



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

JENNIFER COHAN
SECRETARY

August 20, 2018

Mr. Eric Ostimchuk
Traffic Planning and Design, Inc.
2500 East High Street
Suite 650
Pottstown, PA 19464

Dear Mr. Ostimchuk:

The enclosed Traffic Operational Analysis (TOA) review letter for the proposed **Hatteras Hills** (Tax Parcels SM-00-113.18-01-01.00 through 99.00, SM-00-113.18-02-01.00 through 99.00, SM-00-113.18-03-01.00 through 43.00, SM-00-122.01-02-01.00 through 47.00) development has been completed under the responsible charge of a registered professional engineer whose firm is authorized to work in the State of Delaware. They have found the TOA to conform to DelDOT's Development Coordination Manual and other accepted practices and procedures for such studies. DelDOT accepts this review letter and concurs with the recommendations. If you have any questions concerning this letter or the enclosed review letter, please contact me at (302) 760-2167.

Sincerely,

Troy Brestel
Project Engineer

TEB:km

Enclosures

cc with enclosures: Mr. Michael Hoffman, Tarabicos Grosso, L.L.P.
Ms. Constance C. Holland, Office of State Planning Coordination
Ms. Sarah Keifer, Director, Kent County Department of Planning Services
Mr. Andrew Parker, McCormick Taylor, Inc.
DelDOT Distribution

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Brad Eaby, Deputy Attorney General
Robert McCleary, Director, Transportation Solutions (DOTS)
Drew Boyce, Director, Planning
Mark Luszcz, Chief Traffic Engineer, Traffic, DOTS
Michael Simmons, Assistant Director, Project Development South, DOTS
J. Marc Coté, Assistant Director, Development Coordination
T. William Brockenbrough, Jr., County Coordinator, Development Coordination
Peter Haag, Traffic Studies Manager, Traffic, DOTS
Thomas Greve, Central District Engineer, Central District
Richard McCabe, Central District Public Works Engineer, Central District
Stephen Wright, Kent Subdivision Coordinator, Development Coordination
David Dooley, Service Development Planner, Delaware Transit Corporation
Mark Galipo, Traffic Engineer, Traffic, DOTS
Anthony Aglio, Planning Supervisor, Statewide & Regional Planning
Joshua Schwartz, Kent Subdivision Reviewer, Development Coordination
Claudy Joinville, Project Engineer, Development Coordination



August 16, 2018

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

RE: Agreement No. 1773
Traffic Impact Study Services
Task No. 1A Subtask 11A – Hatteras Hills

Dear Mr. Brestel:

McCormick Taylor has completed its review of the Traffic Operational Analysis (TOA) for the Hatteras Hills residential development prepared by Traffic Planning and Design, Inc. (TPD), dated April 23, 2018. TPD prepared the report in a manner generally consistent with DelDOT's *Development Coordination Manual* and DelDOT's scoping letter dated July 5, 2017, with exceptions as noted in this review.

The TOA evaluates the impacts of the Hatteras Hills residential development, proposed to be located in the southwest quadrant of the intersection of Clapham Road (Kent Road 27) and Sophers Row (Kent Road 377) in Kent County, Delaware. The proposed development would consist of 259 age-restricted detached houses on 97 acres of land. One full access point is proposed on Sophers Row. The land is currently zoned AC (agricultural conservation) within Kent County, and the developer seeks rezoning to RS-1 (single family residential) and RS-5 (medium density residential).

While the above information pertains to the proposed Hatteras Hills development, this TOA evaluated combined impacts from both the Hatteras Hills development and the adjacent proposed Chaselynd Hills development. Chaselynd Hills is currently proposed to consist of 206 single family detached houses, and would be located in the northwest quadrant of Clapham Road and Sophers Row. The TOA study area was limited to only the intersection of Clapham Road and Sophers Row. Specifically, the TOA investigated the need for and length of turn lanes, as well as a potential traffic signal, at that intersection.

A TIS was previously completed and reviewed in 2005 for Webb Properties, which was the combined development of what is now known as Hatteras Hills and Chaselynd Hills. Some or all of the improvements recommended as part of that review are anticipated to be required for plan approval, but it is noted that assumptions, analyses and/or improvements associated with the Webb Properties TIS are not part of the current Hatteras Hills TOA that is focused on turn lanes and a potential traffic signal at the intersection of Clapham Road and Sophers Row.

DelDOT currently has one active project that impacts the study area. DelDOT's SR 1, Little Heaven Grade Separated Intersection project is currently under construction under State Contract



No. T200412202. This project will create a grade-separated intersection to eliminate multiple existing at-grade intersections on Delaware Route 1 in the Little Heaven area, including the one at Clapham Road. As impacts from the Little Heaven interchange project affected 2017 traffic counts at Clapham Road and Sophers Row, historical traffic count data was also used to make adjustments as needed and establish “existing volumes” at this intersection. Furthermore, DelDOT determined Design Year 2037 projected through volumes on Clapham Road with the interchange project completed, and these volumes were supplied to TPD for use in this TOA.

Based on our review of this TOA, we have the following comments and recommendations:

The following intersections exhibit level of service (LOS) deficiencies without the implementation of physical roadway and/or traffic control improvements:

<i>Intersection</i>	<i>Existing Traffic Control</i>	<i>Situations for which deficiencies occur</i>
Clapham Road and Sophers Row	One-way stop control (T-intersection)	2037 AM and PM with development (case 2)

The unsignalized intersection of Clapham Road and Sophers Row exhibits LOS deficiencies during future conditions with the proposed development. The eastbound Sophers Row approach is expected to operate at LOS F with queues exceeding 800 feet long during both weekday peak hours for 2037 design year conditions. The applicant proposes to mitigate these LOS deficiencies by constructing a dedicated northbound left-turn lane, which is warranted in existing conditions, and contributing its proportionate share, based on projected future trips, toward DelDOT’s Traffic Signal Revolving Fund for future installation of a traffic signal at this intersection. The signalized intersection, which is not currently warranted but would be sometime before the 2037 design year, would alleviate LOS deficiencies in the future design year condition for both weekday peak hours.

Should the County choose to approve the proposed development, the following items should be incorporated into the site design and reflected on the record plan by note or illustration. All applicable agreements (i.e. letter agreements for off-site improvements and traffic signal agreements) should be executed prior to entrance plan approval for the proposed development. It is important to note the items below represent only a partial list of recommendations for this development, because this TOA was focused solely on the intersection of Clapham Road and Sophers Row. As such, the items below are only associated with that intersection and not with any other on-site or off-site improvements that may be needed, which have been or will be determined through other previous and/or future efforts.

1. The developer should improve the intersection of Clapham Road and Sophers Row. The proposed configuration is shown in the table below.

Approach	Current Configuration	Proposed Configuration
Northbound Clapham Road	One shared left-turn/through lane and one bypass lane	One left-turn lane and one through lane
Southbound Clapham Road	One through lane and one right-turn lane	One through lane and one right-turn lane
Eastbound Sophers Row	One shared left-turn/right-turn lane	One left-turn lane and one right-turn lane

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

Approach	Left-Turn Lane	Right-Turn Lane
Northbound Clapham Road	235 feet *	N/A
Southbound Clapham Road	N/A	350 feet *
Eastbound Sophers Row	N/A	225 feet **

* initial turn lane length based on DelDOT’s *Auxiliary Lane Worksheet* for the 2017 unsignalized with development condition, which is longer than the length needed for the future signalized condition

** initial turn-lane length based on storage length per queuing analysis for future signalized condition. Also see comment below.

Based on additional coordination between the developer and DelDOT subsequent to the TOA submission, to minimize impacts on the adjacent property DelDOT has agreed that the new right-turn lane on eastbound Sophers Row will be 105 feet long with a 30-foot taper. This will be a channelized right-turn lane with a mountable concrete pork-chop island.

2. The developer should enter into a traffic signal agreement with DelDOT to fund an equitable portion of a signal at the intersection of Clapham Road and Sophers Row when DelDOT determines that it is warranted. The agreement should include pedestrian signals, crosswalks, interconnection, and ITS equipment such as CCTV cameras at DelDOT’s discretion. One or more developers may enter into a traffic signal agreement for this intersection. The potential installation of a traffic signal at this intersection will be discussed further during site plan review. Discussions at that time will include design details and potential installation schedule for the signalized condition.



Improvements in this TOA may be considered “significant” under DelDOT’s *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DelDOT’s website at http://deldot.gov/Publications/manuals/de_mutcd/index.shtml.

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

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

Sincerely,

McCormick Taylor, Inc.

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

Andrew J. Parker, P.E., PTOE
Project Manager

Enclosure

General Information

Report date: April 23, 2018

Prepared by: Traffic Planning and Design, Inc.

Prepared for: Investors Realty, Inc.

Tax parcel: SM-00-113.18-01-01.00 through SM-00-113.18-01-99.00, SM-00-113.18-02-01.00 through SM-00-113.18-02-99.00, SM-00-113.18-03-01.00 through SM-00-113.18-03-43.00, SM-00-122.01-02-01.00 through SM-00-122.01-02-47.00

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

Project Description and Background

Description: The proposed residential development would include 259 age-restricted detached homes

Location: The Hatteras Hills residential development is proposed to be located on the southwest quadrant of the intersection of Clapham Road (Kent Road 27) and Sophers Row (Kent Road 377) in Kent County, Delaware.

Amount of land to be developed: approximately 97 acres

Land use approval(s) needed: Subdivision approval and rezoning. The land is currently zoned AC (agricultural conservation) within Kent County, and the developer seeks rezoning to RS-1 (single family residential) and RS-5 (medium density residential).

Proposed completion date: unknown. Design Year of 2037 was used for traffic analysis.

Proposed access locations: One full access point is proposed on Sophers Row.

Daily Traffic Volumes (per DelDOT Traffic Summary 2017):

- 2017 Average Annual Daily Traffic on Clapham Road: 8,679 vpd
- 2017 Average Annual Daily Traffic on Sophers Row: 723 vpd

2015 Delaware Strategies for State Policies and Spending

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

Investment Level 2 has many diverse characteristics. These areas can be composed of less developed areas within municipalities, rapidly growing areas in the counties that have or will have public water and wastewater services and utilities, areas that are generally adjacent to or near Investment Level 1 Areas, smaller towns and rural villages that should grow consistently with their historic character, and suburban areas with public water, wastewater, and utility services. These areas have been shown to be the most active portion of Delaware's developed landscape. They serve as transition areas between Level 1 and the state's more open, less populated areas. They generally contain a limited variety of housing types, predominantly detached single-family dwellings.

In Investment Level 2 Areas, like Investment Level 1 Areas, state investments and policies should support and encourage a wide range of uses and densities, promote other transportation options, foster efficient use of existing public and private investments, and enhance community identity and integrity.

Investments should encourage departure from the typical single-family-dwelling developments and promote a broader mix of housing types and commercial sites encouraging compact, mixed-use development where applicable. Overall, the State's intent is to use its spending and management tools to promote well-designed development in these areas. Such development provides for a variety of housing types, user-friendly transportation systems, and provides essential open spaces and recreational facilities, other public facilities, and services to promote a sense of community. Level 2 Areas would be a prime location for designating "pre-permitted areas."

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

The proposed Hatteras Hills residential development is comprised of 259 age-restricted detached homes and is located within an Investment Level 2 area. Investment Level 2 reflects areas where growth is anticipated by local, county, and State plans in the near term future. As such, the proposed development generally appears to comply with the guidelines of Investment Level 2 areas as described in the 2015 "Strategies for State Policies and Spending."

Relevant Projects in the DelDOT Capital Transportation Program

DelDOT currently has one active project that impacts the study area. DelDOT's SR 1, Little Heaven Grade Separated Intersection project is currently under construction under State Contract No. T200412202. This project will create a grade-separated intersection to eliminate multiple existing at-grade intersections on Delaware Route 1 in the Little Heaven area, including the one at Clapham Road. As impacts from the Little Heaven interchange project affected 2017 traffic counts at Clapham Road and Sophers Row, historical traffic count data was also used to make adjustments as needed and establish "existing volumes" at this intersection. Furthermore,

DelDOT determined Design Year 2037 projected through volumes on Clapham Road with the interchange project completed, and these volumes were supplied to TPD for use in this TOA.

Trip Generation

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

- 259 Senior-Adult Detached Houses (ITE Land Use Code 251)

Table 1
HATTERAS HILLS PEAK HOUR TRIP GENERATION

Land Use	Weekday AM Peak Hour			Weekday PM Peak Hour		
	In	Out	Total	In	Out	Total
259 Senior-Adult Detached Houses	26	48	74	56	36	92
TOTAL TRIPS	26	48	74	56	36	92

Table 2
HATTERAS HILLS DAILY TRIP GENERATION

Land Use	Weekday Daily		
	In	Out	Total
259 Senior-Adult Detached Houses	552	552	1104
TOTAL TRIPS	552	552	1104

Overview of TOA

Intersections examined:

- 1) Clapham Road & Sophers Row

Conditions examined:

- 1) 2017 with Hatteras Hills and Chaselynd Hills (case 1)
- 2) 2037 with Hatteras Hills, Chaselynd Hills and other future development (case 2)

Peak hours evaluated: Weekday morning and evening peak hours

Committed developments considered:

- 1) Chaselynd Hills (206 single-family detached houses)
- 2) Estates at Double Run Creek (299 single-family detached houses)
- 3) Thornberry Crossing (56 single-family detached houses)

- 4) Brockonbridge Village (161 single-family detached houses)

Intersection Descriptions

1) Clapham Road & Sophers Row

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

Northbound approach: (Clapham Road) one shared left-turn/through lane and one bypass lane

Southbound approach: (Clapham Road) one through lane and one right-turn lane

Eastbound approach: (Conleys Chapel Road) one shared left/right-turn lane, stop-controlled

Safety Evaluation

Crash Data: Not evaluated as part of this TOA.

Sight Distance: The study area generally consists of straight and flat roadways and, and there are few potential sight distance obstructions. It appears there is a slight sight distance issue at the intersection of that could affect drivers on the Sophers Row approach. Embankment and vegetation on the northwest corner of the intersection may obstruct sight distance for drivers looking left when stopped on Sophers Row, although it appears there is room for drivers to move up closer to Clapham Road to improve their sight distance.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: The closest transit stops are located on Clapham Road about $\frac{3}{4}$ mile in either direction from the intersection with Sophers Row. These stops are served by DART bus route 303. The route runs between Dover and Georgetown and operates Monday-Friday from approximately 5am-9pm. Route 303 makes 11 trips in each direction daily, with service times focused on the morning, afternoon, and evening peak periods.

Planned transit service: Not evaluated as part of this TOA.

Existing bicycle and pedestrian facilities: According to the Kent County bicycle map, Clapham Road is classified as a “high traffic statewide bicycle route with a bikeway.” Sophers Row is not classified as a bike route. Clapham Road has shoulders; Sophers Row does not.

There are no existing pedestrian facilities in the immediate vicinity of this intersection.

Planned bicycle and pedestrian facilities: Not evaluated as part of this TOA.

Previous Comments

Several comments from DelDOT’s scoping letter dated July 5, 2017 were handled differently in the final TOA submission. These include determination of length of turn lanes (scoping letter

states they should be based on full development in the design year), consistency of proposed Chaselynd Hills land use, and determination of when a signal would be warranted at the intersection.

General HCS Analysis Comments

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

- 1) For unsignalized intersections, the TOA and McCormick Taylor applied heavy vehicle factors (HV) by movement using existing data combined with additional volume to be generated by proposed residential developments that assume zero heavy vehicles. For signalized intersections, McCormick Taylor applied HV by lane group using the above methodology. It is unknown how the TOA determined HV factors used for signalized intersection analysis.
- 2) For existing conditions, the TOA and McCormick Taylor determined and utilized overall intersection peak hour factors (PHF). For future conditions, the TOA and McCormick Taylor assumed a PHF of 0.92 based on the Development Coordination Manual (Section 2.2.8.11.6.F.).
- 3) For analyses of all intersections, the TOA and McCormick Taylor used a base saturation flow rate of 1,750 pc/hr/ln per DeIDOT's Development Coordination Manual.
- 4) The TOA and McCormick Taylor used different signal timing parameters in some instances when conducting signalized intersection analysis.

Table 3
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Hatteras Hills
Report dated April 23, 2018
Prepared by Traffic Planning and Design, Inc.

Unsignalized Intersection ¹ One-Way Stop Control (T-intersection)	LOS per TOA		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Clapham Road & Sophers Row				
2017 with HH and CH (case 1)				
Northbound Clapham Road - Left	A (8.2)	A (9.3)	A (8.2)	A (9.3)
Eastbound Sophers Row	C (23.3)	D (34.5)	C (23.3)	D (34.5) ²
2037 with HH, CH and other developments (case 2)				
Northbound Clapham Road - Left	-	-	A (9.5)	B (13.9) ³
Eastbound Sophers Row	-	-	F (718.8) ⁴	F (1480.6) ⁵
2037 with HH, CH and other developments (case 2) with improvement option 1 ⁶				
Northbound Clapham Road - Left	-	-	A (9.5)	B (13.9) ⁷
Eastbound Sophers Row	-	-	F (320.6) ⁸	F (770.5) ⁹

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

² The 95th percentile queue length is expected to be approximately 4 vehicles (100 feet) long.

³ The 95th percentile queue length is expected to be approximately 2 vehicles (50 feet) long.

⁴ The 95th percentile queue length is expected to be approximately 41 vehicles (1025 feet) long.

⁵ The 95th percentile queue length is expected to be approximately 33 vehicles (825 feet) long.

⁶ Improvement Option 1 consists of adding a lane on the eastbound Sophers Row approach, such that it would have one left-turn lane and one right-turn lane.

⁷ The 95th percentile queue length is expected to be approximately 2 vehicles (50 feet) long.

⁸ The 95th percentile queue length is expected to be approximately 22 vehicles (550 feet) long for the left-turn lane.

⁹ The 95th percentile queue length is expected to be approximately 19 vehicles (475 feet) long for the left-turn lane.

Table 3 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Hatteras Hills
Report dated April 23, 2018
Prepared by Traffic Planning and Design, Inc.

Signalized Intersection ¹⁰	LOS per TOA ¹¹		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Clapham Road & Sophers Row				
2037 with HH, CH and other developments (case 2)	C (34.1)	C (34.8)	C (26.2) ¹²	C (28.8) ¹³
2037 with HH, CH and other developments (case 2) with improvement option 1 ¹⁴	-	-	B (15.2) ¹⁵	B (16.2) ¹⁶

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

¹¹ TOA analysis assumed one shared left/right-turn lane on the eastbound approach.

¹² The 95th percentile queue length on the eastbound approach is expected to be approximately 15 vehicles (375 feet) long.

¹³ The 95th percentile queue length on the eastbound approach is expected to be approximately 11 vehicles (275 feet) long.

¹⁴ Improvement Option 1 consists of adding a lane on the eastbound Sophers Row approach, such that it would have one left-turn lane and one right-turn lane.

¹⁵ The 95th percentile queue length for the eastbound left-turn lane is expected to be approximately 9 vehicles (225 feet) long.

¹⁶ The 95th percentile queue length for the eastbound left-turn lane is expected to be approximately 8 vehicles (200 feet) long.