



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

November 12, 2014

SHAILEN P. BHATT
SECRETARY

Mr. Carl Wilson
The Traffic Group, Inc.
9900 Franklin Square Drive
Suite H
Baltimore, MD 21236

Dear Mr. Wilson:

The enclosed Traffic Operational Analysis (TOA) review letter for the **Delaware SPCA** commercial development (Tax Parcels 09-018.00-029 & 030) has been completed under the responsible charge of a registered professional engineer whose firm is authorized to work in the State of Delaware. They have found the TOA to conform to DelDOT's 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: Mr. Michael Riemann, Becker Morgan Group, Inc.
Ms. Constance C. Holland, Office of State Planning Coordination
Ms. Eileen Fogarty, New Castle County Department of Land Use
Mr. George Haggerty, New Castle County Department of Land Use
Mr. Owen Robatino, New Castle County Department of Land Use
Mr. Andrew Parker, McCormick Taylor, Inc.
Mr. Kyle Clevenger, McCormick Taylor, Inc.
DelDOT Distribution

DelDOT Distribution

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Robert McCleary, Director, Transportation Solutions (DOTS)
Drew Boyce, Director, Planning
Mark Luszcz, Chief Traffic Engineer, Traffic, DOTS
Mark Tudor, Assistant Director, Project Development North, DOTS
J. Marc Coté, Assistant Director, Development Coordination
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Thomas E. Meyer, Traffic Studies Manager, Traffic, DOTS
Kevin Canning, Canal District Engineer, North District
Matthew Lichtenstein, Canal District Public Works Engineer, Canal District
Wayne Henderson, Service Development Planner, Delaware Transit Corporation
John Garcia, New Castle Subdivision Coordinator, Development Coordination
Ahmed Abdelmoteleb, New Castle Traffic Engineer, Traffic, DOTS
Marco Boyce, Planning Supervisor, Statewide & Regional Planning
Claudy Joinville, Project Engineer, Development Coordination
Jenna Frye, Project Manager, Project Development North, DOTS
Breanna Kovach, Project Engineer, Project Development North, DOTS



November 12, 2014

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. 19A Subtask 6A – Delaware SPCA Commercial Development

Dear Mr. Brestel,

McCormick Taylor has completed its review of the Traffic Operational Analysis (TOA) for the Delaware SPCA commercial development prepared by The Traffic Group, Inc. (TTG), dated September 10, 2013. This review was assigned as Task Number 19A (Subtask 6A). TTG prepared the report in a manner generally consistent with DelDOT's *Standards and Regulations for Subdivision Streets and State Highway Access*.

The TOA evaluates impacts of the Delaware SPCA commercial development, proposed to be located on the west side of Stanton-Christiana Road (Delaware Route 7 / New Castle Road 67), approximately 1,950 feet north of Churchmans Road (Delaware Road 58 / New Castle Road 339), within New Castle County, Delaware. The proposed development would consist of a 5,125 square-foot convenience store with 20 fueling stations, a 4,000 square-foot fast food restaurant with drive-through window, and an 11,700 square-foot specialty retail center, all on approximately 21 acres of land. Two full-movement access points are proposed, both on Frontage Road (New Castle Road 336B). The North Site Access would serve as the new western leg of the intersection of Frontage Road and Frontage Road, and the South Site Access would connect to Frontage Road near the south end of the SPCA property. Construction is anticipated to be complete by 2015.

Per DelDOT's TOA Scoping Meeting Minutes dated January 23, 2013, TTG evaluated future conditions without and with the proposed Delaware SPCA commercial development. Both future scenarios include seven other committed developments. However, TTG excluded portions of two of the committed developments (the J.P. Morgan property and the MBNA America / Bank of America property) from their analyses, based on their review and interpretation of the Record Plans for those developments. When we reviewed the TOA, we evaluated the future scenarios as submitted by TTG (Cases 2A and 3A) as well as another set of future scenarios that included all phases of all committed developments according to DelDOT's TOA Scoping Meeting Minutes (Cases 2B and 3B). Furthermore, in April 2014, TTG provided updated traffic counts for two intersections (Stanton-Christiana Road (SR 7) & SR 7 Frontage Road / AAA Boulevard, and Ogetown-Stanton Road (SR 4) & Stanton-Christiana Road (SR 7)). Per DelDOT's direction, the April 2014 counts were used as the basis for traffic analysis of certain scenarios for those two intersections.

Subsequent to the TOA submission in September 2013 and the updated traffic counts for two intersections in April 2014, TTG submitted a Supplemental Traffic Analysis for Churchmans Road at Continental Drive to DeIDOT on October 30, 2014. This supplemental analysis was prepared to demonstrate improvements included in DeIDOT's Churchmans Road, Christiana Hospital to SR 1 project will achieve LOS D at that intersection during the PM peak hour under full buildout conditions. We have evaluated the Supplemental Traffic Analysis as part of this review task.

The land is currently zoned as BP (Business Park) within New Castle County, and the developer proposes rezoning the property to CR (Commercial Regional).

DeIDOT currently has six relevant projects in or near the study area for this TOA. These are:

- SR 1 / I-95 Interchange Improvements Project
- Churchmans Road, Christiana Hospital to SR 1
- Churchmans Crossing Pathway Connection
- Proposed traffic signal at the Abby Medical Center access along Ogletown-Stanton Road (Delaware Route 4 / New Castle Road 358)
- Churchmans Crossing Study

The SR 1 / I-95 Interchange Improvements Project (State Contract No. T200809003) is a large, multi-year construction project that will add high-speed connecting ramps from northbound Delaware Route 1 to northbound I-95 and from southbound I-95 to southbound Delaware Route 1. Planned improvements will separate local traffic movements from high-speed traffic movements. This project is currently under construction and should be complete by the end of 2014. For additional information regarding this project, please see the project website at <http://deldot.gov/information/projects/i95/sr1-i95/index.shtml>

The Churchmans Road, Christiana Hospital to SR 1 project (State Contract No. T200800702) addresses the traffic concerns listed within DeIDOT's 2006 Hazard Elimination Program (HEP, f.k.a. HSIP) Site E report. Traffic concerns included the heavy backup at the eastbound Churchmans Road right-turn lanes leading to I-95 / SR 1 as well as the weaving movement from southbound Delaware Route 7 onto westbound Churchmans Road. The planned improvements include modification of the southbound ramp from Delaware Route 7 to eliminate the weave from the ramp to Continental Drive and addition of a third right-turn lane from eastbound Churchmans Road to the ramp onto I-95 / SR 1. Design revisions made by DeIDOT during September and October 2014 include the addition of a second right-turn lane on the northbound Continental Drive approach. Construction is anticipated to start no earlier than late 2014. For additional information regarding this project, please see the project website at <http://deldot.gov/information/projects/churchmansRdCHtoSR1/index.shtml>

The Churchmans Crossing Pathway Connection is a project that explores the provision of shared use paths in New Castle County. DeIDOT recently prepared a concept master plan for the pathway system in New Castle County, which includes potential alignments for a path along Ogletown-Stanton Road just north of the SPCA property or along Churchmans Road just south



of the SPCA property. This project is in the conceptual planning phase, with no current schedule for design or construction.

A traffic signal is proposed at the Abby Medical Center access along Ogletown-Stanton Road at Centurian Plaza, approximately ¼ mile west of Stanton-Christiana Road. DelDOT has completed a signal warrant analysis and is coordinating with the adjacent medical offices regarding the needed signal agreement at the intersection. The design and construction on this project is projected to start during FY 2014 / FY 2015.

In response to increasing congestion throughout the area, the Churchmans Crossing Study began in the mid-1990's as a joint effort between DelDOT, New Castle County and WILMAPCO to study transportation facilities and operations in the Churchmans Crossing area and to develop recommendations to alleviate anticipated increased congestion primarily through a transportation and land use plan that would enhance quality of life, plan for sustainable growth and development, and provide opportunity for transportation choices. The SPCA property is within the borders of the Churchmans Crossing Study Area, and the area functions in some ways like a Transportation Improvement District (TID). The study included traffic counts and analyses, traffic forecasts, and evaluation of transit, bicycle and pedestrian facilities. It provided recommendations regarding land use, intersection improvements, new roadways, bicycle and pedestrian facilities, increased transit options and improved facilities, and Travel Demand Management measures. Over the past 15 years, many improvements developed through the Churchmans Crossing Study program have been planned, designed, and constructed. Conditions are monitored and analyzed on an annual basis to determine the need and timing for potential future improvements. This DelDOT program is anticipated to continue for the foreseeable future.

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

The applicant has requested a Traffic Impact Study (TIS) waiver for this development based on provisions in Section 40.11.121 of the New Castle County Unified Development Code (UDC). The applicant prepared and submitted a TOA in September 2013, which is the subject of this review. The scope of work for the TOA is largely based on a memo from DelDOT dated January 23, 2013, describing DelDOT's expectation of what would be required for a TOA if a TIS waiver were to be granted. Our understanding is that whether or not the TIS waiver is granted, the proposed development would be subjected to the Level of Service (LOS) requirements of a TIS as stated in the UDC. Our review of the TOA has found that the proposed development would not meet the New Castle County LOS Standards as stated in Section 40.11.210 of the UDC unless physical roadway and/or traffic control improvements are implemented at the following intersections:

<i>Intersection</i>	<i>Existing Traffic Control</i>	<i>Situations for which deficiencies occur</i>
Stanton-Christiana Road (SR 7) and SR 7 Frontage Road / AAA Boulevard	Signalized	2015 PM without and with Delaware SPCA
Stanton-Christiana Road Southbound Ramp and Churchmans Road	Signalized	2015 PM with Delaware SPCA
Churchmans Road and Continental Drive	Signalized	2015 PM with Delaware SPCA

In addition, based on DelDOT’s evaluation criteria, the stop-controlled minor street approaches at the following intersections exhibit 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>
SR 7 Frontage Road and SR 7 Frontage Road / North Site Access	Unsignalized	2015 AM and PM with Delaware SPCA
Ogletown-Stanton Road (SR 4) and Centurian Plaza	Unsignalized	2015 PM with Delaware SPCA

Due to the close proximity of the unsignalized SR 7 Frontage Road intersection to the signalized intersection of Stanton-Christiana Road & Frontage Road / AAA Boulevard, an important aspect of the TOA and this review was to evaluate the operations between those two intersections to make sure they will operate acceptably together. The north site entrance of the SPCA commercial development will be added as the fourth leg to the existing T-intersection, which is located less than 200 feet from the signalized intersection at Stanton-Christiana Road. The TOA included Synchro and SimTraffic queuing analyses of future conditions. With the recommended improvements and intersection configurations described below, both intersections will operate at LOS D or better. There will be practically no queuing on the westbound Frontage Road connector between the two intersections (heading into the SPCA site). In the eastbound direction of the Frontage Road connector, queues from the signalized intersection would, at times, back up to the unsignalized Frontage Road intersection and beyond. The longer queues would occur during the PM peak hour, and would extend onto the northbound and southbound SR 7 Frontage Road approaches and the eastbound SPCA north site driveway approach (exiting the proposed development) by approximately 75-150 feet.

As part of the coordination process between the developer, their engineer, and DelDOT, the developer’s engineer submitted a proposed Entrance Concept Plan for the north site entrance, which includes improvements at the intersection of Stanton-Christiana Road & Frontage Road / AAA Boulevard. This Entrance Concept Plan is provided on Page 7. Because of the unique configuration of these two intersections located in close proximity to each other, DelDOT reviewed SimTraffic analysis prepared by the developer’s engineer. Upon review, DelDOT determined that the proposed configuration shown in the Entrance Concept Plan provided on

Page 7 appears to operate acceptably, although it is noted that the proposed turn lane lengths may not be sufficient to accommodate 95th percentile queue lengths. The developer should coordinate with DelDOT's Subdivision Section to refine design details for these two intersections including final turn-lane lengths during the site plan review process.

DelDOT currently has a project planned (State Contract No. T200809002) that will address Churchmans Road from Christiana Hospital to Delaware Routes 1 and 7, including the intersection of Churchmans Road with the Southbound SR 1 Ramp, and the intersection of Churchmans Road with Continental Drive and Old Churchmans Road. The planned improvements are described immediately below and in Item No. 7, and are shown in a concept plan provided on Pages 11-13. At the intersection of Churchmans Road with the Southbound SR 1 Ramp, the project would bring the ramp traffic bound for Continental Drive under signal control, while maintaining the free right turn for ramp traffic bound for Old Churchmans Road or heading farther west. It will also convert the rightmost eastbound through lane on Churchmans Road to a combination through/right-turn lane, creating a triple right turn onto the southbound SR 7 ramp. With these improvements, the resulting LOS at the ramp intersection will be C in the weekday evening peak hour.

At the intersection of Churchmans Road with Continental Drive and Old Churchmans Road, the DelDOT project will extend and channelize the westbound left turn lanes on Churchmans Road, providing more storage for that queue and ensuring that vehicles making that turn cannot weave across from the free right turn mentioned above. Design revisions made by DelDOT during September and October 2014 include the addition of a second right-turn lane on the northbound Continental Drive approach. The latest design that reflects these revisions is provided on Page 14. With these improvements, the intersection would operate at LOS D in the weekday evening peak hour under full buildout conditions.

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.

1. The developer should improve the Frontage Road from the south site entrance to intersection of Frontage Road and Frontage Road / north site entrance. The developer should coordinate with DelDOT's Subdivision Section through the DelDOT record plan review process to determine the extent of these improvements. Preliminarily, these improvements should include, but are not limited to, two twelve-foot travel lanes and two four-foot shoulders. The developer should provide a bituminous concrete overlay to the existing travel lanes, at DelDOT's discretion. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer if necessary.
2. The developer should construct the north site entrance on the Frontage Road. This entrance should align with the Frontage Road connector to Stanton-Christiana Road. The

proposed configuration is shown in the table below, and on the Entrance Concept Plan provided on Page 7.

Approach	Current Configuration	Proposed Configuration
Northbound Frontage Road	One shared through/right-turn lane (stop-controlled)	One shared left/through/right-turn lane (stop-controlled)
Southbound Frontage Road	One shared through/left-turn lane (stop-controlled)	One shared left/through/right-turn lane (stop-controlled)
Eastbound North Site Entrance	Approach does not exist	One shared left/through/right-turn lane (stop-controlled)
Westbound Frontage Road	One left-turn lane and one right-turn lane (free-flow)	One shared left/through/right-turn lane (free-flow)

When these improvements are constructed, the developer should also reconfigure the northbound Frontage Road approach to eliminate the channelized right-turn movement. The developer should coordinate with DelDOT's Subdivision Section to refine design details during the site plan review process.

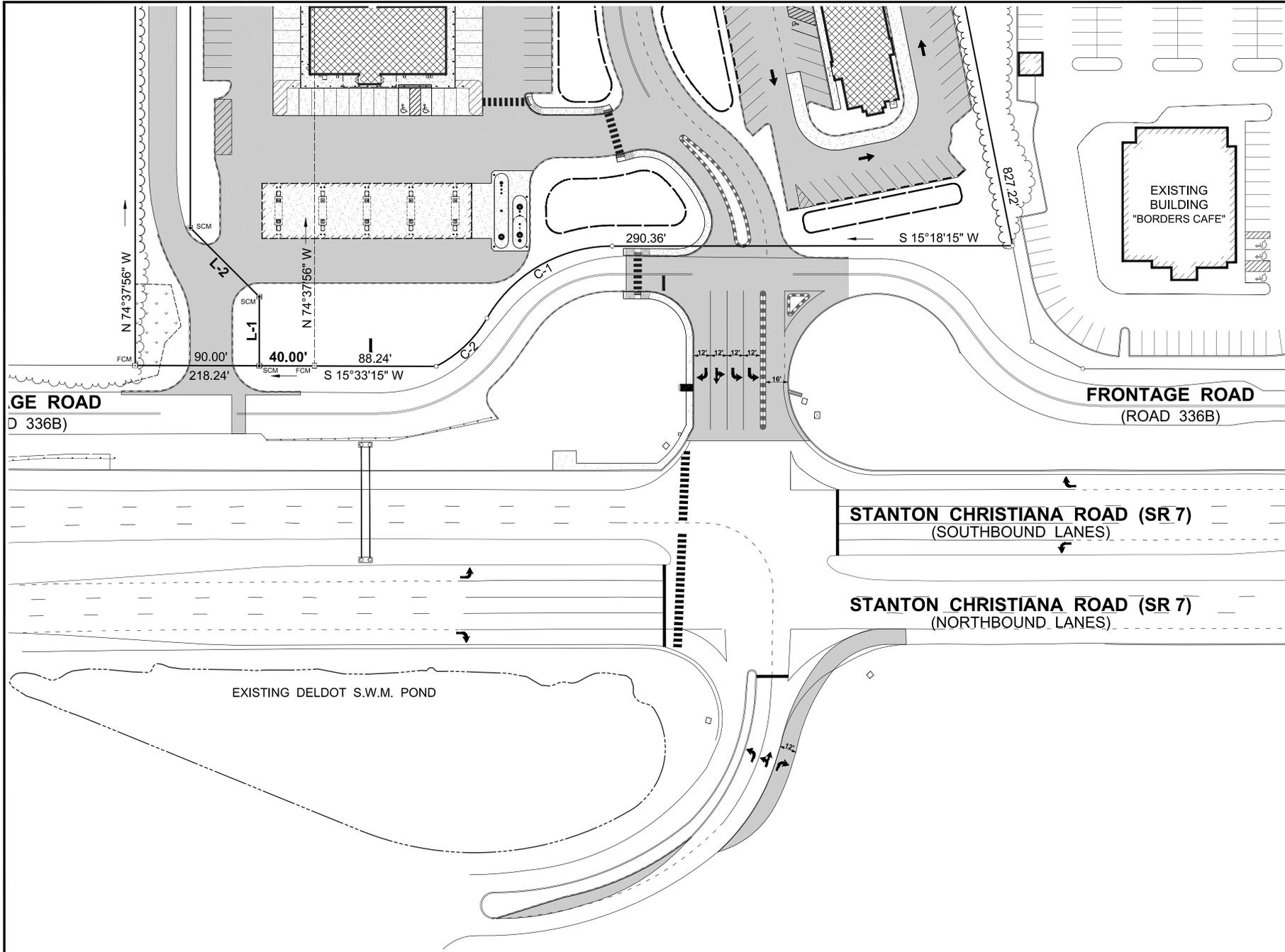
- The developer should retain the south site entrance on the Frontage Road, which currently serves as the entrance driveway for the existing animal shelter. The proposed configuration is shown in the table below, and on the Entrance Concept Plan provided on Page 7.

Approach	Current Configuration	Proposed Configuration
Northbound Frontage Road	One shared through/left-turn lane	One shared through/left-turn lane
Southbound Frontage Road	One shared through/right-turn lane	One through lane and one right-turn lane
Eastbound South Site Entrance	One shared left/right-turn lane	One right-turn-only 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.

Approach	Left-Turn Lane	Right-Turn Lane
Northbound Frontage Road	N/A	N/A
Southbound Frontage Road	N/A	50 feet*
Eastbound South Site Entrance	N/A	N/A

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



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GROUP

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PROJECT TITLE
APPLICATION NO. 2013-XXXX

**S.P.C.A
COMMERCIAL**

EXPLORATORY MAJOR
LAND DEVELOPMENT
PLAN

459 STANTON CHRISTIANA RD.
WHITE CLAY CREEK HUNDRED
NEW CASTLE COUNTY, DE

SHEET TITLE

**ENTRANCE
CONCEPT PLAN**



NO.	DATE	DESCRIPTION

PROJECT NO.: 2012054.00
DATE: 2014-06-24
SCALE: 1" = 30'

DRAWN BY: V.V. PROJ. MGR: M.C.P.

C-1
Copyright 2013

F:\AutoCAD\Projects\2012\2012054\2012054-Entrance-Concept-C012.dwg, Jun 24, 2014, 10:58AM

4. The developer should improve the intersection of Stanton-Christiana Road and Frontage Road / AAA Boulevard. The proposed configuration is shown in the table below, and on the Entrance Concept Plan provided on Page 7.

Approach	Current Configuration	Proposed Configuration
Northbound Stanton-Christiana Road	One left-turn lane, three through lanes, and one right-turn lane	One left-turn lane, three through lanes, and one right-turn lane
Southbound Stanton-Christiana Road	One left-turn lane, three through lanes, and one right-turn lane	One left-turn lane, three through lanes, and one right-turn lane
Eastbound Frontage Road	One shared through/left-turn lane and one right-turn lane	Two exclusive left-turn lanes, one shared through/left-turn lane, and one right-turn lane
Westbound AAA Boulevard	One exclusive left-turn lane and one shared left/through/right-turn lane	One exclusive left-turn lane, one shared through/left-turn lane, and one right-turn lane

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

Approach	Left-Turn Lane(s)	Right-Turn Lane
Northbound Stanton-Christiana Road	600 feet*	350 feet*
Southbound Stanton-Christiana Road	525 feet*	300 feet** (existing turn-lane length is adequate)
Eastbound Frontage Road	150 feet***	425 feet***
Westbound AAA Boulevard	450 feet****	100 feet*****

* turn-lane length based on storage length per queuing analysis plus 200-foot deceleration length per DelDOT's *Road Design Manual*

** turn-lane length based on storage length per queuing analysis plus 200-foot deceleration length per DelDOT's *Road Design Manual*, but existing turn-lane length is adequate

*** Turn-lane length based on storage length per queuing analysis. Achieving this length would require relocating the existing upstream intersection of Frontage Road and North Site Entrance (located just over 100 feet west of existing stop bar).

**** turn-lane length based on storage length per queuing analysis, but length may be limited by proximity to existing upstream intersection of AAA Boulevard and JP Morgan Complex Entrance (located approx. 350 feet east of existing stop bar)

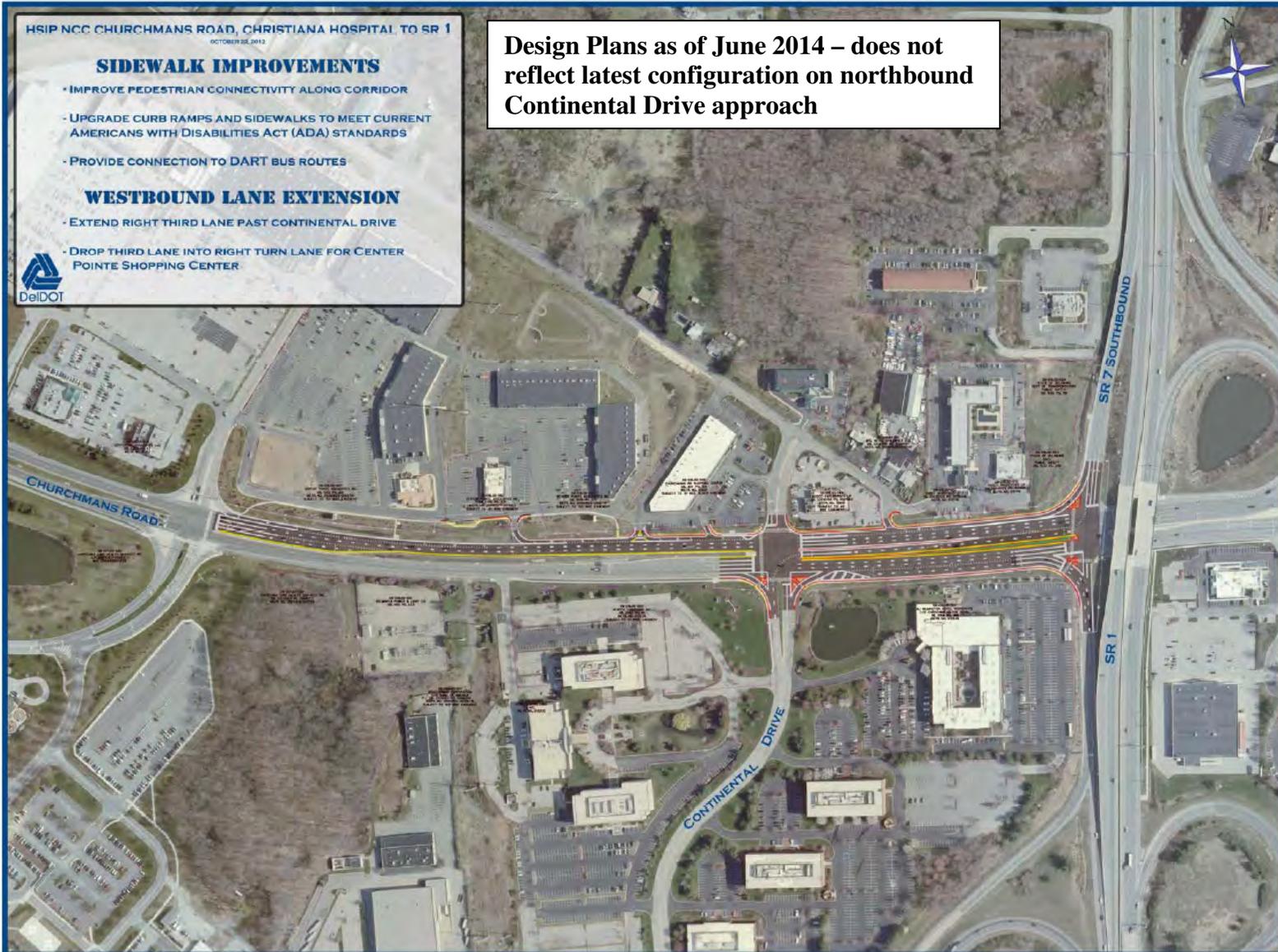
***** turn-lane length based on storage length per queuing analysis

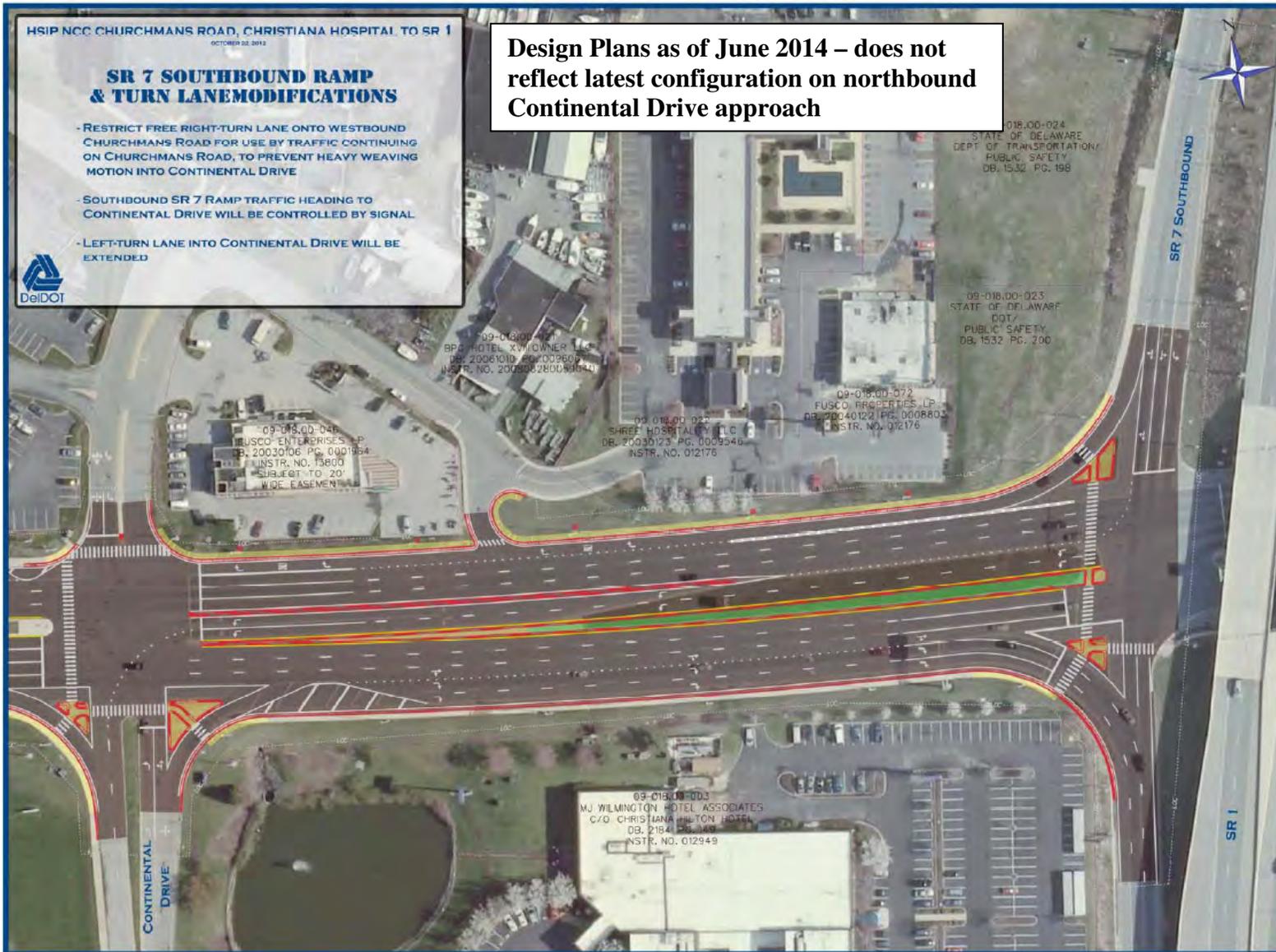
While the initial recommended minimum turn-lane lengths based on traffic analyses are provided above, constraints on the eastbound and westbound approaches result in the need to consider shorter turn-lane lengths. Accordingly, design of the turn lane lengths on the eastbound and westbound approaches should be discussed and refined during the site plan review process.

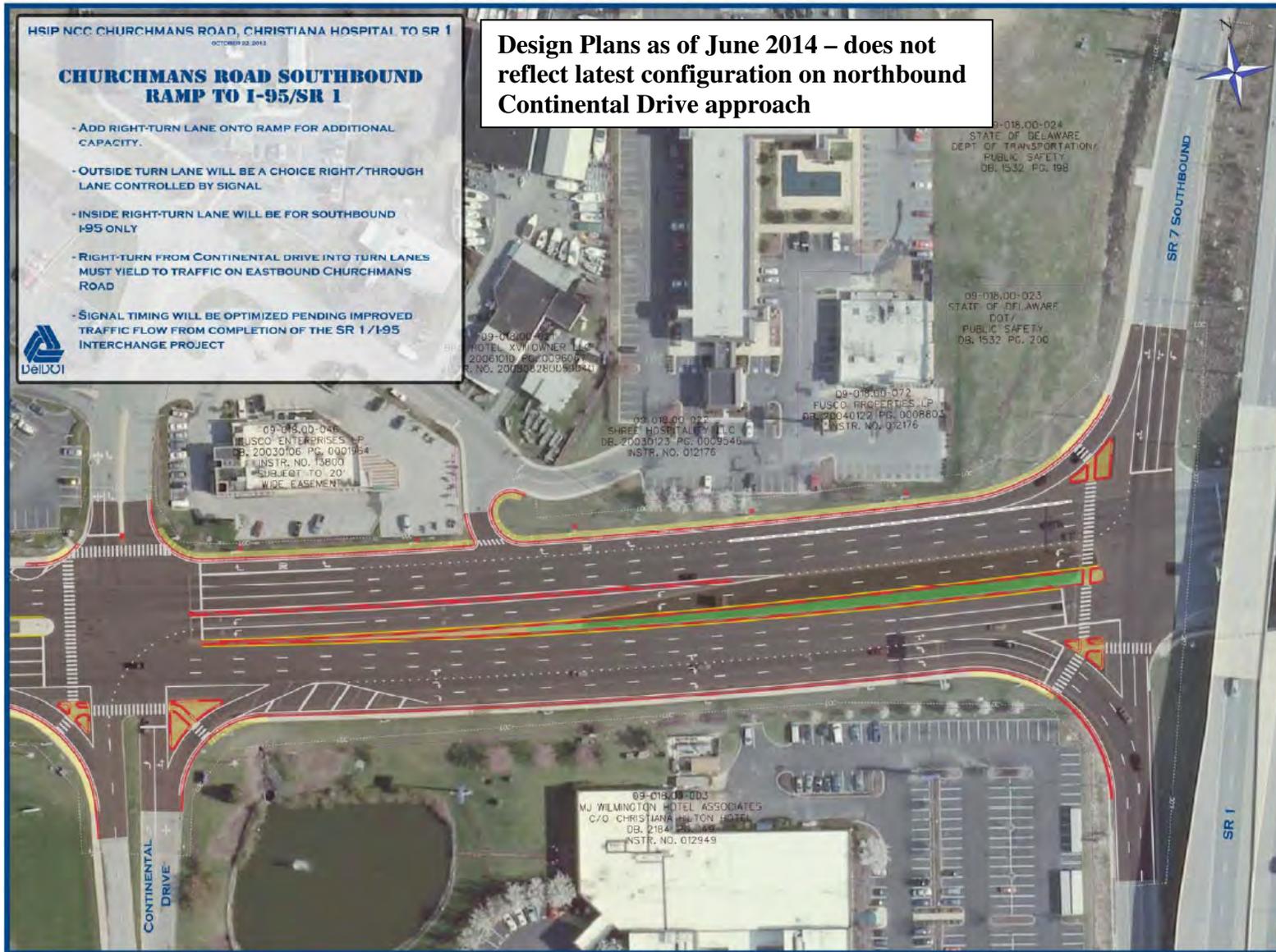
5. The developer should enter into a traffic signal agreement with DeIDOT for the intersection of Stanton-Christiana Road and Frontage Road / AAA Boulevard. The agreement will cover signal adjustments required by the physical improvements described in Item No. 4. The agreement should include pedestrian signals, crosswalks, interconnection, and ITS equipment such as CCTV cameras at DeIDOT's discretion. One or more other developers may enter into a traffic signal agreement for this intersection as well. The developer should coordinate with DeIDOT on the implementation and equitable cost sharing of the traffic signal.
6. The developer should enter into a traffic signal agreement with DeIDOT for the intersection of Ogletown-Stanton Road and Centurian Plaza (at the Abby Medical Center). The agreement should include pedestrian signals, crosswalks, interconnection, and ITS equipment such as CCTV cameras at DeIDOT's discretion. As previously noted, DeIDOT has completed a signal warrant analysis for the proposed signal at this intersection, and is coordinating with the adjacent medical offices regarding the needed signal agreement. The developer should coordinate their efforts with DeIDOT on the design details, implementation and equitable cost sharing of the traffic signal.
7. The developer should coordinate with DeIDOT regarding an equitable share contribution toward DeIDOT's Churchmans Road, Christiana Hospital to SR 1 project. This project includes improvements along Churchmans Road, including at the intersections of Stanton-Christiana Road Southbound Ramp & Churchmans Road and Churchmans Road & Continental Drive. As previously described, the planned improvements for DeIDOT's project include, but are not limited to, modification of the southbound ramp from Delaware Route 7 to eliminate the weave from the ramp to Continental Drive along with the addition of a third right-turn lane from eastbound Churchmans Road to the ramp onto I-95 / SR 1. Design revisions made by DeIDOT during September and October 2014 include the addition of a second right-turn lane on the northbound Continental Drive approach. This project will include various pavement, signing, striping, signal, and sidewalk improvements. A concept plan of the proposed improvements is provided on Pages 11-13 (showing the design plans as of June 2014) and on Page 14 (showing the revised design plans as of October 2014 with the dual right-turn lane configuration on the northbound Continental Drive approach). The developer should be required to make an equitable share contribution toward these improvements and to coordinate with DeIDOT's Subdivision Section regarding the amount thereof.
8. The developer should enter into a traffic signal agreement with DeIDOT for the intersection of Stanton-Christiana Road Southbound Ramp and Churchmans Road. The agreement will cover signal adjustments required by the physical improvements associated with DeIDOT's Churchmans Road, Christiana Hospital to SR 1 project as noted in Item No. 7. The agreement should include pedestrian signals, crosswalks, interconnection, and ITS equipment such as CCTV cameras at DeIDOT's discretion. One or more other developers may enter into a traffic signal agreement for this intersection as

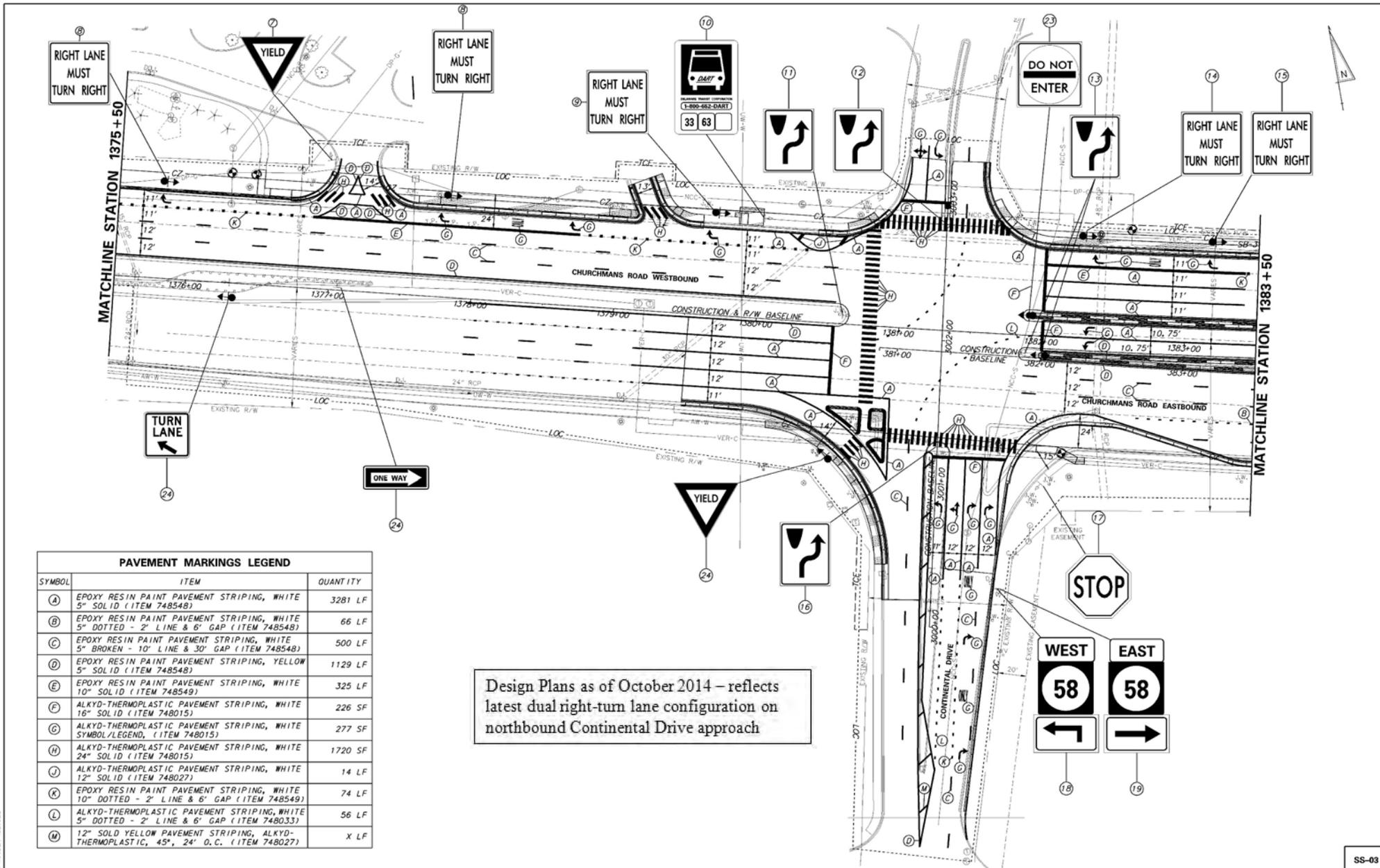
well. The developer should coordinate with DeIDOT on the implementation and equitable cost sharing of the traffic signal.

9. The developer should enter into a traffic signal agreement with DeIDOT for the intersection of Churchmans Road and Continental Drive. The agreement will cover signal adjustments required by the physical improvements associated with DeIDOT's Churchmans Road, Christiana Hospital to SR 1 project as noted in Item No. 7. The agreement should include pedestrian signals, crosswalks, interconnection, and ITS equipment such as CCTV cameras at DeIDOT's discretion. One or more other developers may enter into a traffic signal agreement for this intersection as well. The developer should coordinate with DeIDOT on the implementation and equitable cost sharing of the traffic signal.
10. The following bicycle, pedestrian, and transit improvements should be included:
 - a. Bike parking should be provided near the building entrances within this development. Where the building architecture provides for an awning or other overhang, the bike parking should be covered.
 - b. Utility covers should be made flush with the pavement.
 - c. A minimum ten-foot wide permanent easement from the edge of the right-of-way should be dedicated to DeIDOT within the site frontage along the SR 7 Frontage Road. Within this 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 along the site frontage. Provided that adequate right-of-way exists, the width of the easement may be reduced.
 - d. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances. Type 3 curb ramps are discouraged.
 - e. Internal sidewalks for pedestrian safety and to promote walking as a viable transportation alternative should be constructed within the site. 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 sidewalk. These internal sidewalks should connect to all the proposed buildings on the site, not just to the convenience store.
 - f. Where internal sidewalks are located alongside of parking spaces, a buffer should be added to eliminate vehicular overhang onto the sidewalk.
 - g. The developer should coordinate with the Delaware Transit Corporation regarding the possibility of improving the existing nearby bus stop along Stanton-Christiana Road and/or adding transit services and facilities at this location. Sidewalks should connect from the site to any existing or new transit facilities and parking facilities for bicyclists should be included.



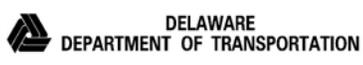






Design Plans as of October 2014 – reflects latest dual right-turn lane configuration on northbound Continental Drive approach

PAVEMENT MARKINGS LEGEND		
SYMBOL	ITEM	QUANTITY
(A)	EPOXY RESIN PAINT PAVEMENT STRIPING, WHITE 5" SOLID (ITEM 74B54B)	3281 LF
(B)	EPOXY RESIN PAINT PAVEMENT STRIPING, WHITE 5" DOTTED - 2' LINE & 6' GAP (ITEM 74B54B)	66 LF
(C)	EPOXY RESIN PAINT PAVEMENT STRIPING, WHITE 5" BROKEN - 10' LINE & 30' GAP (ITEM 74B54B)	500 LF
(D)	EPOXY RESIN PAINT PAVEMENT STRIPING, YELLOW 5" SOLID (ITEM 74B54B)	1129 LF
(E)	EPOXY RESIN PAINT PAVEMENT STRIPING, WHITE 10" SOLID (ITEM 74B549)	325 LF
(F)	ALKYD-THERMOPLASTIC PAVEMENT STRIPING, WHITE 16" SOLID (ITEM 74B015)	226 SF
(G)	ALKYD-THERMOPLASTIC PAVEMENT STRIPING, WHITE SYMBOL/LEGEND, (ITEM 74B015)	277 SF
(H)	ALKYD-THERMOPLASTIC PAVEMENT STRIPING, WHITE 24" SOLID (ITEM 74B015)	1720 SF
(J)	ALKYD-THERMOPLASTIC PAVEMENT STRIPING, WHITE 12" SOLID (ITEM 74B027)	14 LF
(K)	EPOXY RESIN PAINT PAVEMENT STRIPING, WHITE 10" DOTTED - 2' LINE & 6' GAP (ITEM 74B549)	74 LF
(L)	ALKYD-THERMOPLASTIC PAVEMENT STRIPING, WHITE 5" DOTTED - 2' LINE & 6' GAP (ITEM 74B033)	56 LF
(M)	12" SOLID YELLOW PAVEMENT STRIPING, ALKYD-THERMOPLASTIC, 45°, 24' O.C. (ITEM 74B027)	X LF



ADDENDUMS / REVISIONS



HSP NCC CHURCHMANS ROAD, CHRISTIANA HOSPITAL TO SR 1

CONTRACT	BRIDGE NO.	N/A
T200800702	DESIGNED BY	BLK
COUNTY	CHECKED BY	JLF
NEW CASTLE		

SIGNING, STRIPING AND CONDUIT PLAN

SS-03	
SHEET NO.	35
TOTAL SHTS.	X

WWW.PENNEL.COM/PROPERTY/S&C



Improvements in this TOA may be considered “significant” under DeIDOT’s *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DeIDOT’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 DeIDOT’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 DeIDOT’s subdivision review process.

Additional details on our review of this TOA 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.

A handwritten signature in black ink, appearing to read "Andrew J. Parker", is written over a light blue horizontal line.

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

Enclosure

General Information

Report date: September 10, 2013

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

Prepared for: Delaware SPCA

Tax parcels: 09-018.00-029 and 09-018.00-030

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 a 5,125 square-foot convenience store with 20 fueling stations, a 4,000 square-foot fast food restaurant with drive-through window, and an 11,700 square-foot specialty retail center.

Location: The Delaware SPCA commercial development is proposed to be located on the west side of Stanton-Christiana Road (Delaware Route 7 / New Castle Road 67), approximately 1,950 feet north of Churchmans Road (Delaware Road 58 / New Castle Road 339), within New Castle County, Delaware. A site location map is included on Page 17.

Amount of land to be developed: approximately 20.7 acres of land

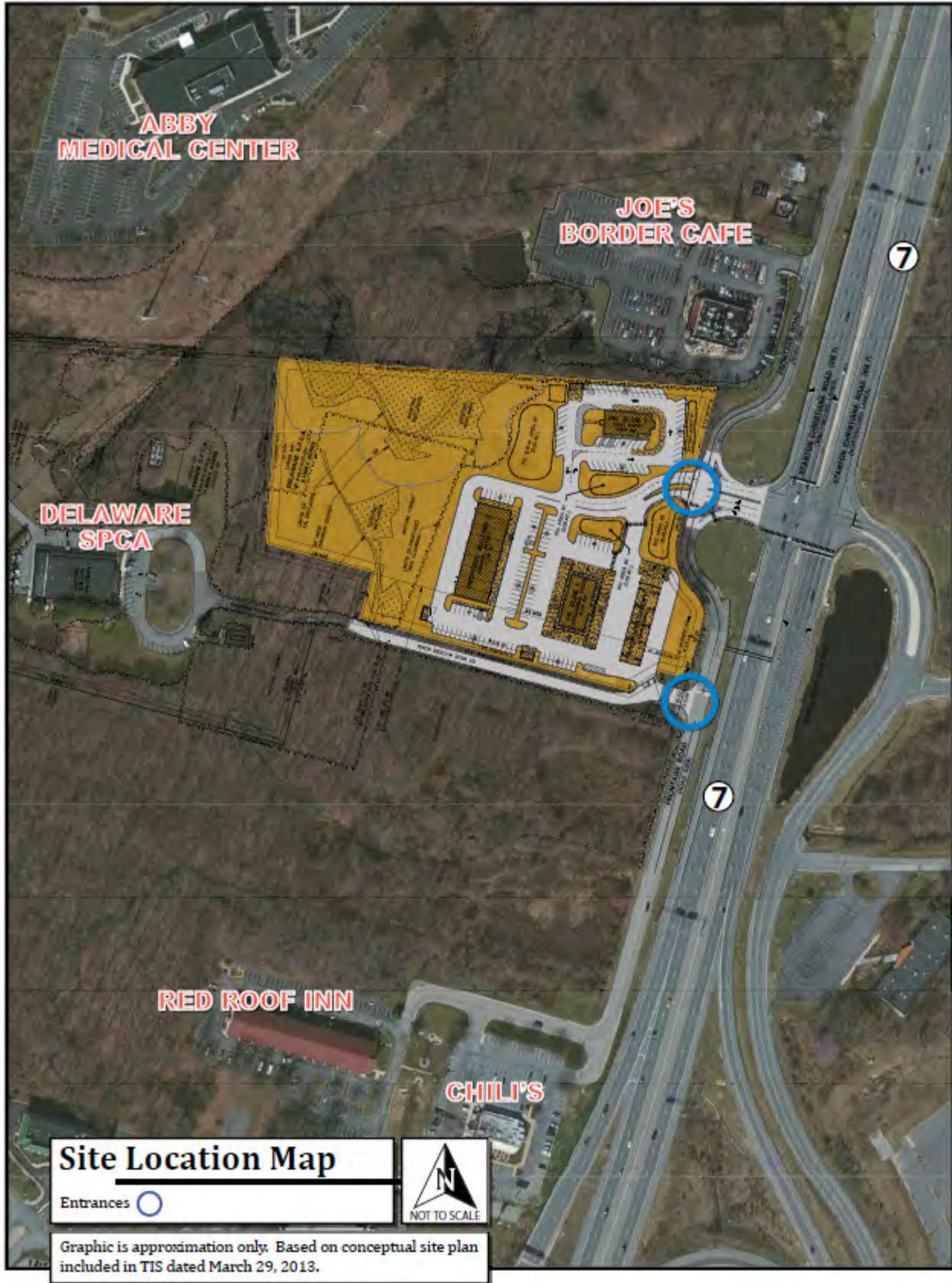
Land use approval(s) needed: Rezoning and Subdivision approval. The land is currently zoned as BP (Business Park) within New Castle County, and the developer proposes rezoning the property to CR (Commercial Regional).

Proposed completion date: 2015

Proposed access locations: Two full-movement access points are proposed, both on Frontage Road (New Castle Road 336B). The North Site Access would serve as the new western leg of the intersection of Frontage Road and Frontage Road, and the South Site Access would connect to Frontage Road near the south end of the SPCA property.

Daily Traffic Volumes (per DelDOT Traffic Summary 2012):

- 2012 Average Annual Daily Traffic on SR 7 Frontage Road: 1,744 vpd
- 2012 Average Annual Daily Traffic on Stanton-Christiana Road: 68,109 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 Delaware SPCA site is located within Investment Level 1.

Investment Level 1

Investment Level 1 Areas are areas of the state that are most 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 1 Areas are often municipalities, towns, or urban/urbanizing places in counties. Density is generally higher than in the surrounding areas. Overall, it is the state's intent to use its spending and management tools to maintain and enhance community character, to promote well-designed and efficient new growth, and to facilitate redevelopment in Investment Level 1 Areas.

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

The Delaware SPCA site is located within Investment Level 1 and is to be developed with retail space, a restaurant, and a convenience store with gas station. The *Strategies* document generally encourages efficient new growth and redevelopment in Investment Level 1 areas, and the proposed development is consistent with those goals. 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."

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

DelDOT currently has six relevant projects in or near the study area for this TOA. These are:

- SR 1 / I-95 Interchange Improvements Project
- Churchmans Road, Christiana Hospital to SR 1
- Churchmans Crossing Pathway Connection
- Proposed traffic signal at the Abby Medical Center access along Ogletown-Stanton Road (Delaware Route 4 / New Castle Road 358)
- Churchmans Crossing Study

The SR 1 / I-95 Interchange Improvements Project (State Contract No. T200809003) is a large, multi-year construction project that will add high-speed connecting ramps from northbound Delaware Route 1 to northbound I-95 and from southbound I-95 to southbound Delaware Route 1. Planned improvements will separate local traffic movements from high-speed traffic movements. This project is currently under construction and should be complete by the end of 2014. For additional information regarding this project, please see the project website at <http://deldot.gov/information/projects/i95/sr1-i95/index.shtml>

The Churchmans Road, Christiana Hospital to SR 1 project (State Contract No. T200800702) addresses the traffic concerns listed within DelDOT's 2006 Hazard Elimination Program (HEP, f.k.a. HSIP) Site E report. Traffic concerns included the heavy backup at the eastbound

Churchmans Road right-turn lanes leading to I-95 / SR 1 as well as the weaving movement from southbound Delaware Route 7 onto westbound Churchmans Road. The planned improvements include modification of the southbound ramp from Delaware Route 7 to eliminate the weave from the ramp to Continental Drive and addition of a third right-turn lane from eastbound Churchmans Road to the ramp onto I-95 / SR 1. Design revisions made by DelDOT during September and October 2014 include the addition of a second right-turn lane on the northbound Continental Drive approach. Construction is anticipated to start no earlier than late 2014. For additional information regarding this project, please see the project website at <http://deldot.gov/information/projects/churchmansRdCHtoSR1/index.shtml>

The Churchmans Crossing Pathway Connection is a project that explores the provision of shared use paths in New Castle County. DelDOT recently prepared a concept master plan for the pathway system in New Castle County, which includes potential alignments for a path along Ogletown-Stanton Road just north of the SPCA property or along Churchmans Road just south of the SPCA property. This project is in the conceptual planning phase, with no current schedule for design or construction.

A traffic signal is proposed at the Abby Medical Center access along Ogletown-Stanton Road at Centurian Plaza, approximately ¼ mile west of Stanton-Christiana Road. DelDOT has completed a signal warrant analysis and is coordinating with the adjacent medical offices regarding the needed signal agreement at the intersection. The design and construction on this project is projected to start during FY 2014 / FY 2015.

In response to increasing congestion throughout the area, the Churchmans Crossing Study began in the mid-1990's as a joint effort between DelDOT, New Castle County and WILMAPCO to study transportation facilities and operations in the Churchmans Crossing area and to develop recommendations to alleviate anticipated increased congestion primarily through a transportation and land use plan that would enhance quality of life, plan for sustainable growth and development, and provide opportunity for transportation choices. The SPCA property is within the borders of the Churchmans Crossing Study Area, and the area functions in some ways like a Transportation Improvement District (TID). The study included traffic counts and analyses, traffic forecasts, and evaluation of transit, bicycle and pedestrian facilities. It provided recommendations regarding land use, intersection improvements, new roadways, bicycle and pedestrian facilities, increased transit options and improved facilities, and Travel Demand Management measures. Over the past 15 years, many improvements developed through the Churchmans Crossing Study program have been planned, designed, and constructed. Conditions are monitored and analyzed on an annual basis to determine the need and timing for potential future improvements. This DelDOT program is anticipated to continue for the foreseeable future.

Trip Generation

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

- 5,125 square-foot convenience store with 20 fueling stations (ITE Land Use Code 853)
- 4,000 square-foot fast-food restaurant with drive-through (ITE Land Use Code 934)
- 11,700 square-foot specialty retail center (ITE Land Use Code 826)

Table 1
DELAWARE SPCA PEAK HOUR TRIP GENERATION

Land Use	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
5,125 sf convenience store with 20 fueling stations	165	166	331	190	191	381
Pass-by Trips	104	105	209	125	126	251
Net External Trips	61	61	122	65	65	130
4,000 sf fast-food restaurant	93	89	182	68	63	131
Pass-by Trips	46	44	90	34	32	66
Net External Trips	47	45	92	34	31	65
11,700 sf specialty retail center	-	-	-	14	18	32
Pass-by Trips	-	-	-	-	-	-
Net External Trips	-	-	-	14	18	32
TOTAL NEW TRIPS	108	106	214	113	114	227

Table 2
DELAWARE SPCA DAILY TRIP GENERATION

Land Use	Weekday ADT		
	In	Out	Total
5,125 sf convenience store with 20 fueling stations	2167	2167	4334
4,000 sf fast-food restaurant	992	992	1984
11,700 sf specialty retail center	269	269	538
TOTAL TRIPS	3428	3428	6856

Overview of TOA

Intersections examined:

- 1) SR 7 Frontage Road & SR 7 Frontage Road / North Site Access
- 2) SR 7 Frontage Road & South Site Access
- 3) SR 7 Frontage Road & Border Café Access
- 4) SR 7 Frontage Road & Metro Business Park Site Access
- 5) Stanton-Christiana Road (SR 7) & SR 7 Frontage Road / AAA Boulevard
- 6) Ogletown-Stanton Road (SR 4) & Stanton-Christiana Road (SR 7)
- 7) Ogletown-Stanton Road (SR 4) & Centurian Plaza
- 8) Stanton-Christiana Road (SR 7) & Old Stanton-Christiana Road
- 9) AAA Boulevard & JP Morgan Complex Entrance
- 10) AAA Boulevard & Delaware Tech West Parking Access
- 11) Stanton-Christiana Road (SR 7) Southbound Ramp & Churchmans Road (SR 58)
- 12) Churchmans Road (SR 58) & Continental Drive
- 13) Churchmans Road (SR 58) & SR 7 Northbound Ramp / Geoffrey Drive

Conditions examined:

- 1) 2013 existing conditions (Case 1)
- 2) 2015 without Delaware SPCA
 - a. including the committed developments listed below except the retail component of Development #4 and the Phase 2 component of Development #6 (Case 2A)
 - b. including all components of all committed developments listed (Case 2B)
- 3) 2015 with Delaware SPCA
 - a. including the committed developments listed below except the retail component of Development #4 and the Phase 2 component of Development #6 (Case 3A)
 - b. including all components of all committed developments listed (Case 3B)

Note: For intersections 1, 2, and 5 from the list above, all cases were required to be analyzed. For all remaining intersections, analysis was required for only Case 3A and Case 3B.

Peak hours evaluated:

Weekday morning and afternoon peak hours. Weekday morning analysis was required for only intersections 1, 2, and 5. Weekday evening analysis was required for all intersections.

Committed developments considered:

- 1) Catawba Property (12,000 square-foot of high-turnover sit-down restaurant)
- 2) Chili's restaurant (841 square-foot addition to existing restaurant)
- 3) Metro Business Park (127,400 square feet of general office space and 48,500 square feet of warehouse space)
- 4) J.P. Morgan Property (600,434 square feet of general office space and 129,000 square feet of retail space)

- 5) Provident Mutual Property (50,000 square feet of general office space)
- 6) MBNA America / Bank of America (108,102 square feet of general office space for Phase 1, and another 879,240 square feet of general office space for Phase 2)
- 7) Christiana Hospital (89,295 square-foot addition to existing hospital building)

Intersection Descriptions

1) SR 7 Frontage Road & SR 7 Frontage Road / North Site Access

Type of Control: existing two-way stop-controlled (T-intersection with stop control on northbound and southbound approaches); proposed three-way stop-controlled (four-leg intersection with stop control on three approaches and a free-flow westbound approach)

Northbound approach: (SR 7 Frontage Road) existing one shared through/right-turn lane, stop controlled; proposed one shared left/through/right-turn lane, stop controlled

Southbound approach: (SR 7 Frontage Road) existing one shared through/left-turn lane, stop controlled; proposed one shared left/through/right-turn lane, stop controlled

Eastbound approach: (Proposed North Site Access) proposed one shared left/through/right-turn lane, stop controlled

Westbound approach: (SR 7 Frontage Road) existing one left-turn lane and one right-turn lane; proposed one shared left/through/right-turn lane

2) SR 7 Frontage Road & South Site Access

Type of Control: two-way stop-controlled (T-intersection)

Northbound approach: (SR 7 Frontage Rd) one shared through/left-turn lane

Southbound approach: (SR 7 Frontage Rd) one shared through/right-turn lane

Eastbound approach: (South Site Access) one shared left/right-turn lane, stop controlled

3) SR 7 Frontage Road & Border Café Access

Type of Control: two-way stop-controlled (T-intersection)

Northbound approach: (SR 7 Frontage Road) one shared through/left-turn lane

Southbound approach: (SR 7 Frontage Road) one shared through/right-turn lane

Eastbound approach: (Border Café Access) one shared left/right-turn lane, stop controlled

4) SR 7 Frontage Road & Metro Business Park Site Access

Type of Control: proposed two-way stop-controlled (T-intersection)

Northbound approach: (SR 7 Frontage Road) existing one through lane; proposed one shared through/left-turn lane

Southbound approach: (SR 7 Frontage Road) existing one through lane; proposed one shared through/right-turn lane

Eastbound approach: (Metro Business Park Site Access) proposed one shared left/right-turn lane, stop controlled

- 5) **Stanton-Christiana Road (SR 7) & SR 7 Frontage Road / AAA Boulevard**
Type of Control: signalized four-leg intersection
Northbound approach: (Stanton-Christiana Road) one left-turn lane, three through lanes and one right-turn lane
Southbound approach: (Stanton-Christiana Road) one left-turn lane, three through lanes and one right-turn lane
Eastbound approach: (SR 7 Frontage Road) one shared through/left-turn lane and one right-turn lane
Westbound approach: (AAA Boulevard) one exclusive left-turn lane and one shared left/through/right-turn lane with channelized right-turn movement

- 6) **Ogletown-Stanton Road (SR 4) & Stanton-Christiana Road (SR 7)**
Type of Control: signalized four-leg intersection
Northbound approach: (Stanton-Christiana Road) two left-turn lanes, three through lanes and one right-turn lane
Southbound approach: (Stanton-Christiana Road) one left-turn lane, three through lanes and one right-turn lane
Eastbound approach: (Ogletown-Stanton Road) three left-turn lanes, one through lane and one right-turn lane
Westbound approach: (JP Morgan Complex North Entrance) one exclusive left-turn lane, one shared through/left-turn lane, one exclusive through lane and one right-turn lane

- 7) **Ogletown-Stanton Road (SR 4) & Centurian Plaza**
Type of Control: two-way stop-controlled (four-leg intersection)
Northbound approach: (Centurian Plaza) one shared through/left-turn lane and one right-turn lane, stop controlled
Southbound approach: (Old Ogletown-Stanton Rd) one shared through/left-turn lane and one right-turn lane, stop controlled
Eastbound approach: (Ogletown-Stanton Road) one left-turn lane, two through lanes and one right-turn lane
Westbound approach: (Ogletown-Stanton Road) one left-turn lane, two through lanes, and one right-turn lane

- 8) **Stanton-Christiana Road (SR 7) & Old Stanton-Christiana Road**
Type of Control: signalized three-leg intersection
Northbound approach: (Stanton-Christiana Road) three through lanes and one right turn lane
Southbound approach: (Stanton-Christiana Road) one left-turn lane and three though lanes
Westbound approach: (Old Stanton-Christiana Road) one left-turn lane and one right turn lane

- 9) **AAA Boulevard & JP Morgan Complex Entrance**
Type of Control: two-way stop-controlled (T-intersection)
Northbound approach: (AAA Boulevard) one shared through/right-turn lane
Southbound approach: (AAA Boulevard) one shared through/left-turn lane
Westbound approach: (JP Morgan Complex Entrance) one shared left/right-turn lane, stop controlled
- 10) **AAA Boulevard & Delaware Tech West Parking Access**
Type of Control: all-way stop-controlled (T-intersection)
Southbound approach: (Delaware Tech Parking Access) one shared left/right-turn lane, stop controlled
Eastbound approach: (AAA Boulevard) one shared through/left-turn lane, stop controlled
Westbound approach: (AAA Boulevard) one shared through/right-turn lane, stop controlled
- 11) **Stanton-Christiana Road (SR 7) Southbound Ramp & Churchmans Road (SR 58)**
Type of Control: signalized four-leg intersection
Southbound approach: (SR 7 Southbound Ramp) one exclusive left-turn lane, one shared through/left-turn lane, one exclusive through lane, and one right-turn lane
Eastbound approach: (Churchmans Road) three through lanes and two right-turn lanes
Westbound approach: (Churchmans Road) two left-turn lanes and three through lanes
- 12) **Churchmans Road (SR 58) & Continental Drive**
Type of Control: signalized four-leg intersection
Northbound approach: (Continental Drive) one exclusive left-turn lane, one shared through/left-turn lane and one right-turn lane
Southbound approach: (Continental Drive) one exclusive left-turn lane and one shared left/through/right-turn lane
Eastbound approach: (Churchmans Road) one left-turn lane, three through lanes and one right-turn lane
Westbound approach: (Churchmans Road) two left-turn lanes, three through lanes and one right-turn lane
- 13) **Churchmans Road (SR 58) & SR 7 Northbound Ramp / Geoffrey Drive**
Type of Control: signalized four-leg intersection
Southbound approach: (SR 7 Northbound Ramp) one exclusive left-turn lane, one shared through/left-turn lane and one right-turn lane
Eastbound approach: (Churchmans Road) two left-turn lanes, two through lanes and one right-turn lane
Westbound approach: (Churchmans Road) one left-turn lane and three through lanes
Note: Geoffrey Drive is the south leg of the intersection. It is one-way southbound (heading away from Churchmans Road).

Safety Evaluation

Crash Data: TTG did not provide crash data or discuss safety in the TOA. The Churchmans Road intersections are covered by DelDOT's HEP 2006 Site E, and safety issues are addressed by DelDOT's Churchmans Road, Christiana Hospital to SR 1 project (Contract No. T200800702).

Sight Distance: With generally straight and flat roadways, sight distance is adequate throughout the study area. No problematic sight distance issues have been reported, and none were observed during field observations in the area.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: The Delaware Transit Corporation (DTC) currently operates five transit routes offering service near the proposed development. DART Routes 5 and 62 travel along Stanton-Christiana Road near the site. Route 5 has bus stops on each side of Stanton-Christiana Road just south of AAA Boulevard. The stop on the northbound side has a small shelter, while the stop on the southbound side has a concrete pad. Route 62 has a bus stop in the J.P. Morgan Center property east of AAA Boulevard (east of Stanton-Christiana Road). Route 5 connects Christiana Mall to Rodney Square with approximately 45 round trips each weekday, 25 round trips on Saturdays, and 9 round trips on Sundays. Route 62 connects Christiana Mall to Fairplay Station with 10 round trips each weekday (no weekend service). DART Routes 15, 33, and 63 travel along Churchmans Road just south of the SPCA site. Route 15 connects Christiana Mall to Rodney Square. Route 33 connects the Newark Transit Hub to Rodney Square. Routes 15 and 33 offer weekday and weekend service. Route 63 offers weekday service only between Christiana Mall and Fairplay Station.

Planned transit service: Mr. Wayne Henderson, a Service Development Planner for the DTC, provided comments on September 17, 2013 in which he requested that the internal pedestrian network connect to all buildings on the site and not simply terminate at the convenience store. This would likely benefit all modes, not just transit-based pedestrians. Mr. Henderson did not mention any planned changes to DTC's existing transit service in the area of the proposed site.

Existing bicycle and pedestrian facilities: According to the bicycle level of service (BLOS) calculator developed by the *League of Illinois Bicyclists*, the SR 7 Frontage Road operates at BLOS C and Stanton-Christiana Road operates at BLOS E. There are currently no designated bicycle lanes within the study area. There are no sidewalks along either the SR 7 Frontage Road or along Stanton-Christiana Road, except for short sections of sidewalk connecting bus stops to nearby crosswalks. There are existing sidewalk along the south side of Churchmans Road and the south side of Ogletown-Stanton Road. There are crosswalks at all the signalized intersections in the study area except at Old Stanton-Christiana Road.

Planned bicycle and pedestrian facilities: To be determined during site plan review process. On September 17, 2013, Wayne Henderson from DTC requested that the internal pedestrian network connect to all buildings on the site and not simply terminate at the convenience store. This would likely benefit all modes, not just transit-based pedestrians.

Previous Comments

All comments from DelDOT's Scoping Letter and Traffic Count Review were addressed in the Final TOA 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.
- There were no indications that the applicant contacted the Delaware Transit Corporation (DTC) for transit-related comments.

General Synchro Analysis Comments

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

- 1) For all intersections for existing conditions, the TOA generally assumed heavy vehicle (HV) percentages consistent with the traffic counts, with a few local exceptions. McCormick Taylor assumed existing HV to be consistent with the traffic counts. For future conditions, the TOA and McCormick Taylor assumed future HV to be the same as existing HV.
- 2) For existing conditions, the TOA and McCormick Taylor determined, for each intersection, overall intersection peak hour factors (PHF). For future conditions, the TOA and McCormick Taylor assumed future PHF to be either the same as existing PHF or 0.80, 0.88, or 0.92 (depending on total intersection volume per DelDOT's Subdivision Manual), whichever is higher.
- 3) For analyses of signalized intersections, the TOA and McCormick Taylor both used a base saturation flow rate of 1,900 pch/gpl because the study area is north of the C&D Canal.
- 4) The TOA and McCormick Taylor used different signal timings when analyzing the signalized intersections in some cases.

Table 3
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Unsignalized Intersection ¹ Two-Way Stop Control (T-intersection) ²	LOS per TOA		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
SR 7 Frontage Road & SR 7 Frontage Road				
2013 Existing (Case 1)				
Northbound Frontage Road	A (8.4)	A (8.5)	A (8.4)	A (8.5)
Southbound Frontage Road	N/A	B (10.0+)	N/A	B (10.4)
2015 without SPCA (Case 2A)				
Northbound Frontage Road	A (8.5)	A (8.8)	A (8.5)	A (8.8)
Southbound Frontage Road	B (13.8)	B (11.7)	B (14.8)	B (13.6)
2015 without SPCA (Case 2B)				
Northbound Frontage Road	N/A	N/A	A (8.5)	A (8.8)
Southbound Frontage Road	N/A	N/A	B (14.8)	B (13.6)

¹ 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.

² The existing intersection is two-way stop controlled, with stop-controlled northbound and southbound approaches and a free westbound movement.

Table 3 (continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Unsignalized Intersection ³ Three-Way Stop Control (4-leg intersection) ⁴	LOS per TOA ⁵		LOS per McCormick Taylor ⁵	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
SR 7 Frontage Road & SR 7 Frontage Road / North Site Access				
2015 with SPCA (Case 3A)				
Northbound Frontage Road	A (2.9)	F (86.4)	A (6.0)	F (216.4)
Southbound Frontage Road	E (43.9)	F (559.8)	F (65.6)	F (832.5)
Eastbound North Site Access	F (87.1)	F (547.8)	F (465.6)	F (5885)
2015 with SPCA (Case 3A) <i>With Improvement Option 1</i> ⁶				
Northbound Frontage Road	A (4.4)	C (17.7)	A (5.2)	D (28.7)
Southbound Frontage Road	B (14.9)	D (28.5)	A (9.8)	C (17.2)
Eastbound North Site Access	B (11.1)	D (30.5)	B (10.8)	D (27.1)
2015 with SPCA (Case 3B)				
Northbound Frontage Road	N/A	N/A	A (6.9)	F (181.9)
Southbound Frontage Road	N/A	N/A	F (67.7)	F (501.9)
Eastbound North Site Access	N/A	N/A	F (313.0)	F (4526)
2015 with SPCA (Case 3B) <i>With Improvement Option 1</i> ⁶				
Northbound Frontage Road	N/A	N/A	A (5.0)	C (21.9)
Southbound Frontage Road	N/A	N/A	B (10.2)	C (15.8)
Eastbound North Site Access	N/A	N/A	A (9.8)	D (30.6)

³ 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.

⁴ The proposed intersection is three-way stop controlled, with stop-controlled northbound, southbound, and eastbound approaches and a free westbound movement. The base configuration of the westbound approach for Case 3A and Case 3B is one shared through/left-turn lane and one right-turn lane.

⁵ Synchro is unable to analyze the three-way stop controlled configuration of Case 3A and 3B. Results shown are reported from SimTraffic. The TOA reported results from SimTraffic Version 8. McCormick Taylor reported results from SimTraffic Version 7.

⁶ Improvement Option 1 consists of converting the westbound approach to one shared left/through/right-turn lane and eliminating the channelization of the northbound and westbound right-turn movements. The analysis of Improvement Option 1 also includes improvements at the adjacent intersection of Stanton-Christiana Road & SR 7 Frontage Road / AAA Boulevard.

Table 4
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Unsignalized Intersection ⁷ Two-Way Stop Control (T-intersection)	LOS per TOA		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
SR 7 Frontage Rd & South Site Access				
2013 Existing (Case 1)				
Northbound Frontage Road - Left	N/A	N/A	N/A	N/A
Eastbound South Site Access	A (8.8)	A (9.0)	A (8.8)	A (9.0)
2015 without SPCA (Case 2A)				
Northbound Frontage Road - Left	N/A	N/A	N/A	N/A
Eastbound South Site Access	A (9.4)	A (9.6)	A (9.4)	A (9.7)
2015 without SPCA (Case 2B)				
Northbound Frontage Road - Left	N/A	N/A	N/A	N/A
Eastbound South Site Access	N/A	N/A	A (9.4)	A (9.7)
2015 with SPCA (Case 3A)				
Northbound Frontage Road - Left	A (0.9)	A (0.6)	A (0.9)	A (0.6)
Eastbound South Site Access	A (9.9)	B (10.1)	A (9.9)	B (10.1)
2015 with SPCA (Case 3B)				
Northbound Frontage Road - Left	N/A	N/A	A (0.9)	A (0.6)
Eastbound South Site Access	N/A	N/A	A (9.9)	B (10.1)

⁷ 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 5
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Unsignalized Intersection⁸ Two-Way Stop Control (T-intersection)	LOS per TOA	LOS per McCormick Taylor
SR 7 Frontage Rd & Border Café Access	Weekday PM	Weekday PM
2015 with SPCA (Case 3A)		
Northbound Frontage Rd – Left	A (7.6)	A (7.7)
Eastbound Border Café Access	A (8.7)	A (8.7)
2015 with SPCA (Case 3B)		
Northbound Frontage Rd – Left	N/A	A (7.7)
Eastbound Border Café Access	N/A	A (8.7)

⁸ 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 6
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Unsignalized Intersection⁹ Two-Way Stop Control (T-intersection)	LOS per TOA	LOS per McCormick Taylor
SR 7 Frontage Rd & Metro Business Park Site Entrance	Weekday PM	Weekday PM
2015 with SPCA (Case 3A)		
Northbound SR 7 Frontage Rd – Left	N/A	N/A
Eastbound Metro Business Park Access	A (9.3)	A (9.3)
2015 with SPCA (Case 3B)		
Northbound SR 7 Frontage Rd – Left	N/A	N/A
Eastbound Metro Business Park Access	N/A	A (9.3)

⁹ 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 7
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Signalized Intersection ¹⁰	LOS per TOA ¹¹		LOS per McCormick Taylor ¹¹	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Stanton-Christiana Rd (SR 7) & SR 7 Frontage Road / AAA Boulevard				
2013 Existing (Case 1) ¹²	B (18.7)	C (29.3)	B (19.9)	C (31.0)
2015 without SPCA (Case 2A)	C (27.3)	E (66.8)	C (27.8)	E (62.9)
2015 without SPCA (Case 2B)	N/A	N/A	C (28.4)	E (58.7)
2015 with SPCA (Case 3A)	D (37.9)	F (87.0)	D (37.3)	E (74.7)
2015 with SPCA (Case 3A) With Improvement Option 1 ¹³	C (30.7)	D (54.7)	C (32.2)	D (54.2)
2015 with SPCA (Case 3B)	N/A	N/A	D (38.3)	E (63.3)
2015 with SPCA (Case 3B) With Improvement Option 1 ¹³	N/A	N/A	C (32.7)	E (61.2)
2015 with SPCA (Case 3B) With Improvement Option 2 ¹⁴	N/A	N/A	C (32.5)	D (39.2)

¹⁰ 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.

¹¹ The TOA applied a base westbound configuration of one exclusive left-turn lane and one shared through/right-turn lane. Based on field observations, McCormick Taylor applied a base westbound configuration of one exclusive left-turn lane and one shared left/through/right-turn lane.

¹² For this intersection, per DelDOT's direction, McCormick Taylor's PM peak hour analyses of Case 1, Case 2B, Case 3B, and Case 3B with Improvement Option 2 conditions used April 2014 traffic count volumes as a base.

¹³ Improvement Option 1 consists of converting the eastbound approach to two exclusive left-turn lanes, one shared through/left-turn lane, and one right-turn lane, and extending the northbound left-turn lane to 600 feet in length. The westbound approach would have one exclusive left-turn lane and one shared left/through/right-turn lane.

¹⁴ Improvement Option 2 consists of Improvement Option 1 with the addition of a separate right-turn lane on the westbound approach, such that it would have one exclusive left-turn lane, one shared through/left-turn lane, and one right-turn lane.

Table 8
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Signalized Intersection ¹⁵	LOS per TOA	LOS per McCormick Taylor
Ogletown-Stanton Road (SR 4) & Stanton-Christiana Road (SR 7)	Weekday PM	Weekday PM
2015 with SPCA (Case 3A)	D (45.7)	D (45.3)
2015 with SPCA (Case 3B) ¹⁶	N/A	D (52.3)

¹⁵ 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.

¹⁶ For this intersection, per DelDOT's direction, McCormick Taylor's analysis of Case 3B conditions used April 2014 traffic count volumes as a base.

Table 9
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Unsignalized Intersection ¹⁷ Two-Way Stop Control	LOS per TOA	LOS per McCormick Taylor
Ogletown-Stanton Road (SR 4) & Centurian Plaza	Weekday PM	Weekday PM
2015 with SPCA (Case 3A)		
Northbound Centurian Plaza	F (450.6)	F (448.7)
Southbound Old Ogletown-Stanton Rd	F (720.0)	F (718.4)
Eastbound SR 4 – Left	A (9.8)	A (9.8)
Westbound SR 4 – Left	B (13.8)	B (13.7)
2015 with SPCA (Case 3B)		
Northbound Centurian Plaza	N/A	F (781.1)
Southbound Old Ogletown-Stanton Rd	N/A	F (*)
Eastbound SR 4 – Left	N/A	B (10.1)
Westbound SR 4 – Left	N/A	B (14.8)

* Due to excessive delay, Synchro does not report a result

Signalized Intersection ¹⁷	LOS per TOA	LOS per McCormick Taylor
Ogletown-Stanton Road (SR 4) & Centurian Plaza	Weekday PM	Weekday PM
2015 with SPCA (Case 3A)	N/A	C (21.9)
2015 with SPCA (Case 3B)	N/A	C (22.7)

¹⁷ 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 10
PEAK HOUR LEVELS OF SERVICE (LOS)
*based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.*

Signalized Intersection ¹⁸	LOS per TOA	LOS per McCormick Taylor
Stanton-Christiana Road (SR 7) & Old Stanton-Christiana Road	Weekday PM	Weekday PM
2015 with SPCA (Case 3A)	A (8.4)	A (5.8)
2015 with SPCA (Case 3B)	N/A	A (6.8)

¹⁸ 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 11
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Unsignalized Intersection ¹⁹ Two-Way Stop Control (T-intersection)	LOS per TOA	LOS per McCormick Taylor
AAA Boulevard & JP Morgan Complex Access	Weekday PM	Weekday PM
2015 with SPCA (Case 3A)		
Southbound AAA Boulevard – Left	A (2.1)	A (2.1)
Westbound JP Morgan Complex Access	B (12.1)	B (13.6)
2015 with SPCA (Case 3B)		
Southbound AAA Boulevard – Left	N/A	A (3.6)
Westbound JP Morgan Complex Access	N/A	C (17.1)

¹⁹ 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 12
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Unsignalized Intersection²⁰ All-Way Stop Control (T-intersection)	LOS per TOA	LOS per McCormick Taylor
AAA Boulevard & Delaware Tech West Parking Access	Weekday PM	Weekday PM
2015 with SPCA (Case 3A)		
Southbound Del Tech Access	A (8.4)	A (8.4)
Eastbound AAA Boulevard	B (10.2)	B (10.2)
Westbound AAA Boulevard	A (7.9)	A (7.9)
Overall Intersection	A (9.3)	A (9.3)
2015 with SPCA (Case 3B)		
Southbound Del Tech Access	N/A	A (8.5)
Eastbound AAA Boulevard	N/A	B (10.5)
Westbound AAA Boulevard	N/A	A (8.1)
Overall Intersection	N/A	A (9.5)

²⁰ 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 13
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Signalized Intersection ²¹	LOS per TOA	LOS per McCormick Taylor
Stanton-Christiana Road (SR 7) SB Ramp & Churchmans Road (SR 58) ²²	Weekday PM	Weekday PM
2015 with SPCA (Case 3A)	D (52.3)	C (32.3)
2015 with SPCA (Case 3A) With Improvement Option 1 ²³	D (41.7)	C (24.5)
2015 with SPCA (Case 3B)	N/A	E (67.3)
2015 with SPCA (Case 3B) With Improvement Option 1 ²³	N/A	C (31.8)

²¹ 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.

²² The TOA and McCormick Taylor analyzed the intersection configuration and signal phasing/timings as they existed when traffic counts were conducted in February 2013. Analysis does not reflect changes that were made in August 2013 due to the temporary closure of the adjacent southbound SR 7 overpass that forced all southbound through traffic to pass through this signalized intersection until southbound SR 7 was reopened in November 2013.

²³ Improvement Option 1 is consistent with DelDOT's Churchmans Road, Christiana Hospital to SR 1 project (Contract No. T200800702). At this intersection, this project consists of modifying the SR 7 SB Ramp approach to convert the right-most through lane to a shared through/right-turn lane that would be used by traffic heading to Continental Drive, thereby eliminating the existing weave. The westbound left-turn lanes approaching Continental Drive will be extended all the way to the SR 7 SB Ramp intersection. Traffic in the southbound SR 7 Ramp free-right turn lane would be limited to motorists continuing west on Churchmans Road past Continental Drive (or turning into an entrance on the north side of Churchmans Road). The eastbound Churchmans Road approach will include a third right-turn lane onto the ramp leading to I-95 and SR 1, such that the eastbound approach will consist of two exclusive through lanes, one shared through/right-turn lane, and two exclusive right-turn lanes.

Table 14
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Signalized Intersection ²⁴	LOS per TOA	LOS per McCormick Taylor
Churchmans Road (SR 58) & Continental Drive	Weekday PM	Weekday PM
2015 with SPCA (Case 3A)	D (51.2)	F (84.2)
2015 with SPCA (Case 3A) <i>With Improvement Option 1</i> ²⁵	N/A	D (54.2)
2015 with SPCA (Case 3B)	N/A	F (167.4)
2015 with SPCA (Case 3B) <i>With Improvement Option 1</i> ²⁵	N/A	F (130.2)
2015 with SPCA (Case 3B) <i>With Improvement Option 2</i> ²⁶	D (52.9)	D (51.7)

²⁴ 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.

²⁵ Improvement Option 1 is consistent with plans for DelDOT's Churchmans Road, Christiana Hospital to SR 1 project (Contract No. T200800702) as of June 2014. Under those plans, which have since been replaced by a newer design, this project includes extending the westbound Churchmans Road left-turn lanes to the upstream signal and setting the northbound Continental Drive right-turn movement as yield-controlled.

²⁶ Improvement Option 2 is consistent with plans for DelDOT's Churchmans Road, Christiana Hospital to SR 1 project (Contract No. T200800702) **as of late October 2014**. Under the latest version of those plans, this project includes extending the westbound Churchmans Road left-turn lanes to the upstream signal and adding a second right-turn lane on the northbound Continental Drive approach (that movement would be signal-controlled). TTG's analysis of this improvement option was provided in the Supplemental Traffic Analysis dated October 30, 2014.

Table 15
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Operational Analysis for Delaware SPCA
Report dated September 10, 2013
Prepared by The Traffic Group, Inc.

Signalized Intersection ²⁷	LOS per TOA	LOS per McCormick Taylor
Churchmans Road (SR 58) & SR 7 NB Ramp / Geoffrey Drive	Weekday PM	Weekday PM
2015 with SPCA (Case 3A)	C (22.1)	B (15.7)
2015 with SPCA (Case 3B)	N/A	B (18.4)

²⁷ 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.