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

JENNIFER COHAN
SECRETARY

December 7, 2016

Mr. D.J. Hughes
Davis, Bowen & Friedel, Inc.
23 North Walnut Street
Milford, DE 19963

Dear Mr. Hughes:

The enclosed Traffic Impact Study (TIS) review letter for the **Harbourtowne (f.k.a. Erb Property)** residential development (Tax Parcels 8-08-141.00-01-01.00-00001) has been completed under the responsible charge of a registered professional engineer whose firm is authorized to work in the State of Delaware. The recommendations contained in the enclosed letter replace those listed in our December 22, 2006 letter (copy enclosed). 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. Jon Derryberry, Davis, Bowen & Friedel, Inc.
Ms. Sarah Keifer, Division of Planning, Kent County Levy Court
Mr. Andrew Parker, McCormick Taylor, Inc.
DelDOT Distribution

DelDOT

DelDOT Distribution

Ms. Annie Cordo, Deputy Attorney General
Mr. Robert McCleary, Director, Transportation Solutions (DOTS)
Mr. Drew Boyce, Director, Planning
Mr. Mark Luszcz, Chief Traffic Engineer, Traffic, DOTS
Mr. Michael Simmons, Assistant Director, Project Development South, DOTS
Mr. J. Marc Coté, Assistant Director, Development Coordination
Mr. T. William Brockenbrough, Jr., County Coordinator, Development Coordination
Mr. Peter Haag, Traffic Studies Manager, Traffic, DOTS
Mr. Adam Weiser, Safety Engineer, Traffic, DOTS
Mr. David Dooley, Service Development Planner, Delaware Transit Corporation
Mr. Anthony Aglio, Planning Supervisor, Statewide & Regional Planning
Ms. Wendy Polasko, Acting Kent County Subdivision Coordinator, Development Coordination
Mr. Joshua Schwartz, Subdivision Manager, Development Coordination
Mr. Claudy Joinville, Project Engineer, Development Coordination

McCORMICK TAYLOR

July 29, 2016

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

RE: Agreement No. 1294
Traffic Impact Study Review Services
Task No. 99 – Harbourtowne (aka Erb Property)

Dear Mr. Brestel:

McCormick Taylor has completed its review of the Traffic Impact Study (TIS) for the development of Harbourtowne prepared by Davis, Bowen, & Friedel, Inc., dated March 2006. This review was assigned as Task Number 99. Davis, Bowen, & Friedel, Inc. prepared the report in a manner generally consistent with DelDOT's *Rules and Regulations for Subdivision Streets*.

The TIS evaluates the impacts of the development of Harbourtowne, in the Town of Frederica, Kent County, Delaware. Originally, and as analyzed in the TIS, the proposed development would include 384 single-family detached houses. After the analysis was complete, the proposed development was modified to consist of 169 single-family detached houses and 166 townhouses. This revised land use would result in a net reduction of approximately 70 trips during the morning peak hour and 100 trips during the evening peak hour. Since the revised land use resulted in a net reduction in trips, additional analysis is not required. This development is located west of Market Street (Kent Road 289) and south of Delaware Route 12 (Canterbury Road) on the southern side of the Town of Frederica. The developer has proposed two access points; one on Jackson Street and one on Market Street. Construction of this project is anticipated to be complete by 2025.

This review letter serves to replace the earlier review letter for this project, which was dated December 19, 2006. The project has been on hold since then, and along with changes to the nearby land use, transportation infrastructure and traffic volumes, coordination has taken place leading to a new set of recommendations for improvements (as described below), which replace the recommendations in the December 19, 2006 letter.

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

1. The developer should enter into a traffic signal agreement with DelDOT for the intersection of Delaware Route 15 and Carpenter Bridge Road. The agreement should include pedestrian signals, crosswalks, interconnection, and ITS equipment such as

CCTV cameras at DelDOT's discretion. One or more other developers may enter into a traffic signal agreement for this intersection as well. The developer should coordinate with DelDOT on the implementation and equitable cost sharing of the traffic signal. Alternatively, the developer may contribute to the Traffic Signal Revolving Fund.

2. The developer should improve Market Street from the north site limit to Murderkill River Bridge to match the existing section north of the site. The developer should provide a bituminous concrete overlay to the existing travel lanes, at DelDOT's discretion. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer if necessary.

3. The following bicycle, pedestrian, and transit improvements should be included:

   a. A right-turn yield to bikes sign (MUTCD R4-4) should be added at the start of any right-turn lanes added along the site frontage.
   b. Adjacent to any right-turn lanes added along the site frontage, a minimum of a five foot bicycle lane should be dedicated and striped with appropriate markings for bicyclists through the turn lane in order to facilitate safe and unimpeded bicycle travel.
   c. Appropriate bicycle symbols, directional arrows, striping (including stop bars), and signing should be included along bicycle facilities and right-turn lanes within the project limits.
   d. Utility covers should be made flush with the pavement.
   e. Along Market Street, a minimum of a five-foot wide sidewalk that meets current AASHTO and ADA standards should be constructed along the site frontage. The sidewalk should have a minimum of a five-foot buffer from the roadway. At the property boundaries, the sidewalk should connect to adjacent sections of existing sidewalk or to the shoulder of Market Street in accordance with DelDOT's *Shared Use Path and/or Sidewalk Termination Policy* dated June 19, 2014. This sidewalk should be accompanied by street lighting.
   f. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances. Type 3 curb ramps are discouraged.
   g. Internal sidewalks for pedestrian safety and to promote walking as a viable transportation alternative should be considered within the development. These sidewalks should each be a minimum of five feet wide (with a minimum of a five-foot buffer from the roadway) and should meet current AASHTO and ADA standards.
   h. The developer should coordinate with DelDOT and the Town of Frederica regarding the possibility of standardizing parking along the east side of Market Street.
   i. The developer should coordinate with the Delaware Transit Corporation on potential transit features along Market Street. These features could potentially include bus stops/pads, bus shelters, and bus pull-off areas.

McCormick Taylor
Engineers & Planners Since 1946

December 19, 2006

Mr. Todd J. Sammons
Project Engineer
DelDOT Division of Planning
P.O. Box 778
Dover, DE 19903

RE: Agreement No. 1294
Traffic Impact Study Review Services
Task No. 99 – Harbourtowne (aka Erb Property)

Dear Mr. Sammons,

McCormick Taylor has completed its review of the Traffic Impact Study (TIS) for the development of Harbourtowne prepared by Davis, Bowen, & Friedel, Inc., dated March 2006. This review was assigned as Task Number 99. Davis, Bowen, & Friedel, Inc. prepared the report in a manner generally consistent with DelDOT's *Rules and Regulations for Subdivision Streets*.

The TIS evaluates the impacts of the development of Harbourtowne, in the Town of Frederica, Kent County, Delaware. Part of the property is located within the Town of Frederica, while the remaining portion is expected to be annexed by the Town. Originally, and as analyzed in the TIS, the proposed development would include 384 single-family detached houses. After the analysis was complete, the proposed development was modified to consist of 169 single-family detached houses and 166 townhouses. This revised land use would result in a net reduction of approximately 70 trips during the morning peak hour and 100 trips during the evening peak hour. Since the revised land use resulted in a net reduction in trips, additional analysis is not required. This development is located west of Market Street (Kent Road 289) and south of Delaware Route 12 (Canterbury Road) on the southern side of the Town of Frederica. The developer has proposed two access points; one on Jackson Street and one on Market Street. Construction of this project is anticipated to be complete by 2013.

DelDOT currently has two relevant projects in the study area: the Delaware Route 1 and Frederica Road (North) grade-separated interchange (State Contract No. 24-122-03), and the Delaware Route 1 and Frederica Road (South) grade separated interchange. The Delaware Route 1 and Frederica Road interchanges will replace the two existing unsignalized intersections of Frederica Road at Delaware Route 1. The Delaware Route 1 and Frederica Road (North) interchange is currently in the design phase. The Delaware Route 1 and Frederica Road (South) interchange has an approved concept plan, but has not yet been pursued into final design. Neither project currently has funding for right-of-way acquisition or construction, and an implementation schedule is not known.

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

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

Intersection	***Situation For Which Deficiency Occurs***
Delaware Route 12 and Carpenter Bridge Road (Kent Road 35)	2013 PM with development
Delaware Route 1 and Frederica Road (North)	Existing AM and PM, and 2013 AM and PM with and without development
Delaware Route 1 and Frederica Road (South)	Existing PM, and 2013 PM with and without development
Delaware Route 15 (Canterbury Road) and Carpenter Bridge Road	2013 AM and PM with and without development
Delaware Route 12 and Jackson Street	2013 PM with development

The intersections of Delaware Route 1 and Frederica Road (North) and Delaware Route 1 and Frederica Road (South) are both within the limits of DelDOT's Corridor Capacity Preservation Program (CCPP). Signalization of these intersections could address the level of service deficiencies; however, DelDOT is generally opposed to this solution in an effort to maintain capacity along the principal arterials within the CCPP. The Delaware Route 1 and Frederica Interchange Projects will address the Delaware Route 1 intersections with Frederica Road; however, there is currently no funding for right-of-way acquisition or construction of those projects, and the Delaware Route 1 and Frederica Road (South) project has yet to be pursued beyond a concept plan.

The intersection of Delaware Route 12 and Jackson Street is expected to experience a minor level of service deficiency (level of service E for the Jackson Street approach during the afternoon peak only). Because this intersection is not expected to meet signal warrants and the deficiency is minor, no recommendations are included.

Should the Town or County choose to 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.

1. The developer should enter into an agreement with DelDOT to fund an equitable portion of the local matching funds required for the Delaware Route 1 and Frederica Road (North) Grade-Separated Interchange Project (State Contract No. 24-122-03). Item 2 below is for information only and will be waived once the developer enters into this agreement. At this time, it is expected that this agreement will be required of at least ten other developments in this area. DelDOT expects to determine the cost sharing based on each development's projected daily traffic volume, compared to the total new development projected daily traffic volume.

2. The developer should enter into an agreement with DelDOT to modify the intersection of Delaware Route 1 and Frederica Road (North) (Kent Road 10). The agreement should provide for the physical restriction of all left-turning traffic. In conjunction with this improvement, the southbound u-turn lane at the Delaware Route 1 crossover located approximately 600 feet south of this intersection should be extended to a minimum length of 600 feet (not including taper).

3. The developer should improve the intersection of Delaware Route 1 and Frederica Road (South). The improvement should provide for the physical restriction of all minor street through and left-turning traffic. The left-turn movements in both directions along Delaware Route 1 should still be allowed.

4. The developer should install a single-lane roundabout at the intersection of Delaware Route 12 and Carpenter Bridge Road. A preliminary concept will need to be designed in order to determine if this improvement is feasible. Should a roundabout be determined to be infeasible at this location, the developer should enter into a traffic signal agreement with DelDOT for this intersection. The traffic signal agreement should include pedestrian signals, crosswalks, and interconnection at DelDOT's discretion.

5. The developer should enter into a traffic signal agreement with DelDOT for the intersection of Delaware Route 15 and Carpenter Bridge Road. The agreement should include pedestrian signals, crosswalks, and interconnection at DelDOT's discretion.

6. The developer should improve Market Street from the north site limit to Muderkill River Bridge to match the existing section north of the site. The developer should provide a bituminous concrete overlay to the existing travel lanes, at DelDOT's discretion. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer if necessary.

7. The following bicycle and pedestrian improvements should be completed:
   a. For any required auxiliary lanes along the site frontage, a minimum of a five-foot bicycle lane should be included in addition to the auxiliary lane in order to facilitate safe and unimpeded bicycle travel.
   b. Regulatory/warning signs should be added along the corridor in order to alert motorists to the presence of bicycle traffic.
   c. Utility covers should be moved outside of the designated bicycle lane or be flush with the pavement.
   d. ADA compliant sidewalks set back a minimum of three-feet from the curb along Market Street and connecting to any existing sidewalks on adjoining properties should be installed. This sidewalk should be accompanied by street lighting.
   e. ADA compliant curb ramps and crosswalk should be considered at the site entrance.
   f. Internal sidewalks to promote walking as a viable transportation alternative should be constructed.

g. The developer should coordinate with DelDOT and the Town of Frederica regarding the possibility of standardizing parking along the east side of Market Street.

h. The developer should coordinate with the Delaware Transit Corporation on potential transit features along Market Street. These features could potentially include bus stops/pads, bus shelters, and bus pull-off areas.

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 subdivision review process.

Additional details on our review of this TIS are attached. Please contact me at (302) 738-0203 or through e-mail at sjdiehl@mtmail.biz if you have any questions concerning this review.

Sincerely,

McCormick Taylor, Inc.

Scott J. Diehl, P.E., PTOE
Project Manager

Enclosure

General Information

Report date: March 2006
Prepared by: Davis, Bowen & Friedel, Inc.
Prepared for: Lacrosse Homes, Inc.
Tax parcel: 8-08-14110-01-0100-000, 8-00-14100-01-2100,000
Generally consistent with DelDOT's *Rules and Regulations for Subdivision Streets*: Yes

Project Description and Background

Description: Proposed 384 single-family detached houses
Location: Town of Frederica, Kent County, DE, on the west side of Market Street and south of Delaware Route 12. A portion of the site area is located in the Town of Frederica; the remaining portion is expected to be annexed.
Amount of land to be developed: 146.44
Land use approval(s) needed: Subdivision approval, annexation of section of parcel outside of current town limits.
Proposed completion date: 2013
Proposed access locations: Two access points are proposed; one on Jackson Street and one on Market Street.

Livable Delaware

(Source: Delaware Strategies for State Policies and Spending, July 2004)

Location with respect to the Strategies for State Policies and Spending Map of Delaware: Harbourtowne is located within Investment Level 2.

Investment Level 2:

These areas, generally adjacent to Investment Level 1 Areas, include less developed areas within municipalities, rapidly growing areas that have or will have public water and wastewater services, and may include smaller towns, rural villages, and suburban areas. These areas typically include single-family detached housing developments, commercial and office uses serving primarily local residents, and a limited range of entertainment, parks and recreation, cultural and institutional facilities.

In Investment Level 2 Areas, state investments and policies should be based on available infrastructure to accommodate orderly growth, encourage departure from the typical single-family-dwelling developments, promote a broader mix of housing types and commercial sites, and encourage development that is consistent with the character of the area. Transportation projects should expand or provide roadways, public transportation, pedestrian walkways, bicycle paths, and other transportation modes that manage flow, support economic development efforts, and encourage connections between communities and the use of local streets for local trips.

Proposed Development's Compatibility with Livable Delaware:

Harbourtowne falls in Investment Level 2. Investment Level 2 typically includes single-family detached housing developments among other uses. Harbourtowne generally adheres to the policies stated in the 2004 update of the Livable Delaware "Strategies for State Policies and Spending."

Comprehensive Plan

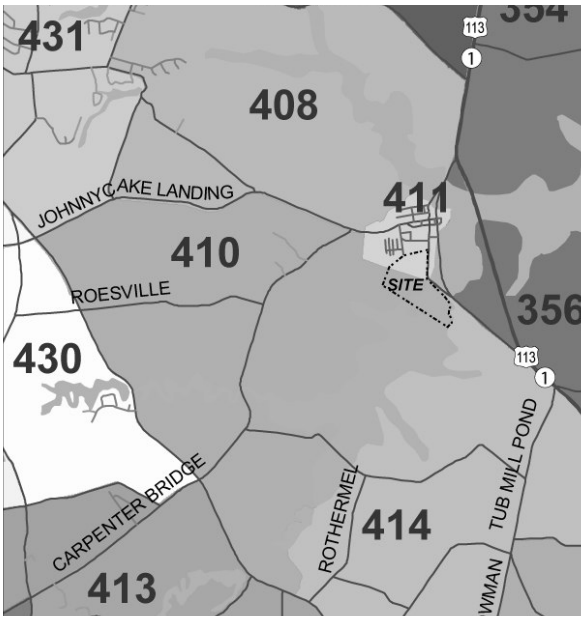
Kent County Comprehensive Plan: The proposed development is primarily located in an area designated as Low Density Residential which allows for 1 to 2.9 dwelling units per acre; however a limited portion is within the residential section of the Town of Frederica's municipal area.

Town of Frederica Comprehensive Plan: The Frederica Comprehensive Plan is generally consistent with the Kent County Comprehensive Plan. The Planning Board indicated that the section of property currently not in the Town has been voted to annex.

Proposed Development's Compatibility with Comprehensive Plans: The proposed development is generally in accordance with the Comprehensive Plans. Harbourtowne proposes approximately 2.41 single-family detached houses per acre.

Transportation Analysis Zones (TAZ)

Transportation Analysis Zones (TAZ) where development would be located:
410 & 411 (Peninsula Code Designation)



TAZ Boundaries (410):

Current employment estimate for TAZ:
157 in 2000
Future employment estimate for TAZ:
306 in 2030
Current population estimate for TAZ:
304 in 2000
Future population estimate for TAZ:
715 in 2030
Current household estimate for TAZ:
131 in 2000
Future household estimate for TAZ:
307 in 2030
Relevant committed developments in TAZ: Johnny Cake Landing, Waterside, Hampton Ridge, Carpenters Crossing, Tuscany and Roesville Estates

Would the addition of committed developments to current estimates exceed future projections: Yes.
Would the addition of committed developments and the proposed development to current estimates exceed future projections: Yes.

TAZ Boundaries (411):

Current employment estimate for TAZ: 295 in 2000
Future employment estimate for TAZ: 335 in 2030
Current population estimate for TAZ: 648 in 2000
Future population estimate for TAZ: 784 in 2030
Current household estimate for TAZ: 246 in 2000
Future household estimate for TAZ: 337 in 2030
Relevant committed developments in TAZ: None.
Would the addition of committed developments to current estimates exceed future projections: No.
Would the addition of committed developments and the proposed development to current estimates exceed future projections: Yes.

Relevant Projects in the DelDOT Capital Transportation Program (2004-2009)

DelDOT currently has two relevant projects in the study area: the Delaware Route 1 and Frederica Road (North) grade-separated interchange (State Contract No. 24-122-03), and the Delaware Route 1 and Frederica Road (South) grade separated interchange. The Delaware Route 1 and Frederica Road interchanges will replace the two existing unsignalized intersections of Frederica Road at Delaware Route 1. The Delaware Route 1 and Frederica Road (North) interchange is currently in the design phase. The Delaware Route 1 and Frederica Road (South) interchange has an approved concept plan, but has not yet been pursued into final design. Neither project currently has funding for right-of-way acquisition or construction, and an implementation schedule is not known.

Trip Generation

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

- Harbourtowne
    - 384 single-family detached houses (ITE land use code 210)

Table 1. Harbourtowne

Land Use	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
384 single-family detached houses	70	209	279	227	134	361
TOTAL PRIMARY DEVELOPMENT TRIPS	**70**	**209**	**279**	**227**	**134**	**361**

Overview of TIS

Intersections examined:

1) Market Street (Kent Road 389) & Site Entrance
2) Delaware Route 12 (Johnnycake Landing Road) & Carpenter Bridge Road (Kent Road 35)
3) David Street (EB Route 12) & Frederica Road (Kent Road 10)
4) Front Street (WB Route 12) & Frederica Road
5) Delaware Route 1 (Bay Road) & Frederica Road (North)
6) Delaware Route 1 & Frederica Road (South)
7) Delaware Route 15 (Canterbury Road) & Carpenter Bridge Road
8) Delaware Route 12 & Andrews Lake Road (Kent Road 380)
9) Delaware Route 15 & Delaware Route 12
10) Frederica Road & Market Street (South)
11) David Street & Market Street
12) Front Street & Market Street
13) Delaware Route 12 & Jackson Street

Conditions examined:

1) Case 1: 2005 existing conditions
2) Case 2: 2013 with committed developments
3) Case 3: 2013 with committed developments and Harbourtowne

Peak hours evaluated: Weekday morning and evening peak hours

Committed developments considered:

- Johnnycake Landing (175 single-family detached houses, 175 townhouses)
- Waterside (49 single-family detached houses)
- Hampton Ridge (132 single-family detached houses)
- Carpenters Crossing (193 single-family detached houses)
- Roesville and Tuscany Estates (485 and 815 single-family detached houses)
- Biggs Property (173 single-family detached houses, 172 townhouses)

Intersection Descriptions

1) **Market Street & Site Entrance**
   Type of Control: t-intersection, stop controlled on the eastbound approach
   Northbound approach: (Market Street) one shared through/left-turn lane
   Southbound approach: (Market Street) one shared through/right-turn lane
   Eastbound approach: (Site Entrance) one shared right/left-turn lane

2) **Delaware Route 12 & Carpenter Bridge Road:**
   Type of Control: t-intersection, stop controlled on the northbound approach
   Northbound approach: (Carpenter Bridge Road) one shared left/right-turn lane
   Eastbound approach: (Delaware Route 12) one shared through/right-turn lane
   Westbound approach: (Delaware Route 12) one shared through/left-turn lane

3) **David Street & Frederica Road:**
   Type of Control: stop controlled, on the eastbound and westbound approaches
   Northbound approach: (Frederica Road) one shared through/left/right-turn lane
   Southbound approach: (Frederica Road) one shared through/left/right-turn lane
   Westbound approach: (David Street) one shared through/left/right-turn lane
   Eastbound approach: (David Street) one shared through/left-turn lane, one right-turn lane
   Note: Front Street (westbound) and David Street (eastbound) form a one-way pair west of Frederica Road

4) **Front Street & Frederica Road:**
   Type of Control: stop controlled, on the eastbound and westbound approaches
   Northbound approach: (Frederica Road) one shared through/left/right-turn lane
   Southbound approach: (Frederica Road) one shared through/left/right-turn lane
   Eastbound approach: (Front Street) one exiting lane
   Westbound approach: (Front Street) one shared through/left/right-turn lane
   Note: Front Street (westbound) and David Street (eastbound) form a one-way pair west of Frederica Road

5) **Delaware Route 1 & Frederica Road (North)/dirt road:**
   Type of Control: stop controlled, on the eastbound and westbound approaches
   Northbound approach: (Delaware Route 1) one through lane, one shared through/right-turn lane
   Southbound approach: (Delaware Route 1) two through lanes, one right-turn lane
   Westbound approach: (dirt road) one unpaved lane
   Eastbound approach: (Frederica Road) one shared through/left-turn lane, one right-turn lane
   Note: Left turns are prohibited from Delaware Route 1

6) **Delaware Route 1 & Frederica Road (South)/dirt road:**
   Type of Control: stop controlled, on the eastbound and westbound approaches

Northbound approach: (Delaware Route 1) one left-turn lane, one through lane, one shared through/right-turn lane
Southbound approach: (Delaware Route 1) one left-turn lane, two through lanes, one right-turn lane
Westbound approach: (dirt road) one unpaved lane
Eastbound approach: (Frederica Road) one shared through/left-turn lane, one channelized right-turn lane

7) Delaware Route 15 & Carpenter Bridge Road:
Type of Control: all-way stop controlled
Northbound approach: (Delaware Route 15) one shared through/left/right-turn lane
Southbound approach: (Delaware Route 15) one shared through/left/right-turn lane
Westbound approach: (Carpenter Bridge Road) one shared through/left/right-turn lane
Eastbound approach: (Carpenter Bridge Road) one shared through/left/right-turn lane

8) Delaware Route 12 & Andrews Lake Road:
Type of Control: stop controlled, on the southbound approach
Southbound approach: (Andrews Lake Road) one shared left/right-turn lane
Eastbound approach: (Delaware Route 12) one shared through/left-turn lane
Westbound approach: (Delaware Route 12) one shared through/right-turn lane

9) Delaware Route 15 & Delaware Route 12:
Type of Control: all-way stop controlled
Northbound approach: (Delaware Route 15) one shared through/left/right-turn lane
Southbound approach: (Delaware Route 15) one shared through/left/right-turn lane
Eastbound approach: (Delaware Route 12) one shared through/left/right-turn lane
Westbound approach: (Delaware Route 12) one shared through/left/right-turn lane
Note: overhead red beacons augment the stop signs

10) Frederica Road & Market Street (South):
Type of Control: stop controlled, on the eastbound approach
Northbound approach: (Frederica Road) one shared through/left-turn lane
Southbound approach: (Frederica Road) one shared through/right-turn lane
Eastbound approach: (Market Street) one shared left/right-turn lane

11) David Street & Market Street:
Type of Control: stop controlled on the northbound and southbound approaches
Northbound approach: (Market Street) one shared through/right-turn lane
Southbound approach: (Market Street) one shared through/left-turn lane
Eastbound approach: (David Street) one shared through/left/right-turn lane
Westbound approach: (David Street) one exiting lane

12) Front Street & Market Street:
Type of Control: stop controlled on the northbound and southbound approaches
Northbound approach: (Market Street) one shared through/left-turn lane
Southbound approach: (Market Street) one shared through/right-turn lane

Eastbound approach: (Front Street) one exiting lane
Westbound approach: (Front Street) one shared through/left/right-turn lane

13) Delaware Route 12 & Jackson Street:
Type of Control: stop controlled on the northbound approach
Northbound approach: (Jackson Street) one shared left/right-turn lane
Eastbound approach: (Delaware Route 12) one shared through/right-turn lane
Westbound approach: (Delaware Route 12) one shared through/left-turn lane

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: DART Bus Route 303 currently provides limited service along Frederica Road.

Planned transit service: The developer should coordinate with the Delaware Transit Corporation on potential transit features in the project area and should include internal sidewalks connecting to main access points.

Existing bicycle and pedestrian facilities: The *Delaware Kent and Sussex Counties Bicycle Touring Map* designates Market Street as having above average cycling conditions.

Planned bicycle and pedestrian facilities: DelDOT had recommended the following:

a. For any required auxiliary lanes along the site frontage, a minimum of a five-foot bicycle lane should be included in addition to the auxiliary lane in order to facilitate safe and unimpeded bicycle travel.
b. Regulatory/warning signs should be added along the corridor in order to alert motorists to the presence of bicycle traffic.
c. Utility covers should be moved outside of the designated bicycle lane or be flush with the pavement.
d. ADA compliant sidewalks set back a minimum of three-feet from the curb along Market Street and connecting to any existing sidewalks on adjoining properties should be installed. This sidewalk should be accompanied by street lighting.
e. ADA compliant curb ramps and crosswalk should be considered at the site entrance.
f. Internal sidewalks to promote walking as a viable transportation alternative should be constructed.
g. The developer should coordinate with DelDOT and the Town of Frederica regarding the possibility of standardizing parking along the east side of Market Street.
h. The developer should coordinate with the Delaware Transit Corporation on potential transit features along Market Street. These features could potentially include bus stops/pads, bus shelters, and bus pull-off areas.

Previous Comments

All comments from DelDOT's Scoping Letter and Preliminary TIS Review were addressed in the Final TIS submission, except as follows:

- The applicant did not contact Mr. Joseph Cantalupo, Assistant Director for Statewide & Regional Planning.
- The applicant did not contact Mr. Wayne Henderson, a Service Development planner at the Delaware Transit Corporation.
- The applicant did not contact DelDOT's project manager, Ms. Diane Bernardo, for the proposed grade-separated interchange on Delaware Route 1.

General HCS Analysis Comments

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

None.

Table 2
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [1] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Market Street & Site Entrance	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2013 with Harbourtowne (Case 3)				
Northbound Market Street – Left	A (7.3)	A (7.6)	A (7.4)	A (7.6)
Eastbound Site Entrance	A (9.6)	B (10.2)	A (9.7)	B (10.3)

[1] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 3
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [2] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 12 & Carpenter Bridge Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1)				
Northbound Carpenter Bridge Road	B (10.3)	B (10.2)	B (10.3)	B (10.2)
Westbound Delaware Route 12 - Left	A (7.9)	A (7.6)	A (7.9)	A (7.6)
2013 without Harbourtowne (Case2)				
Northbound Carpenter Bridge Road	D (25.4)	D (33.3)	D (25.4)	D (33.3)
Westbound Delaware Route 12 - Left	A (8.6)	A (9.3)	A (8.6)	A (9.3)
2013 with Harbourtowne (Case 3)				
Northbound Carpenter Bridge Road	D (30.6)	F (70.7)	D (30.6)	F (70.7)
Westbound Delaware Route 12 - Left	A (8.8)	A (9.8)	A (8.8)	A (9.8)
2013 with Harbourtowne (Case 3) *with the addition of a northbound left-turn lane*				
Northbound Carpenter Bridge Road	C (24.3)	C (19.2)	C (24.3)	C (19.2)
Westbound Delaware Route 12 - Left	A (8.8)	A (9.8)	A (8.8)	A (9.8)

Signalized Intersection [2] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 12 & Carpenter Bridge Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2013 with Harbourtowne (Case 3)	N/A	N/A	B (0.61)	B (0.60)

[2] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 3 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Roundabout Intersection [3]	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 12 & Carpenter Bridge Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2013 with Harbourtowne (Case 3)				
Northbound Carpenter Bridge Road	N/A	N/A	0.55, 0.67	0.42, 0.51
Eastbound Delaware Route 12	N/A	N/A	0.25, 0.31	0.22, 0.27
Westbound Delaware Route 12	N/A	N/A	0.37, 0.45	0.63, 0.76

[3] For roundabouts, the results displayed represent the lower-bound and upper-bound v/c ratios for that approach. The FHWA Roundabouts: An Information Guide defines the lower-bound v/c ratio as the operations that may be expected until roundabouts become more common and the upper-bound v/c ratio as the capacities that are expected at most roundabouts. For roundabouts, the 2000 Highway Capacity Manual does not calculate a letter grade level of service.

Table 4
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [4] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
David Street & Frederica Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1)				
Southbound Frederica Road - Left	A (7.4)	A (7.4)	A (7.4)	A (7.4)
Eastbound David Street	B (10.2)	A (9.7)	B (10.2)	A (9.7)
Westbound David Street	N/A [5]	A (8.9)	N/A [5]	A (8.9)
2013 without Harbourtowne (Case2)				
Southbound Frederica Road - Left	A (7.5)	A (7.6)	A (7.5)	A (7.6)
Eastbound David Street	C (16.7)	B (14.4) [6]	C (16.7)	B (13.9)
Westbound David Street	N/A [5]	A (9.6)	N/A [5]	A (9.6)
2013 with Harbourtowne (Case 3)				
Southbound Frederica Road - Left	A (7.5)	A (7.6)	A (7.5)	A (7.6)
Eastbound David Street	C (20.2)	C (15.2)	C (20.2)	C (15.1)
Westbound David Street	N/A [5]	A (9.6)	N/A [5]	A (9.6)

[4] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.
[5] No westbound vehicles were counted during the morning peak period; therefore no Level of Service was reported for the existing and future condition analyses.
[6] The TIS used a future PHF of 0.88 for the Case 2 PM scenario, however they used a future PHF of 0.92 for all other future scenarios. McCormick Taylor used a future PHF of 0.92 for all future scenarios.

Table 5
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [7] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Front Street & Frederica Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1)				
Northbound Frederica Road - Left	A (7.6)	A (7.8)	A (7.6)	A (7.9)
Westbound Front Street	B (10.8)	B (11.8)	B (10.8)	B (12.0)
2013 without Harbourtowne (Case2)				
Northbound Frederica Road - Left	A (8.0)	A (9.8)	A (8.0)	A (9.8)
Westbound Front Street	C (17.0)	D (26.1)	C (17.0)	D (26.1)
2013 with Harbourtowne (Case 3)				
Northbound Frederica Road - Left	A (8.1)	B (10.2)	A (8.1)	B (10.2)
Westbound Front Street	C (18.6)	D (29.0)	C (18.6)	D (29.0)

[7] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 6
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [8] Two-Way Stop Control	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 1 & Frederica Road (North)/Dirt Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1) [9]				
Eastbound Frederica Road	E (39.4)	F (138.3)	F (177.2)	F (425.2)
Westbound Dirt Road [10]	N/A	N/A	N/A	N/A
2013 without Harbourtowne (Case 2) *without the Delaware Route 1 & Frederica Road Interchange*				
Eastbound Frederica Road	N/A	N/A	F (1389)	F (1887)
2013 with Harbourtowne (Case 3) *without the Delaware Route 1 & Frederica Road Interchange*				
Eastbound Frederica Road	N/A	N/A	F (1599)	F (2150)
2013 with Harbourtowne (Case 3) *without the Delaware Route 1 & Frederica Road Interchange, with rerouted minor street left turns*[11]	N/A	N/A	F (226.4)	F (229.4)

Unsignalized Intersection [8] Two-Way Stop Control	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 1 & Proposed Crossover South of Frederica Road (North)	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2013 with Harbourtowne (Case 3) *without the Delaware Route 1 & Frederica Road Interchange*				
Northbound Delaware Route 1 – U-Turn	N/A	N/A	F (111.3)	C (22.3)

[8] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.
[9] The TIS analyzed this intersection as a t-intersection and having storage of four vehicles. McCormick Taylor analyzed it as having a fourth leg (dirt road) and storage of one vehicle as per the field view.
[10] No westbound vehicles were counted during the peak periods; therefore no Level of Service was reported.
[11] McCormick Taylor evaluated future scenarios without the completion of the interchange project. This included a Case 3 where eastbound left turns are rerouted to the right and u-turns are accommodated by the relocation of the existing crossover south of the intersection. The TIS did not include an evaluation of these scenarios.

Table 6 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [12] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Frederica Road (North) & Delaware Route 1 Ramp	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2013 without Harbourtowne (Case 2)				
Northbound Delaware Route 1 Ramp – Left	N/A	N/A	B (12.3)	C (15.2)
2013 with Harbourtowne (Case 3)				
Northbound Delaware Route 1 Ramp - Left	N/A	N/A	B (12.9)	C (16.7)

Merge [13]	**LOS per TIS** [14]		**LOS per McCormick Taylor**	
Ramp from Frederica Road (North) to Northbound Delaware Route 1	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2013 without Harbourtowne (Case 2)	N/A	N/A	B (16.6)	B (14.2)
2013 with Harbourtowne (Case 3)	N/A	N/A	B (17.1)	B (14.5)

[12] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.
[13] For merge analysis, the numbers in parentheses following levels of service are density of merge influence area.
[14] The TIS did not evaluate the post-interchange merge operations on Delaware Route 1.

Table 7
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [15] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 1 & Frederica Road (South)/Dirt Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1)				
Northbound Delaware Route 1 - Left	B (11.1)	D (25.5)	B (11.1)	D (25.5)
Southbound Delaware Route 1 - Left	B (13.1)	B (10.7)	B (13.3)	B (10.8)
Eastbound Frederica Road [16]	D (28.5)	F (*)	D (34.5)	F (*)
Westbound Dirt Road[17]	N/A	N/A	N/A	N/A
2013 without Harbourtowne (Case 2) *without the Delaware Route 1 & Frederica Road Interchange*				
Northbound Delaware Route 1 - Left	N/A	N/A	B (12.0)	F (53.5)
Southbound Delaware Route 1 - Left	N/A	N/A	B (12.2)	B (11.7)
Eastbound Frederica Road	N/A	N/A	E (35.8)	F (*)
2013 with Harbourtowne (Case 3) *without the Delaware Route 1 & Frederica Road Interchange*				
Northbound Delaware Route 1 - Left	N/A	N/A	B (12.3)	F (105.2)
Southbound Delaware Route 1 - Left	N/A	N/A	B (12.2)	B (11.7)
Eastbound Frederica Road	N/A	N/A	E (37.4)	F (*)
2013 with Harbourtowne (Case 3) *without the Delaware Route 1 & Frederica Road Interchange, with rerouted minor street left turns* [18, 19]				
Northbound Delaware Route 1 - Left	N/A	N/A	B (12.3)	F (105.2)
Southbound Delaware Route 1 - Left	N/A	N/A	B (12.2)	B (12.0)

* Highway Capacity Software does not generate a result due to excessive delay.

[15] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.
[16] McCormick Taylor analyzed the Eastbound Frederica left-turn as having an acceleration lane. The TIS did not.
[17] No westbound vehicles were counted during the peak periods; therefore no Level of Service was reported.
[18] McCormick Taylor evaluated a future scenario without the completion of the interchange project. The TIS did not include an evaluation of this scenario.
[19] Assumes the restriction of minor street left-turning traffic.

Table 7 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [20] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 1 & Proposed Crossover North of Frederica Road (South)	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2013 with Harbourtowne (Case 3) with out the Delaware Route 1 & Frederica Road Interchange				
Northbound Delaware Route 1 – U-Turn	N/A	N/A	B (12.3)	F (91.6)

Merge [21, 22]	**LOS per TIS**		**LOS per McCormick Taylor**	
Ramp from Frederica Road (South) to Southbound Delaware Route 1	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2013 without Harbourtowne (Case 2)	A (9.1)	B (13.2)	B (12.3)	B (17.8)
2013 with Harbourtowne (Case 3)	A (9.6)	B (14.8)	B (12.7)	B (18.7)

[20] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.
[21] For merge analyses, the numbers in parentheses following levels of service are density of merge influence area.
[22] The TIS applied a ramp Free-flow speed of 35 mph. McCormick Taylor used a ramp Free-flow speed of 35 mph.

Table 8
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [23] **All-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 15 & Carpenter Bridge Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1)				
Northbound Carpenter Bridge Road	B (10.5)	B (11.0)	B (10.5)	B (11.0)
Southbound Carpenter Bridge Road	B (11.0)	A (9.7)	B (11.0)	A (9.7)
Eastbound Delaware Route 15	B (10.1)	A (9.2)	B (10.1)	A (9.2)
Westbound Delaware Route 15	A (9.6)	A (10.0)	A (9.4)	A (10.0)
Overall	B (10.5)	B (10.2)	B (10.5)	B (10.2)
2013 without Harbourtowne (Case2)				
Northbound Carpenter Bridge Road	F (71.6)	F (333.4)	F (71.6)	F (333.4)
Southbound Carpenter Bridge Road	F (151.2)	E (44.3)	F (151.2)	E (44.3)
Eastbound Delaware Route 15	E (38.8)	F (55.3)	E (38.8)	F (55.3)
Westbound Delaware Route 15	F (146.7)	F (101.0)	F (146.7)	F (101.0)
Overall	F (111.2)	F (170.8)	F (111.2)	F (170.8)
2013 with Harbourtowne (Case 3)				
Northbound Carpenter Bridge Road	F (75.3)	F (359.6)	F (75.3)	F (359.6)
Southbound Carpenter Bridge Road	F (159.4)	E (48.5)	F (159.4)	E (48.5)
Eastbound Delaware Route 15	E (43.9)	F (88.9)	E (43.9)	F (88.9)
Westbound Delaware Route 15	F (203.9)	F (142.3)	F (203.9)	F (142.3)
Overall	F (133.2)	F (194.2)	F (133.2)	F (194.2)

Signalized Intersection [23]	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 15 & Carpenter Bridge Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2013 with Harbourtowne (Case 3)	C (0.83)	C (0.94)	C (0.76)	C (0.87)

[23] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 9
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [24] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 12 & Andrews Lake Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1)				
Southbound Andrews Lake Road	B (10.2)	A (10.0)	B (10.1)	A (10.0)
Eastbound Delaware Route 12 - Left	A (7.5)	A (7.5)	A (7.6)	A (7.6)
2013 without Harbourtowne (Case2)				
Southbound Andrews Lake Road	B (10.5)	B (10.7)	B (10.4)	B (10.7)
Eastbound Delaware Route 12 - Left	A (7.5)	A (7.7)	A (7.7)	A (7.8)
2013 with Harbourtowne (Case 3)				
Southbound Andrews Lake Road	B (11.0)	B (11.4)	B (10.9)	B (11.4)
Eastbound Delaware Route 12 - Left	A (7.6)	A (7.7)	A (7.8)	A (7.8)

[24] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 10
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [25] **All-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 15 & Delaware Route 12	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1)				
Northbound Delaware Route 15	B (10.1)	B (10.1)	B (10.1)	B (10.1)
Southbound Delaware Route 15	B (10.4)	A (9.4)	B (10.4)	A (9.4)
Eastbound Delaware Route 12	A (9.6)	A (8.7)	A (9.6)	A (8.7)
Westbound Delaware Route 12	A (9.4)	A (8.8)	A (9.4)	A (8.8)
Overall	A (10.0)	A (9.5)	A (10.0)	A (9.5)
2013 without Harbourtowne (Case2)				
Northbound Delaware Route 15	D (25.7)	D (25.5)	D (25.7)	D (25.5)
Southbound Delaware Route 15	C (22.7)	C (22.4)	C (22.7)	C (22.4)
Eastbound Delaware Route 12	B (13.4)	B (11.6)	B (13.4)	B (11.6)
Westbound Delaware Route 12	B (13.4)	B (11.9)	B (13.4)	B (11.9)
Overall	C (21.0)	C (21.5)	C (21.0)	C (21.5)
2013 with Harbourtowne (Case 3)				
Northbound Delaware Route 15	D (29.3)	D (29.1)	D (29.3)	D (29.1)
Southbound Delaware Route 15	D (26.7)	D (29.6)	D (26.7)	D (29.6)
Eastbound Delaware Route 12	B (14.1)	B (12.1)	B (14.1)	B (12.1)
Westbound Delaware Route 12	B (14.9)	B (12.7)	B (14.9)	B (12.7)
Overall	C (23.8)	D (25.8)	C (23.8)	D (25.8)

Roundabout Intersection [26]	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 15 & Delaware Route 12	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2013 Existing (Case 3)				
Northbound Delaware Route 15	N/A	N/A	0.36, 0.43	0.41, 0.50
Southbound Delaware Route 15	N/A	N/A	0.35, 0.42	0.42, 0.51
Eastbound Delaware Route 12	N/A	N/A	0.19, 0.23	0.12, 0.15
Westbound Delaware Route 12	N/A	N/A	0.22, 0.27	0.16, 0.20

[25] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.
[26] For roundabouts, the results displayed represent the lower-bound and upper-bound volume-to-capacity (v/c) ratios for that approach. The FHWA *Roundabouts : An Information Guide* defines the lower-bound v/c ratio as the operations that may be expected until roundabouts become more common and the upper-bound v/c ratio as the capacities that are expected at most roundabouts. For roundabouts, the 2000 Highway Capacity Manual does not calculate a letter grade level of service.

Table 11
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [27] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Market Street & Frederica Road	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1)				
Northbound Frederica Road - Left	A (7.8)	A (7.5)	A (7.6)	A (7.5)
Eastbound Market Street	A (9.0)	A (9.0)	A (9.0)	A (9.0)
2013 without Harbourtowne (Case2)				
Northbound Frederica Road - Left	A (8.0)	A (7.6)	A (7.8)	A (7.6)
Eastbound Market Street	A (9.5)	A (9.6)	A (9.5)	A (9.6)
2013 with Harbourtowne (Case 3)				
Northbound Frederica Road - Left	A (8.1)	A (7.7)	A (7.8)	A (7.8)
Eastbound Market Street	A (10.0)	A (9.7)	A (10.0)	A (9.7)

[27] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 12
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [28] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
David Street & Market Street	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1)				
Northbound Market Street	B (10.9)	B (11.3)	B (10.9)	B (11.3)
Southbound Market Street	B (11.1)	B (11.8)	B (11.0)	B (11.9)
Eastbound David Street – Left	A (7.2)	A (7.3)	A (7.3)	A (7.3)
2013 without Harbourtowne (Case2)				
Northbound Market Street	C (17.4)	B (14.0)	C (17.4)	B (14.1)
Southbound Market Street	C (18.5)	B (14.8)	C (18.5)	B (14.8)
Eastbound David Street – Left	A (7.2)	A (7.3)	A (7.3)	A (7.3)
2013 with Harbourtowne (Case 3)				
Northbound Market Street	C (22.9)	C (15.5)	C (23.4)	C (15.5)
Southbound Market Street	C (20.7)	C (17.4)	C (20.8)	C (17.5)
Eastbound David Street - Left	A (7.2)	A (7.3)	A (7.3)	A (7.3)

[28] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 13
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [29] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Front Street & Market Street	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1)				
Northbound Market Street	B (10.8)	B (11.3)	B (10.8)	B (11.3)
Southbound Market Street	B (10.2)	B (11.0)	B (10.2)	B (10.9)
Westbound Front Street – Left	A (7.4)	A (7.2)	A (7.3)	A (7.3)
2013 without Harbourtowne (Case2)				
Northbound Market Street	B (12.2)	C (20.5)	B (12.2)	C (20.6)
Southbound Market Street	B (11.3)	C (17.3)	B (11.3)	C (17.4)
Westbound Front Street – Left	A (7.4)	A (7.2)	A (7.3)	A (7.3)
2013 with Harbourtowne (Case 3)				
Northbound Market Street	B (13.5)	D (31.6)	B (13.6)	D (32.0)
Southbound Market Street	B (11.6)	C (20.6)	B (11.6)	C (20.7)
Westbound Front Street – Left	A (7.3)	A (7.3)	A (7.3)	A (7.4)

[29] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Table 14
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Harbourtowne
Report dated March 2006
Prepared Davis, Bowen & Friedel, Inc.

Unsignalized Intersection [30] **Two-Way Stop Control**	**LOS per TIS**		**LOS per McCormick Taylor**	
Delaware Route 12 & Jackson Street	Weekday AM	Weekday PM	Weekday AM	Weekday PM
2005 Existing (Case 1)				
Northbound Jackson Street	B (11.9)	B (12.7)	B (11.9)	B (12.7)
Westbound Delaware Route 12 – Left	A (7.8)	A (7.9)	A (7.9)	A (8.0)
2013 without Harbourtowne (Case2)				
Northbound Jackson Street	C (22.5)	D (27.6)	C (22.6)	D (27.4)
Westbound Delaware Route 12 – Left	A (9.2)	A (8.7)	A (9.4)	A (8.8)
2013 with Harbourtowne (Case 3)				
Northbound Jackson Street	D (32.4)	E (41.7)	D (32.4)	E (41.7)
Westbound Delaware Route 12 – Left	A (9.4)	A (9.1)	A (9.5)	A (9.2)

[30] For unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds. For signalized analyses, those numbers are X-critical, a composite volume-to-capacity ratio.

Improvements in this TIS may be considered "significant" under DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DelDOT's website at http://www.deldot.gov/information/pubs_forms/manuals/de_mutcd/index.shtml. For any additional information regarding the work zone impact and mitigation procedures during construction please contact Mr. Adam Weiser of DelDOT's Traffic Section. Mr. Weiser can be reached at (302) 659-4073 or by email at Adam.Weiser@state.de.us.

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 subdivision review process.

Additional details on our review of this TIS are attached. Please contact me at (302) 738-0203 or through e-mail at ajparker@mtmail.biz if you have any questions concerning this review.

Sincerely,

McCormick Taylor, Inc.

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

Enclosure