



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

August 2, 2013

SHAILEN P. BHATT  
SECRETARY

Ms. Betty Tustin  
The Traffic Group, Inc.  
Delmarva Office  
104 Kenwood Court  
Berlin, Maryland 21801

Dear Ms. Tustin:

The enclosed Traffic Impact Study (TIS) review letter for the **Carillon Square** mixed-use 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 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: Ms. Constance C. Holland, Office of State Planning Coordination  
Mr. Lawrence Lank, Director, Sussex County Planning and Zoning  
Mr. Andrew Parker, McCormick Taylor, Inc.  
DelDOT Distribution

## DeIDOT Distribution

Frederick H. Schranck, Deputy Attorney General  
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Michael Simmons, Assistant Director, Project Development South, DOTS  
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Marco Boyce, Planning Supervisor, Statewide & Regional Planning  
Claudy Joinville, Project Engineer, Development Coordination



August 2, 2013

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

RE: Agreement No. 1529  
Traffic Impact Study Services  
**Task No. 18A – Carillon Square**

Dear Mr. Brestel,

McCormick Taylor has completed its review of the Traffic Impact Study (TIS) for the Carillon Square development prepared by The Traffic Group, Inc. (TTG), dated January 2013. This review was assigned as Task Number 18A. TTG prepared the report in a manner generally consistent with DelDOT's *Standards and Regulations for Subdivision Streets and State Highway Access*.

The TIS evaluates the impacts of the Carillon Square development, proposed to be located west of Delaware Route 24 (Sussex Road 24 / John J. Williams Highway) and south of Delaware Route 23 (Sussex Road 22 / Indian Mission Road), within Sussex County, Delaware. Delaware Route 5, also mentioned in this letter, follows the south leg of Sussex Road 24 and the west leg of Sussex Road 22 through their intersection. The proposed development would consist of 125 townhomes, a 31,685 square-foot shopping center, a 4,636 square-foot convenience store with 12 vehicle fueling positions, a 14,673 square-foot pharmacy, and a 3,606 square-foot bank with drive-through window, situated on approximately 38 acres of land. Three access points are proposed: one rights-in/rights-out/lefts-in access point on Delaware Route 24 across from the north entrance of the Bayshore Plaza Shopping Center, one full access point on Delaware Route 23 across from the west entrance of the Nanticoke Crossing Shopping Center, and one rights-in/rights-out access point on Delaware Route 24 approximately 300 feet south of the other proposed Delaware Route 24 site entrance. Construction is anticipated to be complete by 2016.

In general terms, the eastern portion of the property is currently zoned as C-1 (General Commercial) and the western portion of the property is currently zoned AR-1 (Agricultural Residential) within Sussex County. The developer has proposed rezoning the AR-1 parcels to CR-1 (Commercial Residential).

DelDOT currently has one relevant project in the study area. The HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project (State Contract No. T201200903) would implement operational improvements and access management strategies in the area of the Delaware Route 24 and Delaware Route 23 intersection. This project is based in part on DelDOT's SR 24 – SR 30 to Love Creek Bridge Traffic Study, dated November 2010, which recommended adding a second through lane in each direction on Delaware Route 24 in this area. The design phase of

the HSIP project was scheduled to begin in the spring of 2013. According to the FY 2013 – FY 2018 Capital Transportation Program, construction is tentatively scheduled to begin in FY 2017.

This project is also based on the evaluation of the intersection of Delaware Route 24 and Delaware Route 23 within 2008 Sites E and J of DeIDOT’s Hazard Elimination Program (HEP). The HEP recommendations for this location were limited to low-cost signing and striping improvements consisting of the following, which have all since been implemented:

- replace stop line on the eastbound Delaware Route 23 approach
- replace stop line on the westbound Delaware Route 23 approach
- replace the stop line for the northbound Delaware Route 24 left-turn lane
- install dotted lane markings on all approaches to establish the left and right-turn lanes

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

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

<i>Intersection</i>	<i>Existing Traffic Control</i>	<i>Situations for which deficiencies occur</i>
Delaware Route 23 and Nanticoke Crossing Shopping Center East Entrance	Unsignalized	2016 Saturday with Carillon Square
Delaware Route 24 and Delaware Route 23	Signalized	2016 Saturday without and with Carillon Square

The intersection of Delaware Route 23 and Nanticoke Crossing Shopping Center East Entrance exhibits LOS deficiencies under future conditions. However, we do not recommend any improvements be implemented by the developer at this intersection. The LOS deficiency is only for the summer Saturday condition on the southbound approach exiting the Nanticoke Crossing Shopping Center, and is only one second into the LOS E range. The expected 95<sup>th</sup> percentile queue length is less than 75 feet. Additionally, alternate access from that shopping center to Delaware Route 23 is provided via the west entrance.

The intersection of Delaware Route 24 and Delaware Route 23 exhibits LOS deficiencies under future conditions if the existing protected-permitted left-turn phasing is changed to protected-prohibited left-turn phasing on all approaches. DeIDOT has indicated a desire to change the phasing at this intersection to protected-prohibited. If a second through lane is added in each direction on Delaware Route 24, which would occur as part of DeIDOT’s HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project, the analysis indicates that future LOS deficiencies would be resolved even with protected-prohibited phasing on all approaches. As recommended below in Item No. 3, the developer should contribute toward this DeIDOT project.

Should the County choose to approve the proposed development, the following items should be incorporated into the site design and reflected on the record plan. All applicable agreements (i.e.

letter agreements for off-site improvements and traffic signal agreements) should be executed prior to entrance plan approval for the proposed development.

- The developer should construct the north site entrance on Delaware Route 24. This entrance should align with the existing Bayshore Plaza Shopping Center North Entrance on Delaware Route 24. The proposed configuration is shown in the table below.

<b>Approach</b>	<b>Current Configuration</b>	<b>Proposed Configuration</b>
Northbound Delaware Route 24	One through lane and one right-turn lane	One left-turn lane, one through lane and one right-turn lane
Southbound Delaware Route 24	One left-turn lane and one through lane	One left-turn lane, one through lane and one right-turn lane
Eastbound North Site Entrance	One shared left/through/right-turn lane (serves a vacant lot)	One right-turn-only lane
Westbound Bayshore Plaza North Entrance	One left-turn lane and one right-turn lane	One right-turn-only lane*

\* The westbound Bayshore Plaza approach will be modified as part of DelDOT's HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project. The developer of Carillon Square is not responsible for any changes on the westbound Bayshore Plaza approach.

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 during the site plan review process.

<b>Approach</b>	<b>Left-Turn Lane</b>	<b>Right-Turn Lane</b>
Northbound Delaware Route 24	270 feet*	290 feet*
Southbound Delaware Route 24	260 feet*	350 feet*
Eastbound North Site Entrance	N/A	N/A
Westbound Bayshore Plaza North Entrance	N/A	N/A

\* turn-lane length based on DelDOT's *Auxiliary Lane Worksheet*

At the north site entrance on Delaware Route 24, the developer should add a concrete channelization island on the site driveway to separate entering and exiting traffic. This island should be designed to limit exiting traffic to right turns only. The developer should coordinate with DelDOT's Subdivision Section to determine an acceptable design of the channelization.

2. The developer should construct the site entrance on Delaware Route 23. This entrance should align with the existing Nanticoke Crossing Shopping Center West Entrance on Delaware Route 23. The proposed configuration is shown in the table below.

<b>Approach</b>	<b>Current Configuration</b>	<b>Proposed Configuration</b>
Northbound Site Entrance	Approach does not exist	One shared left/through/right-turn lane
Southbound Nanticoke Crossing West Entrance	One shared left/right-turn lane	One shared left/through/right-turn lane
Eastbound Delaware Route 23	One shared through/left-turn lane	One shared through/left-turn lane and one right-turn lane
Westbound Delaware Route 23	One shared through/right-turn lane	One left-turn lane and one shared through/right-turn lane

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

<b>Approach</b>	<b>Left-Turn Lane</b>	<b>Right-Turn Lane</b>
Northbound Site Entrance	N/A	N/A
Southbound Nanticoke Crossing West Entrance	N/A	N/A
Eastbound Delaware Route 23	N/A	240 feet*
Westbound Delaware Route 23	200 feet*	N/A

\* turn-lane length based on DelDOT's *Auxiliary Lane Worksheet*

3. The developer should coordinate with DelDOT regarding an equitable share contribution toward DelDOT's HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project. Calculation of the contribution amount will be based on weekday PM peak hour trips.

4. Subject to the conditions described herein, the developer should construct the south site entrance on Delaware Route 24, to be located approximately 300 feet south of the proposed Delaware Route 24 north site entrance. The proposed configuration is shown in the table below.

Approach	Current Configuration	Proposed Configuration
Northbound Delaware Route 24	One through lane	One through lane
Southbound Delaware Route 24	One through lane	One through lane and one right-turn lane
Eastbound South Site Entrance	Approach does not exist	One right-turn-only lane

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

Approach	Left-Turn Lane	Right-Turn Lane
Northbound Delaware Route 24	N/A	N/A
Southbound Delaware Route 24	N/A	290 feet*
Eastbound South Site Entrance	N/A	N/A

\* turn-lane length based on DelDOT's *Auxiliary Lane Worksheet*, although the turn lane length shown would be limited by proximity to the upstream north site entrance, proposed to be located approximately 300 feet to the north. A possible realistic length for this turn lane would be approximately 150 feet (excluding taper).

At the south site entrance on Delaware Route 24, the developer should add a concrete channelization island on the site driveway to separate entering and exiting traffic. This island should be designed to limit exiting traffic to right turns only. The developer should coordinate with DelDOT's Subdivision Section to determine an acceptable design of the channelization.

Construction of the south site entrance is acceptable to DelDOT provided that the following conditions are met:

- the developer must provide a cross-access easement to the adjacent Timber Acres residential community (located immediately south of the Carillon Square site frontage on Delaware Route 24)
- the developer must construct a stub street leading to the Timber Acres property, which would facilitate a potential future interconnection between the proposed Carillon Square site and the adjacent Timber Acres property
- the developer must coordinate with DelDOT's Subdivision Section to determine an appropriate location for the easement and design details for the stub street

5. The following bicycle, pedestrian, and transit improvements should be included:
- a. The shoulders on Delaware Route 24 and Delaware Route 23 should be maintained and marked as bike lanes along the site frontage.
  - b. A right-turn yield to bikes sign (MUTCD R4-4) should be added at the start of each right-turn lane added to Delaware Route 24 and Delaware Route 23.
  - c. Where right-turn lanes are added to Delaware Route 24 and Delaware Route 23, a minimum of a five-foot bicycle lane should be dedicated and striped with appropriate markings for bicyclists through the turn lane in order to facilitate safe and unimpeded bicycle travel.
  - d. 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.
  - e. Utility covers should be made flush with the pavement
  - f. Bike parking should be provided near the commercial building entrances within this development. Where the building architecture provides for an awning or other overhang, the bike parking should be covered.
  - g. Sidewalks that meet current AASHTO and ADA standards should be constructed within the site. The developer should coordinate with DelDOT's Subdivision Section to determine sidewalk design details during the site plan review process.
  - h. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances. Type 3 curb ramps are discouraged.
  - i. Where internal sidewalks are located alongside of parking spaces, a buffer should be added to eliminate vehicular overhang onto the sidewalk.
  - j. The developer should coordinate with the Delaware Transit Corporation (DTC) regarding the bus stop at this location. This should include an ADA-compliant bus shelter and concrete pad, as well as a bus pull-off, to be installed along the portion of the Delaware Route 24 site frontage south of the proposed south site entrance. 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](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](mailto: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 DeDOT's subdivision review process.

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

Sincerely,

**McCormick Taylor, Inc.**

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

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

Enclosure

## **General Information**

**Report date:** January 2013

**Prepared by:** The Traffic Group, Inc. (TTG)

**Prepared for:** Lighthouse Carillon, LLC

**Tax parcels:** 234-23.00-260, 269.02, 269.03, 269.13, 269.15, 269.16, and 269.18.

**Generally consistent with DelDOT's *Standards and Regulations for Subdivision Streets and State Highway Access*:** Yes

## **Project Description and Background**

**Description:** The proposed development would consist of 125 townhomes, a 31,685 square-foot shopping center, a 4,636 square-foot convenience store with 12 vehicle fueling positions, a 14,673 square-foot pharmacy, and a 3,606 square-foot bank with drive-through window.

**Location:** Carillon Square is proposed to be located west of Delaware Route 24 (Sussex Road 24 / John J. Williams Highway) and south of Delaware Route 23 (Sussex Road 22 / Indian Mission Road), within Sussex County, Delaware. Delaware Route 5, also mentioned in this letter, follows the south leg of Sussex Road 24 and the west leg of Sussex Road 22 through their intersection. A site location map is included on Page 9.

**Amount of land to be developed:** 38.4 acres of land

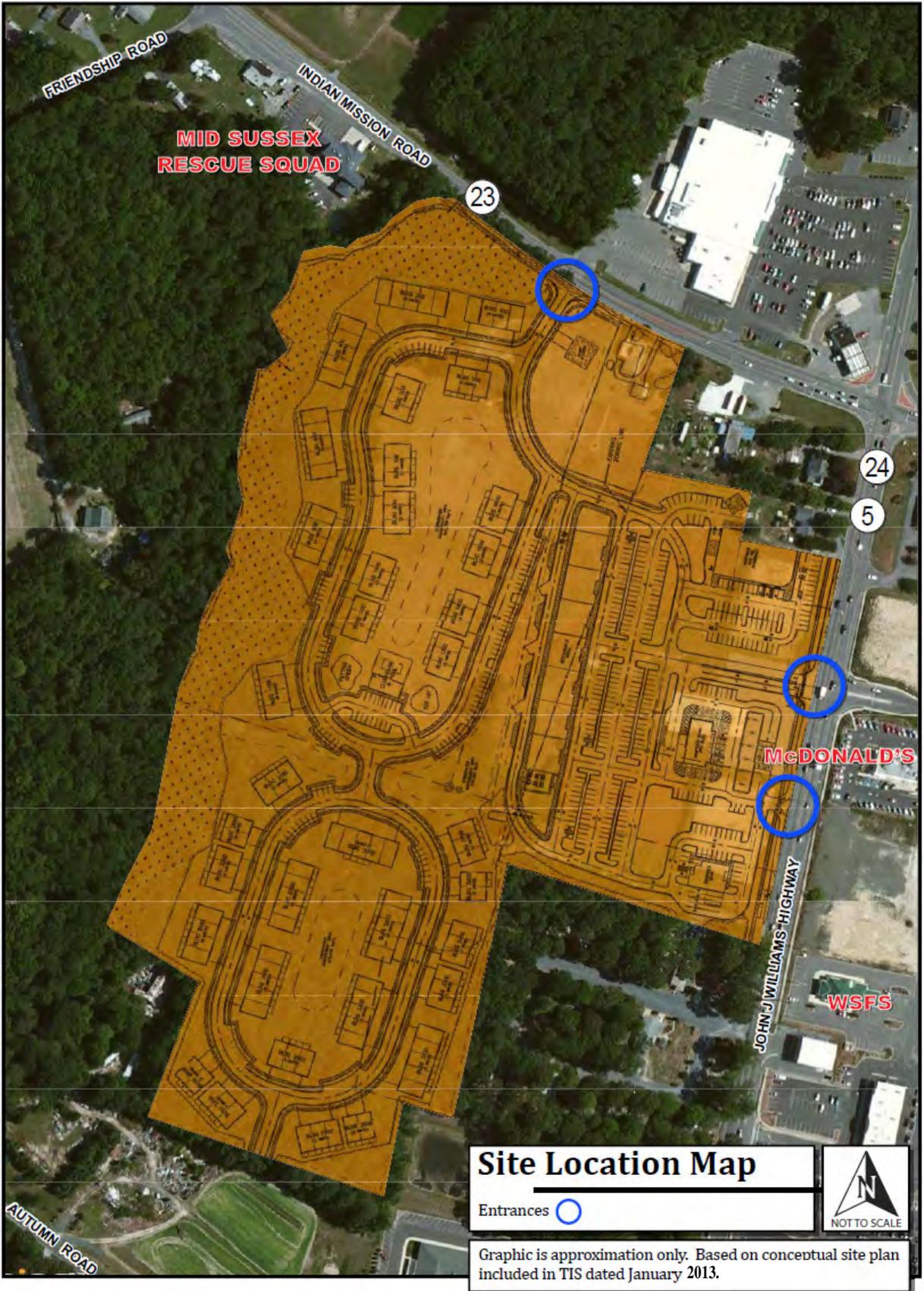
**Land use approval(s) needed:** Rezoning and Subdivision approval. A portion of the property is currently zoned as C-1 (General Commercial) – parcels 269.03, 269.13, 269.15, 269.16, and part of 269.18. The remaining property is currently zoned as AR-1 (Agricultural Residential) – parcels 260, 269.02, and part of 269.18. The developer has proposed rezoning the AR-1 parcels to CR-1 (Commercial Residential).

**Proposed completion date:** 2016

**Proposed access locations:** Three access points are proposed: one rights-in/rights-out/lefts-in access point on Delaware Route 24 across from the north entrance of the Bayshore Plaza Shopping Center, one full access point on Delaware Route 23 across from the west entrance of the Nanticoke Crossing Shopping Center, and one rights-in/rights-out access point on Delaware Route 24 approximately 300 feet south of the other proposed Delaware Route 24 site entrance.

**Daily Traffic Volumes (per DelDOT Traffic Summary 2011):**

- 2011 Average Annual Daily Traffic on Delaware Route 24: 18,803 vpd
- 2011 Average Annual Daily Traffic on Delaware Route 23: 4,093 vpd



## **Delaware Strategies for State Policies and Spending – 2010 Update**

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

The proposed Carillon Square is located almost entirely within Investment Level 2. A very small portion of the site along the western border may fall within Investment Level 3, but site plan shows those areas as undeveloped wetlands.

#### *Investment Level 2*

Investment Level 2 Areas, like Investment Level 1 Areas, are areas prepared for growth and where the state can make cost-effective infrastructure investments for schools, roads, and public safety. In these 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. Investment Level 2 Areas serve as transition areas between Level 1 and the state's more open, less populated areas.

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

The proposed Carillon Square is located within Investment Level 2 and is to be developed as a mixed-use site with townhomes and retail space including stores, restaurants, a pharmacy, a bank, and a convenience store with gas station. The *Strategies* document generally encourages development in Investment Level 2 areas, and the proposed development does not conflict with the character of those areas. It is therefore concluded that the proposed development generally complies with the policies stated in the 2010 update of the "Strategies for State Policies and Spending."

## **Comprehensive Plan**

### **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 development parcel is mostly in a Mixed Residential Area with a small portion in a Highway Commercial Area, both of which are categorized as Growth Areas.

Growth Areas are designed to accommodate concentrated levels of development. Regarding Mixed Residential Areas, these mainly consist of existing residential development and lands where residential developments are proposed under the current General Residential and Medium Density Residential zoning districts. These areas already exist in current zoning and are scattered throughout the County.

The following major guidelines should apply to future growth in Mixed Residential Areas:

*Permitted Uses* – The full range of housing types are appropriate in these residential areas, including single-family homes, townhouses and multi-family units. Nonresidential development is not encouraged.

*Densities* – The current densities in these areas range from a maximum of 4 homes per acre for single-family detached housing to a maximum of 12 dwellings units per acre for multi-family housing.

*Infrastructure* – Central water and sewer facilities are strongly encouraged. If central utilities are not possible, densities should be limited to 2 units per acre.

Regarding Highway Commercial Areas, these include concentrations of retail and service uses that are mainly located along highways. As opposed to small, traditional downtown areas that are often historic and pedestrian-friendly, Highway Commercial Areas include highway commercial corridors, shopping centers and other large commercial vicinities geared towards vehicular traffic. In addition to primary shopping destinations, this area would also be the appropriate place to locate hotels, motels, car washes, auto dealerships, lumberyards and other larger scale commercial uses not primarily targeted to the residents of immediately adjacent residential areas.

**Proposed Development's Compatibility with Comprehensive Plan:**

The proposed development is a mixed use residential and commercial site. The residential portion of the development is compatible with the permitted uses, densities, and infrastructure guidelines for Mixed Residential Areas. While the commercial portion of the development is generally compatible with the description for Highway Commercial Areas, much of the commercial portion of the development actually falls within the Mixed Residential Area, where nonresidential development is discouraged. As such, this development raises questions regarding consistency with the Sussex County Comprehensive Plan, and thus requires additional discussion.

## Transportation Analysis Zones (TAZ)

Transportation Analysis Zones (TAZ) where development would be located: 1218

### TAZ Boundaries:



**Current employment estimate for TAZ:** 25 jobs in 2005

**Future employment estimate for TAZ:** 32 jobs in 2030

**Current population estimate for TAZ:** 581 people in 2005

**Future population estimate for TAZ:** 855 people in 2030

**Current household estimate for TAZ:** 251 houses in 2005

**Future household estimate for TAZ:** 373 houses in 2030

**Relevant committed developments in TAZ:** Pelican Point Phases 1-3

**Would the addition of committed developments to current estimates exceed future projections:** Yes for population and households, no for employment

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

## Relevant Projects in the DelDOT Capital Transportation Program (FY 2013 – FY 2018)

DelDOT currently has one relevant project in the study area. The HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project (State Contract No. T201200903) would implement operational improvements and access management strategies in the area of the Delaware Route 24 and Delaware Route 23 intersection. This project is based in part on DelDOT's SR 24 – SR

30 to Love Creek Bridge Traffic Study, dated November 2010, which recommended adding a second through lane in each direction on Delaware Route 24 in this area. The design phase of the HSIP project was scheduled to begin in the spring of 2013. According to the FY 2013 – FY 2018 Capital Transportation Program, construction is tentatively scheduled to begin in FY 2017.

This project is also based on the evaluation of the intersection of Delaware Route 24 and Delaware Route 23 within 2008 Sites E and J of DelDOT's Hazard Elimination Program (HEP). The HEP recommendations for this location were limited to low-cost signing and striping improvements consisting of the following, which have all since been implemented:

- replace stop line on the eastbound Delaware Route 23 approach
- replace stop line on the westbound Delaware Route 23 approach
- replace the stop line for the northbound Delaware Route 24 left-turn lane
- install dotted lane markings on all approaches to establish the left and right-turn lanes

### **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), and collected traffic data for the existing site. The following land uses were utilized to estimate the amount of new traffic generated for this development:

- 125 townhouses/condominiums (ITE Land Use Code 230)
- 31,685 square-foot shopping center (ITE Land Use Code 820)
- 4,636 square-foot convenience store with 12 fueling stations (*ITE Journal* article rates used for weekday peak hours, ITE Trip Generation Land Use Code 853 used for Saturday peak hour)
- 14,673 square-foot pharmacy with drive-through (ITE Land Use Code 881)
- 3,606 square-foot bank with drive-through (ITE Land Use Code 912)

Table 1  
CARILLON SQUARE PEAK HOUR TRIP GENERATION

Land Use	AM Peak Hour			PM Peak Hour			Saturday Mid-day		
	In	Out	Total	In	Out	Total	In	Out	Total
125 townhouses/condominiums	11	51	62	48	24	72	43	36	79
Internal Capture	-	-	-	15	13	28	13	19	32
<b>Net External Trips</b>	<b>11</b>	<b>51</b>	<b>62</b>	<b>33</b>	<b>11</b>	<b>44</b>	<b>30</b>	<b>17</b>	<b>47</b>
31,685 sf shopping center	48	30	78	145	150	295	211	195	406
Internal Capture	-	-	-	35	37	72	42	40	82
Pass-by Trips	-	-	-	59	61	120	64	59	123
<b>Net External Trips</b>	<b>48</b>	<b>30</b>	<b>78</b>	<b>51</b>	<b>52</b>	<b>103</b>	<b>105</b>	<b>96</b>	<b>201</b>
4,636 sf convenience store with 12 fueling stations	109	110	219	99	100	199	61	59	120
Internal Capture	-	-	-	17	17	34	16	14	30
Pass-by Trips	83	84	167	62	63	125	34	34	68
<b>Net External Trips</b>	<b>26</b>	<b>26</b>	<b>52</b>	<b>20</b>	<b>20</b>	<b>40</b>	<b>11</b>	<b>11</b>	<b>22</b>
14,673 sf pharmacy with drive-through	22	17	39	76	76	152	57	58	115
Internal Capture	-	-	-	13	13	26	15	14	29
Pass-by Trips	-	-	-	31	31	62	21	22	43
<b>Net External Trips</b>	<b>22</b>	<b>17</b>	<b>39</b>	<b>32</b>	<b>32</b>	<b>64</b>	<b>21</b>	<b>22</b>	<b>43</b>
3,606 sf bank with drive-through	25	20	45	46	47	93	50	46	96
Internal Capture	-	-	-	7	7	14	13	12	25
Pass-by Trips	-	-	-	18	19	37	17	16	33
<b>Net External Trips</b>	<b>25</b>	<b>20</b>	<b>45</b>	<b>21</b>	<b>21</b>	<b>42</b>	<b>20</b>	<b>18</b>	<b>38</b>
<b>TOTAL NEW TRIPS</b>	<b>132</b>	<b>144</b>	<b>276</b>	<b>157</b>	<b>136</b>	<b>293</b>	<b>187</b>	<b>164</b>	<b>351</b>

Table 2  
CARILLON SQUARE DAILY TRIP GENERATION

Land Use	Weekday ADT			Saturday ADT		
	In	Out	Total	In	Out	Total
125 townhouses/condominiums	391	391	782	440	440	880
31,685 sf shopping center	680	680	1360	792	792	1584
4,636 sf convenience store with 12 fueling stations	1960	1960	3920	1227	1227	2454
14,673 sf pharmacy with drive-through	647	647	1294	647	647	1294
3,606 sf bank with drive-through	267	267	534	156	156	312
<b>TOTAL TRIPS</b>	<b>3945</b>	<b>3945</b>	<b>7890</b>	<b>3262</b>	<b>3262</b>	<b>6524</b>

## **Overview of TIS**

### **Intersections examined:**

- 1) Delaware Route 24 & North Site Entrance / Bayshore Plaza Shopping Center North Entrance
- 2) Delaware Route 23 & Site Entrance / Nanticoke Crossing Shopping Center West Entrance
- 3) Delaware Route 24 & South Site Entrance
- 4) Delaware Route 23 & Nanticoke Crossing Shopping Center East Entrance
- 5) Delaware Route 23 & Friendship Road (Sussex Road 306A)
- 6) Delaware Route 24 & Delaware Route 23
- 7) Delaware Route 24 & Bayshore Plaza Shopping Center Main Entrance

### **Conditions examined:**

- 1) 2011 existing conditions (Case 1)
- 2) 2016 without Carillon Square (Case 2)
- 3) 2016 with Carillon Square (Case 3)

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

### **Committed developments considered:**

- 1) Bridlewood at Baywood (576 recreational homes)
- 2) Duneside at Baywood, Phase 12 (145 single-family detached houses and 145 recreational homes)
- 3) Baywood, Phases 1-11 (187 recreational homes and 9-hole golf course east of Delaware Route 24 and 393 recreational homes west of Delaware Route 24)
- 4) Independence (formerly Indigo Run) (373 active-adult detached houses)
- 5) Stonewater Creek, Phases 1-7 (97 single-family detached houses)
- 6) Pelican Point (formerly Stonewater Creek, Phases 8-13) (410 single-family detached houses)
- 7) Long Neck Shores (45 single-family detached houses)
- 8) The Peninsula (formerly Bay Farm) (900 recreational homes)

## Intersection Descriptions

### 1) **Delaware Route 24 & North Site Entrance / Bayshore Plaza Shopping Center North Entrance**

**Type of Control:** existing two-way stop-controlled (acts as T-intersection because the west leg only serves a vacant lot and has zero volume in existing conditions); proposed two-way stop-controlled (rights-in/rights-out/lefts-in four-leg intersection)

**Northbound approach:** (Delaware Route 24) existing one through lane and one right-turn lane; proposed one left-turn lane, one through lane and one right-turn lane

**Southbound approach:** (Delaware Route 24) existing one left-turn lane and one through lane; proposed one left-turn lane, one through lane and one right-turn lane

**Eastbound approach:** (Proposed Site Entrance) existing one shared left left/through/right-turn lane (serves a vacant lot); proposed one right-turn-only lane, stop controlled

**Westbound approach:** (Bayshore Plaza North Entrance) existing one left-turn lane and one right-turn lane, stop controlled; proposed one right-turn-only lane, stop controlled

**Note:** The TIS analyzed future conditions under the assumption that Delaware Route 24 would be widened to two through lanes in each direction as part of DelDOT's *HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project*. McCormick Taylor analyzed future conditions both without and with the Delaware Route 24 widening project completed.

### 2) **Delaware Route 23 & Site Entrance / Nanticoke Crossing Shopping Center West Entrance**

**Type of Control:** existing two-way stop-controlled (T-intersection); proposed two-way stop-controlled (four-leg intersection)

**Northbound approach:** (Proposed Site Entrance) proposed one shared left/through/right-turn lane, stop controlled

**Southbound approach:** (Nanticoke Crossing West Entrance) existing one shared left/right-turn lane, stop-controlled; proposed one shared left/through/right-turn lane, stop controlled

**Eastbound approach:** (Delaware Route 23) existing one shared through/left-turn lane; proposed one left-turn lane, one through lane and one right-turn lane

**Westbound approach:** (Delaware Route 23) existing one shared through/right-turn lane; proposed one left-turn lane and one shared through/right-turn lane

### 3) **Delaware Route 24 & South Site Entrance**

**Type of Control:** proposed two-way stop-controlled (right-in/right-out T-intersection)

**Northbound approach:** (Delaware Route 24) existing one through lane; proposed one through lane

**Southbound approach:** (Delaware Route 24) existing one through lane; proposed one through lane and one right-turn lane

**Eastbound approach:** (Proposed Site Entrance) proposed one right-turn-only lane, stop controlled

**Note:** The TIS analyzed future conditions under the assumption that Delaware Route 24 would be widened to two through lanes in each direction as part of DeIDOT's *HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project*. McCormick Taylor analyzed future conditions both without and with the Delaware Route 24 widening project completed.

- 4) **Delaware Route 23 & Nanticoke Crossing Shopping Center East Entrance**  
**Type of Control:** two-way stop-controlled (T-intersection)  
**Southbound approach:** (Nanticoke Crossing East Entrance) one shared left/right-turn lane, stop controlled  
**Eastbound approach:** (Delaware Route 23) one left-turn lane and one through lane  
**Westbound approach:** (Delaware Route 23) one shared through/right-turn lane
  
- 5) **Delaware Route 23 & Friendship Road**  
**Type of Control:** two-way stop-controlled (T-intersection)  
**Northbound approach:** (Friendship Road) one shared left/right-turn lane, stop controlled  
**Eastbound approach:** (Delaware Route 23) one shared through/right-turn lane  
**Westbound approach:** (Delaware Route 23) one shared through/left-turn lane
  
- 6) **Delaware Route 24 & Delaware Route 23**  
**Type of Control:** signalized four-leg intersection  
**Northbound approach:** (Delaware Route 24) one left-turn lane, one through lane and one right-turn lane  
**Southbound approach:** (Delaware Route 24) one left-turn lane, one through lane and one right-turn lane  
**Eastbound approach:** (Delaware Route 23) one left-turn lane, one through lane and one right-turn lane  
**Westbound approach:** (Delaware Route 23) one left-turn lane, one through lane and one right-turn lane

**Note:** The TIS analyzed future conditions under the assumption that Delaware Route 24 would be widened to two through lanes in each direction as part of DeIDOT's *HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project*. McCormick Taylor analyzed future conditions both without and with the Delaware Route 24 widening project completed.

- 7) **Delaware Route 24 & Bayshore Plaza Shopping Center Main Entrance**  
**Type of Control:** signalized three-leg intersection  
**Northbound approach:** (Delaware Route 24) one through lane and one right-turn lane  
**Southbound approach:** (Delaware Route 24) one left-turn lane and one through lane  
**Westbound approach:** (Bayshore Plaza Main Entrance) one left-turn lane and one right-turn lane

**Note:** The TIS analyzed future conditions under the assumption that Delaware Route 24 would be widened to two through lanes in each direction as part of DeIDOT's *HSIP SR*

24 at SR 5 / SR 23 Intersection Improvements Project. McCormick Taylor analyzed future conditions both without and with the Delaware Route 24 widening project completed.

### **Safety Evaluation**

**Crash Data:** Crash data was obtained for December 2009 through December 2012 for the area within a 0.2-mile radius of the intersection of Delaware Route 24 & Delaware Route 23. This included a total of 80 crashes, of which 35 were angle crashes and 24 were rear-end crashes. While there were 21 additional crashes (rounding out the total of 80 crashes), there were no more than 4 occurrences of any other specific crash type (including head-on crashes, sideswipe crashes, hit fixed object, and unknown). Two fatal crashes were reported in the study area during this three-year period, which both occurred at the signalized intersection.

- Delaware Route 24 & Delaware Route 23
  - 33 crashes reported
- Delaware Route 24, north of Delaware Route 23
  - 19 crashes reported
- Delaware Route 24, south of Delaware Route 23 (including Bayshore Plaza North Entrance)
  - 18 crashes reported
- Delaware Route 23, east of Delaware Route 24
  - 4 crashes reported
- Delaware Route 23, east of Delaware Route 24 (including Nanticoke Crossing Entrances)
  - 6 crashes reported

Crash data was not provided in the TIS for the intersections of Delaware Route 24 & Bayshore Plaza Main Entrance and Delaware Route 23 & Friendship Road.

**Sight Distance:** With generally straight and flat roadways, and few potential visual obstructions, sight distance is adequate throughout the study area. No problematic sight distance issues have been reported or indicated by crash data, and no major problems were observed during field observations in the area. One potential sight distance impediment is the forested area that exists along both sides of Delaware Route 23 west of the proposed site entrance.

### **Transit, Pedestrian, and Bicycle Facilities**

**Existing transit service:** The Delaware Transit Corporation (DTC) currently operates one seasonal transit route offering service near the proposed Carillon Square development. DART Route 207, which connects Rehoboth to Long Neck and Pot Nets, travels from the Rehoboth Park & Ride north along Delaware Route 1, west on Delaware Route 24 and then east on Delaware Route 23 to Pot Nets and Massey's Landing, and vice-versa. The nearest stops to the proposed development are along Delaware Route 24 at the Nanticoke Crossing Shopping Center (just north of Delaware Route 23) and along Delaware Route 23 at Bayshore Drive (approx. 1/3 mile east of Delaware Route 24). Route 207 makes these stops as many as nine times each day

during the summer months. For 2012, the seasonal service operated on weekdays and weekends from May 24<sup>th</sup> through September 16<sup>th</sup>.

**Planned transit service:** Ms. Lisa Collins, a Service Development Planner for the DTC, provided comments on July 25, 2011 regarding DTC's future plans for transit services in this area. DTC is planning to add a new year-round bus route providing weekday service between Rehoboth and Milford along Delaware Route 24 going past the proposed development. This new route is planned for FY 2014-2015, which Ms. Collins confirmed in January 2013. She requested that the proposed development include a bus stop.

**Existing bicycle and pedestrian facilities:** According to the bicycle level of service (BLOS) calculator developed by the *League of Illinois Bicyclists*, Delaware Route 23 operates at BLOS A and Delaware Route 24 operates at BLOS B. There are currently designated bicycle lanes along both sides of Delaware Route 24 from north of Delaware Route 23 to south of the Bayshore Plaza Shopping Center. There are 5-foot wide sidewalks along the Bayshore Plaza Shopping Center site frontage along the east side of Delaware Route 24, and a crosswalk with pedestrian signals going across the Bayshore Plaza Main Entrance driveway. There are no sidewalks or crosswalks at the intersection of Delaware Route 23 & Delaware Route 24, or along Delaware Route 23 within the study area.

**Planned bicycle and pedestrian facilities:** McCormick Taylor contacted Marco Boyce and Anthony Aglio with DelDOT's Bicycle and Pedestrian Facilities Team via email on February 19, 2013 regarding planned or requested bicycle and pedestrian facilities in the area of this proposed development. Mr. Boyce provided comments via email on March 7, 2013. If the development does occur, a sidewalk should be provided between Delaware Route 24 and Delaware Route 23, either within the State's right-of-way or as a permanent easement.

### **Previous Comments**

All comments from DelDOT's Scoping Letter and Preliminary TIS (PTIS) Review were addressed in the Final TIS submission, with the following exceptions:

- There were no indications that the applicant contacted DelDOT's Statewide and Regional Planning Section for bicycle and pedestrian comments.
- The TIS did not follow DelDOT's updated analysis parameter requirements regarding base saturation flow rates, peak hour factors and heavy vehicle percentages as found in Section 2.9.11.6 of DelDOT's *Standards and Regulations for Subdivision Streets and State Highway Access*.

**General HCS Analysis Comments**

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

- 1) For unsignalized intersections, the TIS and McCormick Taylor applied heavy vehicle (HV) percentages by movement. For signalized intersections, the TIS and McCormick Taylor applied HV percentages by lane group. For future conditions, the TIS and McCormick Taylor generally assumed future HV percentages to be the same as existing HV percentages. For movements to and from proposed site entrances, the TIS assumed a future HV of 2% and McCormick Taylor assumed a future HV of 3%.
- 2) For existing conditions, the TIS generally applied peak hour factors (PHF) by lane group. For future conditions, the TIS generally assumed future PHF (by lane group) to be the same as existing PHF (by lane group) or, if the volume increased and the existing PHF was less than 0.88, they set the future PHF to 0.88. McCormick Taylor determined, for each intersection, the overall intersection PHF for each peak hour and applied that value to both existing and future conditions.
- 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 signal timings when analyzing the signalized intersections in some cases.
- 5) The TIS input Right-Turn-on-Red (RTOR) volumes for signalized intersection analyses. McCormick Taylor input no RTOR volumes, but did analyze right-turn movements as overlapping the protected left-turn phases.

Table 3  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Carillon Square  
Report dated January 2013  
Prepared by The Traffic Group, Inc.

Unsignalized Intersection <sup>1</sup> Two-Way Stop Control (T-intersection) <sup>2</sup>	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Saturday Mid-day	Weekday AM	Weekday PM	Saturday Mid-day
<b>Delaware Route 24 &amp; North Site Entrance / Bayshore Plaza Shopping Center North Entrance</b>						
2011 Existing (Case 1)						
Southbound Delaware Route 24 – Left	A (8.3)	A (8.4)	B (10.6)	A (8.2)	A (8.3)	B (10.1)
Westbound Bayshore Plaza North Entrance	B (11.9)	B (13.4)	C (24.0)	B (11.3)	B (12.1)	C (22.4)
2016 without Carillon Square (Case 2) <sup>3</sup>						
Southbound Delaware Route 24 – Left	N/A	N/A	N/A	A (8.6)	A (8.8)	B (11.4)
Westbound Bayshore Plaza North Entrance – Right	N/A	N/A	N/A	B (12.0)	B (12.8)	D (25.5)
2016 without Carillon Square (Case 2) With Delaware Route 24 Widening Project <sup>4</sup>						
Southbound Delaware Route 24 – Left	A (8.6)	A (9.0)	B (11.9)	A (8.6)	A (8.8)	B (11.5)
Westbound Bayshore Plaza North Entrance – Right	B (10.0+)	B (10.5)	B (13.8)	B (10.2)	B (10.6)	B (14.1)
2016 with Carillon Square (Case 3)						
Northbound Delaware Route 24 – Left	N/A	N/A	N/A	A (8.9)	B (10.1)	B (13.4)
Southbound Delaware Route 24 – Left	N/A	N/A	N/A	A (8.4)	A (8.6)	B (11.0)
Eastbound Site Entrance – Right	N/A	N/A	N/A	B (10.9)	B (12.8)	C (19.0)
Westbound Bayshore Plaza North Entrance – Right	N/A	N/A	N/A	B (11.5)	B (12.0)	C (22.8)
2016 with Carillon Square (Case 3) With Delaware Route 24 Widening Project <sup>4</sup>						
Northbound Delaware Route 24 – Left	A (8.9)	A (9.9)	B (11.7)	A (8.5)	A (9.0)	B (10.2)
Southbound Delaware Route 24 – Left	A (8.5)	A (8.7)	B (11.4)	A (8.4)	A (8.6)	B (11.1)
Eastbound Site Entrance – Right	A (9.9)	B (10.8)	B (12.0)	A (9.0)	A (9.3)	A (9.5)
Westbound Bayshore Plaza North Entrance – Right	A (9.9)	B (10.2)	B (13.3)	B (10.0+)	B (10.2)	B (13.5)

<sup>1</sup> 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.

<sup>2</sup> This is technically a four-leg intersection but it acts as a three-leg T-intersection because the west leg serves a vacant lot and has zero volume in existing conditions.

<sup>3</sup> The TIS assumed that all future cases would not allow left turns from either side street, and they distributed traffic volumes accordingly. Using the volume figures provided, and knowing that DeIDOT called for no lefts out from either side street at this intersection once the proposed development is built, McCormick Taylor also analyzed this intersection with no lefts out from either side street for all future cases.

<sup>4</sup> The “Delaware Route 24 Widening Project” is based on recommendations from DeIDOT’s SR 24 – SR 30 to Love Creek Bridge Traffic Study dated November 2010. That study recommended adding a second through lane in each direction of Delaware Route 24 in this area, which is included in the analysis of this scenario. DeIDOT’s HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project was generated in part by that study.

Table 3 (continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Carillon Square  
Report dated January 2013  
Prepared by The Traffic Group, Inc.

Unsignalized Intersection <sup>5</sup> Two-Way Stop Control (T-intersection) <sup>6</sup>	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Saturday Mid-day	Weekday AM	Weekday PM	Saturday Mid-day
<b>Delaware Route 24 &amp; North Site Entrance / Bayshore Plaza Shopping Center North Entrance</b>						
2016 with Carillon Square (Case 3) <i>Without South Site Entrance on Delaware Route 24</i> <sup>7</sup>						
Northbound Delaware Route 24 – Left	N/A	N/A	N/A	A (9.0)	B (10.4)	B (13.8)
Southbound Delaware Route 24 – Left	N/A	N/A	N/A	A (8.4)	A (8.6)	B (11.0)
Eastbound Site Entrance – Right	N/A	N/A	N/A	B (11.0)	B (13.2)	C (20.1)
Westbound Bayshore Plaza North Entrance – Right	N/A	N/A	N/A	B (11.5)	B (12.0)	C (22.8)
2016 with Carillon Square (Case 3) <i>Without South Site Entrance on Delaware Route 24</i> <sup>7</sup> <i>With Delaware Route 24 Widening Project</i> <sup>8</sup>						
Northbound Delaware Route 24 – Left	N/A	N/A	N/A	A (8.6)	A (9.2)	B (10.4)
Southbound Delaware Route 24 – Left	N/A	N/A	N/A	A (8.4)	A (8.6)	B (11.1)
Eastbound Site Entrance – Right	N/A	N/A	N/A	A (9.1)	A (9.4)	A (9.6)
Westbound Bayshore Plaza North Entrance – Right	N/A	N/A	N/A	B (10.0+)	B (10.2)	B (13.5)

<sup>5</sup> 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.

<sup>6</sup> This is technically a four-leg intersection but it acts as a three-leg T-intersection because the west leg serves a vacant lot and has zero volume in existing conditions.

<sup>7</sup> This scenario assumes the proposed South Site Entrance on Delaware Route 24 would not be constructed, and the volumes that had been projected to use the South Site Entrance would be reassigned to use this site entrance instead.

<sup>8</sup> The “Delaware Route 24 Widening Project” is based on recommendations from DeIDOT’s SR 24 – SR 30 to Love Creek Bridge Traffic Study dated November 2010. That study recommended adding a second through lane in each direction of Delaware Route 24 in this area, which is included in the analysis of this scenario. DeIDOT’s HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project was generated in part by that study.

Table 4  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Carillon Square  
Report dated January 2013  
Prepared by The Traffic Group, Inc.

Unsignalized Intersection <sup>9</sup> Two-Way Stop Control (T-intersection)	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Saturday Mid-day	Weekday AM	Weekday PM	Saturday Mid-day
<b>Delaware Route 23 &amp; Site Entrance / Nanticoke Crossing Shopping Center West Entrance</b>						
2011 Existing (Case 1)						
Southbound Nanticoke Crossing West Entrance	B (10.9)	B (10.8)	B (13.4)	B (10.6)	B (10.5)	B (13.4)
Eastbound Delaware Route 23 – Left	A (7.7)	A (8.0)	A (8.0)	A (7.7)	A (7.9)	A (8.0)
2016 without Carillon Square (Case 2) <sup>10</sup>						
Southbound Nanticoke Crossing West Entrance	B (12.7)	B (12.3)	B (17.9)	B (12.1)	B (12.2)	C (17.6)
Eastbound Delaware Route 23 – Left	A (7.8)	A (8.3)	A (8.4)	A (7.9)	A (8.4)	A (8.4)
2016 with Carillon Square (Case 3) <sup>11</sup>						
Northbound Site Entrance	B (13.8)	D (26.9)	C (23.6)	B (13.4)	D (25.8)	D (30.7)
Southbound Nanticoke Crossing West Entrance	C (16.8)	B (14.0)	E (36.8)	C (15.9)	B (14.5)	D (30.0)
Eastbound Delaware Route 23 – Left	A (7.8)	A (8.3)	A (8.3)	A (7.7)	A (8.3)	A (8.3)
Westbound Delaware Route 23 – Left	A (8.0)	A (8.4)	A (8.9)	A (8.0)	A (8.5)	A (8.7)

<sup>9</sup> 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.

<sup>10</sup> In Case 2, the TIS added a separate left-turn lane on the eastbound approach. McCormick Taylor assumed that the Case 2 configuration would be the same as the Case 1 configuration (eastbound approach consists of one shared through/left-turn lane).

<sup>11</sup> Case 3 includes a separate left-turn lane and a separate right-turn lane on the eastbound approach, and a separate left-turn lane on the westbound approach.

Table 5  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Carillon Square  
Report dated January 2013  
Prepared by The Traffic Group, Inc.

Unsignalized Intersection <sup>12</sup> Two-Way Stop Control (T-intersection)	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Saturday Mid-day	Weekday AM	Weekday PM	Saturday Mid-day
<b>Delaware Route 24 &amp; South Site Entrance</b>						
2016 with Carillon Square (Case 3)						
Eastbound South Site Entrance – Right	N/A	N/A	N/A	B (11.5)	B (14.1)	C (17.9)
2016 with Carillon Square (Case 3) With Delaware Route 24 Widening Project <sup>13</sup>						
Eastbound South Site Entrance – Right	A (9.7)	B (10.5)	B (11.5)	A (9.9)	B (11.0)	B (12.2)

<sup>12</sup> 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.

<sup>13</sup> The “Delaware Route 24 Widening Project” is based on recommendations from DelDOT’s SR 24 – SR 30 to Love Creek Bridge Traffic Study dated November 2010. That study recommended adding a second through lane in each direction of Delaware Route 24 in this area, which is included in the analysis of this scenario. DelDOT’s HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project was generated in part by that study.

Table 6  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Carillon Square  
Report dated January 2013  
Prepared by The Traffic Group, Inc.

Unsignalized Intersection <sup>14</sup> Two-Way Stop Control (T-intersection)	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Saturday Mid-day	Weekday AM	Weekday PM	Saturday Mid-day
<b>Delaware Route 23 &amp; Nanticoke Crossing Shopping Center East Entrance</b>						
2011 Existing (Case 1)						
Southbound Nanticoke Crossing East Entrance	B (11.2)	C (17.3)	C (16.6)	B (10.7)	C (15.1)	C (15.2)
Eastbound Delaware Route 23 – Left	A (7.7)	A (8.2)	A (8.2)	A (7.6)	A (8.1)	A (8.1)
2016 without Carillon Square (Case 2)						
Southbound Nanticoke Crossing East Entrance	B (12.1)	C (21.6)	C (24.2)	B (12.1)	C (22.9)	D (25.3)
Eastbound Delaware Route 23 – Left	A (7.9)	A (8.5)	A (8.6)	A (7.9)	A (8.6)	A (8.7)
2016 with Carillon Square (Case 3)						
Southbound Nanticoke Crossing East Entrance	B (13.1)	D (26.5)	D (31.3)	B (13.3)	C (23.1)	E (36.0) <sup>15</sup>
Eastbound Delaware Route 23 – Left	A (7.9)	A (8.5)	A (8.6)	A (7.9)	A (8.2)	A (8.7)
2016 with Carillon Square (Case 3) With Improvement Option 1 <sup>16</sup>						
Southbound Nanticoke Crossing East Entrance	N/A	N/A	N/A	B (12.9)	C (20.6)	D (30.8)
Eastbound Delaware Route 23 – Left	N/A	N/A	N/A	A (7.9)	A (8.2)	A (8.7)

<sup>14</sup> 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.

<sup>15</sup> The 95th percentile queue length for the southbound approach during the Case 3 Saturday peak hour is less than 3 vehicles.

<sup>16</sup> Improvement Option 1 consists of adding a separate right-turn lane on the southbound approach.

Table 7  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Carillon Square  
Report dated January 2013  
Prepared by The Traffic Group, Inc.

Unsignalized Intersection <sup>17</sup> Two-Way Stop Control (T-intersection)	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Saturday Mid-day	Weekday AM	Weekday PM	Saturday Mid-day
<b>Delaware Route 23 &amp; Friendship Road</b>						
2011 Existing (Case 1)						
Northbound Friendship Road	B (10.3)	B (11.5)	B (13.7)	B (10.0+)	B (11.4)	B (13.6)
Westbound Delaware Route 23 – Left	A (7.7)	A (8.0)	A (8.1)	A (7.6)	A (8.0)	A (8.1)
2016 without Carillon Square (Case 2)						
Northbound Friendship Road	B (11.7)	B (13.6)	C (18.4)	B (11.3)	B (13.8)	C (18.0)
Westbound Delaware Route 23 – Left	A (8.0)	A (8.3)	A (8.6)	A (7.9)	A (8.4)	A (8.5)
2016 with Carillon Square (Case 3)						
Northbound Friendship Road	B (12.3)	B (14.3)	C (20.2)	B (11.8)	B (14.7)	C (19.9)
Westbound Delaware Route 23 – Left	A (8.1)	A (8.4)	A (8.7)	A (8.0)	A (8.5)	A (8.6)

<sup>17</sup> 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.

Table 8  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Carillon Square  
Report dated January 2013  
Prepared by The Traffic Group, Inc.

Signalized Intersection <sup>18</sup>	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Saturday Mid-day	Weekday AM	Weekday PM	Saturday Mid-day
<b>Delaware Route 24 &amp; Delaware Route 23</b>						
2011 Existing (Case 1)	B (19.8)	C (21.3)	C (29.7)	C (22.4)	C (24.4)	C (34.4)
2016 without Carillon Square (Case 2)	N/A	N/A	N/A	C (23.6)	C (29.2)	D (48.4)
2016 without Carillon Square (Case 2) <i>With Protected-Prohibited Phasing on all Approaches</i>	N/A	N/A	N/A	C (29.1)	D (36.4)	E (73.9)
2016 without Carillon Square (Case 2) <i>With Delaware Route 24 Widening Project</i> <sup>19</sup>	B (19.1)	C (20.1)	C (26.3)	C (25.2)	C (28.3)	D (42.0)
2016 without Carillon Square (Case 2) <i>With Protected-Prohibited Phasing on all Approaches With Delaware Route 24 Widening Project</i> <sup>19</sup>	N/A	N/A	N/A	C (27.8)	C (30.5)	D (46.1)
2016 with Carillon Square (Case 3)	N/A	N/A	N/A	C (24.7)	C (31.8)	D (51.0)
2016 with Carillon Square (Case 3) <i>With Protected-Prohibited Phasing on all Approaches</i>	N/A	N/A	N/A	C (31.8)	D (48.4)	F (88.3)
2016 with Carillon Square (Case 3) <i>With Delaware Route 24 Widening Project</i> <sup>19</sup>	B (19.5)	C (20.7)	C (28.0)	C (26.4)	C (29.3)	D (42.4)
2016 with Carillon Square (Case 3) <i>With Protected-Prohibited Phasing on all Approaches With Delaware Route 24 Widening Project</i> <sup>19</sup>	N/A	N/A	N/A	C (29.8)	C (33.0)	D (49.8)

<sup>18</sup> 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.

<sup>19</sup> The "Delaware Route 24 Widening Project" is based on recommendations from DelDOT's SR 24 – SR 30 to Love Creek Bridge Traffic Study dated November 2010. That study recommended adding a second through lane in each direction of Delaware Route 24 in this area, which is included in the analysis of this scenario. DelDOT's HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project was generated in part by that study.

Table 9  
PEAK HOUR LEVELS OF SERVICE (LOS)  
based on Traffic Impact Study for Carillon Square  
Report dated January 2013  
Prepared by The Traffic Group, Inc.

Signalized Intersection <sup>20</sup>	LOS per TIS			LOS per McCormick Taylor		
	Weekday AM	Weekday PM	Saturday Mid-day	Weekday AM	Weekday PM	Saturday Mid-day
<b>Delaware Route 24 &amp; Bayshore Plaza Shopping Center Main Entrance</b>						
2011 Existing (Case 1)	B (10.4)	B (13.1)	B (13.2)	B (13.5)	B (15.2)	B (19.7)
2016 without Carillon Square (Case 2)	N/A	N/A	N/A	B (13.1)	B (16.8)	C (25.4)
2016 without Carillon Square (Case 2) <i>With Delaware Route 24 Widening Project</i> <sup>21</sup>	A (8.9)	B (11.3)	B (11.3)	B (13.8)	B (16.3)	B (17.9)
2016 with Carillon Square (Case 3)	N/A	N/A	N/A	B (13.3)	B (17.6)	C (27.9)
2016 with Carillon Square (Case 3) <i>With Delaware Route 24 Widening Project</i> <sup>21</sup>	A (8.7)	B (11.2)	B (11.4)	B (13.5)	B (16.3)	B (17.8)

<sup>20</sup> 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.

<sup>21</sup> The "Delaware Route 24 Widening Project" is based on recommendations from DelDOT's SR 24 – SR 30 to Love Creek Bridge Traffic Study dated November 2010. That study recommended adding a second through lane in each direction of Delaware Route 24 in this area, which is included in the analysis of this scenario. DelDOT's HSIP SR 24 at SR 5 / SR 23 Intersection Improvements Project was generated in part by that study.