



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

JENNIFER COHAN
SECRETARY

June 9, 2017

Mr. Michael Kaszyski
Duffield Associates, Inc.
5400 Limestone Road
Wilmington, DE 19808

Dear Mr. Kaszyski

The enclosed Traffic Impact Study (TIS) review letter for the **Fort DuPont** (Tax Parcels 22-009.00-156) redevelopment 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 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. Steve Gorski, Duffield Associates, Inc.
Ms. Constance C. Holland, Office of State Planning Coordination
Ms. Michelle Hartman, City of Delaware City
Mr. Mir Wahed, Johnson, Mirmiran & Thompson, Inc.
Ms. Joanne Arellano, Johnson, Mirmiran & Thompson, Inc.
DelDOT Distribution

DelDOT Distribution

Annie Cordo, Deputy Attorney General
Robert McCleary, Director, Transportation Solutions (DOTS)
Drew Boyce, Director, Planning
Mark Luszc, Chief Traffic Engineer, Traffic, DOTS
Mark Tudor, Assistant Director, Project Development North, DOTS
J. Marc Coté, Assistant Director, Development Coordination
T. William Brockenbrough, Jr., County Coordinator, Development Coordination
Peter Haag, Traffic Studies Manager, Traffic, DOTS
Kevin Canning, Canal District Engineer, North District
Matthew Lichtenstein, Canal District Public Works Engineer, Canal District
David Dooley, Service Development Planner, Delaware Transit Corporation
Pao Lin, New Castle Subdivision Manager, Development Coordination
Mark Galipo, Traffic Engineer, Traffic, DOTS
Anthony Aglio, Planning Supervisor, Statewide & Regional Planning
Claudy Joinville, Project Engineer, Development Coordination



June 9, 2017

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

RE: Agreement No. 1774
Project Number T201769002
Traffic Impact Study Services
Task 4A-Fort DuPont Redevelopment

Dear Mr. Brestel:

Johnson, Mirmiran and Thompson (JMT) has completed the review of the Traffic Impact Study (TIS) for the Fort DuPont Redevelopment, prepared by Duffield Associates, Inc. This task was assigned Task Number 4A. Duffield Associates, Inc. prepared the report in a manner generally consistent with DelDOT's *Development Coordination Manual*.

The TIS evaluates the impacts of a mixed-use development proposed in Delaware City, New Castle County, on the east side of Delaware Route 9 (New Castle Road 2) between the Chesapeake and Delaware Canal and the Delaware City Branch Canal. Subsequent to the October 19, 2016, Scoping Meeting at DelDOT, the proposed uses have been modified. Per the TIS, the mixed use consists of 50 single-family detached houses, 105 townhouses, 100 condominiums, 161 low-rise apartment units, an 85-bed assisted care facility, a 25-room hotel, a 13,000 square-foot museum, 141,000 square feet of office space, a 4,720 square-foot government office building, 75,572 square feet of retail, and a 9,800 square-foot quality restaurant.

The development will be constructed in two separate phases where Phase 1 will consist of 42 single-family detached houses and 49 townhouses. Phase 1 is expected to be constructed by 2020 and the final phase of construction is anticipated to be completed by 2024. Two access points are proposed for the development: a roundabout at the intersection of Delaware Route 9/New Castle Avenue/Polktown Place (New Castle Road 2A) and a full access at the intersection of Wilmington Avenue/Polktown Place. The subject property is on an approximately 296.23-acre assemblage of parcels currently zoned HPR (Historic Preservation and Redevelopment), and the land is not proposed to be rezoned.

DelDOT currently has four relevant projects within the study area: the *SR 72/ SR 1 Interchange* project (Contract #T201511002), a possible future improvement project at the US Route 13/Cox Neck Road (New Castle Road 411) intersection, the *Signalized Median Crossover Signing and Pavement Marking Upgrades – Statewide* study (Contract #T201508305), and the *Statewide*



Horizontal Curve Safety study (Contracts #T201608301 and #T201609201). These projects are described in detail in the supporting documentation that begins on Page 9. Additionally, DelDOT has a resurfacing project (Contract #T201606101) scheduled Summer of 2017 along Delaware Route 72 from US Route 13 to Delaware Route 9. None of the study area intersections were selected for the Hazard Elimination Program (HEP) within the last five years.

In addition, DelDOT has a future *Route 9 Byway Bike and Pedestrian Connector Delaware City* project. This project involves the design of the easternmost extension of the Chesapeake and Delaware (C & D) Canal Trail to connect to Delaware's Bayshore Byway, which includes the Delaware Route 9 corridor. The extension will also connect to the Michael N. Castle/C & D Canal Trail. Additionally, the extension will allow connectivity to the Delaware City Branch Canal via bridge BR 1-497, which is located on Delaware Route 9 between Canal Street and New Castle Avenue in Delaware City. This project is in the RFP (Request for Proposals) stage.

A collaborative effort by DelDOT, DNREC (Delaware Department of Natural Resources and Environmental Control), Delaware Greenways, Inc., and other groups developed the *Corridor Management Plan* in November 2013 for Delaware's Bayshore Byway. This was done as part of the *Delaware Byways Program*. The *Delaware Byways Program* includes the identification, promotion, preservation, and enhancement of Delaware roadways with at least one of the following qualities: scenic, historic, natural, cultural, recreational, and archaeological. Delaware's Bayshore Byway is an approximately 50-mile long section of roadway starting from the City of New Castle, traveling south on Delaware Route 9 and ending on the east side of the Dover Air Force Base at its junction with SR 1. A recommendation from the plan for Delaware Route 9 includes modifying any unimproved segments without paved shoulders to have 5-foot turf shoulders and minimum 10-foot wide travel lanes.

Furthermore, the U.S. Army Corps of Engineers is working on a bridge replacement project over the Delaware City Branch Canal at BR 1-497. The bridge has been closed since September 2016 and is scheduled to reopen in April 2017.

Based on our review of the traffic impact study, we have the following comments and recommendations:

The following intersection exhibits level of service (LOS) deficiencies without the implementation of physical roadway and/or traffic control improvements.

<i>Intersection</i>	<i>Situations for which deficiencies occur</i>
Site Entrance A/New Castle Avenue/ Polktown Place (New Castle Road 2A)/ Delaware Route 9 (New Castle Road 2)	2024 PM and Saturday full Build conditions with development of Fort DuPont Redevelopment (Case 5)

The unsignalized intersection of Site Entrance A/New Castle Avenue with Polktown Place and Delaware Route 9 exhibits LOS deficiencies during the 2024 PM and Saturday peak hours with



the full buildout of the Fort DuPont Redevelopment (Case 5). The deficiencies will take place along the eastbound Polktown Place and westbound New Castle Avenue approaches to the intersection.

Currently, New Castle Avenue and Polktown Place are offset roadways approximately 80 feet apart from each other and form two separate intersections with Delaware Route 9. The TIS recommends a roundabout for this intersection, which could simultaneously address LOS deficiencies as well as the offset intersection geometry. Replacing the offset intersections with a single-lane roundabout along the westbound New Castle Avenue approach would mitigate the LOS deficiencies. With a single-lane roundabout, the intersection would operate at LOS B or better under all Case 5 conditions and would provide more vehicular capacity for any potential future developments.

A review of the detailed crash history from January 2013 to January 2017 within the vicinity of the Delaware Route 9/New Castle Avenue/Polktown Place intersection revealed there were no crashes at the intersection. Based on AASHTO's (American Association of State Highway and Transportation Officials) *Highway Safety Manual*, reduced speeds due to roundabouts and the change of crossing conflict points to merging conflict points contribute to reductions in the occurrence of crashes when compared to signalized intersections. Therefore, based on the analysis results and the safety improvements, it is recommended that a roundabout be installed.

Attached Figure 1 depicts a conceptual layout of the single-lane roundabout. This layout includes the provision of a westbound yield-controlled channelized right turn lane to accommodate the projected high number of right turning vehicles along the westbound New Castle Avenue approach (volumes of 212, 355, and 395 are projected during the Case 5 weekday AM, weekday PM, and Saturday peak hours, respectively.) However, without the channelized right turn lane the roundabout would continue to operate at acceptable levels of service. As such, it is recommended that the final design of the roundabout be determined during the Entrance Plan review process. Other possible improvements that were also considered but not recommended are described in more detail within the supporting documentation which begins on Page 9.

It is acknowledged that installing a roundabout at this location would involve significant geometric improvements due to the large grade differentials between Polktown Place, Delaware Route 9 and New Castle Avenue, and would also impact the earthwork embankments and approaches for two adjacent bridges in the area. As such, it is recommended that the developer coordinate with DelDOT's Development Coordination Section to ensure the feasibility of constructing a roundabout and share the roundabout design with the appropriate DelDOT sections.

Furthermore, per the Federal Highway Administration (FHWA) publication *Roundabouts: An Information Guide*, speed limits within roundabouts are typically less than 30 miles per hour. The speed limits to the north and south of this intersection is 35 and 50 miles per hour, respectively. Therefore, it is recommended that speed limits along the Delaware Route 9 approaches to the roundabout be reduced. Reduced Speed Limit Ahead (W3-5) signs should also be provided along

the Delaware Route 9 approaches to give drivers advance notice to comply with the speed reduction.

Should Delaware City 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. Prior to the issuance of the 50th residential building permit of the Fort DuPont Redevelopment, the developer should modify the New Castle Avenue/Site Entrance A and Polktown Place intersections with Delaware Route 9 to be a single-lane roundabout consistent with the proposed lane configurations as shown on Page 9 and in the table below:

Approach	Current Configuration	Proposed Configuration
Eastbound Polktown Place	One shared through/left turn/right turn lane	One shared through/left turn/right turn lane
Westbound New Castle Avenue/Site Entrance A	One shared through/left turn/right turn lane	One shared through/left turn/right turn lane
Northbound Delaware Route 9	One shared through/left turn/right turn lane	One shared through/left turn/right turn lane
Southbound Delaware Route 9	One shared through/left turn/right turn lane	One shared through/left turn/right turn lane

The roundabout design should follow *NCHRP: Report 672 2nd Edition – Roundabouts: An Information Guide*, DelDOT’s *Road Design Manual*, and DelDOT’s *Design Guidance Memorandum Number 1-26* for roundabouts. The roundabout should include the design to realign the internal roadway east of the roundabout that provides connectivity between New Castle Avenue and Wilmington Avenue. The roundabout should also be designed to accommodate pedestrians and bicyclists and be in compliance with the *Delaware Byways Program*. Additionally, lighting at the roundabout should be evaluated per DelDOT’s lighting guidelines. The developer should submit a plan to DelDOT’s Development Coordination and other pertinent sections depicting the roundabout design. The final design of the roundabout should be determined during the Entrance Plan review process.

2. The developer should resurface the bituminous concrete shoulders as well as concrete roadway joints and patchwork along Delaware Route 9 from south of the Delaware City Branch Canal Bridge to north of the Reedy Point Bridge along the site frontage at DelDOT’s discretion. The developer should coordinate with DelDOT’s Development Coordination Section on the exact limits of the work, which is contingent upon the proposed roundabout alignment.



3. The developer should coordinate with DelDOT's Development Coordination and Traffic sections and Delaware City regarding reducing the speed limit along the Delaware Route 9 approaches as well as providing Reduced Speed Limit Ahead (W3-5) signs.
4. Prior to the issuance of the 96th residential building permit, the developer should improve the Site Entrance B/Wilmington Avenue intersection with Polktown Place to meet DelDOT's local road standards. These include, but are not limited to, two eleven-foot travel lanes and five-foot shoulders along both Wilmington Avenue and Polktown Place. The limits of improvement along Wilmington Avenue should extend to the westernmost internal roadway intersection with Wilmington Avenue. The limits of improvement along Polktown Place should extend to approximately 100 feet from the intersection. Due to roadway constraints, the provision of five-foot shoulders may not be required. A STOP (R1-1) sign and stop bar should be provided along the Wilmington Avenue approach.
5. The developer should provide a bituminous concrete overlay to the existing travel lanes at the Site Entrance B/Wilmington Avenue intersection with Polktown Place, at DelDOT's discretion. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer if necessary.
6. The developer should coordinate with Delaware City to determine the design of all internal streets. Should Delaware City require the streets to be in conformance with DelDOT standards, the roadways should provide pavement markings and signage consistent with the *Delaware Manual on Uniform Traffic Control Devices (DE MUTCD)*. STOP (R1-1) signs should be provided at all unsignalized intersections within the proposed development.
7. As Delaware Route 9 is within Delaware's Bayshore Byway, the developer should submit a site plan and coordinate with DelDOT's Development Coordination and other pertinent sections to ensure compliance with the *Corridor Management Plan* and the *Delaware Byways Program*.
8. The developer should enter into an agreement with DelDOT to fund an equitable portion to the multi-use path improvements planned as part of the future *Route 9 Byway Bike and Pedestrian Connector Delaware City* project. The agreement should specify connectivity to the internal streets within the Fort DuPont Redevelopment including Wilmington Avenue and New Castle Avenue. The developer should coordinate with DelDOT's Development Coordination and other pertinent sections during the plan review process to identify the exact location of the proposed pathways and future connection points.



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 Delaware Route 9 site frontage, applicable internal development streets, and any on-site off-network trails. This easement will be used for the *Route 9 Byway Bike and Pedestrian Connector Delaware City* future DelDOT project. The developer should coordinate with DelDOT's Development Coordination and other pertinent sections regarding the exact limits of the permanent easement.
 - b. Where internal sidewalks are located alongside of perpendicular or angular parking spaces, a buffer, physical barrier or signage should be added to eliminate vehicular overhang onto the sidewalk.
 - c. ADA compliant curb ramps and marked crosswalks should be provided at the site entrances. The use of diagonal curb ramps is discouraged.
 - d. Bike parking racks should be provided near the building entrances for commercial uses. Where the building architecture provides for an awning or other overhang, the bike parking should be covered.
 - e. Utility covers should be moved outside of any designated bicycle lanes and sidewalks or should be flush with the pavement.
 - f. The Delaware Transit Corporation (DTC) currently provides service to Delaware City via DART Route 25 which can be accessed north of the Delaware City Branch Canal, specifically at the Washington Street intersection with Canal Road and at the Delaware Route 9 intersection with Madison Street. As the DTC does not have any future plans to extend the service to the Fort DuPont Redevelopment area, the developer should coordinate with DelDOT's Development Coordination and other pertinent sections during the plan review process to ensure the proposed pathways as part of the future *Route 9 Byway Bike and Pedestrian Connector Delaware City* project provide connectivity to the existing bus stops in the area north of the Delaware City Branch Canal.

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 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.

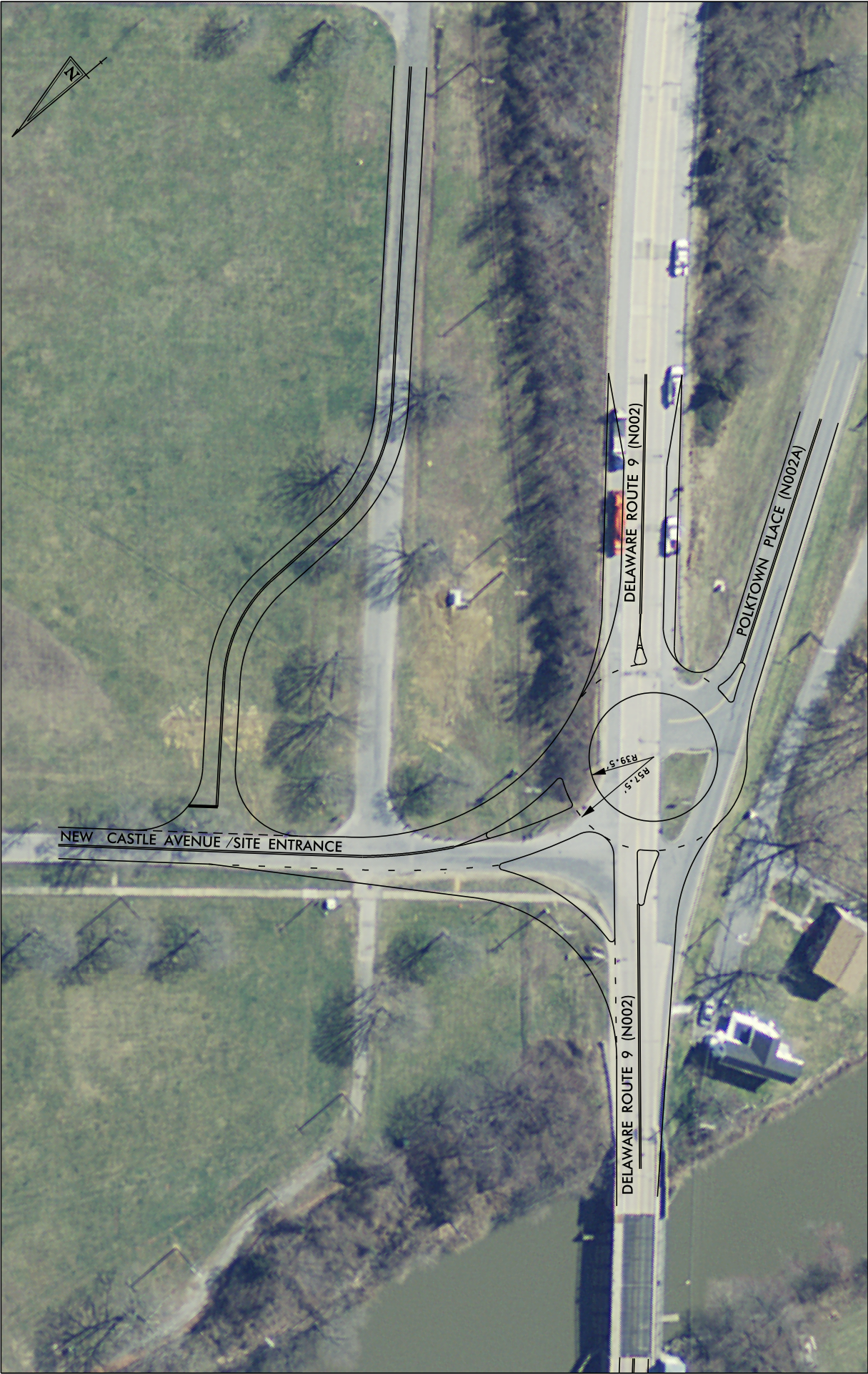
Additional details on our review of the TIS are attached. Please contact me at (302) 266-9600 if you have any questions concerning this review.

Sincerely,
Johnson, Mirmiran, and Thompson, Inc.

Mir Wahed,
Mir Wahed, P.E., PTOE

cc: Joanne Arellano, P.E., PTOE

Enclosure



CONCEPTUAL ROUNDABOUT SKETCH

FORT DUPONT REDEVELOPMENT
TRAFFIC IMPACT STUDY
DELAWARE CITY, NEW CASTLE COUNTY, DELAWARE



JUNE, 2017

FIGURE 1

N.T.S

General Information

Report date: January 2017

Prepared by: Duffield Associates, Inc.

Prepared for: Fort DuPont Redevelopment & Preservation Corporation, Inc.

Tax Parcel: 22-009.00-156

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

Project Description and Background

Description: The mixed-use development will consist of 50 single-family detached houses, 105 townhouses, 100 condominiums, 161 low-rise apartment units, an 85-bed assisted care facility, a 25-room hotel, a 13,000 square-foot museum, 141,000 square feet of office space, a 4,720 square-foot government office building, 75,572 square feet of retail, and a 9,800 square-foot quality restaurant. The development will be constructed in two separate phase where Phase 1 will consist of 42 single-family detached houses and 49 townhouses.

Location: The project site is located on the east side of Delaware Route 9 between the Chesapeake and Delaware Canal and the Delaware City Branch Canal, in Delaware City, New Castle County.

Amount of Land to be developed: The subject property is on an approximately 296.23-acre parcel.

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

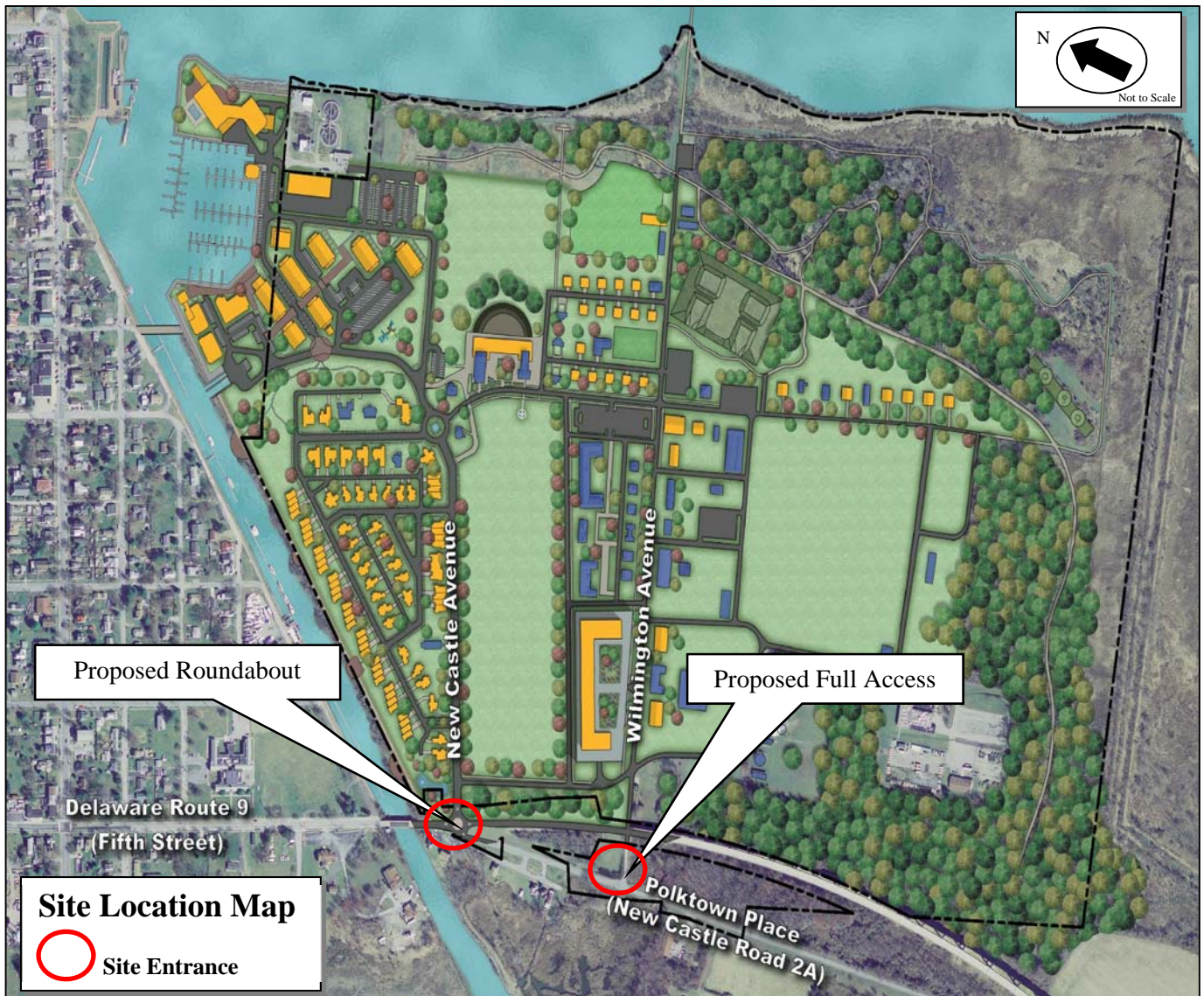
Proposed completion date: 2024

Proposed access locations: Two access points are proposed: a roundabout at the intersection of Delaware Route 9/New Castle Avenue/Polktown Place, and a full access at the intersection of Wilmington Avenue/Polktown Place.

Daily Traffic Volumes:

- 2016 Average Annual Daily Traffic on Delaware Route 9: 2,096 vehicles per day.
- 2016 Average Annual Daily Traffic on Polktown Place: 483 vehicles per day

Site Map



**Graphic is an approximation based on the Conceptual Site Plan prepared by Duffield Associates, Inc. dated July 27, 2016*

Relevant and On-going Projects

DelDOT currently has four relevant projects within the study area: the *SR 72/ SR 1 Interchange* project (Contract #T201511002), a possible future improvement project at the US Route 13/Cox Neck Road (New Castle Road 411) intersection, the *Signalized Median Crossover Signing and Pavement Marking Upgrades – Statewide* study (Contract #T201508305), and the *Statewide Horizontal Curve Safety* study (Contracts #T201608301 and #T201609201). Additionally, DelDOT has a resurfacing project (Contract #T201606101) scheduled Summer of 2017 along Delaware Route 72 from US Route 13 to Delaware Route 9. None of the study area intersections were selected for the Hazard Elimination Program (HEP) within the last five years.

The *SR 72/SR 1 Interchange* project (Contract #T201511002) involves the modification of the existing Diamond Interchange at Delaware Route 1 (SR 1) and Delaware Route 72 (SR 72) to a Diverging Diamond Interchange (DDI). The interchange modifications are needed to improve congestion and safety related to the heavy left-turn movements entering and exiting SR 1. The DDI provides improved traffic, safety, and congestion relief along the SR 72 corridor at this interchange through modifying the existing traffic signals from a three-phase operation to a two-phase operation providing more green time along SR 72. Construction for this project started Spring of 2016 and the DDI was opened to traffic November 2016.

DelDOT is working on a possible future intersection improvement project at the US Route 13 intersection with Cox Neck Road. The improvement would involve the installation of a traffic signal and a potential right turn on red restriction on the westbound right turn movement from Cox Neck Road. At this time, no contract number or design plans are available as the project is currently being coordinated with legislators.

The *Signalized Median Crossover Signing and Pavement Marking Upgrades – Statewide* project (Contract #T201508305) is designed to improve safety along divided highways throughout Delaware. As part of the project, signing and striping were evaluated at signalized intersections along divided highways within the state roadway network per the *Delaware Manual on Uniform Traffic Control Devices (DE MUTCD)* standards. The US Route 13 intersection with Delaware Route 72 was evaluated as part of this project. Recommendations included signage (Yield, Do Not Enter, Wrong Way, Turn Lane, Divided Highway) and striping improvements following *DE MUTCD* specifications. Field visits confirm the recommendations have not been completed.

The *Statewide Horizontal Curve Safety* project (Contracts #T201608301 and #T201609201) is designed to improve safety along horizontal curves for all roadway classifications throughout Delaware. As part of this project, all the horizontal curve locations are evaluated per the *DE MUTCD* standards. Improvements are recommended based on ball bank studies of each horizontal curve with proper signage and spacing based on Figure 2C-2 and Tables 2C-5 and 2C-6 of the *DE MUTCD*. Several roadways within the study area are part of this project. These roadways include Delaware Route 9, Cox Neck Road/Clinton Street (New Castle Road 411), Clarks Corner Road (New Castle Road 378), Delaware Route 72 (New Castle Road 46), US Route 13 (New Castle Road 34), and Delaware Route 7 (Bear Corbitt Road/New Castle Road 5). As a recommendation within this DelDOT project, plans were developed and approved in September 2016 for the horizontal curve along Cox Neck Road (approximately 300 feet west of the Cox Neck Road intersection with Clarks Corner Road). Field visits confirm the improvements have not been completed. As this is an ongoing project, plans for the remaining roadways within the study area are either in the process of being developed or are under review by DelDOT.

In addition, DelDOT has a future *Route 9 Byway Bike and Pedestrian Connector Delaware City* project. This project involves the design of the easternmost extension of the Chesapeake and Delaware (C & D) Canal Trail to connect to Delaware's Bayshore Byway, which includes the Delaware Route 9 corridor. The extension will also connect to the Michael N. Castle/C & D Canal Trail. Additionally, the extension will allow connectivity to the Delaware City Branch Canal via bridge BR 1-497, which is located on Delaware Route 9 between Canal Street and New Castle Avenue in Delaware City. This project is in the RFP (Request for Proposals) stage.

A collaborative effort by DelDOT, DNREC (Delaware Department of Natural Resources and Environmental Control), Delaware Greenways, Inc., and other groups developed the *Corridor Management Plan* in November 2013 for Delaware's Bayshore Byway. This was done as part of the *Delaware Byways Program*. The *Delaware Byways Program* includes the identification, promotion, preservation, and enhancement of Delaware roadways with at least one of the following qualities: scenic, historic, natural, cultural, recreational, and archaeological. Delaware's Bayshore Byway is an approximately 50-mile long section of roadway starting from the City of New Castle, traveling south on Delaware Route 9 and ending on the east side of the Dover Air Force Base at its junction with SR 1. A recommendation from the plan for Delaware Route 9 includes modifying any unimproved segments without paved shoulders to have 5-foot turf shoulders and minimum 10-foot wide travel lanes.

Furthermore, the U.S. Army Corps of Engineers is working on a bridge replacement project over the Delaware City Branch Canal at BR 1-497. The bridge has been closed since September 2016 and is scheduled to reopen in April 2017.

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 the Investment Level 3 and Out of Play 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 the Department 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 Out of Play

These lands which are not available for development include publicly-owned lands, private conservation lands, lands for which serious legal and/or environmental constraints on development are identified, and lands in some form of permanent open-space protection. These areas are

generally not expected to be the location of private development activities such as residential subdivisions or commercial shopping centers. However, government entities, private property owners, and conservation organizations are still expected to invest in these areas for the purposes in which they were acquired and preserved. There may also be times when private property owners could be able to build or redevelop on these lands in accordance with State and local environmental and land use regulations.

Proposed Development's Compatibility with Livable Delaware:

The proposed development is located in Investment Level 3 and Out of Play areas. According to Livable Delaware, Level 3 may be appropriate for compact development once Level 2 Areas (which are located to the north of the site) are built out. Furthermore, according to DelDOT's January 23, 2017 PLUS review comments for the site, the lands within the Out of Play areas have been transferred to the Fort DuPont Redevelopment and Preservation Corporation for the purpose of development in accordance with a Board approved redevelopment plan. Therefore, this development appears to be generally consistent with the 2015 update of the Livable Delaware "Strategies for State Policies and Spending."

Comprehensive Plans

(Source: Delaware City, Comprehensive Plan Update, December 2014)

Delaware City Comprehensive Plan:

The subject property is zoned as HPR (Historic Preservation and Redevelopment). According to the Comprehensive Plan, the purpose of the HPR zone is to allow for the preservation of historic structures on the Fort DuPont site while at the same time allowing a mix of redevelopment uses at the site which complements Delaware City.

Proposed Development's Compatibility with the Delaware City Comprehensive Plan:

Per the Delaware City Comprehensive Plan, the HPR district may include residential, historic preservation, marina, hotel, retail/commercial uses, non-drive through restaurants, and office buildings. Therefore, the proposed development is generally compatible with the Delaware City Comprehensive Plan.

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, 9th Edition: An ITE Informational Report*, published by the Institute of Transportation Engineers (ITE) for the following land uses:

- ITE Land Use Code 210 – Single-Family Detached Housing
- ITE Land Use Code 221 – Low-Rise Apartment
- ITE Land Use Code 230 – Residential Condominium/Townhouse
- ITE Land Use Code 254 – Assisted Living
- ITE Land Use Code 310 – Hotel
- ITE Land Use Code 580 – Museum
- ITE Land Use Code 710 – General Office Building
- ITE Land Use Code 730 – Government Office Building
- ITE Land Use Code 820 – Shopping Center
- ITE Land Use Code 931 – Quality Restaurant

The proposed land uses within the TIS have been modified since the October 19, 2016 Scoping Meeting at DelDOT. The peak period trip generation for Phase 1 of the development is included in Table 1.

Table 1
PHASE 1 FORT DUPONT REDEVELOPMENT

Land Use	ADT	AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
42 Single-Family Detached Houses	473	10	30	40	31	18	49	25	21	46
49 Townhouse Units	346	6	25	31	23	11	34	31	26	57
Net New Trips	819	16	55	71	54	29	83	56	47	103

The TIS applied internal capture and did not consider pass-by in the trip generation calculations. The resulting peak period trip generation for the full build of the development is included in Table 2.

Table 2
FULL DEVELOPMENT OF FORT DUPONT REDEVELOPMENT

Land Use	ADT	AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
50 Single-Family Detached Houses	555	11	34	45	36	21	57	29	25	54
105 Townhouse Units	671	9	45	54	43	20	63	40	34	74
100 Condominium Units	643	9	43	52	40	20	60	39	33	72
161 Low-Rise Apartment Units	1,212	17	64	81	67	36	103	52	45	97
85 Bed Assisted Living Facility	259	8	4	12	8	11	19	13	15	28
25 Room Hotel	204	8	5	13	8	7	15	12	10	22
13,000 SF Museum	*	3	1	4	0	3	3	6	3	9
141,000 SF General Office Building	1,705	222	30	252	40	197	237	33	28	61
4,720 SF Government Office Building	*	24	4	28	2	4	6	0	0	0
72,572 SF Shopping Center	3,099	79	49	128	232	251	483	368	340	708
9,800 SF Quality Restaurant	882	6	2	8	50	24	74	63	43	106
Total Trips	-	396	281	677	526	594	1,120	655	576	1,231
Internal Capture	-	37	37	74	166	166	332	110	110	220
Net New Trips	-	359	244	603	360	428	788	545	466	1,011

*Note: *Trip Generation, 9th Edition: An ITE Informational Report*, published by the Institute of Transportation Engineers (ITE) does not provide a rate for ADT due to limited data.

Overview of TIS

Intersections examined:

1. Site Entrance A / New Castle Avenue / Polktown Place (New Castle Road 2A) / Delaware Route 9 (Fifth Street)
2. Site Entrance B / Wilmington Avenue / Polktown Place
3. Delaware Route 9 / Cox Neck Road (New Castle Road 411) / Clinton Street (New Castle Road 411)
4. Delaware Route 72 / Clarks Corner Road (New Castle Road 378) / Delaware Route 9
5. US Route 13 / Delaware Route 72
6. Cox Neck Road / Clarks Corner Road / Delaware Street (New Castle Road 378)
7. US Route 13 / Cox Neck Road
8. Delaware Route 9 / Port Penn (New Castle Road 2)

Conditions examined:

1. Case 1 – 2016 Existing
2. Case 2 – 2020 No Build conditions without Fort DuPont Redevelopment
3. Case 3 – 2020 Build conditions with Phase 1 of Fort DuPont Redevelopment
4. Case 4 – 2024 No Build conditions without Fort DuPont Redevelopment
5. Case 5 – 2024 Full Build conditions with Fort DuPont Redevelopment

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

Committed Developments considered:

1. St. Georges Crossing (290 single-family detached houses, 279 age-restricted townhouses)
2. Peoples Industrial Park (9 industrial park parcels)
3. Highpointe at St. Georges (f.k.a. Linden Hill Farm) (175 single-family detached houses)

Intersection Descriptions

1. Site Entrance A / New Castle Avenue / Polktown Place (New Castle Road 2A) / Delaware Route 9 (Fifth Street)

Type of Control: existing stop controlled intersection; proposed one-lane roundabout

Northbound Approach: (Delaware Route 9) existing one shared through/left turn/right turn lane; proposed one shared through/left turn/right turn lane, yield controlled

Southbound Approach: (Delaware Route 9) existing one shared through/left turn/right turn lane; proposed one shared through/left turn/right turn lane, yield controlled

Eastbound Approach: (Polktown Place) existing one shared through/left turn/right turn lane, stop controlled; proposed one shared through/left turn/right turn lane, yield controlled

Westbound Approach: (New Castle Avenue) existing one shared through/left turn/right turn lane, stop controlled; proposed one shared through/left turn lane and one channelized right turn lane, yield controlled

2. Site Entrance B / Wilmington Avenue / Polktown Place

Type of Control: existing stop controlled intersection (T-intersection)

Northbound Approach: (Polktown Place) existing one shared through/right turn lane

Southbound Approach: (Polktown Place) existing one shared through/left turn lane

Westbound Approach: (Wilmington Avenue) one shared left turn/right turn lane, stop controlled

3. Delaware Route 9 / Cox Neck Road (New Castle Road 411) / Clinton Street (New Castle Road 411)

Type of Control: existing signal controlled intersection

Northbound Approach: (Delaware Route 9) existing one shared through/left turn/right turn lane

Southbound Approach: (Delaware Route 9) existing one shared through/left turn/right turn lane

Eastbound Approach: (Cox Neck Road) existing one shared through/left turn/right turn lane

Westbound Approach: (Clinton Street) existing one shared through/left turn/right turn lane

4. Delaware Route 72 / Clarks Corner Road (New Castle Road 378) / Delaware Route 9

Type of Control: existing signal controlled intersection

Northbound Approach: (Clarks Corner Road) existing one shared through/left turn/right turn lane

Southbound Approach: (Clarks Corner Road) existing one shared through/left turn lane and one channelized right turn lane

Eastbound Approach: (Delaware Route 72) existing one shared through/left turn/right turn lane

Westbound Approach: (Delaware Route 9) existing one shared through/left turn lane and one channelized right turn lane

5. US Route 13 / Delaware Route 72

Type of Control: existing signal controlled intersection

Northbound Approach: (US Route 13) existing two left turn lanes, two through lanes, and one channelized right turn lane

Southbound Approach: (US Route 13) existing one left turn lane, one through lane, and one channelized right turn lane

Eastbound Approach: (Delaware Route 72) existing one left turn lane, two through lanes, and one channelized right turn lane

Westbound Approach: (Delaware Route 72) existing one left turn lane, two through lanes, and one channelized right turn lane

6. Cox Neck Road / Clarks Corner Road / Delaware Street (New Castle Road 378)

Type of Control: existing stop controlled intersection

Northbound Approach: (Clarks Corner Road) existing one shared through/left turn/right turn lane, stop controlled

Southbound Approach: (Clarks Corner Road) existing one shared through/left turn/right turn lane, stop controlled

Eastbound Approach: (Cox Neck Road) existing one shared through/left turn/right turn lane

Westbound Approach: (Cox Neck Road) existing one shared through/left turn/right turn lane

7. US Route 13 /Cox Neck Road

Type of Control: existing stop controlled intersection (T-intersection)

Northbound Approach: (US Route 13) existing one left turn lane, two through lanes, and one channelized right turn lane

Southbound Approach: (US Route 13) existing one left turn lane and two through lanes

Westbound Approach: (Cox Neck Road) existing one left turn lane and one channelized right turn lane, stop controlled

8. Delaware Route 9 / Port Penn Road (New Castle Road 2)

Type of Control: existing stop controlled intersection (T-intersection)

Southbound Approach: (Delaware Route 9) existing one left turn lane and one right turn lane, stop controlled

Eastbound Approach: (Port Penn Road) existing one shared through/left turn lane

Westbound Approach: (Port Penn Road) existing one shared through/right turn lane

Alternative Improvements

As discussed starting on Page 2, the unsignalized intersection of Site Entrance A/New Castle Avenue with Polktown Place and Delaware Route 9 exhibits LOS deficiencies during the 2024 PM and Saturday peak hours with the full buildout of the Fort DuPont Redevelopment (Case 5). Thus, a roundabout is recommended to mitigate the deficiencies. Other possible improvements that were also considered but not recommended are described in more detail below.

By maintaining the offset configuration of these intersections, but modifying the westbound New Castle Avenue approach to provide a shared through/left turn lane and a separate right turn lane, and modifying the northbound Delaware Route 9 approach to provide a separate right turn lane, the westbound New Castle Avenue approach would improve to operate at the acceptable LOS D or better under Case 5 conditions. The maximum 95th percentile westbound queue length with this intersection modification is projected to be approximately 113 feet on the right turn lane and approximately 55 feet on the left turn lane during the Case 5 Saturday midday peak hour. Although this would improve the westbound New Castle Avenue approach, the eastbound Polktown Place approach would continue to operate at LOS E (48.8 seconds of delay) during the Saturday midday peak hour under Case 5 conditions. However, the maximum projected 95th percentile queue length on Polktown Place is approximately 13 feet during the Case 5 Saturday midday peak hour. This is a minimal queue length that could be accommodated along Polktown Place without obstructing any adjacent roadways. Although maintaining the offset geometry at this intersection with lane

modifications would mitigate levels of service deficiencies along the westbound approach and result in minimal queue lengths, it would not accommodate any potential future development in the area. In addition, this option would not address any operational constraints due to closely spaced offset intersections. Specifically, there exists an operational constraint between a vehicle turning left from Polktown Place who may have to immediately stop for vehicles turning left from southbound Delaware Route 9. This leads to inefficient operation of the intersection as well as increases in driver confusion. The two-stage left turn movement would be further constrained by increases in left turning volumes due to future development along Polktown Place.

The intersection deficiencies could also be mitigated and the intersection could be improved to operate at LOS B or better under Case 5 conditions with the offset unsignalized configuration, by providing a northbound Delaware Route 9 separate right turn lane and by prohibiting left-out and through movements from westbound Site Entrance A/New Castle Avenue. With this prohibition, vehicles would access southbound Delaware Route 9 via the internal connection with the Wilmington Avenue/Polktown Place intersection and a right turn movement onto southbound Delaware Route 9 from Polktown Place. Though we would encourage this prohibition, we realize there may be difficulties with enforcement of preventing westbound New Castle Avenue left turning vehicles from exiting the site as the route would have vehicles travel approximately 0.40 miles farther than a typical path to access southbound Delaware Route 9.

Additionally, realigning the existing offset intersections and installing a two-phase traffic signal would mitigate the LOS deficiencies as well as address any intersection offset geometry concerns. The signal would operate at acceptable LOS C or better under all Case 5 conditions. With the realignment and signal installation, additional modifications would be needed along the westbound New Castle Avenue and northbound Delaware Route 9 approaches. Specifically, the westbound New Castle Avenue approach would have to be modified to provide a shared through/left turn lane and a separate right turn lane, and the northbound Delaware Route 9 approach would have to be modified to provide a separate right turn lane. With these improvements, the maximum projected 95th percentile queue length on southbound Delaware Route 9 would be approximately 283 feet during the Case 5 Saturday midday peak hour which could be accommodated on the roadway without impeding any adjacent intersections/driveways. Although the installation of a signal would mitigate the LOS deficiencies, it is acknowledged that the appropriate DE MUTCD warrants to install the signal would not be met initially, due to the phased construction of the development.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: The Delaware Transit Corporation (DTC) does not provide any service along the Delaware Route 9 site frontage. However, there is a current bus route (Route 25) to the north of the site along Delaware Route 9, within the downtown area of Delaware City, looping east around Washington Street and Clinton Street. Access to the bus route exists at the Washington Street intersection with Canal Road and at the Delaware Route 9 intersection with Madison Street.

Planned transit service: JMT contacted Mr. David Dooley, Transit Planner at the DTC. On March 1, 2017, Mr. Dooley stated that the DTC does not have any future plans to extend bus service to the Fort DuPont Redevelopment area but recommends five-foot sidewalks be constructed along Delaware Route 9 to provide connectivity to the existing sidewalks for accessing the bus stops.

Existing bicycle and pedestrian facilities: According to DelDOT's *Delaware Bicycle Facility Master Plan* (October 2005) and the *New Castle County Bicycle Map*, statewide, regional, and connector bicycle routes exist within the study area. The statewide bicycle route exists along Port Penn Road, US Route 13, Cox Neck Road, Clarks Corner Road, and Delaware Route 9 traversing through four of the study intersections. The regional bicycle route (NC-2) exists along Delaware Route 9 and traverses through seven of the study intersections. The connector bicycle route exists along US Route 13 and traverses through two of the study intersections. Sidewalks exist along Delaware Route 9, Clinton Street, and Port Penn Road. Pedestrian crosswalks exist at the Delaware Route 9/Port Penn Road and Delaware Route 9/Cox Neck Road/Clinton Street intersections.

Planned bicycle and pedestrian facilities: JMT contacted Mr. John Fiori and Ms. Sarah Coakley, DelDOT's Bicycle and Pedestrian Coordinators on February 8, 2017. A response from Mr. Fiori and Ms. Coakley has not been received. JMT also contacted Mr. Mike Hahn, DelDOT's Planning and Byways Coordinator. In a February 8, 2017 email, Mr. Hahn discussed the future multi-use paths planned as part of the *Delaware Byways Program*. Additionally, Mr. Hahn requested for coordination between him and the developer regarding the site design.

Bicycle Level of Service and Bicycle Compatibility Index: According to the League of Illinois Bicyclists (LIB), Bicycle Level of Service (BLOS) is an emerging national standard for quantifying the bike-friendliness of a roadway by measuring on-road bicyclist comfort levels for specific roadway geometries and traffic conditions. Utilizing the 10-year projected AADT along the Delaware Route 9 site frontage, the provision of 5-foot bike lanes, and a 35 miles per hour speed limit, the BLOS with the full build out construction of the proposed development are summarized below. The BLOS was determined utilizing the calculators published on the LIB website: <http://www.bikelib.org/roads/blos/blosform.htm>

- Delaware Route 9 – BLOS: B (1.51-2.50)

Previous Comments

The comments from the Preliminary TIS have been addressed in the TIS.

General HCS Analysis Comments

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

1. For the unsignalized intersection analyses, the TIS used HCS+, Version 5.60 whereas JMT used HCS 2010, Version 6.90.
2. For the signalized intersection analyses, the TIS used HSC 2010, version 6.65 whereas JMT used HCS 2010, version 6.90.
3. JMT utilized a PHF consistent with the existing turning movement counts at each intersection whereas the TIS assumed a PHF of 0.92 for each intersection.
4. JMT used heavy vehicle percentages consistent with the existing turning movement counts at each intersection while the TIS utilized arbitrary percentages.
5. Per DelDOT's *Development Coordination Manual*, JMT used a heavy vehicle percentage of 3% for each movement in a future scenario analysis, 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. The TIS maintained the heavy vehicle percentages utilized in their existing cases throughout the future cases.
6. Per DelDOT's *Development Coordination Manual*, JMT utilized the future PHF 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, whereas the TIS assumed 0.92.
7. JMT utilized pedestrian and bicycle counts consistent with the existing turning movement counts whereas the TIS did not.

Table 3
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection ^{1,2,3,4,5} Two-Way Stop Control	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2016 Existing (Case 1)						
Eastbound Polktown Place	A (9.0)	A (9.3)	A (9.4)	A (9.3)	A (9.4)	A (9.5)
Westbound New Castle Avenue	A (8.7)	A (8.9)	A (8.9)	A (8.8)	A (8.9)	A (8.9)
Northbound Delaware Route 9 Left	-	-	-	A (7.2)	A (7.4)	A (7.4)
Northbound Delaware Route 9 Through/Left	A (7.3)	A (7.4)	A (7.4)	-	-	-
Northbound Delaware Route 9 Approach	-	-	-	A (1.2)	A (0.0)	A (0.3)
Southbound Delaware Route 9 Left	A (7.3)	A (7.3)	A (7.3)	-	-	-
Southbound Delaware Route 9 Through/Left	-	-	-	A (7.5)	A (7.3)	A (7.3)
Southbound Delaware Route 9 Approach	-	-	-	A (1.7)	A (0.4)	A (0.7)

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

² The TIS configured the southbound Delaware Route 9 approach as a shared through/left turn/right turn lane whereas JMT configured the approach as a shared through/left turn lane and a channelized right turn lane consistent with existing conditions.

³ The TIS configured the northbound Delaware Route 9 approach as a shared through/left-turn lane and a right turn lane whereas JMT configured the approach as a shared through/left turn/right turn lane consistent with field conditions.

⁴ The New Castle Avenue and Polktown Place approaches are approximately 80 feet offset from each other, and form two separate intersections with Delaware Route 9. However, both the TIS and JMT analyzed this location as one intersection consistent with how it operates in the field.

⁵ HCS+ software does not provide approach delays along major streets whereas HCS 2010 does.

Table 3 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection ^{1,2,3,4,5} Two-Way Stop Control	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
Site Entrance A/New Castle Avenue/Polktown Place/Delaware Route 9						
2020 without development of Fort DuPont Redevelopment (Case 2)						
Eastbound Polktown Place	A (9.1)	A (9.5)	A (9.6)	A (9.4)	A (9.6)	A (9.6)
Westbound New Castle Avenue	A (8.7)	A (9.0)	A (8.9)	A (8.9)	A (9.0)	A (9.0)
Northbound Delaware Route 9 Left	-	-	-	A (7.3)	A (7.5)	A (7.4)
Northbound Delaware Route 9 Through/Left	A (7.3)	A (7.5)	A (7.4)	-	-	-
Northbound Delaware Route 9 Approach	-	-	-	A (7.3)	A (7.5)	A (7.4)
Southbound Delaware Route 9 Left	A (7.3)	A (7.3)	A (7.4)	-	-	-
Southbound Delaware Route 9 Through/Left	-	-	-	A (7.5)	A (7.3)	A (7.4)
Southbound Delaware Route 9 Approach	-	-	-	A (1.5)	A (0.4)	A (0.7)

Table 3 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection^{1,2,3,4,5} Two-Way Stop Control	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
Site Entrance A/New Castle Avenue/Polktown Place/Delaware Route 9						
2020 with development of Phase 1 Fort DuPont Redevelopment (Case 3) ⁶						
Eastbound Polktown Place	A (9.7)	A (9.7)	B (10.6)	B (10.0)	B (10.9)	B (10.9)
Westbound New Castle Avenue	A (8.9)	A (8.9)	A (9.3)	A (9.1)	A (9.5)	A (9.4)
Northbound Delaware Route 9 Left	-	-	-	A (7.3)	A (7.5)	A (7.4)
Northbound Delaware Route 9 Through/Left	A (7.3)	A (7.3)	A (7.4)	-	-	-
Northbound Delaware Route 9 Approach	-	-	-	A (1.0)	A (0.0)	A (0.3)
Southbound Delaware Route 9 Left	A (7.3)	A (7.3)	A (7.5)	-	-	-
Southbound Delaware Route 9 Through/Left	-	-	-	A (7.6)	A (7.5)	A (7.5)
Southbound Delaware Route 9 Approach	-	-	-	A (2.9)	A (2.5)	A (3.0)

⁶ During the PM peak hour, JMT utilized volumes consistent with Exhibit 26 for Case 3 conditions from the report whereas the TIS did not.

Table 3 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection^{1,2,3,4,5} Two-Way Stop Control	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
Site Entrance A/New Castle Avenue/Polktown Place/Delaware Route 9						
2024 without development of Fort DuPont Redevelopment (Case 4)						
Eastbound Polktown Place	A (9.2)	A (9.5)	A (9.6)	A (9.4)	A (9.6)	A (9.7)
Westbound New Castle Avenue	A (8.7)	A (9.0)	A (9.0)	A (8.9)	A (9.1)	A (9.0)
Northbound Delaware Route 9 left	-	-	-	A (7.3)	A (7.5)	A (7.4)
Northbound Delaware Route 9 Through/ left	A (7.3)	A (7.5)	A (7.4)	-	-	-
Northbound Delaware Route 9 Approach	-	-	-	A (1.2)	A (0.0)	A (0.3)
Southbound Delaware Route 9 Left	A (7.3)	A (7.3)	A (7.4)	-	-	-
Southbound Delaware Route 9 Through/ Left	-	-	-	A (7.5)	A (7.3)	A (7.4)
Southbound Delaware Route 9 Approach	-	-	-	A (1.6)	A (0.4)	A (0.8)

Table 3 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection ^{1,2,3,4,5} Two-Way Stop Control	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
Site Entrance A/New Castle Avenue/Polktown Place/Delaware Route 9						
2024 with full development of Fort DuPont Redevelopment (Case 5)						
Eastbound Polktown Place	C (24.7)	D (34.0)	F (77.8)	D (28.4)	E (39.4)	F (88.5)
Westbound New Castle Avenue	B (13.4)	D (27.2)	F (148.9)	C (15.3)	E (42.5)	F (196.3)
Northbound Delaware Route 9 Left	-	-	-	A (7.3)	A (7.5)	A (7.4)
Northbound Delaware Route 9 Through/ Left	A (7.3)	A (7.5)	A (7.4)	-	-	-
Northbound Delaware Route 9 Approach	-	-	-	A (0.5)	A (0.0)	A (0.1)
Southbound Delaware Route 9 Left	A (8.2)	A (8.1)	A (9.0)	-	-	-
Southbound Delaware Route 9 Through/ Left	-	-	-	A (8.3)	A (8.2)	A (9.0)
Southbound Delaware Route 9 Approach	-	-	-	A (7.4)	A (6.4)	A (7.9)

Table 3 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection ¹ Two-Way Stop Control	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
Site Entrance A/New Castle Avenue/Polktown Place/Delaware Route 9						
2024 full development of Fort DuPont Redevelopment (Case 5) <i>With Improvement Option 1</i> ⁷						
Eastbound Polktown Place	-	-	-	D (26.6)	D (26.5)	E (48.8)
Westbound New Castle Avenue Through/Left	-	-	-	C (22.5)	D (32.5)	F (90.9)
Westbound New Castle Avenue Right	-	-	-	A (9.6)	B (10.8)	B (11.3)
Westbound New Castle Avenue Approach	-	-	-	B (11.8)	C (15.1)	D (26.3)
Northbound Delaware Route 9 Through/Left	-	-	-	A (7.3)	A (7.5)	A (7.4)
Northbound Delaware Route 9 Approach	-	-	-	A (0.5)	A (0.0)	A (0.1)
Southbound Delaware Route 9 Through/Left	-	-	-	A (8.3)	A (8.0)	A (8.5)
Southbound Delaware Route 9 Approach	-	-	-	A (7.4)	A (6.2)	A (7.4)

⁷ Improvement Option 1 accounts for maintaining the offset configurations of the eastbound Polktown Place and westbound New Castle Avenue approaches, but modifying the westbound New Castle Avenue approach to provide a shared through/left turn lane and a separate right turn lane. The northbound Delaware Route 9 approach would be modified to provide a separate right turn as well.

Table 3 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection ^{1,5} Two-Way Stop Control	LOS per TIS			LOS per JMT		
Site Entrance A/New Castle Avenue/Polktown Place/Delaware Route 9	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2024 with full development of Fort DuPont Redevelopment (Case 5) with Improvement Option 2 ⁸						
Eastbound Polktown Place	-	-	-	B (12.8)	B (13.5)	C (15.9)
Westbound New Castle Avenue	-	-	-	A (9.6)	B (10.8)	B (11.3)
Northbound Delaware Route 9 Left/Through	-	-	-	A (7.3)	A (7.5)	A (7.4)
Northbound Delaware Route 9 Approach	-	-	-	A (0.5)	A (0.0)	A (0.1)
Southbound Delaware Route 9 Through/Left	-	-	-	A (8.3)	A (8.0)	A (8.5)
Southbound Delaware Route 9 Approach	-	-	-	A (7.4)	A (6.2)	A (7.4)

⁸ Improvement Option 2 accounts for the restriction of left-turn and through movements from westbound New Castle Avenue. Left-turning volumes would be rerouted to Wilmington Avenue and Polktown Place to access southbound Delaware Route 9. The northbound Delaware Route 9 approach would be modified to provide a separate right turn lane as well.

Table 3 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Signalized Intersection ¹	LOS per TIS			LOS per JMT		
Site Entrance A/New Castle Avenue/Polktown Place/Delaware Route 9	Weekday AM	Weekday PM	Saturday MIDDAY	Weekday AM	Weekday PM	Saturday MIDDAY
2024 with full development of Fort DuPont Redevelopment (Case 5) with Improvement Option 3 ⁹	-	-	-	B (12.3)	B (16.3)	C (21.1)

⁹ Improvement Option 3 accounts for the installation of a two-phase traffic signal operating in FREE mode during the AM, PM and Saturday peak periods. The westbound New Castle Avenue approach would be modified to provide one shared through/left turn lane and one right turn lane. The northbound Delaware Route 9 approach would also be modified to provide a separate right turn lane.

Table 3 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Roundabout ¹	LOS per TIS			LOS per JMT		
Site Entrance A/New Castle Avenue/Polktown Place/Delaware Route 9	Weekday AM	Weekday PM	Saturday MIDDAY	Weekday AM	Weekday PM	Saturday MIDDAY
2024 with full development of Fort DuPont Redevelopment (Case 5) <i>With Improvement Option 4</i> ^{10,11}						
Eastbound Polktown Place	A (5.1)	A (6.1)	A (7.0)	A (4.8)	A (6.2)	A (6.9)
Westbound New Castle Avenue	A (6.2)	A (10.0)	B (10.1)	A (5.8)	A (9.2)	B (10.0)
Northbound Delaware Route 9	A (6.5)	A (7.8)	A (9.2)	A (5.2)	A (6.6)	A (9.1)
Southbound Delaware Route 9	A (7.2)	B (9.7)	B (12.1)	A (5.5)	A (9.3)	B (12.0)
Overall	A (6.7)	A (9.4)	B (10.9)	A (5.2)	A (8.9)	B (10.7)
2024 with full development of Fort DuPont Redevelopment (Case 5) <i>With Improvement Option 5</i> ^{10,12}						
Eastbound Polktown Place	-	-	-	A (5.8)	A (6.2)	A (6.9)
Westbound New Castle Avenue	-	-	-	A (5.3)	A (7.0)	A (7.5)
Northbound Delaware Route 9	-	-	-	A (6.5)	A (6.6)	A (9.1)
Southbound Delaware Route 9	-	-	-	A (7.2)	A (9.3)	B (12.0)
Overall	-	-	-	A (6.4)	A (7.9)	A (9.8)

¹⁰ During the AM, PM and Saturday peak hours, JMT utilized volumes consistent with Exhibits 28, 29, and 30 for Case 5 conditions from the report whereas the TIS did not.

¹¹ Improvement Option 4 accounts for the installation of a one-lane roundabout.

¹² Improvement Option 5 accounts for the installation of a one-lane roundabout with a channelized YIELD-controlled right turn lane along the westbound New Castle Avenue approach.

Table 4
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ^{1,5}	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2016 Existing (Case 1) ¹³						
Westbound Wilmington Avenue	A (8.3)	A (8.4)	A (8.4)	A (8.5)	A (8.5)	A (8.5)
Southbound Polktown Place Left	A (7.2)	A (7.2)	A (7.2)	A (7.2)	A (7.3)	A (7.3)
Southbound Polktown Place Approach	-	-	-	A (5.8)	A (5.7)	A (3.3)
2020 without development of Fort DuPont Redevelopment (Case 2) ^{13,14}						
Westbound Wilmington Avenue	A (8.3)	A (8.4)	A (8.4)	A (8.5)	A (8.5)	A (8.5)
Southbound Polktown Place Left	A (7.2)	A (7.2)	A (7.2)	A (7.3)	A (7.3)	A (7.3)
Southbound Polktown Place Approach	-	-	-	A (5.8)	A (5.7)	A (3.3)
2020 with development of Phase 1 of Fort DuPont Redevelopment (Case 3) ^{13,14}						
Westbound Wilmington Avenue	A (8.3)	A (8.4)	A (8.4)	A (8.5)	A (8.5)	A (8.5)
Southbound Polktown Place Left	A (7.2)	A (7.2)	A (7.2)	A (7.3)	A (7.3)	A (7.3)
Southbound Polktown Place Approach	-	-	-	A (5.8)	A (5.7)	A (3.3)

¹³ During the PM peak hour, JMT utilized northbound Polktown Place volumes consistent with Exhibits 5, 11, 14, 26, and 29 from the report for Cases 1, 2, and 3, whereas the TIS did not.

¹⁴ JMT maintained the peak hour factor during this future case since no growth in volumes is expected at the intersection.

Table 4 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ^{1,5}	LOS per TIS			LOS per JMT		
Site Entrance B/Wilmington Avenue/Polktown Place	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2024 without development of Fort DuPont Redevelopment (Case 4) ^{13,14}						
Westbound Wilmington Avenue	A (8.3)	A (8.4)	A (8.4)	A (8.5)	A (8.5)	A (8.5)
Southbound Polktown Place Left	A (7.2)	A (7.2)	A (7.2)	A (7.3)	A (7.3)	A (7.3)
Southbound Polktown Place Approach	-	-	-	A (5.8)	A (5.7)	A (3.3)
2024 with full development of Fort DuPont Redevelopment (Case 5) ¹⁴						
Westbound Wilmington Avenue	A (8.3)	A (8.4)	A (8.4)	A (8.5)	A (8.5)	A (8.5)
Southbound Polktown Place Left	A (7.2)	A (7.2)	A (7.2)	A (7.3)	A (7.3)	A (7.3)
Southbound Polktown Place Approach	-	-	-	A (5.8)	A (5.7)	A (3.3)
2024 with full development of Fort DuPont Redevelopment (Case 5) <i>with Improvement Option 2</i> ¹⁵						
Westbound Wilmington Avenue	-	-	-	A (8.6)	A (8.9)	A (8.8)
Southbound Polktown Place Left	-	-	-	A (7.3)	A (7.3)	A (7.3)
Southbound Polktown Place Approach	-	-	-	A (5.9)	A (5.7)	A (3.2)

¹⁵ Improvement Option 2 accounts for the restriction of left-turn and through movements from westbound New Castle Avenue at the Delaware Route 9 intersection. Left-turning volumes would be rerouted to Wilmington Avenue and Polktown Place to access southbound Delaware Route 9.

Table 5
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Signalized Intersection ¹	LOS per TIS			LOS per JMT		
Delaware Route 9/Cox Neck Road/Clinton Street ^{16,17,18,19}	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2016 Existing (Case 1)	B (11.8)	B (11.8)	B (10.9)	B (14.0)	B (14.3)	B (13.5)
2020 without development of Fort DuPont Redevelopment (Case 2)	B (12.0)	B (11.9)	B (11.1)	B (14.2)	B (14.5)	B (13.7)
2020 with development of Phase 1 Fort DuPont Redevelopment (Case 3)	B (11.3)	B (11.6)	B (10.8)	B (13.5)	B (14.2)	B (13.4)
2024 without development of Fort DuPont Redevelopment (Case 4)	B (12.0)	B (11.8)	B (11.2)	B (14.2)	B (14.4)	B (13.8)
2024 with full development of Fort DuPont Redevelopment (Case 5) ^{20,21}	B (11.2)	B (11.9)	B (12.6)	B (13.1)	B (14.3)	B (15.0)

¹⁶ The TIS modeled the signal as a coordinated signal whereas JMT modeled the signal as a uncoordinated consistent with DelDOT signal timing plans.

¹⁷ The TIS utilized optimized signal timing splits based on a 60 second cycle length whereas JMT analyzed the intersection utilizing max green times and the resulting cycle length consistent with the DelDOT signal timing plans to analyze the worst case scenario.

¹⁸ The delay per vehicle decreases in Case 3 and Case 5 because the increase in volumes due to the development are mostly applied to the northbound and southbound throughs which experience minimal delay.

¹⁹ JMT incorporated pedestrian signal timings within the analysis whereas the TIS did not.

²⁰ During the Saturday peak hour, the TIS utilized a westbound left turn volume of 62 consistent with the Case 5 volumes shown on Exhibit 30 of the report. However, JMT utilized a volume of 32 which is consistent with the methodology utilized to calculate the Case 5 volumes.

²¹ During the AM peak hour, JMT reduced the heavy vehicle percentage along the westbound Clinton Street approach from 4% to 3%, the northbound Delaware Route 9 approach from 6% to 3%, and the southbound Delaware Route 9 approach from 18% to 3% due to the significant increase in traffic along those approaches during Case 5 conditions.

Table 6
Peak Hour Levels Of Service (LOS)
Based on Final Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates

Signalized Intersection ¹	LOS per TIS			LOS per JMT		
Delaware Route 72/Clarks Corner Road/Delaware Route 9 ^{22,23,24,25}	Weekday AM	Weekday PM	Saturday MIDDAY	Weekday AM	Weekday PM	Saturday MIDDAY
2016 Existing (Case 1) ²⁶	B (11.7)	B (15.8)	B (10.7)	C (24.7)	C (31.2)	C (24.6)
2020 without development of Fort DuPont Redevelopment (Case 2)	B (12.3)	B (17.9)	B (11.0)	C (25.2)	C (32.5)	C (25.2)
2020 with development of Phase 1 Fort DuPont Redevelopment (Case 3)	B (11.9)	B (17.3)	B (10.8)	C (25.0)	C (33.5)	C (25.4)
2024 without development of Fort DuPont Redevelopment (Case 4)	B (12.2)	B (18.3)	B (11.0)	C (25.3)	C (33.3)	C (25.4)
2024 with full development of Fort DuPont Redevelopment (Case 5) ²⁷	B (11.6)	B (17.5)	B (12.4)	C (27.3)	D (40.2)	D (39.5)

²² The TIS modeled the signal as a coordinated signal whereas JMT modeled the signal as uncoordinated consistent with DelDOT signal timing plans.

²³ Per field observations, the eastbound Delaware Route 72 approach operates with a lead phase. However, due to the limitations of the HCS software with this type of phasing along a shared lane approach, both the TIS and JMT did not incorporate the lead phasing in the analysis.

²⁴ Per field observations, JMT modeled the northbound Clarks Corner Road and southbound Delaware Route 9 approaches with split phasing whereas the TIS did not.

²⁵ The TIS utilized optimized signal timing splits based on a 60 second cycle length whereas JMT analyzed the intersection utilizing max green times and the resulting cycle length consistent with the DelDOT signal timing plans to analyze the worst case scenario.

²⁶ During the PM peak hour, the TIS utilized a southbound left turn volume of 212 and a southbound right turn volume of 116, whereas JMT utilized a southbound left turn volume of 116 and southbound right turn volume of 212 consistent with the Case 1 volumes shown on Exhibit 5 of the report.

²⁷ During the AM peak hour, JMT reduced the heavy vehicle percentage along the westbound through/left turn lane from 8% to 3% due to the significant increase in traffic along that lane during Case 5 conditions.

Table 7
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Signalized Intersection	LOS per TIS			LOS per JMT		
US Route 13/ Delaware Route 72 ^{28,29,30,31}	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2016 Existing (Case 1)	D (36.0)	D (40.8)	C (30.9)	D (40.1)	D (50.5)	C (31.2)
2020 without development of Fort DuPont Redevelopment (Case 2)	D (37.0)	D (41.5)	C (33.0)	D (41.5)	D (52.4)	C (32.7)
2020 with development of Phase 1 Fort DuPont Redevelopment (Case 3) ³²	D (36.3)	D (48.5)	C (32.9)	D (41.8)	D (52.6)	C (32.6)
2024 without development of Fort DuPont Redevelopment (Case 4)	D (37.5)	D (42.6)	C (33.9)	D (42.1)	D (54.8)	C (33.4)
2024 with full development of Fort DuPont Redevelopment (Case 5)	D (38.8)	D (41.9)	C (31.5)	D (44.3)	E (57.2)	C (33.7)
2024 with full development of Fort DuPont Redevelopment (Case 5) <i>with Mitigation</i> ³³	-	-	-	D (44.3)	D (51.9)	C (33.7)

²⁸ JMT did not model the eastbound right turn lane due to the movement being free flow, whereas the TIS did.

²⁹ For the AM and PM peak hours, the TIS modeled the signal phasing with overlapping right turn movements, whereas JMT utilized the right turn on red volumes based on the existing turning movement count.

³⁰ JMT utilized splits consistent with the DelDOT signal timing plans whereas the TIS did not during some peak hours and cases.

³¹ JMT utilized max recall along the eastbound and westbound Delaware Route 72 approaches consistent with the DelDOT signal timing plans whereas the TIS did not.

³² During the AM peak hour, the TIS utilized a westbound right turn volume of 225, whereas JMT utilized a westbound right turn volume of 25 consistent with Case 3 volumes shown on Exhibit 19 of the report.

³³ The mitigation scenario includes modifications to the signal timing splits during the PM peak hour.

Table 8
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2016 Existing (Case 1)						
Westbound Cox Neck Road Approach	B (13.3)	C (15.1)	B (14.2)	B (15.0)	B (14.9)	B (13.0)
Northbound US Route 13 U-Turn	A (7.5)	A (8.7)	A (8.0)	A (8.3)	B (12.0)	A (9.2)
Southbound US Route 13 Left	A (9.7)	A (8.4)	A (8.9)	B (10.4)	A (8.4)	A (8.9)
2020 without development of Fort DuPont Redevelopment (Case 2) ³⁴						
Westbound Cox Neck Road Approach	C (24.7)	C (19.8)	C (16.3)	C (16.6)	C (19.0)	C (15.1)
Northbound US Route 13 U-Turn	A (7.7)	A (9.0)	A (8.2)	A (8.5)	B (13.2)	A (9.7)
Southbound US Route 13 Left	B (10.5)	A (8.7)	A (9.2)	B (10.9)	A (8.7)	A (9.3)

³⁴ During the AM, PM and Saturday peak hours, the TIS modeled the northbound US Route 13 approach with one through lane whereas JMT modeled the approach with two through lanes consistent with existing conditions.

Table 8 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
US Route 13/Cox Neck Road						
2020 with development of Phase 1 of Fort DuPont Redevelopment (Case 3) ³⁴						
Westbound Cox Neck Road Approach	C (24.8)	C (19.9)	C (16.4)	C (16.8)	C (19.2)	C (15.2)
Northbound US Route 13 U-Turn	A (7.7)	A (9.0)	A (8.2)	A (8.5)	B (13.2)	A (9.7)
Southbound US Route 13 Left	B (10.5)	A (8.7)	A (9.2)	B (10.9)	A (8.7)	A (9.3)
2024 without development of Fort DuPont Redevelopment (Case 4) ³⁵						
Westbound Cox Neck Road Approach	C (16.2)	C (20.8)	C (17.2)	C (17.5)	C (20.6)	C (15.7)
Northbound US Route 13 U-Turn	A (7.7)	A (9.2)	A (8.2)	A (8.6)	B (13.8)	A (9.9)
Southbound US Route 13 Left	B (10.8)	A (8.8)	A (9.4)	B (11.3)	A (8.9)	A (9.5)

³⁵ During the Saturday peak hour, the TIS modeled the northbound US Route 13 approach with one through lane whereas JMT modeled the approach with two through lanes consistent with existing conditions.

Table 8 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ¹	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
US Route 13/Cox Neck Road						
2024 with full development of Fort DuPont Redevelopment (Case 5) ^{35,36,37}						
Westbound Cox Neck Road Approach	C (17.3)	C (20.8)	C (18.6)	C (18.6)	C (23.3)	C (17.6)
Northbound US Route 13 U-Turn	A (7.7)	A (9.2)	A (8.2)	A (8.6)	B (13.8)	A (9.9)
Southbound US Route 13 Left	B (10.8)	A (8.8)	A (9.4)	B (11.3)	A (8.9)	A (9.5)

³⁶ During the PM peak hour, the TIS used a volume of 127 on the westbound Cox Neck Road left-turn movement whereas JMT used 149 consistent with Exhibit 29 of the report for Case 5 conditions.

³⁷ During the Saturday peak hour, a southbound US Route 13 right turn volume of 8 is depicted on Exhibit 30 of the report for Case 5 conditions. Both the TIS and JMT did not include this volume in the analysis as this movement would occur north of the intersection at the access to Highpointe at St Georges.

Table 9
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control ^{1,5}	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
2016 Existing (Case 1)						
Eastbound Cox Neck Road Left	A (7.7)	A (7.4)	A (7.3)	A (8.1)	A (7.4)	A (7.3)
Eastbound Cox Neck Road Approach	-	-	-	A (1.9)	A (1.1)	A (1.0)
Westbound Cox Neck Road Left	A (7.9)	A (7.3)	A (7.3)	A (8.6)	A (7.4)	A (7.3)
Westbound Cox Neck Road Approach	-	-	-	A (1.0)	A (0.3)	A (0.9)
Northbound Clarks Corner Road Approach	B (13.8)	A (9.6)	A (9.3)	C (21.1)	A (9.7)	A (9.5)
Southbound Clarks Corner Road Approach	C (16.3)	A (9.7)	A (9.1)	D (33.6)	A (9.8)	A (9.2)
2020 without development of Fort DuPont Redevelopment (Case 2)						
Eastbound Cox Neck Road Left	A (7.8)	A (7.4)	A (7.4)	A (7.9)	A (7.4)	A (7.4)
Eastbound Cox Neck Road Approach	-	-	-	A (1.8)	A (1.4)	A (1.5)
Westbound Cox Neck Road Left	A (8.0)	A (7.4)	A (7.3)	A (8.3)	A (7.4)	A (7.4)
Westbound Cox Neck Road Approach	-	-	-	A (0.9)	A (0.2)	A (0.7)
Northbound Clarks Corner Road Approach	B (14.7)	B (9.8)	A (9.6)	C (16.1)	B (10.0)	A (9.8)
Southbound Clarks Corner Road Approach	C (17.6)	B (10.0)	A (9.3)	C (20.0)	B (10.1)	A (9.4)

Table 9 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control ^{1,5}	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
Cox Neck Road/Clarks Corner Road						
2020 with development of Phase 1 of Fort DuPont Redevelopment (Case 3)						
Eastbound Cox Neck Road Left	A (7.8)	A (7.4)	A (7.4)	A (7.9)	A (7.4)	A (7.4)
Eastbound Cox Neck Road Approach	-	-	-	A (1.8)	A (1.3)	A (1.4)
Westbound Cox Neck Road Left	A (8.0)	A (7.4)	A (7.3)	A (8.3)	A (7.4)	A (7.4)
Westbound Cox Neck Road Approach	-	-	-	A (0.9)	A (0.2)	A (0.7)
Northbound Clarks Corner Road Approach	B (14.8)	A (9.9)	A (9.7)	C (16.1)	B (10.1)	A (9.9)
Southbound Clarks Corner Road Approach	C (17.8)	B (10.1)	A (9.3)	C (20.2)	B (10.2)	A (9.4)
2024 without development of Fort DuPont Redevelopment (Case 4)						
Eastbound Cox Neck Road Left	A (7.8)	A (7.4)	A (7.4)	A (7.9)	A (7.5)	A (7.4)
Eastbound Cox Neck Road Approach	-	-	-	A (1.9)	A (1.4)	A (1.5)
Westbound Cox Neck Road Left	A (8.0)	A (7.4)	A (7.3)	A (8.4)	A (7.4)	A (7.4)
Westbound Cox Neck Road Approach	-	-	-	A (0.9)	A (0.2)	A (0.7)
Northbound Clarks Corner Road Approach	C (15.3)	A (9.8)	A (9.7)	C (16.7)	B (10.0)	A (9.9)
Southbound Clarks Corner Road Approach	C (18.4)	B (10.1)	A (9.4)	C (21.0)	B (10.2)	A (9.5)

Table 9 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control ^{1,5}	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
Cox Neck Road/Clarks Corner Road						
2024 with full development of Fort DuPont Redevelopment (Case 5)						
Eastbound Cox Neck Road Left	A (7.9)	A (7.5)	A (7.4)	A (7.9)	A (7.5)	A (7.5)
Eastbound Cox Neck Road Approach	-	-	-	A (1.9)	A (1.2)	A (1.0)
Westbound Cox Neck Road Left	A (8.1)	A (7.5)	A (7.5)	A (8.5)	A (7.5)	A (7.5)
Westbound Cox Neck Road Approach	-	-	-	A (0.9)	A (0.8)	A (1.1)
Northbound Clarks Corner Road Approach	C (15.4)	B (10.1)	A (9.6)	C (17.1)	B (10.3)	A (9.8)
Southbound Clarks Corner Road Approach	C (20.7)	B (10.7)	A (10.0)	C (24.4)	B (10.9)	B (10.1)

Table 10
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ^{1,5}	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
Delaware Route 9/Port Penn Road						
2016 Existing (Case 1) ^{38,39}						
Eastbound Port Penn Road Left	A (7.3)	A (7.3)	A (7.4)	A (7.6)	A (7.4)	A (7.4)
Eastbound Port Penn Road Approach	-	-	-	A (4.7)	A (2.4)	A (3.6)
Southbound Delaware Route 9 Left	A (8.9)	A (9.2)	A (9.4)	A (9.2)	A (9.4)	A (9.5)
Southbound Delaware Route 9 Right	A (8.5)	A (8.5)	A (8.5)	A (8.8)	A (8.6)	A (8.6)
Southbound Delaware Route 9 Approach	A (8.6)	A (9.0)	A (9.3)	A (9.0)	A (9.1)	A (9.4)

³⁸ During the AM peak hour, JMT utilized volumes along the westbound Port Penn Road approach consistent with Exhibit 4 of the report for Case 1 conditions whereas the TIS did not.

³⁹ During the PM peak hour, a volume of 2 is depicted along the westbound Port Penn Road left-turn on Exhibit 5 of the report for Case 1 conditions. Both the TIS and JMT omitted this movement from the analysis as this is a minor volume occurring at an adjacent single family home driveway.

Table 10 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ^{1,5}	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
Delaware Route 9/Port Penn Road						
2020 without development of Fort DuPont Redevelopment (Case 2) ^{39,40}						
Eastbound Port Penn Road Left	A (7.3)	A (7.3)	A (7.4)	A (7.6)	A (7.4)	A (7.4)
Eastbound Port Penn Road Approach	-	-	-	A (4.8)	A (2.5)	A (3.6)
Southbound Delaware Route 9 Left	A (9.0)	A (9.3)	A (9.4)	A (9.3)	A (9.6)	A (9.6)
Southbound Delaware Route 9 Right	A (8.5)	A (8.6)	A (8.6)	A (8.8)	A (8.7)	A (8.6)
Southbound Delaware Route 9 Approach	A (8.7)	A (9.1)	A (9.3)	A (9.0)	A (9.3)	A (9.5)

⁴⁰ During the AM, PM and Saturday peak hours JMT utilized volumes consistent with Exhibits 10.11 and 12 of the report Case 2 conditions whereas the TIS did not.

Table 10 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ^{1,5}	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
Delaware Route 9/Port Penn Road						
2020 with development of Phase 1 of Fort DuPont Redevelopment (Case 3) ^{39,41}						
Eastbound Port Penn Road Left	A (7.3)	A (7.3)	A (7.4)	A (7.6)	A (7.4)	A (7.4)
Eastbound Port Penn Road Approach	-	-	-	A (5.0)	A (3.3)	A (4.2)
Southbound Delaware Route 9 Left	A (9.0)	A (9.4)	A (9.6)	A (9.3)	A (9.7)	A (9.8)
Southbound Delaware Route 9 Right	A (8.5)	A (8.6)	A (8.6)	A (8.8)	A (8.7)	A (8.7)
Southbound Delaware Route 9 Approach	A (8.7)	A (9.1)	A (9.4)	A (9.0)	A (9.3)	A (9.5)
2024 without development of Fort DuPont Redevelopment (Case 4) ^{39, 42}						
Eastbound Port Penn Road Left	A (7.3)	A (7.3)	A (7.4)	A (7.6)	A (7.4)	A (7.4)
Eastbound Port Penn Road Approach	-	-	-	A (4.7)	A (2.4)	A (3.6)
Southbound Delaware Route 9 Left	A (9.0)	A (9.4)	A (9.5)	A (9.3)	A (9.6)	A (9.7)
Southbound Delaware Route 9 Right	A (8.5)	A (8.6)	A (8.6)	A (8.8)	A (8.7)	A (8.6)
Southbound Delaware Route 9 Approach	A (8.8)	A (9.1)	A (9.3)	A (9.1)	A (9.3)	A (9.5)

⁴¹ During the AM, PM, and Saturday peak hours, JMT utilized volumes consistent with Exhibits 25, 26, and 27 of the report for Case 3 conditions whereas the TIS did not.

⁴² During the AM, PM and Saturday peak hours, JMT utilized volumes consistent with Exhibits 13, 14 and 15 of the report for Case 4 conditions whereas the TIS did not.

Table 10 (Continued)
Peak Hour Levels Of Service (LOS)
Based on Traffic Impact Study for Fort DuPont Redevelopment
Report Dated: January 2017
Prepared by Duffield Associates, Inc.

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ^{1,5}	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Midday	Weekday AM	Weekday PM	Saturday Midday
Delaware Route 9/Port Penn Road						
2024 with full development of Fort DuPont Redevelopment (Case 5) ^{39,43,44}						
Eastbound Port Penn Road Left	A (7.5)	A (7.4)	A (7.6)	A (7.6)	A (7.5)	A (7.7)
Eastbound Port Penn Road Approach	-	-	-	A (6.6)	A (5.4)	A (6.4)
Southbound Delaware Route 9 Left	B (10.0)	B (10.6)	B (11.6)	B (10.5)	B (11.2)	B (12.2)
Southbound Delaware Route 9 Right	A (8.7)	A (8.9)	A (8.9)	A (8.9)	A (9.0)	A (9.0)
Southbound Delaware Route 9 Approach	A (9.0)	A (9.7)	B (10.2)	A (9.6)	A (10.0)	B (10.5)

⁴³ During the AM and PM peak hours, JMT reduced heavy vehicle percentages along the eastbound Port Penn Road left-turn from 24% to 7%, and from 7% to 3%, respectively, due to the significant increase of traffic along that movement during Case 5 conditions.

⁴⁴ During the AM, PM and Saturday peak hours, JMT utilized volumes consistent with Exhibits 28, 29, 30 at the report for Case 5 conditions whereas the TIS did not.