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

CAROLANN WICKS, P.E.
SECRETARY

March 15, 2011

Mr. Thomas Klein
Director
Georgetown Planning and Zoning
333 North Race Street
Georgetown, DE 19947

Dear Mr. Klein:

The attached Traffic Impact Study (TIS) review letter for the **Royal Farms - Georgetown** development has been completed under the responsible charge of a registered professional engineer whose firm is authorized to work in the State of Delaware. They have found the TIS to conform to DelDOT's Standards and Regulations for Subdivision Streets and State Highway Access and other accepted practices and procedures for such studies. DelDOT accepts this TIS review and concurs with the recommendations. We are providing it to you in fulfillment of our joint agreement regarding the review of TIS.

If you have any questions concerning this letter or the attached review letter, please contact me at (302) 760-2109.

Sincerely,

T. William Brockenbrough, Jr.

T. William Brockenbrough, Jr.
County Coordinator

TWB:km
Enclosures
cc with enclosures: Ms. Constance C. Holland, Office of State Planning Coordination
Mr. Lawrence Lank, Sussex County Planning and Zoning Commission
Mr. Derrick S. Kennedy, Orth-Rodgers & Associates, Inc.
Mr. Shawn P. Tucker, Drinker, Biddle & Reath, LLP
Mr. Andrew J. Parker, McCormick Taylor
Mr. Mir Wahed, Johnson, Mirmiran, and Thompson
DelDOT Distribution

DelDOT

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Frederick H. Schranck, Deputy Attorney General
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Donald D. Weber, Chief Traffic Engineer, Traffic, DOTS
Mark Luszcz, Assistant Chief Traffic Engineer, Traffic, DOTS
Thomas E. Meyer, Traffic Studies Manager, Traffic, DOTS
Theodore G. Bishop, Assistant Director, Development Coordination
Jeffrey Reed, South District Engineer, Maintenance and Operations
Lisa Collins, Service Development Planner, Delaware Transit Corporation
Monroe C. Hite, III, Project Manager, Project Development South, DOTS
J. Marc Coté, Subdivision Engineer, Development Coordination
T. William Brockenbrough, Jr., County Coordinator, Development Coordination
Anthony Aglio, Bicycle and Pedestrian Coordinator, Statewide & Regional Planning
Lenny Massotti, Sussex Subdivision Engineer, Development Coordination
Derek A. Sapp, Subdivision Manager, Development Coordination
Troy E. Brestel, Project Engineer, Development Coordination

McCormick Taylor
Engineers & Planners Since 1946

March 15, 2011

Mr. William Brockenbrough, Jr.
County Coordinator
DelDOT Division of Planning
P.O. Box 778
Dover, DE 19903

RE: Agreement No. 1404
Traffic Impact Study Services
Task No. 44A – Royal Farms – Georgetown

Dear Mr. Brockenbrough,

McCormick Taylor has completed its review of the Traffic Impact Study (TIS) for the Royal Farms development prepared by Orth-Rodgers & Associates, Inc. (ORA), dated June 26, 2009, along with the subsequent Addendum prepared by ORA, dated January 13, 2011. Our review of the original TIS was assigned as Task No. 44A under Agreement No. 1404. Our review of the Addendum was assigned as Task No. 4A under Agreement No. 1529. ORA prepared the reports in a manner generally consistent with DelDOT's *Standards and Regulations for Subdivision Streets and State Highway Access*.

The TIS evaluates the impacts of a Royal Farms store, proposed to be located on the northeast corner of US Route 113 (Sussex Road 113 / DuPont Boulevard) and Delaware Route 18/404 (Sussex Road 18 / Seashore Highway) in the Town of Georgetown, in Sussex County, Delaware.

The originally-proposed version of this development was evaluated in the June 2009 TIS, with our draft review completed in August 2009. As originally evaluated, the proposed development would have consisted of a 5,000 square-foot convenience store with 16 gas pumps on approximately 2 acres of land. Currently, a car sales lot associated with the Boulevard Ford dealership is located on the site. The car sales lot on this parcel would be eliminated as the site is redeveloped, but the Ford dealership would remain on the adjacent parcel to the east. Two access points were proposed: one on Delaware Route 18/404 and one on US Route 113. These previously-proposed access points were in the same locations as existing driveways for the car sales lot, but would have been improved. Construction was anticipated to be complete by 2011.

Based on our review of the original analysis, ORA submitted additional analysis to DelDOT in October 2009 to support their desired site access. After our review of that analysis and further coordination between all parties, DelDOT would not approve the site access that the developer and ORA desired. In June and July 2010, with the developer still unsatisfied with the site access as it would be allowed by DelDOT, ORA worked with DelDOT to collect additional data and conduct further queuing analyses in support of an agreeable site entrance configuration and location. Based on that June/July 2010 study, ORA and DelDOT reached an agreement on an acceptable configuration and location for the site entrance along Delaware Route 18/404, which is to be located a minimum of 360 feet east of the westbound Delaware Route 18/404 left-turn

lane stop bar at US Route 113. More information and results from the June/July 2010 study can be found in the detailed review section of this letter.

Subsequent to the June/July 2010 study, the developer decided to revise the proposed land use for the site, to now include a 3,000 square-foot bank with drive-through window on the adjacent parcel to the north of the proposed Royal Farms. The proposed bank would replace Rogers Graphics, an existing business on that parcel. The proposed Royal Farms convenience store with gas pumps, as described above, would remain part of the plan for the overall site. All parcels and land uses of the overall site (Royal Farms, bank, and existing Ford dealership) would have internal roadway connections. Additionally, the originally proposed site access on US Route 113 is no longer part of the plan. Instead, along with the proposed access point on Delaware Route 18/404, an access point is proposed on Gordy Street. Construction is still anticipated to be complete by the end of 2011. With the addition of the bank to the proposed land use for the site, DelDOT required ORA to submit an Addendum to the original TIS. Our review of the January 2011 Addendum analyses, along with information regarding the June/July 2010 study, can be found in the detailed review section of this letter.

The front section of this letter (through Page 9) contains recommendations based on the revised site plan (including the bank) and all updated analyses (including the January 2011 Addendum). Beginning on Page 10, the detailed review section of this letter consists of two parts. The first part (Pages 10-24) is based solely on the original TIS dated June 26, 2009, and the second part (Pages 25-34) is based on the January 2011 Addendum and the June/July 2010 study.

The land is currently zoned as HC (Highway Commercial) within the Town of Georgetown. The developer does not propose to change the zoning.

DelDOT currently has two relevant projects within the study area. The first is the US Route 113, North/South Improvements project (aka US 113 North/South Study) (State Contract No. 22-127-01). The US 113 North/South Study seeks to address the existing and future transportation needs along the US Route 113 corridor while preserving environmental and historic resources, preserving the existing north/south corridor in Sussex County, and accommodating planned economic growth. The project team coordinates with Sussex and Kent Counties and the affected municipalities and continues to study viable alternatives for north/south capacity improvements throughout Sussex County. Many alternatives have been studied, both on and off existing alignments.

In June 2007, after evaluating input from the public, conducting analyses and working to refine the alternatives, DelDOT announced a Recommended Preferred Alternative for the Georgetown Area of the US Route 113 North/South Study. For more information, please see the project web site at http://www.deldot.gov/information/projects/us113/. The Refined On-Alignment Alternative is the Recommended Preferred Alternative in the Georgetown Area. As currently planned, the design concept for this alternative would have direct impacts on the intersection of US Route 113 and Delaware Route 18/404 and the proposed Royal Farms development location. It would become a grade-separated intersection with ramps going through the proposed Royal

Farms property and eliminating access to the site. However, the DelDOT Project Manager for the US 113 North/South Study has indicated this is a long-term project with improvements not expected to occur until at least 2020.

The second project is the Corridor Capacity Preservation Program (CCPP), which is a statewide program intended to sustain the capacity of adopted highway corridors by various means such as limiting access points and using service roads for local vehicle trips. The general purpose of the program is to ensure that the existing principal arterial highways, such as US Route 113, are able to efficiently carry regional traffic without impedance from the effects of local development.

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

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

Intersection	***Situations for which deficiencies occur***
US Route 113 and Delaware Route 18/404	2009 Existing Saturday; 2011 Saturday without and with Royal Farms; 2011 PM and Saturday with Royal Farms and Georgetown Commercial

The intersection of US Route 113 and Delaware Route 18/404 exhibits LOS deficiencies under existing and future conditions. Other than the improvements described below in Item Nos. 5-7, we do not recommend additional improvements be implemented by the developer at this intersection. The major improvements required to fully correct the LOS deficiencies at this intersection (e.g., grade separation or widening several approaches to include multiple additional lanes) cannot be considered a reasonable developer improvement project. Additionally, this intersection is within the US 113 North/South Study area and as such, solutions to these deficiencies must ultimately occur as part of that larger process.

Should the Town of Georgetown 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 construct the south site entrance on Delaware Route 18/404 at a minimum distance of 360 feet east of the westbound Delaware Route 18/404 left-turn lane stop bar at US Route 113. The proposed configuration is shown in the table below.

Approach	Current Configuration	Proposed Configuration
Eastbound Delaware Route 18/404	One through lane	One left-turn lane and one through lane
Westbound Delaware Route 18/404	One exclusive through lane and one shared through/right-turn lane	One through lane and one right-turn lane
Southbound Site Entrance	Approach does not exist	One left-turn lane and one right-turn lane

The proposed westbound Delaware Route 18/404 right-turn lane should continue past the site entrance as the beginning of the proposed second exclusive through lane on the westbound approach to the signalized intersection with US Route 113 (see Item No. 5 below). Also, beginning at this site entrance, westbound Delaware Route 18/404 should be widened to include a separate right turn lane on the approach to US Route 113.

Initial recommended minimum turn-lane lengths (excluding tapers) of the separate turn lanes are listed below. The developer should coordinate with DelDOT's Subdivision Section to determine final turn-lane lengths.

Approach	Left-Turn Lane	Right-Turn Lane
Eastbound Delaware Route 18/404	50 feet*	N/A
Westbound Delaware Route 18/404	N/A	175 feet**
Southbound Site Entrance	50 feet***	50 feet***

* turn-lane length based on evaluation of queues for this eastbound left-turn vs. queues for the back-to-back westbound Delaware Route 18/404 left-turn lane at US Route 113, assuming a 50-foot minimum storage + deceleration lane length and a 50-foot taper length between the back-to-back turn lanes

** turn-lane length based on deceleration length per DelDOT's *Standards and Regulations for Subdivision Streets and State Highway Access*

*** turn-lane length based on storage length per queuing analysis, with 50-foot minimum. These turn lanes would be internal to the site and may not be marked for this full length.

2. The developer should improve the north site entrance on Gordy Street as needed to accommodate the proposed site. This is the existing entrance for Rogers Graphics, a business which will be removed as the site is redeveloped with a bank. While no changes

to the existing lane configuration are needed for this entrance, it should continue to facilitate full-movement access to and from the site onto Gordy Street. The northbound site entrance approach should be stop-controlled.

3. The developer should close all the existing site entrances on Delaware Route 18/404 and US Route 113.

4. The developer should improve the intersection of US Route 113 and Gordy Street by adding a separate right-turn lane on the northbound approach of US Route 113. The proposed configuration is shown in the table below.

Approach	Current Configuration	Proposed Configuration
Westbound Gordy Street	One right-turn-only lane	One right-turn-only lane
Northbound US Route 113	One exclusive through lane and one shared through/right-turn lane	Two through lanes and one right-turn lane
Southbound US Route 113	Two through lanes	Two through lanes

Initial recommended minimum turn-lane lengths (excluding tapers) of the separate turn lanes are listed below. The developer should coordinate with DelDOT's Subdivision Section to determine final turn-lane lengths.

Approach	Left-Turn Lane	Right-Turn Lane
Westbound Gordy Street	N/A	N/A
Northbound US Route 113	N/A	350 feet*
Southbound US Route 113	N/A	N/A

* turn-lane length based on DelDOT's *Road Design Manual*

5. The developer should improve the intersection of US Route 113 and Delaware Route 18/404 by adding a separate right-turn lane on the westbound approach of Delaware Route 18/404. The proposed configuration is shown in the table below.

Approach	Current Configuration	Proposed Configuration
Eastbound Delaware Route 18/404	One left-turn lane, one through lane, and one right-turn lane	One left-turn lane, one through lane, and one right-turn lane
Westbound Delaware Route 18/404	One left-turn lane, one exclusive through lane, and one shared through/right-turn lane	One left-turn lane, two through lanes, and one right-turn lane
Northbound US Route 113	Two left-turn lanes, two through lanes, and one right-turn lane	Two left-turn lanes, two through lanes, and one right-turn lane
Southbound US Route 113	One left-turn lane, two through lanes, and one right-turn lane	One left-turn lane, two through lanes, and one right-turn lane

The separate right-turn lane to be added on the westbound approach should begin at the proposed site entrance on Delaware Route 18/404, to be located a minimum of 360 feet east of the westbound Delaware Route 18/404 left-turn lane stop bar at US Route 113. The westbound right-turn lane will be controlled by a yield condition, and no acceleration lane onto northbound US Route 113 will be provided.

6. The developer should enter into an agreement with DelDOT to fund an equitable portion of additional improvements to the intersection of US Route 113 and Delaware Route 18/404 to lengthen turn lanes at the intersection. As many as eight (8) existing turn lanes may need to be lengthened on the approaches to the intersection, in some cases to the maximum extent possible.

   Initial recommended minimum turn-lane lengths (excluding tapers) of the separate turn lanes are listed below. The developer should coordinate with DelDOT's Subdivision Section to determine final turn-lane lengths.

Approach	Left-Turn Lane(s)	Right-Turn Lane
Eastbound Delaware Route 18/404	375 feet*	700 feet*
Westbound Delaware Route 18/404	260 feet**	360 feet***
Northbound US Route 113	975 feet**** (two lanes)	585 feet*****
Southbound US Route 113	750 feet*	685 feet*****

* turn-lane length based on storage length per queuing analysis

** turn-lane length based on evaluation of queues for this westbound left-turn vs. queues for the back-to-back eastbound Delaware Route 18/404 left-turn lane at the site entrance, assuming a 50-foot minimum storage + deceleration lane length and a 50-foot taper length between the back-to-back turn lanes

*** length of new separate right-turn lane on the westbound approach dictated by the mutually agreeable location of the proposed site entrance on Delaware Route 18/404, as measured from the site entrance to the westbound Delaware Route 18/404 left-turn lane stop bar at US Route 113

**** turn-lane length based on storage length per queuing analysis, but length may be limited by proximity to the existing upstream median crossover (located approximately 900 feet from the stop bar)

***** turn-lane length based on deceleration length per DelDOT's *Road Design Manual* + storage length per queuing analysis, but length may be limited by proximity to existing upstream intersections and/or driveways

   At least two other developers (Georgetown Commercial and Windsor Farms South) are expected to be responsible for part of these improvements as well. The developer should coordinate with DelDOT to determine design details, implementation, and/or contribution towards these improvements.

7. The developer should enter into a traffic signal agreement with DelDOT for the intersection of US Route 113 and Delaware Route 18/404. The agreement will cover the signal adjustments required by the physical improvements noted in Item Nos. 5 and 6. The agreement should include pedestrian signals, crosswalks, interconnection, and ITS equipment such as CCTV cameras at DelDOT's discretion. At least one other developer (Georgetown Commercial) is expected to 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.

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

   a. Along westbound Delaware Route 18/404 between the eastern edge of the site frontage and the site entrance, a minimum of a five-foot bicycle lane should be dedicated and striped with appropriate markings for bicyclists between the right-most lane and the curbline in order to facilitate safe and unimpeded bicycle travel. This five-foot bicycle lane should continue past the site entrance and be striped between the right-most through lane and the right-turn lane all the way to the stop bar at the signalized intersection with US Route 113.
   b. 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.
   c. Utility covers should be flush with the pavement.
   d. Covered bike parking should be provided near the building entrances within this development.
   e. 15-foot wide easements from the edge of the right-of-way should be dedicated to DelDOT within the site frontages along US Route 113 and Delaware Route 18/404. Within each easement, a minimum of a five-foot wide sidewalk (with a minimum of a five-foot buffer from the roadway) that meets current AASHTO and ADA standards should be constructed. The sidewalks should connect to any paths on adjacent parcels.
   f. The existing sidewalk along the Gordy Street frontage should remain (or be reconstructed as needed due to site entrance improvements).
   g. Where the existing site entrance driveways are being closed along Delaware Route 18/404 and US Route 113, the former driveways should be filled in to match the surrounding area. Ultimately, there should be continuous sidewalk along the entire site frontage (Delaware Route 18/404, US Route 113, and Gordy Street), with crosswalks across the proposed site entrances.
   h. ADA compliant curb ramps and marked crosswalks should be provided at all pedestrian crossings, including across internal roads and across all site entrances. Type 3 curb ramps are discouraged. Furthermore, ADA compliant curb ramps and crosswalks, along with pedestrian signals, should be installed across the north and east legs of the intersection of US Route 113 and Delaware Route 18/404.
   i. Internal sidewalks for pedestrian safety and to promote walking as a viable transportation alternative should be constructed within the development. These sidewalks should each be a minimum of seven feet wide (with a minimum of a five-foot buffer from the roadway) and should meet current AASHTO and ADA standards. These internal sidewalks should connect the building entrances to the frontage sidewalks.
   j. Where internal sidewalks are located alongside of parking spaces, a buffer should be added to eliminate vehicular overhang onto the sidewalk.
   k. The developer should coordinate with the Delaware Transit Corporation (DTC) regarding the possibility of adding a bus stop near the development along westbound Delaware Route 18/404. Internal sidewalks should be connected to any new transit facilities and parking facilities for bicyclists should be included. The developer

should coordinate with the DTC regarding the details and implementation of the transit-related improvements.

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 the 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

PART I: THIS PART OF THE REVIEW LETTER (PAGES 10-24) IS BASED SOLELY ON THE ORIGINAL TIS DATED JUNE 26, 2009

Our review contained in Part I was completed in August 2009.

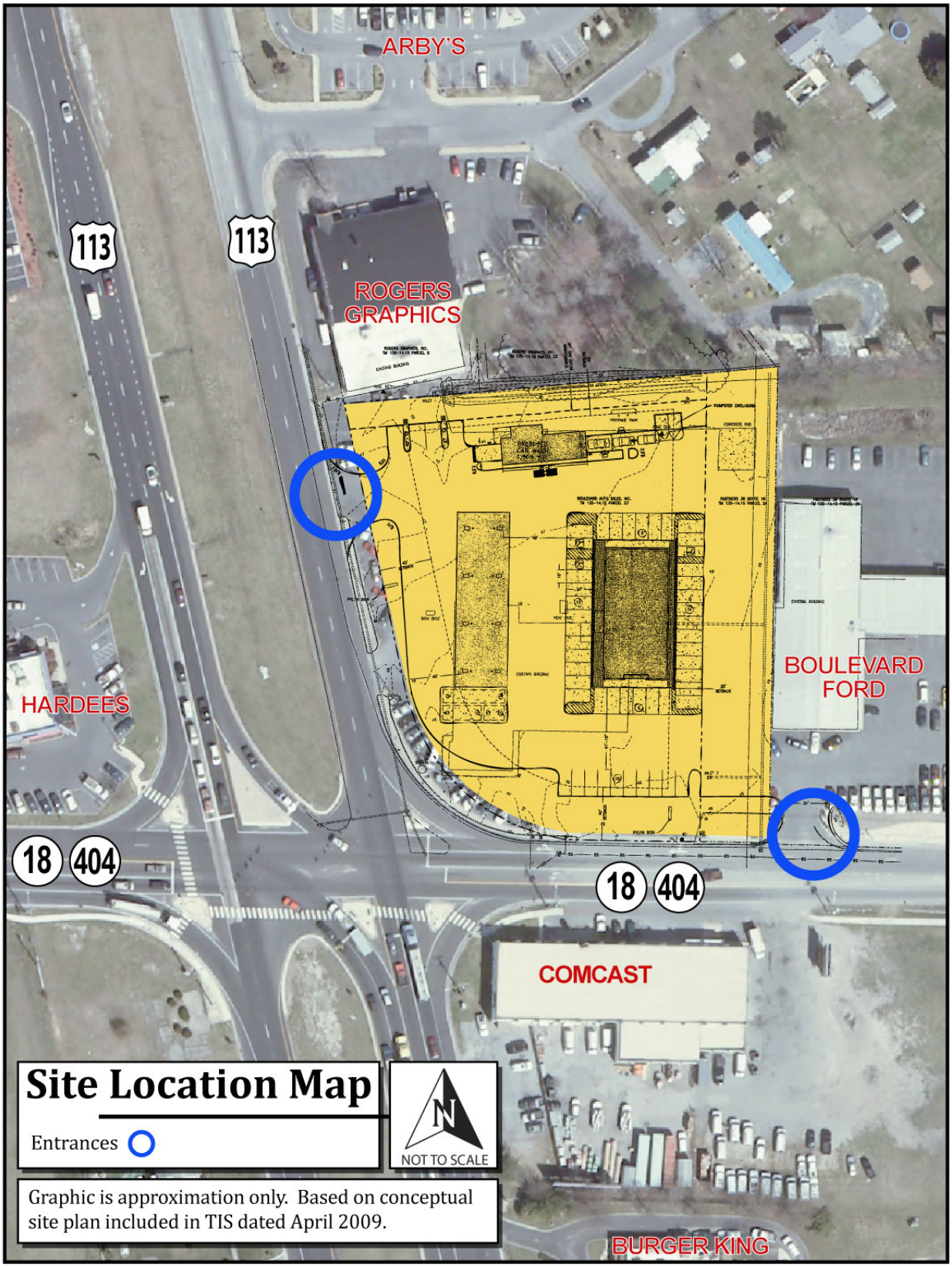
General Information

Report date: June 26, 2009
Prepared by: Orth Rodgers & Associates, Inc.
Prepared for: Royal Farms
Tax parcels: 135-14.00-15.23
Generally consistent with DelDOT's *Rules and Regulations for Subdivision Streets*: Yes

Project Description and Background

Description: The proposed development would consist of a 5,000 square-foot convenience store with 16 gas pumps. Currently, a car sales lot associated with the Boulevard Ford dealership is located on the site. The car sales lot on this parcel would be eliminated as the site is redeveloped, but the Ford dealership would remain on the adjacent parcel.
Location: Royal Farms is proposed to be located on the northeast corner of US Route 113 (Sussex Road 113 / DuPont Boulevard) and Delaware Route 18/404 (Sussex Road 18 / Seashore Highway) in the Town of Georgetown, in Sussex County, Delaware. A site location map is included on Page 11.
Amount of land to be developed: approximately 2 acres of land
Land use approval(s) needed: Subdivision approval. The land is currently zoned as HC (Highway Commercial) within the Town of Georgetown. The developer does not propose to change the zoning.
Proposed completion date: 2011
Proposed access locations: Two access points are proposed: one on Delaware Route 18/404 and one on US Route 113. These access points are in the same locations as existing driveways for the car sales lot, but will be improved.
Daily Traffic Volumes:

- 2008 Average Annual Daily Traffic on US Route 113: 19,504 vpd
- 2008 Average Annual Daily Traffic on Delaware Route 18/404: 7,097 vpd


ARBY'S
113
113
ROGERS GRAPHICS
HARDEES
BOULEVARD FORD
18
404
18
404
COMCAST
BURGER KING
Site Location Map
Entrances
N
NOT TO SCALE
Graphic is approximation only. Based on conceptual site plan included in TIS dated April 2009.

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: The proposed Royal Farms is located within Investment Level 1 area.

Description of Investment Levels:

Investment Level 1:

These areas are often municipalities or urban/urbanizing places where density is generally higher than in surrounding areas. Areas classified as Investment Level 1 are population centers built around a traditional central business district, which offers a wide range of opportunities for employment, shopping and recreation. Investment Level 1 Areas are considered to drive Delaware's economy and therefore reinvestment and redevelopment are encouraged.

In Investment Level 1 Areas, state investments and policies should support and encourage a wide range of uses and densities, promote other transportation options, foster efficient use of existing public and private investments, and enhance community identity and integrity. Typical transportation projects included new or expanded facilities and services for all modes of transportation, including public transportation facilities and services. Projects will also include those that manage traffic flow and congestion, support economic development and redevelopment efforts, and encourage connections between communities and the use of local streets for local trips.

Proposed Development's Compatibility with Livable Delaware: The proposed Royal Farms is located within Investment Level 1 and is to be developed as a commercial site, consistent with the character of Investment Level 1 areas. It is therefore concluded that the proposed development generally complies with the policies stated in the 2004 update of the Livable Delaware "Strategies for State Policies and Spending."

Comprehensive Plans

Sussex County Comprehensive Plan:
(Source: Sussex County Comprehensive Plan Update, June 2008)

The Sussex County Comprehensive Plan Future Land Use Map indicates that the proposed Royal Farms development is in the Town of Georgetown, a municipality. Sussex County strongly favors directing development to municipalities that desire it. The specific permitted uses and densities governing new construction within an incorporated municipality will continue to be governed by that municipality's zoning ordinance, its public water and sewer capacities, and its comprehensive planning policies.

Town of Georgetown Comprehensive Plan:
(Source: Town of Georgetown Comprehensive Plan, February 2002)

On the Existing Land Use Map, the proposed development is designated as Highway Commercial, and the Recommended Future Land Use Map shows the area as Highway Commercial.

Proposed Development's Compatibility with Comprehensive Plans: The proposed commercial development is currently zoned as HC (Highway Commercial) in the Town of Georgetown. As such, the proposed development appears to be compatible with the Sussex County Comprehensive Plan and the Town of Georgetown Comprehensive Plan.

Transportation Analysis Zones (TAZ)

Transportation Analysis Zones (TAZ) where development would be located: 1257

TAZ Boundaries:

Current employment estimate for TAZ: 1,292 jobs in 2005
Future employment estimate for TAZ: 1,519 jobs in 2030
Current population estimate for TAZ: 2,834 people in 2005
Future population estimate for TAZ: 3,730 people in 2030
Current household estimate for TAZ: 866 houses in 2005
Future household estimate for TAZ: 1,151 houses in 2030

Relevant committed developments in the TAZ: Georgetown Hunt
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: No

Relevant Projects in the DelDOT Capital Transportation Program (FY 2008 – FY 2013)

DelDOT currently has two relevant projects within the study area. The first is the US Route 113, North/South Improvements project (aka US 113 North/South Study) (State Contract No. 22-127-01). The US 113 North/South Study seeks to address the existing and future transportation needs along the US Route 113 corridor while preserving environmental and historic resources, preserving the existing north/south corridor in Sussex County, and accommodating planned economic growth. The project team coordinates with Sussex and Kent Counties and the affected municipalities and continues to study viable alternatives for north/south capacity improvements throughout Sussex County. Many alternatives are being studied, both on and off existing alignments.

In June 2007, after evaluating input from the public, conducting analyses and working to refine the alternatives, DelDOT announced a Recommended Preferred Alternative for the Georgetown Area of the US Route 113 North/South Study. For more information, please see the project web site at http://www.deldot.gov/information/projects/us113/. The Refined On-Alignment Alternative is the Recommended Preferred Alternative in the Georgetown Area. As currently planned, the design concept for this alternative would have direct impacts on the intersection of US Route 113 and Delaware Route 18/404 and the proposed Royal Farms development location. It would become a grade-separated intersection with ramps going through the proposed Royal Farms property and eliminating access to the site. However, the DelDOT Project Manager for the US 113 North/South Study has indicated this is a long-term project with improvements not expected to occur until at least 2020.

The second project is the Corridor Capacity Preservation Program (CCPP), which is a statewide program intended to sustain the capacity of adopted highway corridors by various means such as limiting access points and using service roads for local vehicle trips. The general purpose of the program is to ensure that the existing principal arterial highways, such as US Route 113, are able to efficiently carry regional traffic without impedance from the effects of local development.

Trip Generation

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

- 5,000 square-foot convenience store with 16 gas pumps (ITE Land Use Code 853)

Table 1
ROYAL FARMS PEAK HOUR TRIP GENERATION

Land Use	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	In	Out	Total	In	Out	Total	In	Out	Total
5,000 sf convenience store with 16 gas pumps	133	132	265	152	153	305	82	78	160
Pass-By Trips	101	100	201	116	116	232	62	59	121
Primary Trips	**32**	**32**	**64**	**36**	**37**	**73**	**20**	**19**	**39**
Redevelopment Credit	12	8	20	8	13	21	14	17	31
TOTAL NEW TRIPS	**20**	**24**	**44**	**28**	**24**	**52**	**6**	**2**	**8**

Table 2
ROYAL FARMS DAILY TRIP GENERATION

Land Use	**Weekday ADT**			**Saturday ADT**		
	In	Out	Total	In	Out	Total
5,000 sf convenience store with 16 gas pumps	2114	2114	4228	3621	3621	7242
TOTAL TRIPS	**2114**	**2114**	**4228**	**3621**	**3621**	**7242**

Overview of TIS

Intersections examined:

1) US Route 113 & Site Entrance
2) Delaware Route 18/404 & Site Entrance
3) US Route 113 & Delaware Route 18/404

Conditions examined:

1) 2009 existing conditions (Case 1)
2) 2011 without Royal Farms (Case 2)
3) 2011 with Royal Farms and right-in/right-out site access on US Route 113, without Georgetown Commercial (Case 3)

4) 2011 with Royal Farms and no rights in from US Route 113, without Georgetown Commercial (Case 4)
5) 2011 with Royal Farms and right-in/right-out site access on US Route 113, with Georgetown Commercial (Case 5)
6) 2011 with Royal Farms and no rights in from US Route 113, with Georgetown Commercial (Case 6)

Peak hours evaluated: Weekday morning and evening, and Saturday mid-day peak hours

Committed developments considered:

1) Shipbuilders Square (267 townhouses)
2) Georgetown Hunt (80 single-family detached houses)
3) Isaac's Family Farm (332 townhouses and 171,590 square feet of retail space)
4) Georgetown Commercial (451 townhouses and 60,000 square feet of retail space)*
*Georgetown Commercial was considered for Cases 5 and 6 only.

Intersection Descriptions

1) US Route 113 & Site Entrance
Type of Control: existing and proposed two-way stop-controlled (T-intersection)
Westbound approach: (Site Entrance) one right-turn-only lane, stop-controlled
Northbound approach: (US Route 113) one exclusive through lane and one shared through/right-turn lane
Southbound approach: (US Route 113) two through lanes, separated from northbound lanes by grass median
Note: For Cases 4 and 6, this intersection was evaluated with no rights in from northbound US Route 113.

2) Delaware Route 18/404 & Site Entrance
Type of Control: existing and proposed two-way stop-controlled (T-intersection)
Eastbound approach: (Delaware Route 18/404) one shared through/left-turn lane
Westbound approach: (Delaware Route 18/404) one exclusive through lane and one shared through/right-turn lane
Southbound approach: (Site Entrance) one shared left/right-turn lane, stop-controlled

3) US Route 113 & Delaware Route 18/404
Type of Control: signalized four-leg intersection
Eastbound approach: (Delaware Route 18/404) one left-turn lane, one through lane, and one right-turn lane
Westbound approach: (Delaware Route 18/404) one left-turn lane, one exclusive through lane, and one shared through/right-turn lane
Northbound approach: (US Route 113) two left-turn lanes, two through lanes, and one right-turn lane
Southbound approach: (US Route 113) one left-turn lane, two through lanes, one right-turn lane

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: The Delaware Transit Corporation (DTC) currently operates three transit routes near the proposed development. DART Route 206 connects Georgetown, Lewes and Rehoboth Beach, and travels along US Route 113 near the proposed development. DART Route 212 connects Georgetown, Bridgeville, Seaford, and Laurel. DART Route 303 connects Georgetown and Dover, with numerous stops in between. All three bus routes stop at the DART Transfer Center and Park & Ride at the nearby Delaware Tech Georgetown Campus.

Planned transit service: McCormick Taylor contacted Ms. Lisa Collins, a Service Development Planner for the DTC, via email on July 9, 2009 to determine whether DTC has any plans to extend the existing transit system in the vicinity of the development. In an email dated July 28, 2009, Ms. Collins stated that DTC is realigning DART Route 212 in December 2009 to serve the Georgetown Train Station using Delaware Route 18/404. She also stated that when this route is heading outbound from Georgetown toward Bridgeville, there is not a safe place to install a bus stop opposite Delaware Tech, but DTC would like a bus stop somewhere nearby along Delaware Route 18/404.

Existing bicycle and pedestrian facilities: According to the *Delaware Kent and Sussex Counties Bicycle Touring Map*, Delaware Route 18/404 has above average cycling conditions with moderate traffic volumes (2,000 – 10,000 ADT). US Route 113 along the site frontage has above average cycling conditions with high traffic volumes (greater than 10,000 ADT). There are limited sidewalks along the site frontages on US Route 113 or Delaware Route 18/404, and crosswalks across the south and west legs of the nearby intersection of US Route 113 and Delaware Route 18/404.

Planned bicycle and pedestrian facilities: DelDOT's Bicycle and Pedestrian Facilities Team indicated, in a letter from Anthony Aglio and Jennifer Baldwin dated May 19, 2009, that the following bicycle and pedestrian facilities should be required. In the letter, Mr. Agilo and Ms. Baldwin commented that the nearby area includes a significant amount of commercial use, a college, and existing residential development. If the development does occur, the following requests should be incorporated into the project to facilitate bicycle and pedestrian transportation:

a. Provide an ADA compliant sidewalk along all property frontage, including a 5' buffer from the pavement.
b. Include ADA compliant curb ramps
c. Connect internal sidewalks to the frontage sidewalk and include crosswalks through all driveways.
d. Add pedestrian crosswalk and signals on the north and east side of the intersection of US Route 113 & Delaware Route 18/404.
e. Where internal sidewalks are located alongside of parking spaces, add a buffer to eliminate vehicular overhang onto the sidewalk.
f. Covered bike parking should be included near the entrances to the facility.

g. The developer of this location should contact DART regarding the addition of transit service and transit facilities at this location. The internal sidewalks should be connected to this stop and include parking facilities for bicyclists.

The letter indicated that Delaware Route 18/404 is designated as a Regional Bicycle Route, and nearby Bedford Street (Sussex Road 114) is a Statewide Bicycle Route. The letter also stated that the site is in close proximity to other Bicycle Routes, including County Seat Highway (Sussex Road 28), Lewes-Georgetown Highway (Sussex Road 18), Vaughn Road Sussex Road 520), Donovans Road (Sussex Road 243), and Trap Pond Road (Sussex Road 62).

Previous Comments

All comments from DelDOT's Scoping Letter, Traffic Count Review, Preliminary TIS Review, and Revised Preliminary TIS Review were addressed in the Final TIS submission.

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

1) For future conditions, where the lane group volume increased from the existing volume, the TIS and McCormick Taylor assumed a peak hour factor (PHF) of either existing PHF or 0.88, whichever was greater, at the site entrance intersections. For the intersection of US Route 113 and Delaware Route 18/404, due to heavy volumes, the TIS and McCormick Taylor assumed either existing PHF or 0.92, whichever was greater. For cases where the lane group volume did not change from existing to future conditions, the TIS and McCormick Taylor assumed a future PHF equal to existing PHF.

2) For future conditions, the TIS assumed heavy vehicle factors (HV) to be the same as existing HV and assumed no minimum HV. Where the lane group volume increased from the existing volume, McCormick Taylor assumed the HV to be either existing HV or 2%, whichever was greater. For cases where the lane group volume did not change from existing to future conditions, McCormick Taylor assumed a future HV equal to existing HV.

3) The HCS analyses included in the TIS did not always reflect the lane widths observed in the field by McCormick Taylor. McCormick Taylor's HCS analyses incorporated the field-measured lane widths.

4) The TIS and McCormick Taylor used different cycle lengths and/or signal timing parameters when analyzing the signalized intersections in some cases.

5) The TIS input existing Right-Turn-on-Red (RTOR) volumes for future analyses. Due to increased volumes and fewer available gaps, there would likely be fewer vehicles able to make right turns on red, so McCormick Taylor input no RTOR volumes for future conditions.

Table 3
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Royal Farms
Report dated June 26, 2009
Prepared by Orth-Rodgers & Associates, Inc.

Unsignalized Intersection [1] **Two-Way Stop Control (T-intersection)**	**LOS per TIS**			**LOS per McCormick Taylor**		
US Route 113 & Site Entrance	Weekday AM	Weekday PM	Saturday Mid-Day	Weekday AM	Weekday PM	Saturday Mid-Day
2009 Existing (Case 1)						
Westbound Site Entrance – right	B (10.9)	B (12.3)	B (13.4)	B (11.3)	B (13.0)	C (15.4)
2011 without Royal Farms (Case 2)						
Westbound Site Entrance – right	B (11.4)	B (13.0)	B (14.9)	B (11.9)	B (14.0)	C (17.7)
2011 with Royal Farms, right-in/right-out access (Case 3)						
Westbound Site Entrance – right	B (11.9)	B (13.9)	B (15.6)	B (12.5)	C (15.1)	C (18.7)
2011 with Royal Farms, right-in/right-out access (Case 3) *With Improvement Option 1* [2]						
Westbound Site Entrance – right	N/A	N/A	N/A	B (12.2)	B (14.6)	C (18.3)
2011 with Royal Farms, no rights in access (Case 4)						
Westbound Site Entrance – right	B (11.6)	B (13.5)	B (15.3)	B (12.2)	B (14.6)	C (18.3)
2011 with Royal Farms and Georgetown Commercial, right-in/right-out access (Case 5)						
Westbound Site Entrance – right	B (12.4)	B (15.2)	B (16.8)	B (13.2)	C (16.8)	C (20.6)
2011 with Royal Farms and Georgetown Commercial, right-in/right-out access (Case 5) *With Improvement Option 1* [2]						
Westbound Site Entrance – right	N/A	N/A	N/A	B (12.8)	C (16.2)	C (20.2)
2011 with Royal Farms and Georgetown Commercial, no rights in access (Case 6)						
Westbound Site Entrance – right	B (12.1)	B (14.7)	B (16.5)	B (12.8)	C (16.2)	C (20.2)

[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.
[2] Improvement Option 1 includes an exclusive right-turn lane on the northbound approach of US Route 113, which is warranted by DelDOT's *Standards and Regulations for Subdivision Streets and State Highway Access*.

Table 4
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Royal Farms
Report dated June 26, 2009
Prepared by Orth-Rodgers & Associates, Inc.

Unsignalized Intersection [3] **Two-Way Stop Control (T-intersection)**	**LOS per TIS**			**LOS per McCormick Taylor**		
Delaware Route 18/404 & Site Entrance	Weekday AM	Weekday PM	Saturday Mid-Day	Weekday AM	Weekday PM	Saturday Mid-Day
2009 Existing (Case 1)						
Eastbound Delaware Route 18/404 – Left	A (8.6)	A (8.8)	A (8.4)	A (8.1)	A (8.7)	A (8.5)
Southbound Site Entrance	B (13.1)	B (10.8)	B (14.2)	B (11.7)	B (11.0)	B (14.2)
2011 without Royal Farms (Case 2)						
Eastbound Delaware Route 18/404 – Left	A (8.4)	A (9.2)	A (8.9)	A (8.3)	A (9.1)	A (9.0)
Southbound Site Entrance	B (12.6)	B (11.5)	C (17.6)	B (12.7)	B (11.8)	C (18.1)
2011 with Royal Farms (Case 3)						
Eastbound Delaware Route 18/404 – Left	A (8.6)	A (9.6)	A (9.1)	A (8.5)	A (9.5)	A (9.1)
Southbound Site Entrance	B (12.7)	C (15.9)	C (18.0)	B (12.9)	C (16.5)	C (18.4)
2011 with Royal Farms (Case 3) *With Improvement Option 1* [4]						
Eastbound Delaware Route 18/404 – Left	N/A	N/A	N/A	A (8.5)	A (9.5)	A (9.1)
Southbound Site Entrance	N/A	N/A	N/A	B (12.5)	C (15.5)	C (17.8)
2011 with Royal Farms (Case 4)						
Eastbound Delaware Route 18/404 – Left	A (8.8)	A (10.0)	A (9.2)	A (8.7)	A (9.9)	A (9.3)
Southbound Site Entrance	B (13.6)	C (18.0)	C (19.4)	B (13.9)	C (18.7)	C (19.9)
2011 with Royal Farms (Case 4) *With Improvement Option 1* [4]						
Eastbound Delaware Route 18/404 – Left	N/A	N/A	N/A	A (8.7)	A (9.9)	A (9.3)
Southbound Site Entrance	N/A	N/A	N/A	B (13.4)	C (17.5)	C (19.2)

[3] 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.
[4] Improvement Option 1 includes an exclusive left-turn lane on the eastbound approach and an exclusive right-turn lane on the westbound approach of Delaware Route 18/404, which are warranted by DelDOT's *Standards and Regulations for Subdivision Streets and State Highway Access*.

Table 4 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Royal Farms
Report dated June 26, 2009
Prepared by Orth-Rodgers & Associates, Inc.

Unsignalized Intersection [5] **Two-Way Stop Control (T-intersection)**	**LOS per TIS**			**LOS per McCormick Taylor**		
Delaware Route 18/404 & Site Entrance	Weekday AM	Weekday PM	Saturday Mid-Day	Weekday AM	Weekday PM	Saturday Mid-Day
2011 with Royal Farms and Georgetown Commercial (Case 5)						
Eastbound Delaware Route 18/404 – Left	A (8.7)	A (9.8)	A (9.3)	A (8.6)	A (9.8)	A (9.4)
Southbound Site Entrance	B (13.2)	C (17.3)	C (20.3)	B (13.5)	C (18.1)	C (20.8)
2011 with Royal Farms and Georgetown Commercial (Case 5) *With Improvement Option 1* [6]						
Eastbound Delaware Route 18/404 – Left	N/A	N/A	N/A	A (8.6)	A (9.8)	A (9.4)
Southbound Site Entrance	N/A	N/A	N/A	B (13.0)	C (17.0)	C (20.1)
2011 with Royal Farms and Georgetown Commercial (Case 6)						
Eastbound Delaware Route 18/404 – Left	A (8.9)	B (10.3)	A (9.5)	A (8.8)	B (10.2)	A (9.6)
Southbound Site Entrance	B (14.3)	C (20.0)	C (22.2)	B (14.6)	C (20.8)	C (22.8)
2011 with Royal Farms and Georgetown Commercial (Case 6) *With Improvement Option 1* [6]						
Eastbound Delaware Route 18/404 – Left	N/A	N/A	N/A	A (8.8)	B (10.2)	A (9.6)
Southbound Site Entrance	N/A	N/A	N/A	B (14.3)	C (19.6)	C (22.2)

[5] 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.
[6] Improvement Option 1 includes an exclusive left-turn lane on the eastbound approach and an exclusive right-turn lane on the westbound approach of Delaware Route 18/404, which are warranted by DelDOT's *Standards and Regulations for Subdivision Streets and State Highway Access.*

Table 5
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Royal Farms
Report dated June 26, 2009
Prepared by Orth-Rodgers & Associates, Inc.

Signalized Intersection [7]	**LOS per TIS**			**LOS per McCormick Taylor**		
US Route 113 & Delaware Route 18/404	Weekday AM	Weekday PM	Saturday Mid-Day	Weekday AM	Weekday PM	Saturday Mid-Day
2009 Existing (Case 1)	D (0.84)	D (0.85)	E (0.97)	D (0.83)	D (0.83)	E (0.94)
2011 without Royal Farms (Case 2)	D (0.77)	D (0.84)	F (1.07)	D (0.76) [8]	D (0.84)	E (1.00)
2011 with Royal Farms (Case 3)	D (0.77)	D (0.84)	F (1.09)	D (0.76) [8]	D (0.83) [9]	F (1.03)
2011 with Royal Farms (Case 3) *With Improvement Option 1* [10]	N/A	N/A	N/A	D (0.76)	D (0.83) [11]	F (1.02)
2011 with Royal Farms (Case 3) *With Improvement Option 2* [12]	N/A	N/A	N/A	D (0.67)	D (0.80) [13]	D (0.86)
2011 with Royal Farms (Case 4)	D (0.78)	D (0.84)	F (1.09)	D (0.76) [8]	D (0.82) [14]	F (1.03)
2011 with Royal Farms (Case 4) *With Improvement Option 1* [10]	N/A	N/A	N/A	D (0.76)	D (0.82) [15]	F (1.03)
2011 with Royal Farms (Case 4) *With Improvement Option 2* [12]	N/A	N/A	N/A	D (0.67)	D (0.80) [13]	D (0.86)

[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.
[8] X-critical values for the future AM peak hour (without improvements) are lower than existing AM peak hour values due primarily to differences between existing and assumed future PHF values. Many existing PHF values for this intersection were rather low (i.e., less than 0.70 for some lane groups). Based on standard practice, future PHF values were assumed to be at least 0.92.
[9] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 3 PM peak hour is approximately 28 vehicles.
[10] Improvement Option 1 includes the addition of an exclusive u-turn lane on the southbound approach of US Route 113, such that the southbound approach would consist of one exclusive u-turn lane, one exclusive left-turn lane, two through lanes, and one exclusive right-turn lane.
[11] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 3 PM peak hour with Improvement Option 1 is approximately 28 vehicles.
[12] Improvement Option 2 includes the addition of a second through lane on the eastbound Delaware 18/404 approach, along with a second left-turn lane and an exclusive right-turn lane on the westbound Delaware Route 18/404 approach.
[13] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 3 and Case 4 PM peak hour with Improvement Option 2 is approximately 25 vehicles.
[14] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 4 PM peak hour is approximately 27 vehicles.
[15] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 4 PM peak hour with Improvement Option 1 is approximately 26 vehicles.

Table 5 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Royal Farms
Report dated June 26, 2009
Prepared by Orth-Rodgers & Associates, Inc.

Signalized Intersection [16]	**LOS per TIS**			**LOS per McCormick Taylor**		
US Route 113 & Delaware Route 18/404	Weekday AM	Weekday PM	Saturday Mid-Day	Weekday AM	Weekday PM	Saturday Mid-Day
2011 with Royal Farms and Georgetown Commercial (Case 5)	D (0.84)	E (0.94)	F (1.11)	D (0.80) [17]	E (0.94) [18]	F (1.13)
2011 with Royal Farms and Georgetown Commercial (Case 5) *With Improvement Option 1* [19]	N/A	N/A	N/A	D (0.80)	E (0.93) [20]	F (1.08)
2011 with Royal Farms and Georgetown Commercial (Case 5) *With Improvement Option 2* [21]	N/A	N/A	N/A	D (0.74)	E (0.92) [22]	F (1.02)
2011 with Royal Farms and Georgetown Commercial (Case 5) *With Improvement Option 3* [23]	N/A	N/A	N/A	D (0.58)	D (0.77) [24]	D (0.86)

[16] 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.
[17] X-critical values for the future AM peak hour (without improvements) are lower than existing AM peak hour values due primarily to differences between existing and assumed future PHF values. Many existing PHF values for this intersection were rather low (i.e., less than 0.70 for some lane groups). Based on standard practice, future PHF values were assumed to be at least 0.92.
[18] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 5 PM peak hour is approximately 31 vehicles.
[19] Improvement Option 1 includes the addition of an exclusive u-turn lane on the southbound approach of US Route 113, such that the southbound approach would consist of one exclusive u-turn lane, one exclusive left-turn lane, two through lanes, and one exclusive right-turn lane.
[20] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 5 PM peak hour with Improvement Option 1 is approximately 30 vehicles.
[21] Improvement Option 2 includes the addition of a second through lane on the eastbound Delaware 18/404 approach, along with a second left-turn lane and an exclusive right-turn lane on the westbound Delaware Route 18/404 approach.
[22] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 5 PM peak hour with Improvement Option 2 is approximately 27 vehicles.
[23] Improvement Option 3 includes the addition of a second left-turn lane and a second through lane on the eastbound Delaware Route 18/404 approach, a second left-turn lane on the westbound Delaware 18/404 approach, and a third through lane on the both northbound and southbound US Route 113 approaches.
[24] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 5 PM peak hour with Improvement Option 3 is approximately 30 vehicles.

Table 5 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Royal Farms
Report dated June 26, 2009
Prepared by Orth-Rodgers & Associates, Inc.

Signalized Intersection [25]	**LOS per TIS**			**LOS per McCormick Taylor**		
US Route 113 & Delaware Route 18/404	Weekday AM	Weekday PM	Saturday Mid-Day	Weekday AM	Weekday PM	Saturday Mid-Day
2011 with Royal Farms and Georgetown Commercial (Case 6)	D (0.84)	E (0.94)	F (1.11)	D (0.80) [26]	E (0.93) [27]	F (1.13)
2011 with Royal Farms and Georgetown Commercial (Case 6) *With Improvement Option 1* [28]	N/A	N/A	N/A	D (0.80)	E (0.93) [29]	F (1.08)
2011 with Royal Farms and Georgetown Commercial (Case 6) *With Improvement Option 2* [30]	N/A	N/A	N/A	D (0.73)	E (0.91) [31]	F (1.01)
2011 with Royal Farms and Georgetown Commercial (Case 6) *With Improvement Option 3* [32]	N/A	N/A	N/A	D (0.58)	D (0.76) [33]	D (0.86)

[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] X-critical values for the future AM peak hour (without improvements) are lower than existing AM peak hour values due primarily to differences between existing and assumed future PHF values. Many existing PHF values for this intersection were rather low (i.e., less than 0.70 for some lane groups). Based on standard practice, future PHF values were assumed to be at least 0.92.
[27] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 6 PM peak hour is approximately 30 vehicles.
[28] Improvement Option 1 includes the addition of an exclusive u-turn lane on the southbound approach of US Route 113, such that the southbound approach would consist of one exclusive u-turn lane, one exclusive left-turn lane, two through lanes, and one exclusive right-turn lane.
[29] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 6 PM peak hour with Improvement Option 1 is approximately 30 vehicles.
[30] Improvement Option 2 includes the addition of a second through lane on the eastbound Delaware 18/404 approach, along with a second left-turn lane and an exclusive right-turn lane on the westbound Delaware Route 18/404 approach.
[31] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 6 PM peak hour with Improvement Option 2 is approximately 27 vehicles.
[32] Improvement Option 3 includes the addition of a second left-turn lane and a second through lane on the eastbound Delaware Route 18/404 approach, a second left-turn lane on the westbound Delaware 18/404 approach, and a third through lane on the both northbound and southbound US Route 113 approaches.
[33] The 95th percentile queue length for the westbound Delaware Route 18/404 through movement during the Case 6 PM peak hour with Improvement Option 3 is approximately 30 vehicles.

PART II: THIS PART OF THE REVIEW LETTER (PAGES 25-34) IS BASED ON THE JANUARY 2011 ADDENDUM AND THE JUNE/JULY 2010 STUDY

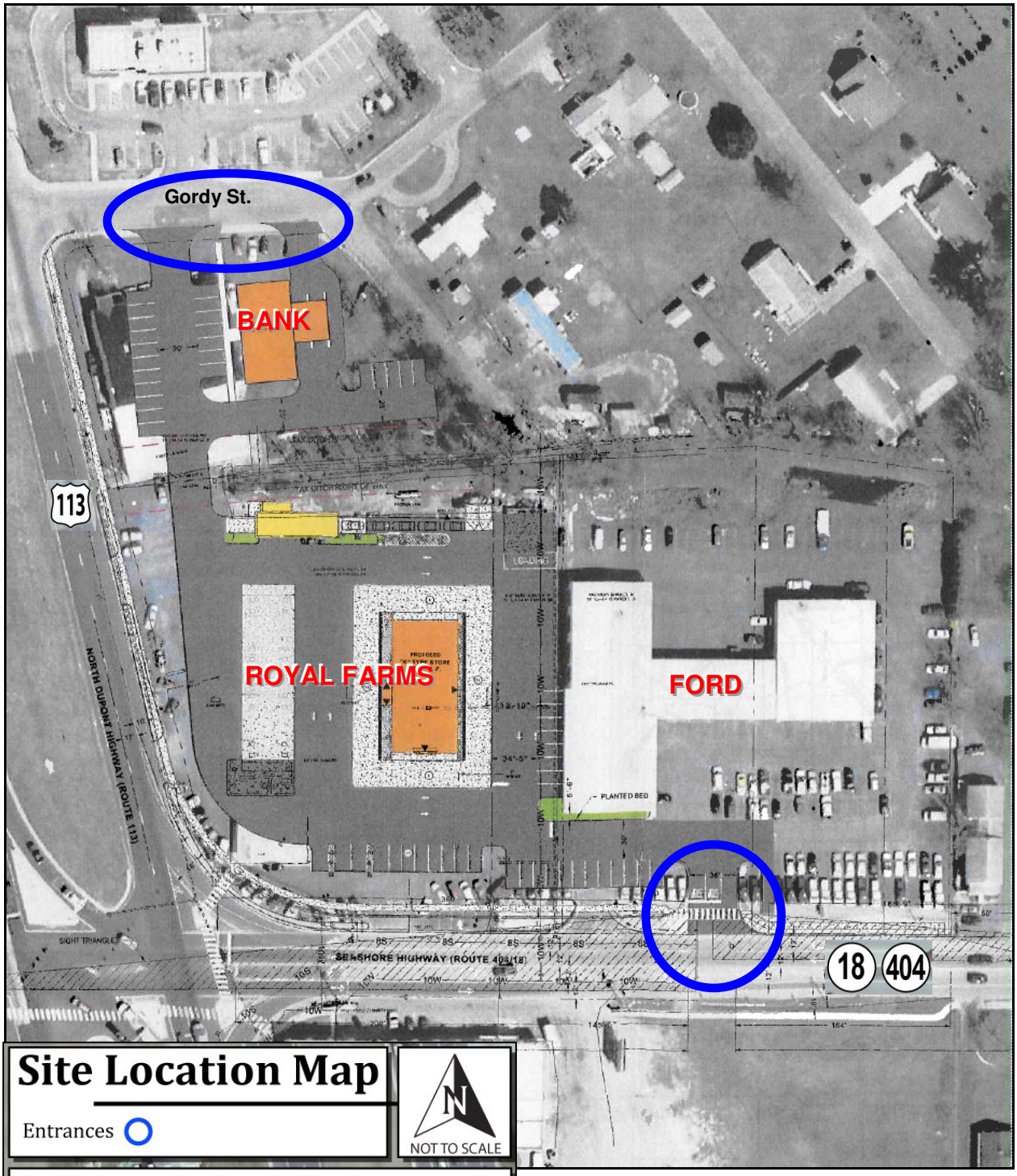
Part II addresses only those aspects of the proposed development and corresponding review that are different from the original June 2009 TIS and our August 2009 review presented in Part I.

General Information

Addendum date: January 13, 2011
Prepared by: Orth Rodgers & Associates, Inc.
Prepared for: Royal Farms
Tax parcels: 135-14.00-15.08, 15-22, 15-23, and 15-24
Generally consistent with DelDOT's *Rules and Regulations for Subdivision Streets*: Yes

Project Description and Background

Description: The proposed development would consist of a 5,000 square-foot convenience store with 16 gas pumps, and a 3,000 square-foot bank with drive-through window. Currently, a car sales lot associated with the Boulevard Ford dealership is located on the site. The car sales lot would be eliminated as the site is redeveloped, but the Ford dealership would remain on the adjacent parcel to the east of the proposed convenience store. The proposed bank would replace Rogers Graphics, an existing business on the adjacent parcel to the north of the proposed convenience store.
Location: Royal Farms is proposed to be located on the northeast corner of US Route 113 Delaware Route 18/404 in the Town of Georgetown, in Sussex County, Delaware. A site location map is included on Page 26.
Amount of land to be developed: approximately 3.2 acres of land
Land use approval(s) needed: Subdivision approval. The land is currently zoned as HC (Highway Commercial) within the Town of Georgetown. The developer does not propose to change the zoning.
Proposed completion date: 2011
Proposed access locations: Two access points are proposed: one on Delaware Route 18/404 and one on Gordy Street.


Gordy St.
BANK
113
ROYAL FARMS
FORD
NORTH DUPONT HIGHWAY (ROUTE 113)
SEASHORE HIGHWAY (ROUTE 404/18)
18
404
Site Location Map
Entrances
N
NOT TO SCALE
Graphic is approximation only. Based on conceptual site plan dated November 2010.

Trip Generation

Trip generation for the proposed development was computed using comparable land uses and equations or rates contained in Trip Generation, Eighth Edition, published by the Institute of Transportation Engineers (ITE). Additionally, pass-by percentages published in the article "Trip-Generation for Convenience Stores" (*ITE Journal*, August 2001) were also used. The following land use was utilized to estimate the amount of new traffic generated for this development:

- 5,000 square-foot convenience store with 16 gas pumps (ITE Land Use Code 853)
- 3,000 square-foot bank with drive-through window (ITE Land Use Code 912)

Table 6
ROYAL FARMS PEAK HOUR TRIP GENERATION

Land Use	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	In	Out	Total	In	Out	Total	In	Out	Total
5,000 sf convenience store w/ 16 gas pumps*	133	132	265	152	153	305	82	78	160
Pass-By Trips	101	100	201	116	116	232	62	59	121
Primary Trips	**32**	**32**	**64**	**36**	**37**	**73**	**20**	**19**	**39**
3,000 sf bank w/ drive-through window	21	16	37	39	38	77	42	38	80
Pass-By Trips	11	9	20	21	21	42	23	20	43
Primary Trips	**10**	**7**	**17**	**18**	**17**	**35**	**19**	**18**	**37**
Car Sales Lot Redevelopment Credit	12	8	20	8	13	21	14	17	31
TOTAL NEW TRIPS	**30**	**31**	**61**	**46**	**41**	**87**	**25**	**20**	**45**

* peak hour trip generation for ITE Land Use Code 853 based on number of gas pumps

Table 7
ROYAL FARMS DAILY TRIP GENERATION

Land Use	Weekday ADT			Saturday ADT		
	In	Out	Total	In	Out	Total
5,000 sf convenience store with 16 gas pumps*	4341	4341	8682	1636	1636	3272
5,000 sf convenience store with 16 gas pumps**	2114	2114	4228	3621	3621	7242
3,000 sf bank with drive-through window	222	222	444	129	129	258
TOTAL TRIPS*	**4563**	**4563**	**9126**	**1765**	**1765**	**3530**
TOTAL TRIPS**	**2336**	**2336**	**4672**	**3750**	**3750**	**7500**

* daily trip generation for ITE Land Use Code 853 based on number of gas pumps
** daily trip generation for ITE Land Use Code 853 based on square footage of store

Overview of TIS

Intersections examined:

1) Delaware Route 18/404 & Site Entrance
2) US Route 113 & Delaware Route 18/404
3) US Route 113 & Gordy Street

Conditions examined:

1) 2011 with Royal Farms and without Georgetown Commercial (Case 7)
2) 2011 with Royal Farms and with Georgetown Commercial (Case 8)

Peak hours evaluated: Weekday morning and evening, and Saturday mid-day peak hours

Committed developments considered:

1) Shipbuilders Square (267 townhouses)
2) Georgetown Hunt (80 single-family detached houses)
3) Isaac's Family Farm (332 townhouses and 171,590 square feet of retail space)
4) Georgetown Commercial (451 townhouses and 60,000 square feet of retail space)*
   *Georgetown Commercial was considered for Case 8 only

Intersection Descriptions

1) Delaware Route 18/404 & Site Entrance

Type of Control: proposed two-way stop-controlled (T-intersection)
Eastbound approach: (Delaware Route 18/404) existing one through lane; proposed one left-turn lane and one through lane
Westbound approach: (Delaware Route 18/404) existing one exclusive through lane and one shared through/right-turn lane; proposed one through lane and one right-turn lane
Southbound approach: (Site Entrance) proposed one left-turn lane and one right-turn lane, stop-controlled
Note: This site entrance is to be located at least 360 feet east of the left-turn lane stop bar on westbound Delaware Route 18/404 at US Route 113.

2) US Route 113 & Delaware Route 18/404

Type of Control: signalized four-leg intersection
Eastbound approach: (Delaware Route 18/404) one left-turn lane, one through lane, and one right-turn lane
Westbound approach: (Delaware Route 18/404) one left-turn lane, one exclusive through lane, and one shared through/right-turn lane
Northbound approach: (US Route 113) two left-turn lanes, two through lanes, and one right-turn lane
Southbound approach: (US Route 113) one left-turn lane, two through lanes, one right-turn lane

3) US Route 113 & Gordy Street
Type of Control: two-way stop-controlled (T-intersection)
Westbound approach: (Gordy Street) one right-turn-only lane, stop-controlled
Northbound approach: (US Route 113) one exclusive through lane and one shared through/right-turn lane
Southbound approach: (US Route 113) two through lanes, separated from northbound lanes by grass median

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

1) For future conditions, where the lane group volume increased from the existing volume, the TIS and McCormick Taylor assumed a peak hour factor (PHF) of either existing PHF or 0.88, whichever was greater, at the site entrance intersection and the Gordy Street intersection. For the intersection of US Route 113 and Delaware Route 18/404, due to heavy volumes, the TIS and McCormick Taylor assumed either existing PHF or 0.92, whichever was greater.

2) For future conditions, the TIS assumed heavy vehicle factors (HV) to be the same as existing HV and assumed no minimum HV. Where the lane group volume increased from the existing volume, McCormick Taylor assumed the HV to be either existing HV or 2%, whichever was greater. For cases where the lane group volume did not change from existing to future conditions, McCormick Taylor assumed a future HV equal to existing HV.

3) The HCS analyses included in the TIS did not always reflect the lane widths observed in the field by McCormick Taylor. McCormick Taylor's HCS analyses incorporated the field-measured lane widths as much as possible.

4) The TIS and McCormick Taylor used different cycle lengths and/or signal timing parameters when analyzing the signalized intersections in some cases.

5) The TIS input existing Right-Turn-on-Red (RTOR) volumes for future analyses. Due to increased volumes and fewer available gaps, there would likely be fewer vehicles able to make right turns on red, so McCormick Taylor input no RTOR volumes for future conditions.

Table 8
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Addendum to the Traffic Impact Study for Royal Farms
Addendum dated January 13, 2011
Prepared by Orth-Rodgers & Associates, Inc.

Unsignalized Intersection [34] **Two-Way Stop Control (T-intersection)**	**LOS per TIS Addendum**			**LOS per McCormick Taylor**		
Delaware Route 18/404 & Site Entrance [35]	Weekday AM	Weekday PM	Saturday Mid-Day	Weekday AM	Weekday PM	Saturday Mid-Day
2011 without Royal Farms (Case 7)						
Eastbound Delaware Route 18/404 – Left	A (8.6)	A (9.6)	A (9.1)	A (8.5)	A (9.5)	A (9.1)
Southbound Site Entrance	B (13.2)	C (17.9)	C (19.8)	B (13.2)	C (17.9)	C (19.8)
2011 with Royal Farms and Georgetown Commercial (Case 8)						
Eastbound Delaware Route 18/404 – Left	A (8.6)	A (9.8)	A (9.4)	A (8.6)	A (9.8)	A (9.4)
Southbound Site Entrance	B (13.8)	C (19.6)	C (22.4)	B (13.8)	C (19.6)	C (22.4)

[34] For both unsignalized and signalized intersection analyses, the numbers in parentheses following levels of service (LOS) are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.
[35] The proposed site entrance configuration has one left-turn lane and one through lane on the eastbound Delaware Route 18/404 approach, one through lane and one right-turn lane on the westbound Delaware Route 18/404 approach, and one left-turn lane and one right-turn lane on the southbound site entrance approach.

Table 9
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Addendum to the Traffic Impact Study for Royal Farms
Addendum dated January 13, 2011
Prepared by Orth-Rodgers & Associates, Inc.

Signalized Intersection [36]	**LOS per TIS Addendum**			**LOS per McCormick Taylor**		
US Route 113 & Delaware Route 18/404 [37]	Weekday AM	Weekday PM	Saturday Mid-Day	Weekday AM	Weekday PM	Saturday Mid-Day
2011 with Royal Farms (Case 7)	N/A	N/A	N/A	D (49.4)	D (54.6)	F (80.0+)
2011 with Royal Farms (Case 7) *With Improvement Option 1* [38]	D (45.3)	D (48.5)	E (72.9)	D (49.1)	D (52.7) [39]	E (78.9) [40]
2011 with Royal Farms (Case 7) *With Improvement Option 2* [41]	N/A	N/A	N/A	D (45.6)	D (50.8)	D (55.0-)

[36] For both unsignalized and signalized intersection analyses, the numbers in parentheses following levels of service (LOS) are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.
[37] The existing intersection configuration has one left-turn lane, one through lane, and one right-turn lane on the eastbound Delaware Route 18/404 approach, one left-turn lane, one exclusive through lane, and one shared through/right-turn lane on the westbound Delaware Route 18/404 approach, two left-turn lanes, two through lanes, and one right-turn lane on the northbound US Route 113 approach, and one left-turn lane, two through lanes, and one right-turn lane on the southbound US Route 113 approach.
[38] Improvement Option 1 includes the addition of an exclusive right-turn lane on the westbound approach of Delaware Route 18/404, such that the westbound approach would consist of one left-turn lane, two exclusive through lanes, and one exclusive right-turn lane.
[39] Notable 95th percentile queue lengths for the Case 7 PM peak hour (with Improvement Option 1) are approximately 15 vehicles for the eastbound left-turn lane, 25 vehicles for the westbound through lanes, and 16 vehicles for the westbound left-turn lane.
[40] Notable 95th percentile queue lengths for the Case 7 Saturday peak hour (with Improvement Option 1) are approximately 23 vehicles for the eastbound right-turn lane, 28 vehicles for the northbound left-turn lanes, and 26 vehicles for the southbound left-turn lane.
[41] Improvement Option 2 includes Improvement Option 1 plus the addition of a second through lane on the eastbound approach of Delaware Route 18/404 and a second left-turn lane on the southbound approach of US Route 113.

Table 9 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Addendum to the Traffic Impact Study for Royal Farms
Addendum dated January 13, 2011
Prepared by Orth-Rodgers & Associates, Inc.

Signalized Intersection [42]	**LOS per TIS Addendum**			**LOS per McCormick Taylor**		
US Route 113 & Delaware Route 18/404 [43]	Weekday AM	Weekday PM	Saturday Mid-Day	Weekday AM	Weekday PM	Saturday Mid-Day
2011 with Royal Farms and Georgetown Commercial (Case 8)	N/A	N/A	N/A	D (52.2)	E (62.4)	F (100.2)
2011 with Royal Farms and Georgetown Commercial (Case 8) *With Improvement Option 1* [44]	D (51.5)	E (59.9)	F (89.6)	D (51.7)	E (59.5) [45]	F (96.2) [46]
2011 with Royal Farms and Georgetown Commercial (Case 8) *With Improvement Option 2* [47]	N/A	N/A	N/A	D (48.0)	E (56.8)	E (66.3)
2011 with Royal Farms and Georgetown Commercial (Case 8) *With Improvement Option 3* [48]	N/A	N/A	N/A	D (46.4)	D (50.5)	D (53.0)

[42] For both unsignalized and signalized intersection analyses, the numbers in parentheses following levels of service (LOS) are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.
[43] The existing intersection configuration has one left-turn lane, one through lane, and one right-turn lane on the eastbound Delaware Route 18/404 approach, one left-turn lane, one exclusive through lane, and one shared through/right-turn lane on the westbound Delaware Route 18/404 approach, two left-turn lanes, two through lanes, and one right-turn lane on the northbound US Route 113 approach, and one left-turn lane, two through lanes, and one right-turn lane on the southbound US Route 113 approach.
[44] Improvement Option 1 includes the addition of an exclusive right-turn lane on the westbound approach of Delaware Route 18/404, such that the westbound approach would consist of one left-turn lane, two exclusive through lanes, and one exclusive right-turn lane.
[45] Notable 95th percentile queue lengths for the Case 8 PM peak hour (with Improvement Option 1) are approximately 22 vehicles for the eastbound left-turn lane, 29 vehicles for the westbound through lanes, and 15 vehicles for the westbound left-turn lane.
[46] Notable 95th percentile queue lengths for the Case 8 Saturday peak hour (with Improvement Option 1) are approximately 28 vehicles for the eastbound right-turn lane, 39 vehicles for the northbound left-turn lanes, and 30 vehicles for the southbound left-turn lane.
[47] Improvement Option 2 includes Improvement Option 1 plus the addition of a second through lane on the eastbound approach of Delaware Route 18/404 and a second left-turn lane on the southbound approach of US Route 113.
[48] Improvement Option 3 includes Improvement Option 2 plus the addition of a third through lane on the southbound approach of US Route 113.

Table 10
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Addendum to the Traffic Impact Study for Royal Farms
Addendum dated January 13, 2011
Prepared by Orth-Rodgers & Associates, Inc.

Unsignalized Intersection [49] **Two-Way Stop Control (T-intersection)**	**LOS per TIS Addendum**			**LOS per McCormick Taylor**		
US Route 113 & Gordy Street [50]	Weekday AM	Weekday PM	Saturday Mid-Day	Weekday AM	Weekday PM	Saturday Mid-Day
2011 with Royal Farms (Case 7)						
Westbound Gordy Street – right	N/A	N/A	N/A	B (12.0)	B (14.7)	C (16.9)
2011 with Royal Farms (Case 7) *With Improvement Option 1* [51]						
Westbound Gordy Street – right	B (11.4)	B (13.7)	C (16.3)	B (11.4)	B (13.7)	C (16.3)
2011 with Royal Farms and Georgetown Commercial (Case 8)						
Westbound Gordy Street – right	N/A	N/A	N/A	B (12.3)	C (15.1)	C (17.5)
2011 with Royal Farms and Georgetown Commercial (Case 8) *With Improvement Option 1* [51]						
Westbound Gordy Street – right	B (11.6)	B (14.0)	C (16.9)	B (11.6)	B (14.0)	C (16.9)

[49] For both unsignalized and signalized intersection analyses, the numbers in parentheses following levels of service (LOS) are average delay per vehicle, measured in seconds. For signalized analyses, LOS analysis results are given for only the overall intersection delay.
[50] The existing intersection configuration has one right-turn-only lane on the westbound Delaware Route 18/404 approach, one exclusive through lane and one shared through/right-turn lane on the northbound US Route 113 approach, and two through lanes on the southbound US Route 113 approach (separated from northbound lanes by a grass median).
[51] Improvement Option 1 includes the addition of an exclusive right-turn lane on the northbound approach of US Route 113, such that the northbound approach would consist of two exclusive through lanes and one exclusive right-turn lane.

Overview of the DelDOT/ORA Data Collection and Queuing Analysis (June/July 2010)

In June and July 2010, ORA worked with DelDOT to collect additional data and conduct further queuing analyses in support of an agreeable site entrance location. Essentially, ORA asserted that the HCS results for queue lengths on the westbound approach of Delaware Route 18/404 at US Route 113 were too conservative at this particular location. Using additional data collection and queuing analysis, the goal of the study was to develop a more accurate basis to establish a mutually agreeable location for the proposed site entrance on Delaware Route 18/404.

The data collection efforts and findings of the study were documented in a July 28, 2010 memo sent from ORA to Charles Altevogt, a Program Manager in DelDOT's Development Coordination Section. McCormick Taylor has reviewed that memo as part of our review of the TIS and TIS Addendum for the proposed Royal Farms development.

Both ORA and DelDOT collected queuing data on the westbound approach of Delaware Route 18/404 during the critical PM peak hour on Tuesday, June 22 and Friday, June 25, 2010. The observed average queue length on the westbound approach was approximately 200 feet during the PM peak hour. It was then determined that the HCS-based average queue length (for existing conditions) was roughly 1.6 to 1.8 times higher than the field-observed average queue length.

ORA determined that the observed 90^{th} or 95^{th} percentile queue length, which is typically used to determine storage lengths or the minimum distance of the site entrance from the stop bar, was estimated to be 300 feet for existing conditions. ORA then performed an analysis to compare the westbound queue lengths of existing conditions (without Royal Farms, without Georgetown Commercial, and without a separate right-turn lane on the westbound approach) to those of full-build conditions (with Royals Farms and Georgetown Commercial). The future conditions analyses were done both with and without a separate right-turn lane on the westbound approach. ORA found that the difference in the westbound queue lengths during the critical PM peak hour was less than one vehicle length between the existing conditions scenario and the future full-build with separate westbound right-turn lane scenario. Given that there was an almost negligible difference in the westbound queue lengths of those two scenarios, ORA recommended that, based on observations of existing conditions, the proposed site entrance should be designed and located such that a 300-foot westbound queue length could be accommodated.

In Mr. Altevogt's review of ORA's July 28, 2010 memo, as summarized in an email dated December 30, 2010, he did not endorse the site entrance to be located at a distance of 300 feet from the westbound stop bar. Instead, he applied a rationale that the site entrance location could essentially be based on the HCS-based *average* queue length (instead of 95^{th} percentile queue length) for the future full-build with separate right-turn lane scenario. This length was reported by ORA as 365 feet in the July 28, 2010 memo. Mr. Altevogt also stated that it could be determined by multiplying the observed average queue length (200 feet) by 1.8 (the previously-calculated typical multiplier for HCS-based queue lengths vs. observed queue lengths at this location), to come up with an acceptable distance of 360 feet. Mr. Altevogt mentioned that, while not factored into the analysis, the future westbound queue lengths may be limited due to anticipated improvements associated with Georgetown Commercial, including lengthening the second through lane west of US Route 113 and adding a signalized entrance on US Route 113.