B (10.5)	B (10.2)
2023 without development (Case 2)						
Westbound Cave Neck Road Left Turn	A (8.6)	A (8.0)	A (8.1)	A (8.6)	A (8.1)	A (8.1)
Northbound Samuel Paynter Boulevard Approach	B (12.8)	B (12.2)	B (11.3)	B (12.7)	B (11.7)	B (11.2)
2023 with development (Case 3)						
Westbound Cave Neck Road Left Turn	A (8.9)	A (8.3)	A (8.3)	A (8.9)	A (8.3)	A (8.3)
Northbound Samuel Paynter Boulevard Approach	B (14.1)	B (13.5)	B (12.4)	B (13.9)	B (12.8)	B (12.2)
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)						
Westbound Cave Neck Road Left Turn	-	-	-	A (8.7)	A (8.1)	A (8.2)
Northbound Samuel Paynter Boulevard Approach	-	-	-	B (13.0)	B (12.0)	B (11.4)

¹⁵ The TIS modeled the northbound Samuel Paynter Boulevard approach as one shared left-turn/right-turn lane whereas JMT modeled as a separate left-turn and right-turn lane consistent with field conditions.

Table 10 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/Samuel Paynter Boulevard ¹⁵						
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Westbound Cave Neck Road Left Turn	-	-	-	A (8.8)	A (8.1)	A (8.2)
Northbound Samuel Paynter Boulevard Approach	-	-	-	B (13.1)	B (12.0)	B (11.4)

Table 11
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/E. Mill Run Road ¹⁶						
2019 Existing (Case 1)						
Westbound Cave Neck Road Left Turn	A (8.5)	A (7.7)	A (7.7)	A (8.2)	A (7.7)	A (7.7)
Northbound E. Mill Run Road Approach	B (11.3)	A (9.8)	B (10.0)	A (9.3)	A (8.6)	A (8.3)
2023 without development (Case 2)						
Westbound Cave Neck Road Left Turn	A (8.9)	A (7.9)	A (7.9)	A (8.6)	A (7.9)	A (8.0)
Northbound E. Mill Run Road Approach	B (12.8)	B (10.8)	B (11.1)	B (10.2)	A (9.1)	A (8.7)
2023 with development (Case 3)						
Westbound Cave Neck Road Left Turn	A (9.3)	A (8.1)	A (8.2)	A (8.9)	A (8.1)	A (8.2)
Northbound E. Mill Run Road Approach	B (14.3)	B (11.6)	B (12.2)	B (10.9)	A (9.5)	A (9.2)
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)						
Westbound Cave Neck Road Left Turn	-	-	-	A (8.7)	A (8.0)	A (8.0)
Northbound E. Mill Run Road Approach	-	-	-	B (10.4)	A (9.2)	A (8.8)

¹⁶ JMT configured the northbound E. Mill Run Road approach as a flared minor-street approach consistent with existing condition whereas the TIS did not.

Table 11 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/E. Mill Run Road ¹⁶						
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Westbound Cave Neck Road Left Turn	-	-	-	A (8.7)	A (8.0)	A (8.0)
Northbound E. Mill Run Road Approach	-	-	-	B (10.4)	A (9.2)	A (8.9)

Table 12
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/Old Grist Run						
2019 Existing (Case 1)						
Eastbound Cave Neck Road Left Turn	A (7.5)	A (7.7)	A (7.5)	A (7.5)	A (7.8)	A (7.6)
Westbound Cave Neck Road Left Turn	A (8.4)	A (7.7)	A (7.6)	A (8.1)	A (7.7)	A (7.7)
Northbound Old Grist Run Approach	B (11.4)	B (11.8)	B (10.6)	B (11.5)	B (11.8)	B (10.7)
Southbound Old Grist Run Approach	B (13.1)	B (11.3)	B (11.1)	B (13.0)	B (11.4)	B (11.2)
2023 without development (Case 2)						
Eastbound Cave Neck Road Left Turn	A (7.6)	A (8.3)	A (7.9)	A (7.6)	A (8.3)	A (7.9)
Westbound Cave Neck Road Left Turn	A (8.6)	A (7.8)	A (7.8)	A (8.3)	A (7.8)	A (7.8)
Northbound Old Grist Run Approach	B (12.9)	C (16.1)	B (13.0)	B (12.9)	C (16.1)	B (13.1)
Southbound Old Grist Run Approach	C (15.4)	C (15.1)	B (13.9)	C (15.3)	C (15.2)	B (14.0)
2023 with development (Case 3)						
Eastbound Cave Neck Road Left Turn	A (7.8)	A (8.5)	A (8.1)	A (7.8)	A (8.5)	A (8.1)
Westbound Cave Neck Road Left Turn	A (8.9)	A (8.0)	A (8.0)	A (8.6)	A (8.0)	A (8.0)
Northbound Old Grist Run Approach	B (14.7)	C (19.1)	C (15.2)	C (14.8)	C (19.0)	C (15.4)
Southbound Old Grist Run Approach	C (19.8)	C (17.9)	C (16.9)	C (19.6)	C (18.0)	C (17.0)

Table 12 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/Old Grist Run						
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.7)	A (8.3)	A (8.0)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.4)	A (7.9)	A (7.9)
Northbound Old Grist Run Approach	-	-	-	B (13.5)	C (16.9)	B (13.6)
Southbound Old Grist Run Approach	-	-	-	C (16.5)	C (16.0)	B (14.6)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.8)	A (8.3)	A (8.0)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.4)	A (7.9)	A (7.9)
Northbound Old Grist Run Approach	-	-	-	B (13.7)	C (17.0)	B (13.6)
Southbound Old Grist Run Approach	-	-	-	C (17.1)	C (16.1)	B (14.7)

Table 13
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Beulah Boulevard						
2019 Existing (Case 1)						
Westbound Cave Neck Road Left Turn	A (8.4)	A (7.7)	A (7.6)	A (8.1)	A (7.8)	A (7.7)
Northbound Beulah Boulevard Approach	B (11.4)	B (10.3)	B (10.1)	B (11.5)	B (10.4)	B (10.3)
2023 without development (Case 2)						
Westbound Cave Neck Road Left Turn	A (8.6)	A (8.2)	A (8.0)	A (8.3)	A (8.2)	A (8.0)
Northbound Beulah Boulevard Approach	B (13.7)	B (13.2)	B (12.2)	B (13.8)	B (13.3)	B (12.3)
2023 with development and without rights-in access (Case 3)						
Westbound Cave Neck Road Left Turn	A (8.9)	A (8.4)	A (8.2)	A (8.6)	A (8.4)	A (8.3)
Northbound Beulah Boulevard Approach	C (16.1)	B (14.9)	B (13.9)	C (16.2)	C (15.0)	B (14.1)
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)						
Westbound Cave Neck Road Left Turn	-	-	-	A (8.4)	A (8.3)	A (8.1)
Northbound Beulah Boulevard Approach	-	-	-	B (14.4)	B (13.8)	B (12.7)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Westbound Cave Neck Road Left Turn	-	-	-	A (8.4)	A (8.3)	A (8.1)
Northbound Beulah Boulevard Approach	-	-	-	B (14.7)	B (13.8)	B (12.8)

Table 14
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Sweetbriar Road (Sussex Road 261) ¹⁷						
2019 Existing (Case 1)						
Eastbound Cave Neck Road Left Turn	A (7.4)	A (7.7)	A (7.4)	A (7.4)	A (7.7)	A (7.5)
Westbound Cave Neck Road Left Turn	A (8.2)	A (8.0)	A (7.9)	A (8.2)	A (8.0)	A (8.0)
Northbound Sweetbriar Road Approach	C (16.6)	C (15.1)	B (12.8)	C (17.1)	C (15.7)	B (13.3)
2023 without development (Case 2)						
Eastbound Cave Neck Road Left Turn	A (7.7)	A (8.7)	A (7.6)	A (7.6)	A (7.8)	A (7.6)
Westbound Cave Neck Road Left Turn	A (8.6)	A (8.5)	A (8.3)	A (8.6)	A (8.5)	A (8.3)
Northbound Sweetbriar Road Approach	E (35.2)	D (27.6)	C (18.3)	E (38.2)	D (30.4)	C (19.4)
2023 without development (Case 2) <i>with Improvement Option I</i> ¹⁸						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.6)	A (7.8)	A (7.6)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.6)	A (8.5)	A (8.3)
Northbound Sweetbriar Road Approach	-	-	-	D (30.6)	C (24.5)	C (16.6)

¹⁷ The TIS configured westbound Cave Neck Road approach with a short left turn pocket with storage for nine vehicles and a shared through/right turn lane whereas the JMT modeled with a left turn lane and a shared through/right turn lane to be consistent with existing conditions.

¹⁸ Improvement Option I provides a shared left turn/through lane and a right turn lane along the eastbound Cave Neck Road.

Table 14 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Sweetbriar Road (Sussex Road 261) ¹⁷						
2023 without development (Case 2) with Improvement Option II ¹⁹						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.6)	A (7.8)	A (7.6)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.6)	A (8.5)	A (8.3)
Northbound Sweetbriar Road Left Turn/Through	-	-	-	D (33.7)	D (30.5)	C (19.2)
Northbound Sweetbriar Road Right Turn	-	-	-	B (11.6)	B (11.0)	B (10.5)
Northbound Sweetbriar Road Approach	-	-	-	D (28.3)	D (25.6)	C (16.9)
2023 without development (Case 2) with Improvement Option III ²⁰						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.6)	A (7.8)	A (7.6)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.6)	A (8.5)	A (8.3)
Northbound Sweetbriar Road Left turn	-	-	-	C (18.7)	C (20.6)	C (15.7)
Northbound Sweetbriar Road Through/Right Turn	-	-	-	B (14.0)	B (12.0)	B (11.3)
Northbound Sweetbriar Road Approach	-	-	-	C (15.7)	B (14.7)	B (12.7)

¹⁹ Improvement Option II provides a shared left turn/through lane and a right turn lane along the northbound Sweetbriar Road approach.

²⁰ Improvement Option III provides a left turn lane and a shared through/right turn lane along the northbound Sweetbriar Road approach.

Table 14 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Sweetbriar Road (Sussex Road 261) ¹⁷						
2023 with development (Case 3)						
Eastbound Cave Neck Road Left Turn	A (7.8)	A (8.0)	A (7.7)	A (7.7)	A (7.9)	A (7.8)
Westbound Cave Neck Road Left Turn	A (8.7)	A (8.7)	A (8.5)	A (8.8)	A (8.7)	A (8.6)
Northbound Sweetbriar Road Approach	F (52.1)	E (39.6)	C (23.8)	F (58.4)	E (46.4)	D (26.0)
2023 with development (Case 3) with Improvement Option I ¹⁸						
Eastbound Cave Neck Road Left Turn	A (7.8)	A (8.0)	A (7.7)	A (7.7)	A (7.7)	A (7.8)
Westbound Cave Neck Road Left Turn	A (8.7)	A (8.2)	A (8.0)	A (8.8)	A (8.7)	A (8.6)
Northbound Sweetbriar Road Approach	E (40.8)	D (31.1)	C (19.6)	E (44.7)	D (34.4)	C (21.2)
2023 with development (Case 3) with Improvement Option II ¹⁹						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.7)	A (7.9)	A (7.8)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.8)	A (8.7)	A (8.6)
Northbound Sweetbriar Road Left Turn/Through	-	-	-	E (48.4)	E (44.8)	D (25.7)
Northbound Sweetbriar Road Right Turn	-	-	-	B (12.3)	B (11.6)	B (11.1)
Northbound Sweetbriar Road Approach	-	-	-	E (37.8)	D (34.9)	C (20.9)

Table 14 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Sweetbriar Road (Sussex Road 261) ¹⁷						
<i>2023 with development (Case 3) with Improvement Option III ²⁰</i>						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.7)	A (7.9)	A (7.8)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.8)	A (8.7)	A (8.6)
Northbound Sweetbriar Road Left Turn	-	-	-	C (22.2)	D (25.4)	C (19.1)
Northbound Sweetbriar Road Through/Right Turn	-	-	-	C (15.0)	B (12.9)	B (12.1)
Northbound Sweetbriar Road Approach	-	-	-	C (16.6)	C (16.6)	B (14.1)
<i>2023 without development (Case 2) with Improvement Option IV ²¹</i>						
Westbound Cave Neck Road Left Turn	-	-	-	A (8.6)	A (8.5)	A (8.3)
Northbound Sweetbriar Road Approach	-	-	-	D (30.3)	D (25.4)	C (17.4)
<i>2023 without development (Case 2) with Improvement Option V ²²</i>						
Westbound Cave Neck Road Left Turn	-	-	-	A (8.2)	A (8.0)	A (7.8)
Northbound Sweetbriar Road Left Turn	-	-	-	C (22.8)	C (20.9)	C (15.2)
Northbound Sweetbriar Road Right Turn	-	-	-	B (11.0)	B (10.3)	A (9.8)
Northbound Sweetbriar Road Approach	-	-	-	C (19.9)	C (18.3)	B (13.7)

²¹ Improvement Option IV scenario includes the closure of the northerly leg of the intersection and the realignment of northbound Sweetbriar Road approximately 350 feet east of the existing location with a shared left turn/right turn lane along northbound Sweetbriar Road, a shared right turn/through lane along eastbound Cave Neck Road, and a left turn lane and a through lane along westbound Cave Neck Road.

²² Improvement Option V includes the closure of the northerly leg of the intersection and the realignment of Sweetbriar Road approximately 350 feet east of the existing location. The improvement provides a channelized right turn lane and a through lane along eastbound Cave Neck Road and a left turn lane and a channelized right turn lane along northbound Sweetbriar Road.

Table 14 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Sweetbriar Road (Sussex Road 261) ¹⁷						
2023 with development (Case 3) with Improvement Option IV ²¹						
Westbound Cave Neck Road Left Turn	-	-	-	A (8.8)	A (8.7)	A (8.6)
Northbound Sweetbriar Road Approach	-	-	-	E (43.6)	E (35.9)	C (22.5)
2023 with development (Case 3) with Improvement Option V ²²						
Westbound Cave Neck Road Left Turn	-	-	-	A (8.8)	A (8.2)	A (8.0)
Northbound Sweetbriar Road Left Turn	-	-	-	D (29.8)	D (27.0)	C (18.7)
Northbound Sweetbriar Road Right Turn	-	-	-	B (11.6)	B (10.8)	B (10.3)
Northbound Sweetbriar Road Approach	-	-	-	C (24.4)	C (22.2)	C (16.0)
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.6)	A (7.9)	A (7.7)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.6)	A (8.6)	A (8.4)
Northbound Sweetbriar Road Approach	-	-	-	E (37.8)	D (34.3)	C (20.7)

Table 14 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Sweetbriar Road (Sussex Road 261) ¹⁷						
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b) with Improvement Option III ²⁰						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.6)	A (7.9)	A (7.7)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.6)	A (8.6)	A (8.4)
Northbound Sweetbriar Road Left Turn	-	-	-	C (19.0)	C (21.9)	C (16.5)
Northbound Sweetbriar Road Through/Right Turn	-	-	-	B (13.9)	B (12.3)	B (11.5)
Northbound Sweetbriar Road Approach	-	-	-	C (15.1)	C (15.2)	B (13.0)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.7)	A (7.9)	A (7.7)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.6)	A (8.6)	A (8.4)
Northbound Sweetbriar Road Approach	-	-	-	E (41.5)	D (34.7)	C (20.9)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c) with Improvement Option III ²⁰						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.7)	A (7.9)	A (7.7)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.6)	A (8.6)	A (8.4)
Northbound Sweetbriar Road Left Turn	-	-	-	C (19.8)	C (22.0)	C (16.5)
Northbound Sweetbriar Road Through/Right Turn	-	-	-	D (26.0)	C (22.0)	C (16.4)
Northbound Sweetbriar Road Approach	-	-	-	C (24.5)	C (22.0)	C (16.5)

Table 15
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Hudson Road						
2019 Existing (Case 1)						
Eastbound Cave Neck Road Left Turn	A (7.5)	A (7.8)	A (7.5)	A (7.5)	A (7.7)	A (7.5)
Westbound Cave Neck Road Left Turn	A (8.1)	A (7.7)	A (7.7)	A (8.0)	A (7.7)	A (7.8)
Northbound Hudson Road Approach	B (14.7)	B (14.1)	B (12.6)	B (14.8)	B (14.2)	B (12.6)
Southbound Hudson Road Approach	C (20.2)	C (21.4)	C (15.9)	C (19.6)	C (21.9)	C (16.4)
2023 without development (Case 2) ²³						
Eastbound Cave Neck Road Left Turn	A (7.6)	A (7.7)	A (7.6)	A (7.6)	A (7.8)	A (7.6)
Westbound Cave Neck Road Left Turn	A (8.3)	A (7.9)	A (7.9)	A (8.2)	A (8.0)	A (8.0)
Northbound Hudson Road Approach	D (33.5)	C (22.2)	C (18.7)	D (33.5)	D (27.1)	C (18.8)
Southbound Hudson Road Approach	F (91.2)	F (128.1)	F (54.2)	F (82.7)	F (205.1)	F (54.4)
2023 with development (Case 3)						
Eastbound Cave Neck Road Left Turn	A (7.6)	A (8.0)	A (7.6)	A (7.6)	A (7.9)	A (7.6)
Westbound Cave Neck Road Left Turn	A (8.4)	A (8.0)	A (8.1)	A (8.3)	A (8.0)	A (8.1)
Northbound Hudson Road Approach	E (42.1)	E (37.9)	C (22.7)	E (41.2)	E (37.4)	C (22.8)
Southbound Hudson Road Approach	F (165.6)	F (364.7)	F (124.8)	F (147.3)	F (362.8)	F (125.0)

²³ During the PM peak hour, the TIS utilized AM peak hour volumes along the westbound Cave Neck Road approach whereas JMT utilized PM peak hour volumes consistent with the volume diagrams.

Table 15 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Hudson Road						
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.6)	A (7.8)	A (7.6)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.2)	A (8.0)	A (8.0)
Northbound Hudson Road Approach	-	-	-	D (31.6)	D (29.6)	C (19.6)
Southbound Hudson Road Approach	-	-	-	F (77.1)	F (248.2)	F (66.0)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.6)	A (7.8)	A (7.6)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.3)	A (8.0)	A (8.0)
Northbound Hudson Road Approach	-	-	-	D (33.8)	D (29.5)	C (19.7)
Southbound Hudson Road Approach	-	-	-	F (89.1)	F (248.4)	F (67.7)

Table 15 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection All-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Hudson Road ²⁴						
2023 without development (Case 2)	-	-	-	C (15.9)	C (18.0)	B (12.4)
2023 with development (Case 3)	C (22.9)	C (23.1)	B (14.1)	C (16.4)	C (23.1)	B (14.1)
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)	-	-	-	C (14.6)	C (19.2)	B (12.7)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)	-	-	-	B (14.9)	C (19.2)	B (12.8)

Table 15 (continued)
Peak Hour Levels Of Service (LOS)

Roundabout ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Hudson Road ²⁵						
2023 without development (Case 2)	-	-	-	A (6.6)	A (7.0)	A (6.0)
2023 with development (Case 3)	A (7.2)	A (7.5)	A (6.4)	A (6.9)	A (7.5)	A (6.4)

²⁴ Improvement scenario provides an all-way stop control while maintaining existing lane configurations.

²⁵ Improvement scenario provides a single lane roundabout.

Table 15 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Hudson Road						
<i>2023 without development (Case 2) with Improvement Option IV or V ^{21, 22}</i>						
Eastbound Cave Neck Road Left Turn	-	-	-	A (7.9)	A (8.1)	A (7.8)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.2)	A (8.0)	A (8.0)
Northbound Hudson Road Approach	-	-	-	E (42.0)	E (35.5)	C (21.9)
Southbound Hudson Road Approach	-	-	-	F (104.8)	F (286.9)	F (76.7)
<i>2023 with development (Case 3) with Improvement Option IV or V ^{21, 22}</i>						
Eastbound Cave Neck Road Left Turn	-	-	-	A (8.0)	A (8.2)	A (7.9)
Westbound Cave Neck Road Left Turn	-	-	-	A (8.3)	A (8.0)	A (8.1)
Northbound Hudson Road Approach	-	-	-	F (71.2)	F (55.7)	D (27.9)
Southbound Hudson Road Approach	-	-	-	F (288.6)	F (493.5)	F (184.3)

Table 15 (continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection All-Way Stop Control ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Hudson Road ²⁴						
2023 without development (Case 2) with Improvement Option IV or V ^{21, 22}	-	-	-	C (17.9)	D (26.9)	B (14.0)
2023 with development (Case 3) with Improvement Option IV or V ^{21, 22}	-	-	-	D (25.6)	E (42.2)	C (17.2)

Table 15 (continued)
Peak Hour Levels Of Service (LOS)

Roundabout ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Cave Neck Road/ Hudson Road ²⁵						
2023 without development (Case 2) with Improvement Option IV or V ^{21, 22}	-	-	-	A (6.7)	A (7.4)	A (6.2)
2023 with development (Case 3) with Improvement Option IV or V ^{21, 22}	-	-	-	A (7.4)	A (7.9)	A (6.7)

Table 16
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Chappell Farm
Report Dated: February 2020
Prepared By: Becker Morgan Group, Inc.

Unsignalized Intersection Two-Way Stop Control (T-intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Hudson Road/Walker Road (Sussex Road 260)						
2019 Existing (Case 1)						
Eastbound Walker Road Approach	A (9.6)	A (9.8)	A (9.5)	A (9.6)	A (9.8)	A (9.6)
Northbound Hudson Road Left Turn	A (7.5)	A (7.6)	A (7.4)	A (7.6)	A (7.6)	A (7.5)
2023 without development (Case 2)						
Eastbound Walker Road Approach	B (10.9)	B (11.2)	B (11.1)	B (10.9)	B (11.2)	B (11.2)
Northbound Hudson Road Left Turn	A (7.9)	A (7.9)	A (7.8)	A (7.9)	A (8.0)	A (7.9)
2023 with development (Case 3)						
Eastbound Walker Road Approach	B (11.6)	B (11.8)	B (11.5)	B (11.6)	B (11.8)	B (11.5)
Northbound Hudson Road Left Turn	A (8.0)	A (8.0)	A (7.9)	A (8.0)	A (8.0)	A (7.9)
2023 with Convenience Store with Gas only, with/without rights-in access, and with/without a Connector Road (Cases 4a and 4b)						
Eastbound Walker Road Approach	-	-	-	B (11.2)	B (11.4)	B (11.0)
Northbound Hudson Road Left Turn	-	-	-	A (7.9)	A (8.0)	A (7.8)
2023 with Convenience Store with Gas and Residential, without rights-in access, and with a Connector Road (Case 4c)						
Eastbound Walker Road Approach	-	-	-	B (11.2)	B (11.4)	B (11.0)
Northbound Hudson Road Left Turn	-	-	-	A (8.0)	A (8.0)	A (7.8)