



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

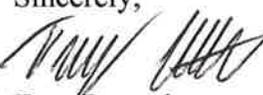
JENNIFER COHAN
SECRETARY

April 18, 2016

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

Dear Mr. Hughes:

The enclosed Traffic Impact Study (TIS) review letter for the **Love Creek Elementary School** (Tax Parcel 334-12.00-45.01) has been completed under the responsible charge of a registered professional engineer whose firm is authorized to work in the State of Delaware. They have found the TIS to conform to DelDOT's Development Coordination Manual and other accepted practices and procedures for such studies. DelDOT accepts this review letter and concurs with the recommendations. If you have any questions concerning this letter or the enclosed review letter, please contact me at (302) 760-2167.

Sincerely,

Troy Brestel
Project Engineer

TEB:km

Enclosures

cc with enclosures: Mr. Zachary Crouch, Davis, Bowen & Friedel, Inc.
Ms. Constance C. Holland, Office of State Planning Coordination
Mr. Lawrence Lank, Sussex County Planning and Zoning
Ms. Janelle Cornwell, Sussex County Planning and Zoning
Mr. Andrew Parker, McCormick Taylor, Inc.
DelDOT Distribution

DelDOT Distribution

Annie Cordo, Deputy Attorney General

Robert McCleary, Director, Transportation Solutions (DOTS)

Drew Boyce, Director, Planning

Mark Luszczyk, Chief Traffic Engineer, Traffic, DOTS

Michael Simmons, Assistant Director, Project Development South, DOTS

J. Marc Coté, Assistant Director, Development Coordination

T. William Brockenbrough, Jr., County Coordinator, Development Coordination

Peter Haag, Traffic Studies Manager, Traffic, DOTS

Alastair Probert, South District Engineer, South District

Gomez Norwood, South District Public Works Manager, South District

David Dooley, Service Development Planner, Delaware Transit Corporation

Steven Sisson, Sussex Subdivision Coordinator, Development Coordination

Scott Johnson, Sussex Subdivision Manager, Development Coordination

Brian Clarke, Sussex Traffic Engineer, Traffic, DOTS

Anthony Aglio, Planning Supervisor, Statewide & Regional Planning

Claudy Joinville, Project Engineer, Development Coordination



April 18, 2016

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

RE: Agreement No. 1655
Traffic Impact Study Services
Task No. 1 Subtask 15A – Love Creek Elementary School

Dear Mr. Brestel:

McCormick Taylor has completed its review of the Traffic Impact Study (TIS) for the Love Creek Elementary School prepared by Davis, Bowen & Friedel, Inc. (DBF), dated January 2016. This review was assigned as Task Number 1 (Subtask 15A). DBF prepared the report in a manner generally consistent with DelDOT's *Development Coordination Manual*.

The TIS evaluates the impacts of the Love Creek Elementary School (LCES) development, proposed to be located on the west side of Delaware Route 24 (John J. Williams Highway / Sussex Road 24), just south of Mulberry Knoll Road (Sussex Road 284) in Sussex County, Delaware. The proposed development consists of a 720-student elementary school on approximately 25.25 acres of land. One full signalized access point is proposed on Delaware Route 24, directly across from Beacon Middle School. A restricted access point is also proposed for emergency access to/from Mulberry Knoll Road via an interconnection to the proposed Delaware State Police Troop 7 facility. Construction is anticipated to be complete by 2017.

The land is currently zoned as AR-1 (Agricultural Residential) with a Conditional Use for the school in Sussex County, and no rezoning is needed to permit the proposed use. The Conditional Use for the elementary school was approved by Sussex County Council on June 16, 2015.

DelDOT currently has four relevant projects in the study area. The first project is the Cedar Grove/Postal Lane Intersection Realignment Project at Plantation Road, which was recently completed and opened to traffic. Prior to this project, Postal Lane (Sussex Road 283) intersected Plantation Road (Sussex Road 275) approximately 150' north of the intersection with Cedar Grove Road (also Sussex Road 283). This project realigned the two offset stop-controlled T-intersections to create one four-leg intersection controlled by a traffic signal. The project included separate left-turn, through and right-turn lanes on each leg of the intersection, bicycle lanes, sidewalks, and street lighting. Construction of this project was completed in early 2015.

The next two projects described below involve improvements on Delaware Route 24, with one project from Love Creek to Mulberry Knoll Road and the other from Mulberry Knoll Road to Delaware Route 1 (Sussex Road 14).



The SR 24, Mulberry Knoll Road to SR 1 Improvement Project (State Contract No. T200411209) involves the widening of Delaware Route 24 to facilitate the continuation of the existing four-lane section with auxiliary turn lanes to west of Plantation Road, where it will tie in to the existing roadway section. The southbound Plantation Road approach and northbound Warrington Road approach will also be widened to provide one left turn-lane, one shared through/left-turn lane, one through lane, and one right-turn lane on each approach. The project also includes the addition of a third left-turn lane on the eastbound approach of Delaware Route 24 at the Delaware Route 1 intersection. For this project, preliminary engineering is complete, right-of-way acquisition is currently underway, and construction is funded for FY 18 and 19.

The SR 24, Love Creek Bridge to Mulberry Knoll Road Improvements Project (State Contract No. T201212201) consists of safety and operational improvements on Delaware Route 24, including but not limited to the addition of separate left-turn lanes along the Delaware Route 24 approaches to the Mulberry Knoll Road intersection, turn lane modifications at the Beacon Middle School entrance, and adding bike lanes in along some sections. Earlier versions of this project had included widening Delaware Route 24 to include two through lanes in each direction, but the widening is no longer proposed. Based on previous traffic studies at the Mulberry Knoll Road intersection, DelDOT has determined that a traffic signal is not warranted at this time and a signal is not included as part of the DelDOT improvements project. This project is currently in the conceptual design phase with right-of-way acquisition funded for FY 18 and 19 and construction funded for FY 20 and 21.

The Plantation Road Improvements, SR 24 to US 9 Project (State Contract No. T20111201) will provide operational improvements along Plantation Road from Delaware Route 24 to US Route 9. The project will include adding and modifying turn lanes, bypass lanes, and various intersection improvements and safety improvements. The preliminary engineering phase is scheduled to begin in FY 17 with construction to begin in FY 22 at the earliest.

In addition, a School Zone MUTCD Compliance Review was conducted by DelDOT for the Beacon Middle School. The study assessed the existing traffic control devices to determine if the school zone complies with the new requirements contained in the latest version of the Delaware MUTCD. The findings were compiled in a report dated July 2013, and the recommendations are limited to minor signing and striping modifications / upgrades.



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 24 & Beacon Middle School / Site Access	Signalized	2014 Existing AM (Case 1); 2014 AM without and with Love Creek Elementary (Case 2 & 3)
Delaware Route 24 & Mulberry Knoll Road	Unsignalized	2014 Existing AM & PM (Case 1); 2017 AM & PM without and with Love Creek Elementary (Case 2 & 3); 2020 AM & PM with Love Creek Elementary and DelDOT Improvements (Case 3)
Delaware Route 24 & Plantation Road / Warrington Road	Signalized	2017 PM without and with Love Creek Elementary (Case 2 & 3)

The existing signalized intersection at Delaware Route 24 and Beacon Middle School exhibits LOS deficiencies during the existing AM peak hour, and will continue to exhibit LOS deficiencies for future AM peak hour conditions when the LCES site access is constructed opposite Beacon Middle School. The existing middle school on the south side of Delaware Route 24 starts at 7:55 AM, which coincides with the 7:30-8:30 AM peak hour of Delaware Route 24. The eastbound direction of Delaware Route 24 experiences long delays during the AM peak hour due largely to the heavy volume of commuter traffic headed towards the SR 1 corridor. Westbound Delaware Route 24 left turns into Beacon Middle School must compete with the high-volume eastbound through movement for green time, which results in lengthy delays and queues for westbound left turns and eastbound through traffic. The TIS conducted initial queue measurements on three different mornings, with the eastbound Delaware Route 24 queue at times extending more than one mile from the Beacon Middle School intersection.

The existing conditions described above have been a concern for many years and have been a focus of DelDOT studies and planned improvements including DelDOT's SR 24, Love Creek Bridge to Mulberry Knoll Road Improvements Project. While that project previously included widening of Delaware Route 24 to provide a second through lane in each direction, it no longer does. As a result, the existing LOS deficiencies would continue into the future with or without LCES. As such, for the intersection of Delaware Route 24 and Beacon Middle School / LCES Site Access, we do not recommend any further improvements be implemented by the developer beyond those described below in Item Nos. 1 and 2. The lane configuration and signal phasing of the proposed LCES Site Access intersection has been coordinated with DelDOT's Traffic Section and reflected in the signal plan approved in March 2016.

The unsignalized intersection of Delaware Route 24 and Mulberry Knoll Road exhibits LOS deficiencies during existing and future conditions, even with the improvements planned as part



of DelDOT's SR 24, Love Creek to Mulberry Knoll Road Improvements Project. These planned improvements consist of adding separate left-turn lanes on the Delaware Route 24 approaches. With the planned improvements, the anticipated LOS deficiencies would continue to occur on the relatively low-volume northbound and southbound Mulberry Knoll Road approaches. Under future conditions with LCES, the anticipated 95th percentile queue lengths on Mulberry Knoll Road are less than 50 feet on the northbound approach and less than 150 feet on the southbound approach during both the weekday AM and PM peak hours.

Based on previous traffic studies at the intersection of Delaware Route 24 and Mulberry Knoll Road, DelDOT determined that a traffic signal was not warranted at this intersection and as such one was not included as part of the SR 24, Love Creek to Mulberry Knoll Road Improvements Project. To address the side street LOS deficiencies at this intersection, a traffic signal could be installed in the future once the appropriate warrants are met as demonstrated through a Traffic Signal Justification Study. Belle Terre, a proposed residential development that would be located west of Mulberry Knoll Road and north of Delaware Route 24 (north of the LCES site), would add a substantial amount of traffic to the intersection of Delaware Route 24 and Mulberry Knoll Road, particularly on the southbound Mulberry Knoll approach. Delays on that approach would increase significantly if a signal is not installed when Belle Terre is constructed. As currently proposed, the Belle Terre development would be completed no sooner than 2023 – six years after the expected opening date of the proposed LCES. As such, it is anticipated that a signal might eventually be installed at this intersection, but not until several years after LCES is open to students.

It is also noted that due to anticipated shifts in travel patterns associated with reassigning students from Rehoboth Elementary School and Shields Elementary School to LCES, the proposed new elementary school would contribute a relatively low amount of traffic to the intersection of Delaware Route 24 and Mulberry Knoll Road. Net new traffic volume attributed to LCES would represent approximately only 3% of the total future peak hour volume passing through the intersection. Considering all the factors described above, we do not recommend any improvements be implemented by the LCES developer at the intersection of Delaware Route 24 and Mulberry Knoll Road.

The signalized intersection of Delaware Route 24 and Plantation Road/Warrington Road exhibits LOS deficiencies during future conditions without and with LCES during the PM peak hour. Acceptable LOS would be achieved for all future cases with the improvements planned as part of DelDOT's SR 24, Mulberry Knoll Road to SR 1 Project. These planned improvements include the addition of a second through lane along both directions of Delaware Route 24 and the addition of a shared through/left-turn lane on both the northbound Warrington Road approach and the southbound Plantation Road approach. The SR 24, Mulberry Knoll Road to SR 1 Project is funded for construction in FY 18 and 19. Because this intersection will be sufficiently improved by the DelDOT project, and because LCES wouldn't add much net new volume to this intersection due to shifts in travel patterns associated with reassigning students from Rehoboth Elementary School and Shields Elementary School to LCES, we do not recommend that any improvements be implemented at this intersection by the developer of LCES.



Should the County choose to approve the proposed development, the following items should be 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 site access along Delaware Route 24, converting the site access from a three-leg signalized intersection to a four-leg signalized intersection. This entrance driveway should be located directly opposite the existing access to Beacon Middle School. The proposed configuration is shown in the table below, which is consistent with the signal plan approved by DelDOT's Traffic Section in March 2016 for the proposed four-leg intersection.

Approach	Current Configuration	Proposed Configuration
Northbound Beacon Middle School	One left-turn lane and one right-turn lane	One shared through/left-turn lane and one right-turn lane
Southbound LCES Site Access	Approach does not exist	One shared through/left-turn lane and one right-turn lane
Eastbound Delaware Route 24	One through lane and one right-turn lane	One left-turn lane, one through lane and one right-turn lane
Westbound Delaware Route 24	One left-turn lane and one through lane	One left-turn lane, one through 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 Development Coordination Section to determine final turn-lane lengths during the site plan review process.

Approach	Left-Turn Lane	Right-Turn Lane
Northbound Beacon Middle School	N/A	215 feet*
Southbound LCES Site Access	N/A	150 feet*
Eastbound Delaware Route 24	260 feet **	100 feet ***
Westbound Delaware Route 24	620 feet ***	296 feet ****

- * turn-lane length based on storage length per queuing analysis
- ** turn-lane length as proposed in the TIS, maximized based on available ROW. This length exceeds anticipated left-turn lane queue lengths based on analysis.
- *** turn-lane length per concept plans for DelDOT's *SR 24, Love Creek Bridge to Mulberry Knoll Road Improvements Project*. This length exceeds anticipated queue lengths based on analysis.
- **** turn-lane length as proposed in the TIS. This length exceeds the required 290' turn-lane length per DelDOT's *Auxiliary Lane Worksheet*



2. The developer should finalize the traffic signal agreement with DelDOT for the intersection of Delaware Route 24 and Beacon Middle School / Proposed Site Access. The agreement will cover signal adjustments required by the physical improvements described in Item No. 1, which are consistent with the signal plan approved by DelDOT's Traffic Section in March 2016 for the proposed four-leg intersection. The agreement should include pedestrian signals and crosswalks, along with other equipment and features at DelDOT's discretion. In particular, this signal will include two pedestrian crosswalks – one crossing the north leg (the LCES Site Access) and one crossing the east leg (Delaware Route 24). Both crosswalks must include countdown pedestrian signals and pushbuttons along with ADA-compliant curb ramps. The developer is responsible for constructing and implementing the necessary traffic signal modifications, and should continue to coordinate with DelDOT in this regard.
3. The developer should construct a vehicular connection leading to the proposed driveway on the future Delaware State Police Troop 7 site (adjacent property). The future DSP Troop 7 driveway will connect to Mulberry Knoll Road. This vehicular connection between the LCES and the DSP site would have restricted/gated access, intended only to provide LCES with emergency access and custodial staff access to/from Mulberry Knoll Road. The developer should coordinate with DelDOT's Subdivision Section to determine design details for this restricted access vehicular connection.
4. School zone signing and pavement markings on the road network surrounding the proposed school should be updated per the *2012 Delaware MUTCD*.
5. As proposed in the TIS, the Cape Henlopen School District should stagger the start times of the existing Beacon Middle School and the proposed LCES by one hour, with one school starting at approximately 7:15 AM and the other starting at approximately 8:15 AM. These start times would also serve to have the heaviest school-related traffic volumes turning to and from the site access driveways occur outside of the highest commuter traffic time period along eastbound Delaware Route 24.
6. The following bicycle, pedestrian, and transit improvements should be included:
 - a. A right-turn yield to bikes sign (MUTCD R4-4) should be added at the start of the right-turn lane on westbound Delaware Route 24 at the site entrance
 - b. Adjacent to the right-turn lane along westbound Delaware Route 24 at the site entrance, a minimum of a five-foot bicycle lane should be dedicated and striped with appropriate markings for bicyclists through the turn lane in order to facilitate safe and unimpeded bicycle travel.
 - c. Appropriate bicycle symbols, directional arrows, striping (including stop bars), and signing should be included along bicycle facilities and right-turn lanes within the project limits.
 - d. Utility covers should be made flush with the pavement.



- e. Bike parking should be provided near the school entrance(s). Where the building architecture provides for an awning or other overhang, the bike parking should be covered.
- f. A minimum 15-foot wide easement from the edge of the right-of-way should be dedicated to DelDOT within the site frontage along Delaware Route 24. Within the easement along Delaware Route 24, a minimum of a ten-foot wide shared-use path that meets current AASHTO and ADA standards should be constructed along the site frontage. The shared-use path should have a minimum of a five-foot buffer from the roadway. The shared-use path should connect to the shoulder of Delaware Route 24 in accordance with DelDOT's *Shared Use Path and/or Sidewalk Termination Policy* dated June 19, 2014.
- g. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances. Type 3 curb ramps are discouraged.
- h. 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 five 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 proposed frontage shared-use path and to the proposed Delaware Transit Corporation (DTC) bus stop on Delaware Route 24.
- i. Where internal sidewalks are located alongside of parking spaces, a buffer should be added to eliminate vehicular overhang onto the sidewalk.
- j. ADA compliant curb ramps and crosswalks should be provided at all pedestrian crossings, including all site entrances. Type 3 curb ramps are discouraged.
- k. The developer should install crosswalks along the east leg and north leg of the signalized intersection of Delaware Route 24 and the proposed site access/Beacon Middle School, including pedestrian-actuated countdown signals and ADA-compliant curb ramps.
- l. The developer should coordinate with DelDOT and the adjacent developers of the adjacent Belle Terre and Saddle Ridge residential developments regarding the potential for direct pedestrian/bicycle connections between those developments and the proposed elementary school.
- m. The developer should coordinate with the DTC regarding the addition of an ADA-compliant bus stop waiting pad along Delaware Route 24 at the east end of the site frontage near the location where the proposed shared-use path would connect to the shoulder. An internal sidewalk should connect the proposed bus stop waiting pad on Delaware Route 24 to the main entrance of the school building. The developer should coordinate with the DTC regarding the details and implementation of the transit-related improvements.

Improvements in this TIS may be considered “significant” under DelDOT’s *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DelDOT’s website at http://www.deldot.gov/information/pubs_forms/manuals/de_mutcd/index.shtml. For any additional information regarding the work zone impact and mitigation procedures during



construction please contact Mr. Adam Weiser of 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 Development Coordination review process.

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

Sincerely,

McCormick Taylor, Inc.

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 2016

Prepared by: Davis, Bowen & Friedel, Inc. (DBF)

Prepared for: Tetra Tech Architects & Engineers on behalf of Cape Henlopen School District

Tax parcel: 334-12.00-45.01

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

Project Description and Background

Description: The proposed Love Creek Elementary School (LCES) would accommodate a total of 720 students.

Location: The LCES is proposed to be located on the west side of Delaware Route 24 (John J. Williams Highway / Sussex Road 24), just south of Mulberry Knoll Road (Sussex Road 284) in Sussex County, Delaware. A site location map is included on Page 10.

Amount of land to be developed: approximately 25.25 acres of land

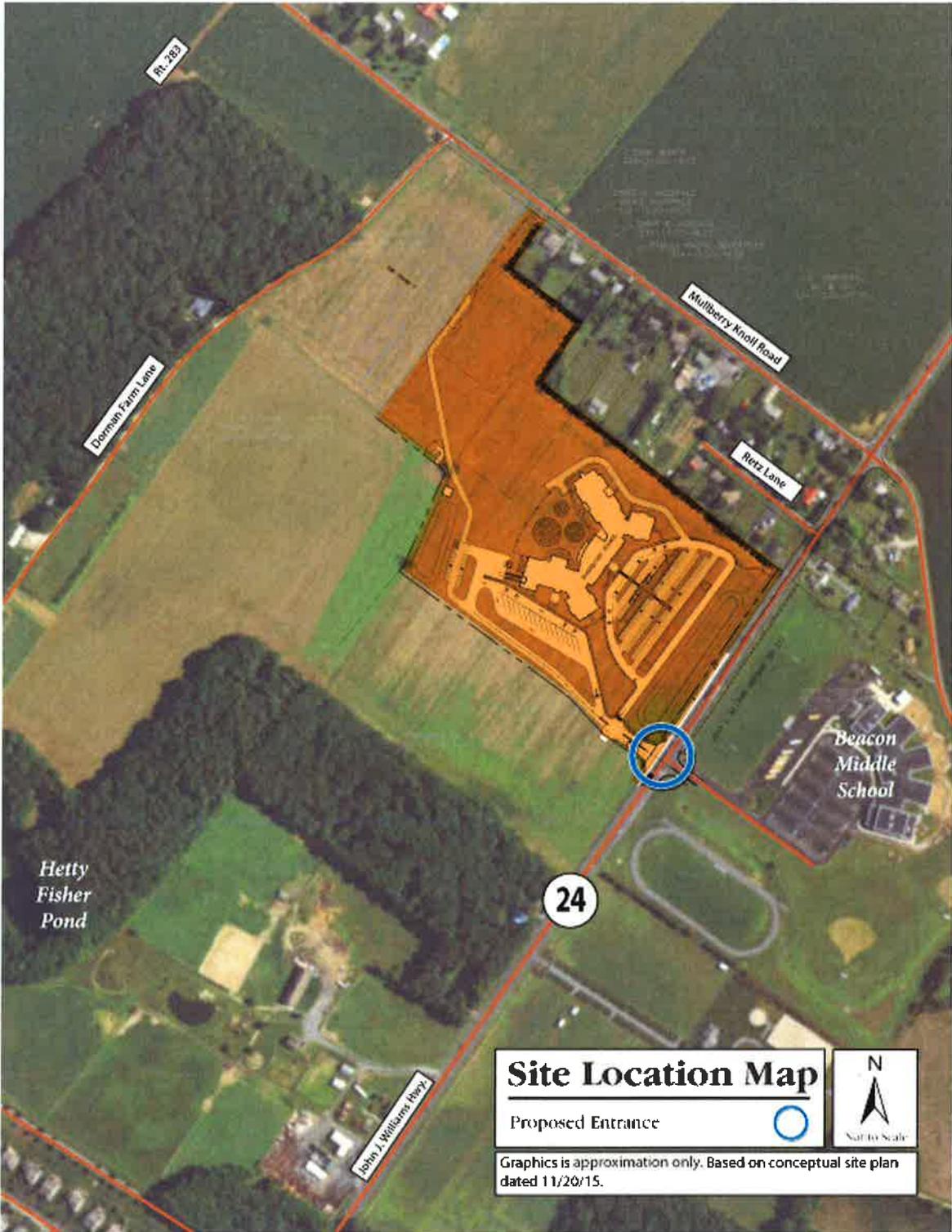
Land use approval(s) needed: The land is currently zoned as AR-1 (Agricultural Residential) with a Conditional Use for the school in Sussex County, and no rezoning is needed to permit the proposed use. Sussex County Council approved the Conditional Use for the school on June 16, 2015.

Proposed completion date: 2017

Proposed access locations: One full signalized access point is proposed on Delaware Route 24, directly across from Beacon Middle School. A restricted access point is also proposed for emergency access to/from Mulberry Knoll Road via an interconnection to the proposed Delaware State Police Troop 7 facility.

Daily Traffic Volumes (per DelDOT Traffic Summary 2014):

- 2014 Average Annual Daily Traffic on Delaware Route 24: 18,401 vpd



2015 Delaware Strategies for State Policies and Spending

Location with respect to the Strategies for State Policies and Spending Map of Delaware:
The proposed Love Creek Elementary School is located within an Investment Level 2 area.

Investment Level 2

Investment Level 2 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.

It is the goal of the state Delaware Department of Education (DOE) to direct new school construction to areas that will integrate school facilities within communities. The DOE recognizes the integral role of educational facilities within communities. As such, the DOE seeks to ensure that residential growth that generates additional demand on educational facilities is managed and planned with adequate educational infrastructure in mind. This includes transportation-system connections and availability to support multimodal access within the community, to include but not limited to, walking paths, bike paths, and safe pedestrian grade crossings.

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

The proposed Love Creek Elementary School is located within an Investment Level 2 area, and is to be developed as a 720-student elementary school. This type of development is consistent with the character of Investment Level 2 areas, which promotes smart development in transition areas such as this. The *Strategies* document generally encourages the construction of schools and other community/public facilities where existing and planned development is located. Assuming the planning and construction of the school takes into account pedestrian and bicycle facilities and connections to nearby developable parcels, the proposed development appears to generally comply with the policies stated in the 2015 "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 in within the Environmentally Sensitive Developing Area (categorized as a Growth Area).

Growth Areas, including the Environmentally Sensitive Developing Area, are designed to accommodate concentrated levels of development. The Environmentally Sensitive Developing Area has been designated by Sussex County for large areas around Rehoboth Bay, Indian River

Bay, and Little Assawoman Bay (the inland bays). This designation recognizes two characteristics of these areas. First, these regions are among the most desirable locations in Sussex County for new housing, as reflected in new construction data and real estate prices. Second, these regions contain ecologically important wetlands and other coastal lands that help absorb floodwaters and provide extensive habitat for native flora and fauna. These areas also have great impacts upon the water quality of the bays and inlets and upon natural habitats.

The challenge in these regions is to safeguard genuine natural areas and mitigate roadway congestion without stifling the tourism and real estate markets that: a) provide many jobs; b) create business for local entrepreneurs; and c) help keep local tax rates reasonable. The County has major initiatives to extend public sewer service to replace failing on-site systems in many of these areas. Very careful control of stormwater runoff is an extremely important concern to keep sediment and other pollutants out of the inland bays.

The following major guidelines should apply to future growth in Environmentally Sensitive Developing Areas:

Permitted Uses – Environmentally Sensitive Developing Areas are areas that can accommodate development provided special environmental concerns are addressed. A range of housing types should be permitted in Environmentally Sensitive Areas, including single-family homes, townhouses and multi-family units. Retail and office uses are appropriate but larger shopping centers and office parks should be confined to selected locations with access to arterial roads. Careful mixtures of homes with light commercial and institutional uses can be appropriate to provide for convenient services and to allow people to work close to home. Major new industrial uses are not proposed in these areas. Industrial zones are regulated by the Delaware Coastal Zone Act, which restrict heavy industry and bulk transfer.

Densities – The Environmentally Sensitive Developing Areas function as an “overlay” area to several underlying zoning districts. It may be advisable for legal reasons to convert this overlay area into regular zoning districts, while maintaining the current standards. Most of the Environmental Sensitive Developing Areas should continue to allow 2 homes per acre. The option should exist to go up to 4 units per acre if the developer uses optional density bonuses. Smaller lots and flexibility in dimensional standards should be allowed if the developer uses a cluster option that results in permanent preservation of a substantial percentage of the tract.

The County may also consider an additional layer of protection in the Environmentally Sensitive Developing Areas. Tidal wetland area could be subtracted from the total tract size so that “net” tract size is used as the basis for calculating how much development is allowed.

All applicants for developments of a minimum size (as specified in zoning) should continue to be required to provide information that analyzes the development’s potential environmental impacts, including effects on stormwater runoff, nitrogen and phosphorous loading, wetlands, woodlands, wastewater treatment, water systems, and other matters that affect the ecological sensitivity of the inland bays.

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

Proposed Development's Compatibility with Comprehensive Plan: The proposed Love Creek Elementary School is planned to be developed as a 720-student elementary school on approximately 25.25 acres of land. The proposed school appears to comply with the characteristics of Growth Areas in general as well as the *Permitted Uses* for the Environmentally Sensitive Developing Area. The school is located on the major east-west corridor of Delaware Route 24, which continues to experience steady development - characteristic of growth areas and developing areas as described in the Comprehensive Plan. As more residential developments are built along the Delaware Route 24 corridor, a need for additional schools will arise. The location of the proposed LCES is ideal since there is no existing elementary school in the southwestern area of the school district, and a goal of the comprehensive plan is to direct development to area with existing or planned community services, such as schools.

The site is currently zoned AR-1 (Agricultural Residential) with a Conditional Use for the school in Sussex County, and no rezoning is needed to permit the proposed use. Sussex County Council approved the Conditional Use for the school on June 16, 2015. The proposed development therefore fits Sussex County's existing and future land use plan and generally complies with the County's Comprehensive Plan.

Relevant Projects in the DelDOT Capital Transportation Program

DelDOT currently has four relevant projects in the study area. The first project is the Cedar Grove/Postal Lane Intersection Realignment Project at Plantation Road, which was recently completed and opened to traffic. Prior to this project, Postal Lane (Sussex Road 283) intersected Plantation Road (Sussex Road 275) approximately 150' north of the intersection with Cedar Grove Road (also Sussex Road 283). This project realigned the two offset stop-controlled T-intersections to create one four-leg intersection controlled by a traffic signal. The project included separate left-turn, through and right-turn lanes on each leg of the intersection, bicycle lanes, sidewalks, and street lighting. Construction of this project was completed in early 2015.

The next two projects described below involve improvements on Delaware Route 24, with one project from Love Creek to Mulberry Knoll Road and the other from Mulberry Knoll Road to Delaware Route 1 (Sussex Road 14).

The SR 24, Mulberry Knoll Road to SR 1 Improvement Project (State Contract No. T200411209) involves the widening of Delaware Route 24 to facilitate the continuation of the existing four-lane section with auxiliary turn lanes to west of Plantation Road, where it will tie in to the existing roadway section. The southbound Plantation Road approach and northbound Warrington Road approach will also be widened to provide one left turn-lane, one shared through/left-turn lane, one through lane, and one right-turn lane on each approach. The project also includes the addition of a third left-turn lane on the eastbound approach of Delaware Route 24 at the Delaware Route 1 intersection. For this project, preliminary engineering is complete, right-of-way acquisition is currently underway, and construction is funded for FY 18 and 19.

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In addition, a School Zone MUTCD Compliance Review was conducted by DelDOT for the Beacon Middle School. The study assessed the existing traffic control devices to determine if the school zone complies with the new requirements contained in the latest version of the Delaware MUTCD. The findings were compiled in a report dated July 2013, and the recommendations are limited to minor signing and striping modifications / upgrades.

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, which represents the maximum build-out potential:

- 720-student Elementary School (ITE Land Use Code 520)

Table 1
LOVE CREEK ELEMENTARY SCHOOL PEAK HOUR TRIP GENERATION

Land Use	Weekday AM Peak Hour			Weekday PM Peak Hour		
	In	Out	Total	In	Out	Total
720-student elementary school	178	146	324	99	103	202
TOTAL TRIPS	178	146	324	99	103	202

Table 2
LOVE CREEK ELEMENTARY SCHOOL DAILY TRIP GENERATION

Land Use	Weekday ADT		
	In	Out	Total
720-student elementary school	465	465	930
TOTAL TRIPS	465	465	930

Overview of TIS

Intersections examined:

- 1) Delaware Route 24 & Beacon Middle School / Proposed Site Access
- 2) Delaware Route 24 & Mulberry Knoll Road
- 3) Delaware Route 24 & Plantation Road / Warrington Road
- 4) Plantation Road & Cedar Grove Road / Postal Lane

Conditions examined:

- 1) 2014 existing conditions (Case 1)
- 2) 2017 without Love Creek Elementary School (Case 2)
- 3) 2017 with Love Creek Elementary School (Case 3)

Peak hours evaluated: Weekday morning and evening peak hours

Committed developments considered:

- 1) Delaware State Police (DSP) Troop 7 (relocating from Delaware Route 1 location)
- 2) Saddle Ridge a.k.a. Windswept (81 single-family detached homes)
- 3) Love Creek Marina (existing 59-slip marina with public boat launch, an improved marina office with associated marina retail sales replacing the existing retail boat sales, 153 townhouses/condos, a 100-room extended stay hotel and a 7,500 square-foot restaurant)
- 4) Redden Ridge (84 single-family detached homes)
- 5) Pelican Landing (105,500 square-foot shopping center, 5,000 square-foot fast-food restaurant with drive-through)
- 6) Residual 22 acres per sales contract (assumes 44 single-family detached homes)

Intersection Descriptions

- 1) **Delaware Route 24 & Beacon Middle School / Proposed Site Access**
Type of Control: existing signalized three-leg intersection; proposed signalized four-leg intersection
Northbound approach: (Beacon Middle School) existing one left-turn lane and one right-turn lane; proposed one shared through/left-turn lane and one right-turn lane
Southbound approach: (Proposed Site Access) proposed one shared through/left-turn lane and one right-turn lane
Eastbound approach: (DE Route 24) existing one through lane and one right-turn lane; proposed one left-turn lane, one through lane and one right-turn lane
Westbound approach: (DE Route 24) existing one left-turn lane and one through lane; proposed one left-turn lane, one through lane and one right-turn lane

- 2) **Delaware Route 24 & Mulberry Knoll Road**
Type of Control: two-way stop-controlled (four-leg intersection)
Northbound approach: (Mulberry Knoll Road) one shared left/through/right-turn lane, stop-controlled
Southbound approach: (Mulberry Knoll Road) one shared left/through/right-turn lane, stop-controlled
Eastbound approach: (DE Route 24) one shared through/left-turn lane and one right-turn lane
Westbound approach: (DE Route 24) one shared through/left-turn lane and one right-turn lane

- 3) **Delaware Route 24 & Plantation Road / Warrington Road**
Type of Control: signalized four-leg intersection
Northbound approach: (Warrington Road) one left-turn lane, one through lane, and one right-turn lane
Southbound approach: (Plantation Road) one left-turn lane, one through lane, and one right-turn lane
Eastbound approach: (DE Route 24) one left-turn lane, one through lane, and one right-turn lane
Westbound approach: (DE Route 24) one left-turn lane, one through lane, and one right-turn lane

- 4) **Plantation Road & Cedar Grove Road / Postal Lane**
Type of Control: signalized four-leg intersection
Northbound approach: (Plantation Road) one left-turn lane, one through lane, and one right-turn lane
Southbound approach: (Plantation Road) one left-turn lane, one through lane, and one right-turn lane
Eastbound approach: (Cedar Grove Road) one left-turn lane, one through lane, and one right-turn lane
Westbound approach: (Postal Lane) one left-turn lane, one through lane, and one right-turn lane

Safety Evaluation

Crash Data: Crash data was obtained for all study area intersections for a three-year period from September 1, 2012 to September 1, 2015. The crash data request returned a total of 89 reportable crashes in the three year period, including 1 alcohol-related fatal crash and 19 personal injuries of which one was alcohol-related. Most of the crashes were front-to-rear collisions, followed by angle collisions as the second most common type. The contributing circumstances are typically due to driver inattention, distraction or fatigue, following too close, failure to yield right-of-way, or driving under the influence. There were 6 alcohol related crashes, 5 crashes involving motorcycles, 1 crash involving a bicycle and zero pedestrian crashes. 16% of crashes occurred during dark conditions and 10% of crashes occurred during wet or snowy conditions. The crashes at or near each intersection were as follows:

- Delaware Route 24 & Beacon Middle School
 - 18 crashes reported
- Delaware Route 24 & Mulberry Knoll Road
 - 19 crashes reported (including 1 fatality)
- Delaware Route 24 & Plantation Road / Warrington Road
 - 31 crashes reported
- Plantation Road & Cedar Grove Road / Postal Lane
 - 21 crashes reported (intersection was under construction during this period and safety-related improvements are now complete)

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.

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: The Delaware Transit Corporation (DTC) operates a seasonal DART bus route (Route 207) and a new year-round bus route (Route 215), effective February 2016, in the study area. Route 207 serves Rehoboth / Long Neck / Pot-Nets from mid-May to mid-September. Route 215 runs between Rehoboth/Lewes and Millsboro via Delaware Route 24 with two round-trips in the morning and three in the afternoon. The nearest bus stops are at the Beebe Medical Center to the east and near the Love Creek Bridge to the west.

Planned transit service: DBF contacted a representative from the DTC regarding existing and planned service in the area. DBF was notified of the planned year-round bus route (Route 215) serving Rehoboth/Lewes and Millsboro, which has since begun service after the final TIS was submitted. The DTC requested that an ADA-compliant bus pad be included along the site frontage. The proposed LCES site plan includes an ADA-compliant bus waiting area within the 10' wide multi-use path at the tie-in to the westbound shoulder of Delaware Route 24.

Existing bicycle and pedestrian facilities: According to DelDOT's Sussex County Bicycle Map, Delaware Route 24 is designated as a High-Traffic Regional Bicycle Route with a
Love Creek Elementary

Bikeway. Delaware Route 24 has a 10' shoulders in both directions, but no designated bike lanes along the site frontage. According to the bicycle level of service (BLOS) calculator developed by the *League of Illinois Bicyclists*, Delaware Route 24 operates at BLOS A. Statewide Bicycle Route 1 runs along Plantation Road and Warrington Road, crossing Delaware Route 24.

There are no existing pedestrian facilities at or near the proposed elementary school. Delaware Route 24 is a major collector with 12' lanes, 10' shoulders and no sidewalks throughout the study area. The proposed school and internal roadway system is located in an existing farm field.

Planned bicycle and pedestrian facilities: DBF contacted Mr. Marco Boyce from DelDOT's Division of Planning on October 1, 2014 regarding planned or requested bicycle and pedestrian facilities in the area of the proposed LCES. Mr. Boyce and several representatives from the Division of Planning provided their comments, which include donation of a 15'-wide permanent easement along the Delaware Route 24 site frontage for a multi-use path, which will tie-in to the existing shoulder at each end. It was also requested that a bicycle lane be striped between the westbound Delaware Route 24 through-lane and the right-turn lane to the proposed LCES. Further, DelDOT stressed the importance of separating the various modes of traffic (buses, parent drop-off, pedestrians/bicyclists) to avoid potentially dangerous conflicts while developing the site plan. Bike racks near the school entrance(s) were also requested. Mr. Boyce advised that the final site layout for the school should provide means for future bicycle/pedestrian connections from the adjacent developable parcels. The developer of the planned Belle Terre residential development, located immediately northwest of the school, was asked to provide a bicycle/pedestrian connection to the school in their site plan.

Regarding the signalized site access on Delaware Route 24, DelDOT requires two signalized pedestrian crosswalks – one crossing the north leg (the LCES access driveway) and one crossing the east leg (Delaware Route 24). Both crosswalks would need to include pedestrian signals and pushbuttons along with ADA-compliant curb ramps.

It is noted that DelDOT's SR 24, Mulberry Knoll Road to SR 1 Project will include new sidewalk and bike lanes along both sides of Delaware Route 24 from Delaware Route 1 to just west of the intersection with Plantation Road/Warrington Road. Also, concept plans for the SR 24, Love Creek to Mulberry Knoll Road Project show future sidewalk being added along both sides of Delaware Route 24 from Love Creek Pines Lane to Spencer Lane/Williams Way along with bike lanes throughout the project area.

Previous Comments

All comments from DelDOT's Scoping Letter, Traffic Count Review, Preliminary TIS (PTIS) Review and other correspondence appear to have been addressed in the Final TIS submission.

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 factors (HV) by movement using existing data. For signalized intersections, the TIS and McCormick Taylor applied HV by lane group using existing data (using 3% HV where actual HV percentages were not available). For future conditions, the TIS and McCormick Taylor assumed future HV equal to existing HV or 3%, whichever was greater. The TIS and McCormick Taylor also assumed 3% HV for future movements to and from the proposed site.
- 2) For existing conditions, the TIS and McCormick Taylor determined, for each intersection, overall intersection peak hour factors (PHF). For future conditions, the TIS assumed future PHF of either existing PHF or adjusted to 0.80, 0.88, or 0.92 (depending on intersection volume), whichever was greater, for all intersections. McCormick Taylor assumed future PHF equal to existing PHF.
- 3) For analyses of the signalized intersections, the TIS and McCormick Taylor used a base saturation flow rate of 1,750 pcphpl.
- 4) 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 our field-measured lane widths.
- 5) The TIS and McCormick Taylor used different signal timings when analyzing the signalized intersections in some cases.
- 6) The TIS generally input Right-Turn-on-Red (RTOR) volumes for signalized intersection analyses, using existing RTOR volumes for existing and future analyses. McCormick Taylor conservatively input no right-turn-on-red (RTOR) volumes for existing and future conditions analyses, but did analyze right-turn movements as overlapping protected left-turn phases.

Table 3
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Love Creek Elementary School
Report dated January 2016
Prepared by Davis, Bowen & Friedel, Inc.

Signalized Intersection ¹	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Delaware Route 24 & Beacon Middle School / Site Access				
2014 Existing (Case 1) ²	F (164.1)	A (8.9)	F (239.6)	B (11.1)
2017 without Love Creek Elementary (Case 2) ³	F (173.7)	B (17.2)	F (278.7)	C (31.1)
2017 with Love Creek Elementary (Case 3)	F (167.9)	B (17.7)	F (240.7)	C (32.4)
2017 with Love Creek Elementary (Case 3) <i>With Improvement Option 1</i> ⁴	D (43.7)	B (16.3)	E (70.2)	C (30.6)

¹ The numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

² Analysis assumes oversaturated conditions, which includes an initial queue of 139 vehicles as measured in the field. The TIS used the HCS optimization tool in their analysis while McCormick Taylor maintained the minimum and maximum green times per the existing signal timing worksheets provided by DelDOT.

³ Case 2 analysis assumes the southbound site access has been constructed with a shared through/left-turn lane and a right-turn lane for use by the residual 22 developable acres west of the site. The residual 22 acres will generate low volumes. Permissive phasing was assumed for the northbound and southbound approaches.

⁴ Improvement Option 1 consists of adding a second through lane on eastbound Delaware Route 24. The TIS assumed the westbound approach would have protected/permitted left-turn phasing. McCormick Taylor assumed protected/prohibited left-turn phasing on the westbound approach since it would be opposed by two eastbound through lanes.

Table 4
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Love Creek Elementary School
Report dated January 2016
Prepared by Davis, Bowen & Friedel, Inc.

Unsignalized Intersection ⁵ Two-Way Stop Control (four-leg intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Delaware Route 24 & Mulberry Knoll Road				
2014 Existing (Case 1)				
Northbound Mulberry Road	F (56.6)	D (32.8)	F (56.6)	D (32.8)
Southbound Mulberry Road	D (31.0)	E (37.1)	D (31.0)	E (37.1)
Eastbound DE Route 24 – Left	A (8.9)	B (10.0+)	A (8.8)	B (10.0+)
Westbound DE Route 24 – Left	B (11.5)	A (9.6)	B (11.5)	A (9.6)
2017 without LCES (Case 2) ⁶				
Northbound Mulberry Road	F (93.8)	F (93.0)	F (175.5)	F (93.0)
Southbound Mulberry Road	F (55.8)	F (136.5)	F (94.6)	F (136.4)
Eastbound DE Route 24 – Left	A (9.3)	B (11.7)	A (9.5)	B (11.7)
Westbound DE Route 24 – Left	B (12.1)	B (10.4)	B (12.9)	B (10.4)
2017 with LCES (Case 3) ⁶				
Northbound Mulberry Road	F (127.4)	F (115.0)	F (280.1) ⁷	F (115.0) ⁷
Southbound Mulberry Road	F (68.4)	F (168.8)	F (144.7) ⁸	F (168.7) ⁸
Eastbound DE Route 24 – Left	A (9.5)	B (11.9)	A (9.7)	B (11.9)
Westbound DE Route 24 – Left	B (12.3)	B (10.5)	B (12.9)	B (10.4)
2020 with LCES (Case 3) With DelDOT Improvements ⁹				
Northbound Mulberry Road	F (101.2)	F (102.3)	F (171.9) ¹⁰	F (102.3) ¹⁰
Southbound Mulberry Road	F (52.6)	F (144.7)	F (78.3) ¹¹	F (144.6) ¹¹
Eastbound DE Route 24 – Left	A (9.5)	B (11.9)	A (9.7)	B (11.9)
Westbound DE Route 24 – Left	B (12.3)	B (10.5)	B (13.0)	B (10.5)

⁵ The numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

⁶ For Case 2 and Case 3 AM peak hour period analysis, the TIS used the default PHF = 0.92. McCormick Taylor used existing PHF = 0.86.

⁷ For Case 3, the 95th percentile queue length for the northbound approach is less than 2 vehicles during the AM peak hour and less than 1 vehicle during the PM peak hour.

⁸ For Case 3, the 95th percentile queue length for the southbound approach is less than 6 vehicles during the AM peak hour and less than 6 vehicles during the PM peak hour.

⁹ Improvements planned as part of DelDOT's SR 24, Love Creek to Mulberry Knoll Road Project (State Contract No. T201212201) include the addition of exclusive left-turn lanes along the eastbound and westbound DE Route 24 approaches. The improvement project is not funded for construction prior to FY19. Thus, HCS analysis was performed with DBF's projected 2020 traffic volumes with the improvements in place.

¹⁰ For Case 3 (with DelDOT Improvements), the 95th percentile queue length for the northbound approach is less than 2 vehicles during the AM peak hour and less than 1 vehicle during the PM peak hour.

¹¹ For Case 3 (with DelDOT Improvements), the 95th percentile queue length for the southbound approach is less than 4 vehicles during the AM peak hour and less than 6 vehicles during the PM peak hour.

Table 5
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Love Creek Elementary School
Report dated January 2016
Prepared by Davis, Bowen & Friedel, Inc.

Signalized Intersection ¹²	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Delaware Route 24 & Plantation Road / Warrington Road				
2014 Existing (Case 1) ¹³	C (34.3)	D (44.5)	C (27.2)	D (40.6)
2017 without Love Creek Elementary (Case 2) ¹³	D (40.2)	E (70.4)	D (35.2)	E (76.2)
2017 with Love Creek Elementary (Case 3) ¹³	D (38.4)	E (73.1)	C (34.3)	F (82.3)
2017 with Love Creek Elementary (Case 3) <i>With DelDOT Improvements</i> ¹⁴	C (24.9)	C (32.7)	C (26.0)	C (35.0)

¹² The numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

¹³ Analysis conservatively assumes seasonal adjustment factor of 1.00, which more closely resembles field conditions than analysis with DelDOT seasonal adjustment factors < 1.0.

¹⁴ Improvements planned as part of DelDOT's SR 24, Mulberry Knoll Road to SR 1 Project (State Contract No. T200411209) include the addition of a second through lane along both directions of DE Route 24 and the addition of a shared through/left-turn lane on both the northbound Warrington Road approach and the southbound Plantation Road approach. The TIS assumed protected-permitted phasing for the DE Route 24 left-turn phases. McCormick Taylor assumed protected-prohibited phasing for the DE Route 24 left-turn phases due to the dual opposing through lanes.

Table 6A
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Love Creek Elementary School
Report dated January 2016
Prepared by Davis, Bowen & Friedel, Inc.

Unsignalized Intersection ¹⁵ Two-Way Stop Control (four-leg intersection)	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Plantation Road & Cedar Grove Road / Postal Lane				
2014 Existing (Case 1) ¹⁶				
Eastbound Cedar Grove Road	C (21.0)	C (21.0)	C (21.0)	C (21.7)
Westbound Postal Lane	C (23.4)	E (43.9)	C (23.4)	E (49.1)
Northbound Plantation Road – Left	A (8.0)	A (8.0)	A (8.0)	A (8.0)
Southbound Plantation Road – Left	A (8.0)	A (8.3)	A (8.0)	A (8.3)

Table 6B
PEAK HOUR LEVELS OF SERVICE (LOS)
based on Traffic Impact Study for Love Creek Elementary School
Report dated January 2016
Prepared by Davis, Bowen & Friedel, Inc.

Signalized Intersection ¹⁵	LOS per TIS		LOS per McCormick Taylor	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Plantation Road & Cedar Grove Road / Postal Lane				
2017 without Love Creek Elementary (Case 2)	B (18.4)	B (18.4)	B (13.0)	B (13.5)
2017 with Love Creek Elementary (Case 3)	B (18.4)	B (18.6)	B (13.5)	B (13.7)

¹⁵ The numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

¹⁶ This intersection was actually two offset unsignalized intersections when traffic counts were conducted in Fall 2014. The TIS analyzed the Case 1 existing condition as one unsignalized intersection. As of May 2015, the realignment project and signalized of the intersection was completed. The current traffic control for the single signalized intersection is reflected in the Case 2 and Case 3 analyses.