



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

JENNIFER COHAN
SECRETARY

August 17, 2015

Ms. Brigitte Odum-Ewuakye
Century Engineering, Inc.
4134 North DuPont Highway
Dover, DE 19901

Dear Ms. Odum-Ewuakye:

The enclosed Traffic Operational Analysis (TOA) review letter for the **Energizer / Playtex Expansion** (Tax Parcel ED-05-067.19-02-04) 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 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: Ms. Constance C. Holland, Office of State Planning Coordination
Ms. Ann Marie Townshend, City of Dover Planning and Inspections
Mr. Mir Wahed, Johnson, Mirmiran & Thompson, Inc.
DelDOT Distribution

DelDOT Distribution

Annie Cordo, Deputy Attorney General
Robert McCleary, Director, Transportation Solutions (DOTS)
Drew Boyce, Director, Planning
Mark Luszcz, 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
Thomas E. Meyer, Traffic Studies Manager, Traffic, DOTS
Thomas Greve, Central District Engineer, Central District
Steve McCabe, Central District Public Works Engineer, Central District
Wendy Polasko, Kent Subdivision Coordinator, Development Coordination
David Dooley, Service Development Planner, Delaware Transit Corporation
Naa-Atswei Tetteh, Kent Traffic Engineer, Traffic, DOTS
Anthony Aglio, Planning Supervisor, Statewide & Regional Planning
Claudy Joinville, Project Engineer, Development Coordination
Waylon Sprowl, Subdivision Manager, Development Coordination



August 13, 2015

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

RE: Agreement No. 1654
Project Number T201469011
Traffic Impact Study Services
Task 6A-Energizer/Playtex Expansion

Dear Mr. Brestel,

Johnson, Mirmiran and Thompson (JMT) has completed the review of the Traffic Operational Analysis (TOA) for the proposed Energizer/Playtex Expansion, prepared by Century Engineering. Additionally, a review of the signal warrant analysis was performed at one site access intersection. The reviews were assigned as Task Number 6A. Century Engineering prepared the report in a manner generally consistent with DeIDOT's *Development Coordination Manual*.

Per the October 2, 2014 scoping meeting minutes, the TOA evaluates the impacts to expand the existing Playtex manufacturing site by 41,250 square feet. The latest site plan dated February 24, 2015 shows a total expansion of 39,050 square feet. The site is located on the southeast corner of Walker Road (Kent Road 70) and Saulsbury Road (Kent Road 156) in the City of Dover. The proposed expansion would utilize two existing access points, one at the intersection of Saulsbury Road and Clara Street and one along Walker Road. The existing access at the intersection of Saulsbury Road and Clara Street is located approximately 700 feet east from the intersection on the northerly side of Clara Street. However, since Clara Street is maintained by the City of Dover, the intersection of Saulsbury Road and Clara Street is treated as the site access for the purpose of this TOA. The access point along Walker Road would continue to be limited to rights-in/rights-out and restricted lefts-out; lefts-in are prohibited. The lefts-out from this access point to Walker Road is proposed to be restricted during shift changes from the site. The subject property is on an approximately 33.22-acre assemblage of parcels that is zoned C-3 (Commercial). No change in zoning is expected with the expansion.

Two additional access points for the existing Playtex manufacturing site exists along Saulsbury Road and are currently gated. The additional access points would continue to be gated with the expansion. Per correspondence with DeIDOT, an additional analysis was conducted by JMT to examine the Northern Driveway as exit only during shift changes with the proposed expansion. The results from this additional access are included in Table 4.



DelDOT currently has two relevant projects in the vicinity of the study area: the *West Dover Connector* project (Contract #T200411701) and a Hazard Elimination Program (HEP) safety improvement project at the SR 8 and SR 15 intersection.

The *West Dover Connector* project (Contract #T200411701) addresses the need to improve mobility across the Norfolk Southern Railroad for all modes of travel to and from the west side of Dover. Additionally, this project will reduce congestion at key intersections, improve connectivity for regional, through and local travel, and improve safety. The project is located on the western side of Dover and to the north of Camden and Wyoming. The project will extend Saulsbury Road from its current terminus at North Street to US Route 13. This extension will involve the construction of 3.2 miles of new mainline roadway and will also include auxiliary connections to Wyoming Mill Road and New Burton Road. Bicycle facilities will be provided on the roadway shoulder in addition to a shared use path. The project will connect multiple recreational areas, residential communities and commercial facilities. The existing intersection of North Street and Saulsbury Road will be upgraded to accommodate additional through and turning lanes. Construction began in April 2015 and is anticipated to be completed in approximately two years. For additional information regarding the West Dover Connector project, please see the project website at <http://deldot.gov/information/projects/wdc/>

The HEP safety improvement project at the SR 8 and SR 15 intersection addresses the capacity and safety recommendations contained in the 2012 HEP Site S for the Saulsbury Road/Forrest Avenue/Forest Street intersection. This project proposes the installation of additional through and left turn lanes along the northbound and southbound Saulsbury Road approaches to the intersection. Design is scheduled to begin in Fiscal Year 2019.

Site S is a 2.37-mile corridor located in Dover along SR 8/Forrest Avenue/Division Street from 0.02 mile east of Heatherfield Way to Kings Highway. The Site S Task I report included a crash summary, sight distance measurements, and a review of the Saulsbury Road/Forrest Avenue/Forest Street intersection. Suggested Task I remedial improvements at the Saulsbury Road/Forrest Avenue/Forest Street intersection included replacing damaged signs and installing Yield, Advance Street Name, Signal Ahead, and Speed Limit signs in compliance with the *Delaware Manual on Uniform Traffic Control Devices (DE MUTCD)*. This intersection was further reviewed under Task II to address capacity constraints and congestion related crashes. Providing protected only left turn phasing along the eastbound, westbound, and northbound approaches was also recommended. A field visit confirmed that protected only left turn phasing on all approaches has been implemented. Task II recommendations also included the installation of additional through and left turn lanes along the northbound and southbound approaches of Saulsbury Road to Forrest Avenue/Forest Street. These additional through and left turn lanes along both approaches of Saulsbury Road to Forrest Avenue/Forest Street have not yet been implemented.

Based on our review of the traffic operational analysis, 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>Situations for which deficiencies occur</i>
Saulsbury Road/Clara Street/Dover Elks Entrance/Site Entrance A	2017 AM and PM without Energizer/Playtex Expansion (Case 2) 2017 AM and PM with Energizer/Playtex Expansion (Case 3)
Saulsbury Road/Forrest Avenue/Forest Street	2014 PM Existing (Case 1) 2017 AM and PM without Energizer/Playtex Expansion (Case 2) 2017 AM and PM with Energizer/Playtex Expansion (Case 3)
Walker Road/Saulsbury Road/McKee Road	2017 AM without Energizer/Playtex Expansion (Case 2) 2017 AM and PM with Energizer/Playtex Expansion (Case 3)

It should be noted that the deficiencies mentioned above are also due to the future traffic redistribution caused by the *West Dover Connector* project. The proposed improvements as part of the *West Dover Connector* is projected to increase traffic along Saulsbury Road.

The unsignalized intersection of Saulsbury Road/Clara Street/Dover Elks Entrance/Site Entrance A would exhibit LOS deficiency under future conditions with or without the Energizer/Playtex Expansion during the AM and PM peak hours. The LOS deficiency occurs along the eastbound Dover Elks Entrance during the AM peak hour and along the eastbound Dover Elks Entrance and westbound Clara Street during the PM peak hour. With the full build condition, the maximum projected 95th percentile queue length along westbound Clara Street is approximately 250 feet during the PM peak hour based on existing geometry. However, with the proposed improvement of the westbound Clara Street approach (shared through/left turn lane and a right turn lane), the queue lengths would be reduced. Specifically, the maximum projected 95th percentile queue length will approximately be 135 feet along the shared through/left turn lane and will approximately be 40 feet along the right turn lane.

The installation of a traffic signal at this location would mitigate the LOS deficiencies. A Signal Justification Study was performed by Century Engineering in the TOA report to examine whether a traffic signal is warranted. Based on the October 1, 2014 correspondence, DelDOT Traffic Section would require two exiting lanes from Clara Street with the provision of a traffic signal. Our review of the Signal Justification Study depicts that none of the signal warrants are met with the provision of two lanes exiting Clara Street. Although the westbound Clara Street approach would continue to experience delays during the AM and PM peak hours, with one or two exiting lanes on Clara Street, we recommend that the Clara Street approach be reconfigured to provide a shared through/left turn lane and a separate right turn lane to reduce delay and queue lengths.

Century Engineering also conducted an additional peak hour warrant analysis with one exiting lane from Clara Street (existing lane configurations). Based on the single lane analysis on Clara Street, only the peak hour signal warrant is satisfied. Per correspondence from DelDOT Traffic Section (dated June 22, 2015), DelDOT agrees to install a traffic signal at this intersection with two exiting lanes from Clara Street given the Peak Hour Warrant from the DE MUTCD being satisfied under the single lane scenario, the projected delays under both the single and two lane scenarios, and its location within the City of Dover. Also, the proposed crosswalk on the north side of Saulsbury Road at Clara Street has the potential for heavier use with the proposed Capital School District expansion. The future expansion is expected to increase traffic on Clara Street.



Based on the proposed lane configuration (two lanes exiting Clara Street), we do not believe a signal is necessary at this intersection. However, due to the expansion of the Capital School District and the pedestrian safety at this location, a signal will be recommended at this intersection.

The signalized intersection of Saulsbury Road/Forrest Avenue/Forest Street exhibits LOS deficiencies during the existing and future peak periods, with or without the Energizer/Playtex Expansion. During the 2014 Existing (Case 1) conditions, this deficiency is limited to the PM peak hour, while deficiencies occur during both the AM and PM peak 2017 conditions with and without the project (Cases 2 and 3). However, the HEP safety improvement project at the SR 8 and SR 15 intersection addresses the LOS deficiencies at this intersection. Specifically, with the addition of a left turn and through lane along the northbound and southbound Saulsbury Road approaches, this intersection would operate with acceptable levels of service under future conditions with or without the expansion. As a result, we do not recommend that any additional improvements be implemented by the developer at this intersection.

The signalized intersection of Walker Road/Saulsbury Road/McKee Road exhibits LOS deficiencies during the future peak periods, with or without the Energizer/Playtex Expansion. During the 2017 conditions without the expansion (Case 2), this deficiency is limited to the AM peak hour, while deficiencies occur during both the AM and PM peak hour with the expansion conditions (Case 3). Furthermore, the maximum projected 95th percentile queue lengths in 2017 with the expansion (Case 3) AM peak hour would be approximately 285 feet and 270 feet along the southbound Saulsbury Road left turn lane and the westbound Walker Road left turn lane, respectively. The southbound Saulsbury Road queue length will be accommodated as the left turn lane becomes a two way left turn lane. However, the westbound Walker Road left turn lane can only accommodate 130 feet of storage. Geometric restrictions limit improvements on this approach. In order to address the LOS and the queue deficiency, an additional southbound Saulsbury Road through lane would need to be constructed. Since the traffic contribution from the Energizer/Playtex Expansion site accounts for only 2.5% of the total intersection volume during peak periods and widening Saulsbury Road is beyond the scope of the site development project, we do not recommend any additional improvements be implemented by this developer.

The developer should maintain the Walker Road/Site Entrance B to be consistent with the current lane configurations. Furthermore, based on DeIDOT's *Development Coordination Manual*, a right turn lane with minimum storage length (excluding taper) of 100 feet is warranted for the eastbound approach of Walker Road to Site Entrance B. However, due to right of way issues, this right turn lane may not be feasible to construct and therefore is not recommended.

Should the City of Dover 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 provide a bituminous concrete overlay due to changes in striping to northbound Saulsbury Road from the Clara Street intersection to approximately 290 feet



south of that intersection at DeIDOT’s discretion. DeIDOT should analyze the existing lanes’ pavement section and recommend an overlay thickness to the developer’s engineer if necessary.

2. The developer should improve the Saulsbury Road/Clara Street/Dover Elks Entrance/Site Entrance A intersection to be consistent with the proposed lane configurations as shown in the table below:

Approach	Current Configuration	Proposed Configuration
Eastbound Dover Elks Entrance	One shared through/left turn/right turn lane	No Change
Westbound Clara Street	One shared through/left turn/right turn lane	One shared through/left turn lane and one right turn lane
Northbound Saulsbury Road	One two-way left turn lane and one shared through/right turn lane	One left turn lane, one through lane, and one right turn lane
Southbound Saulsbury Road	One two-way left turn lane and one shared through/right turn lane	One left turn lane and one shared through/right turn lane

The recommended minimum storage lengths (excluding taper) of the separate left turn and right turn lanes along each approach are listed below. The left turn lane storage lengths are based on the HCS analysis results while the right turn lane storage lengths are based on the higher values between the HCS analysis results and DeIDOT’s *Development Coordination Manual*.

Approach	Left Turn Lane	Right Turn Lane
Westbound Clara Street	-	100’
Northbound Saulsbury Road	100’	240’
Southbound Saulsbury Road	100’	-

3. The developer should enter into a traffic signal agreement with DeIDOT for the Saulsbury Road/Clara Street/Dover Elks Entrance/Site Entrance A intersection. The agreement should include signal heads, pedestrian signals, crosswalks, interconnection, and ITS equipment at DeIDOT’s discretion. The developer should coordinate with DeIDOT on the implementation and cost of these improvements.



4. To reinforce the peak hour left turn restriction along the northbound Site Entrance B approach at Walker Road, the developer should remove the existing restricted hours signs located above the existing No Left Turn sign (R3-2) and install a *DE MUTCD* compliant sign depicting the restricted hours (similar to the R10-20aP sign). The restricted hours outlined on this sign should include all peak hour shift changes.
5. The following bicycle, pedestrian, and transit improvements should be included:
 - a. The developer should extend the sidewalk on the north side of the Clara Street site frontage to tie in with the existing sidewalk.
 - b. When a right turn lane is added along northbound Saulsbury Road at Clara Street, a five-foot wide bicycle lane should be provided through the right turn lane in order to facilitate safe and unimpeded bicycle travel. A Right Turn Yield to Bikes sign (R4-4) should be added before the start of each right turn lane.
 - c. Where internal sidewalks are located alongside of parking spaces, a buffer, physical barrier or signage should be added to eliminate vehicular overhang onto the sidewalk.
 - d. ADA compliant curb ramps and a marked crosswalk should be provided at the Saulsbury Road/Clara Street/Dover Elks Entrance/Site Entrance A, Saulsbury Road/Northern Existing Entrance, and Walker Road/Site Entrance B intersections. The use of Type 3 curb ramps is discouraged.
 - e. 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.
 - f. Utility covers should be moved outside of any designated bicycle lanes or should be flush with the pavement.
 - g. The developer should coordinate with DART to upgrade the two existing bus stops located along northbound Saulsbury Road from Clara Street to Walker Road to be ADA compliant (5 feet by 8 feet bus pads). The two bus stops along Saulsbury Road are located approximately 90 feet north of the Northern Existing Entrance (Gated) and 475 feet south of the Walker Road intersection.

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.

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.



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

Sincerely,
Johnson, Mirmiran, and Thompson, Inc.

Mir Ate Wahed,

Mir Wahed, P.E., PTOE

Cc: Richard Mishura
Joanne Maulit, P.E., PTOE

Enclosure

General Information

Report date: February 24, 2015

Prepared by: Century Engineering

Prepared for: Energizer/Playtex

Tax Parcels: ED-05-067.19-02-04, 11.01

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

Project Description and Background

Description: Per scoping meeting minutes (October 2, 2014) - 41,250 square feet expansion of the existing Playtex manufacturing site. Latest site plan (February 24, 2015) – 39,050 square feet expansion.

Location: The project is proposed on the southeast corner of Walker Road (Kent Road 70) and Saulsbury Road (Delaware Route 15/Kent Road 156).

Amount of Land to be developed: Approximately 33.22-acre assemblage of parcels.

Land Use approval(s) needed: Entrance Plan.

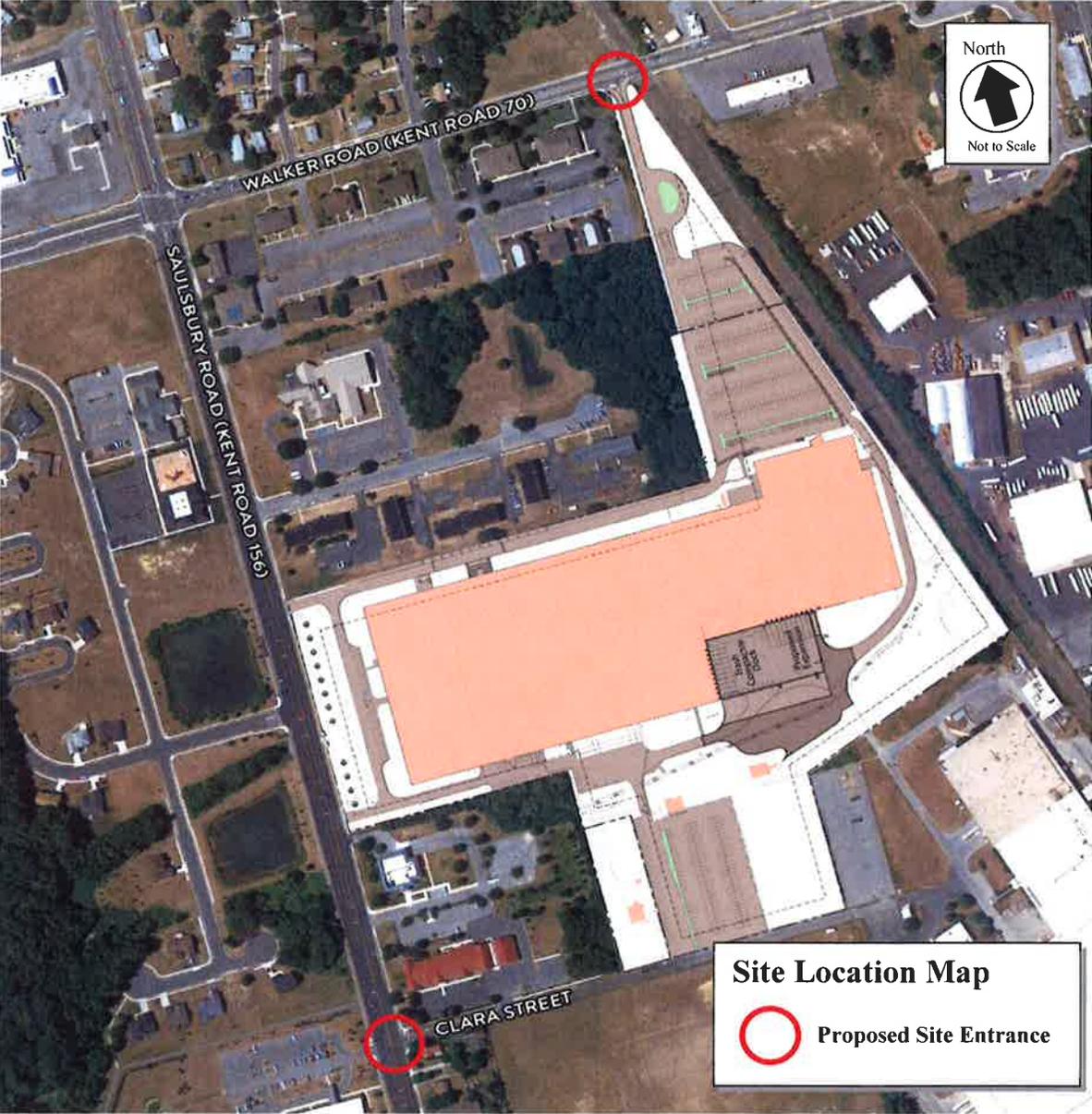
Proposed completion date: 2017.

Proposed access location: The proposed expansion would use the two existing main access points at the intersection of Clara Street and Saulsbury Road, and along Walker Road. The access point along Walker Road would be limited to right-in/right-out and restricted left-out; left-in would be prohibited.

Daily Traffic Volumes:

- 2014 Average Annual Daily Traffic on Walker Road (Kent Road 70): 9,482 vehicles per day.
- 2014 Average Annual Daily Traffic on Saulsbury Road (Delaware Route 15/Kent Road 156): 26,071 vehicles per day.

Site Map



**Graphic is an approximation based on the Overall Site Horizontal Layout plan prepared by HM Architects/Engineers, Inc. dated February 2, 2015.*

Relevant and On-going Projects

DelDOT currently has two relevant projects in the vicinity of the study area: the *West Dover Connector* project (Contract #T200411701) and a Hazard Elimination Program (HEP) safety improvement project at the SR 8 and SR 15 intersection.

The *West Dover Connector* project (Contract #T200411701) addresses the need to improve mobility across the Norfolk Southern Railroad for all modes of travel to and from the west side of Dover. Additionally, this project will reduce congestion at key intersections, improve connectivity for regional, through and local travel, and improve safety. The project is located on the western side of Dover and to the north of Camden and Wyoming. The project will extend Saulsbury Road from its current terminus at North Street to US Route 13. This extension will involve the construction of 3.2 miles of new mainline roadway and will also include auxiliary connections to Wyoming Mill Road and New Burton Road. Bicycle facilities will be provided on the roadway shoulder in addition to a shared use path. The project will connect multiple recreational areas, residential communities and commercial facilities. The existing intersection of North Street and Saulsbury Road will be upgraded to accommodate additional through and turning lanes. Construction began in April 2015 and is anticipated to be completed in approximately two years. For additional information regarding the West Dover Connector project, please see the project website at <http://deldot.gov/information/projects/wdc/>

The HEP safety improvement project at the SR 8 and SR 15 intersection addresses the capacity and safety recommendations contained in the 2012 HEP Site S for the Saulsbury Road/Forrest Avenue/Forest Street intersection. This project proposes the installation of additional through and left turn lanes along the northbound and southbound Saulsbury Road approaches to the intersection. Design is scheduled to begin in Fiscal Year 2019.

Site S is a 2.37-mile corridor located in Dover along SR 8/Forrest Avenue/Division Street from 0.02 mile east of Heatherfield Way to Kings Highway. The Site S Task I report included a crash summary, sight distance measurements, and a review of the Saulsbury Road/Forrest Avenue/Forest Street intersection. Suggested Task I remedial improvements at the Saulsbury Road/Forrest Avenue/Forest Street intersection included replacing damaged signs and installing Yield, Advance Street Name, Signal Ahead, and Speed Limit signs in compliance with the *Delaware Manual on Uniform Traffic Control Devices (DE MUTCD)*. This intersection was further reviewed under Task II to address capacity constraints and congestion related crashes. Providing protected only left turn phasing along the eastbound, westbound, and northbound approaches was also recommended. A field visit confirmed that protected only left turn phasing on all approaches has been implemented. Task II recommendations also included the installation of additional through and left turn lanes along the northbound and southbound approaches of Saulsbury Road to Forrest Avenue/Forest Street. These additional through and left turn lanes along both approaches of Saulsbury Road to Forrest Avenue/Forest Street have not yet been implemented.

Trip Generation

In a January 21, 2015 email from DelDOT to Century Engineering, it was stated that the current and future site traffic data provided by Century Engineering was used by DelDOT to develop the

peak hour and daily trip generation. The peak period trip generation for the Energizer/Playtex Expansion development is included in Table 1.

Table 1
ENERGIZER/PLAYTEX EXPANSION TRIP GENERATION

Land Use	ADT	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
41,250 square foot expansion	424	128	69	197	77	128	205

Overview of TOA

Intersections examined:

1. Saulsbury Road (Delaware Route 15/Kent Road 156) / Clara Street / Site Entrance A / Dover Elks Entrance
2. Walker Road (Kent Road 70) / Site Entrance B
3. Saulsbury Road / Northern Existing Entrance
4. Saulsbury Road / Forrest Avenue (Delaware Route 8) / Forest Street (Kent Road 51)
5. Walker Road / Saulsbury Road / McKee Road (Kent Road 156)

Conditions examined:

- Case 1 – 2014 Existing Conditions
- Case 2 – 2017 without the proposed expansion (No Build)
- Case 3 – 2017 with the proposed expansion fully developed (Build)

Peak hours evaluated: Weekday morning and weekday evening peak hours.

Intersection Descriptions

1. **Saulsbury Road (Delaware Route 15/Kent Road 156) / Clara Street / Dover Elks / Site Entrance A**

Type of Control: existing stop controlled intersection; proposed signalized intersection

Eastbound Approach: (Dover Elks Entrance) existing one shared through/left turn/right turn lane, stop controlled

Westbound Approach: (Clara Street/Site Entrance A) existing one shared through/left turn/right turn lane, stop controlled; proposed one shared through/left turn lane and one right turn lane

Northbound Approach: (Saulsbury Road) existing one two-way left turn lane and one shared through/right turn lane; proposed one left turn lane, one through lane and one right turn lane

Southbound Approach: (Saulsbury Road) existing one two-way left turn lane and one shared through/right turn lane; proposed one left turn lane and one shared through/right turn lane

2. **Walker Road (Kent Road 70) / Site Entrance B**

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

Eastbound Approach: (Walker Road) existing one two-way left turn lane and one shared through/right turn lane

Westbound Approach: (Walker Road) existing one two-way left turn lane and one through lane

Northbound Approach: (Site Entrance B) existing one shared left turn/right turn lane, stop controlled

Note: Left turn movements from Walker Road onto Site Entrance B are prohibited. Left turn movements from Site Entrance B onto Walker Road are restricted from 7:00 a.m. to 9:00 a.m. and from 3:30 p.m. to 5:30 p.m.

3. **Saulsbury Road (Delaware Route 15) / Northern Existing Entrance**

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

Westbound Approach: existing one shared left turn/right turn lane, stop controlled

Northbound Approach: existing one two-way left turn lane and one through lane

Southbound Approach: existing one two-way left turn lane and one through lane

Note: Westbound approach is a gated access point. Per correspondence with DelDOT, an additional analysis was conducted by JMT to examine the entrance as exit only during shift changes with the proposed expansion.

4. **Saulsbury Road (Delaware Route 15) / Forrest Avenue (Delaware Route 8) / Forest Street (Kent Road 51)**

Type of Control: existing signalized intersection

Eastbound Approach: (Forrest Avenue) existing one left turn lane, two through lanes, and one channelized right turn lane

Westbound Approach: (Forest Street) existing one left turn lane, two through lanes, and one channelized right turn lane

Northbound Approach: (Saulsbury Road) existing one left turn lane, one through lane, and one channelized right turn lane

Southbound Approach: (Saulsbury Road) existing one left turn lane, one through lane, and one channelized right turn lane

5. **Walker Road / Saulsbury Road (Delaware Route 15) / McKee Road (Kent Road 156)**

Type of Control: existing signalized intersection

Eastbound Approach: (Walker Road) existing one left turn lane, one through lane, and one channelized right turn lane

Westbound Approach: (Walker Road) existing one left turn lane, one through lane, and one channelized right turn lane

Northbound Approach: (Saulsbury Road) existing one left turn lane, one through lane, and one right turn lane

Southbound Approach: (McKee Road) existing one left turn lane, one through lane, and one right turn lane

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: The Delaware Transit Corporation (DTC) currently operates DART Routes 100, 101, 102 and 113 which traverse through the project's study intersections. The following describes the bus routes and stops within the study area:

- The designated bus stop for Route 100 that exists within the study area is located at the Walker Road/Playtex Northern Site Entrance intersection. DART Route 100 provides 20 trips on weekdays from 6:00 a.m. to 9:23 p.m.
- The designated bus stop for Route 101 that exists within the study area is located at the Walker Road/Playtex Northern Site Entrance intersection. DART Route 101 provides 31 trips on weekdays from 6:00 a.m. to 9:23 p.m. Additionally, Route 101 provides nine Saturday trips from 9:00 a.m. to 5:23 p.m.
- Route 102 traverses through the Saulsbury Road/Forrest Avenue/Forest Street intersection with the nearest bus stop approximately 600 feet west from the intersection. DART Route 102 provides 31 trips on weekdays from 6:00 a.m. to 9:18 p.m.
- The designated bus stops for Route 113 that exist within the study area are located at the Saulsbury Road/Walker Road and Saulsbury Road/Clara Street/Site Entrance A intersections. DART Route 113 provides 16 trips on weekdays from 6:00 a.m. to 9:48 p.m.

Planned transit service: Century Engineering and DelDOT contacted Mr. Wayne Henderson, Service Development Planner at the DTC. In a March 25, 2015 email from Ms. Tremica Cherry, Service Development Planner at the DTC, it was recommended that two bus stops along Saulsbury Road be improved with 5 feet by 8 feet bus pads with associated ADA requirements.

Existing bicycle and pedestrian facilities: According to the *Kent County Bicycle Map*, statewide, connector, and regional bicycle routes exist within the study area. The regional bicycle route runs along Forrest Avenue and traverses through the Saulsbury Road/Forrest Avenue/Forest Street intersection. The connector bicycle route runs along Walker Road and traverses through the Saulsbury Road/Walker Road and Walker Road/Site Entrance B intersections. The statewide bicycle route runs along Saulsbury Road and traverses through the Saulsbury Road/Walker Road, Saulsbury Road/Clara Street, and Saulsbury Road/Forrest Avenue/Forest Street intersections.

Pedestrian sidewalks exist along Forrest Avenue/Forest Street, Saulsbury Road, and Walker Road. Pedestrian signal controlled crosswalks are present on each of the four legs of both existing signalized intersections within the study area. No striped crosswalks exist at the unsignalized intersections of Saulsbury Road/Clara Street or Walker Road/Site Entrance B.

Planned bicycle and pedestrian facilities: Century Engineering contacted Mr. Marco Boyce, DelDOT's former Bicycle and Pedestrian Coordinator and JMT contacted Mr. Anthony Aglio, DelDOT's Bicycle and Pedestrian Coordinator. Per an April 7, 2015 email from Mr. Aglio, it was requested that the recommendations of the *Dover/Kent County MPO Regional Bike Plan* be incorporated. The *Dover/Kent County MPO Regional Bike Plan* adopted in September 2011 recommends adjusting lane widths on Forrest Avenue/Forest Street, Walker Road and Saulsbury Road to accommodate striped in-road bike lanes and multi-use paths. It was also suggested to contact the Capital School District about pedestrian facilities along Clara Street. Per the TOA, Century Engineering has contacted the Capital School District, but has not received any response. Additionally, multi-use paths and bike lanes were recommended to be added along Saulsbury Road, and bike lanes were recommended to be added along Walker Road. Furthermore, it was mentioned that multi-use paths are planned at the Saulsbury Road/Forrest Avenue/Forest Street intersection per the Dover Bike Plan.

Bicycle Level of Service and Bicycle Compatibility Index: According to the League of Illinois Bicyclists (LIB), Bicycle Level of Service (BLOS) is a national standard for quantifying the bike-friendliness of a roadway by measuring on-road bicyclist comfort levels for specific roadway geometries and traffic conditions. Utilizing the 10-year projected AADT along Saulsbury Road and Walker Road the BLOS with the construction of the proposed development and no bike lanes are summarized below. The BLOS was determined utilizing the calculators published on the LIB website: <http://www.bikelib.org/roads/blos/blosform.htm>

- Saulsbury Road – BLOS: A
- Walker Road – BLOS: D

Previous Comments

None.

General HCS/Synchro Analysis Comments

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

1. Per DelDOT's *Development Coordination Manual*, JMT used a heavy vehicle percentage of 3% for each movement in future scenario analysis, unless the existing heavy vehicle percentage was greater than 3% and there was no significant increase of vehicles along that movement, in which case the existing heavy vehicle percentage was used for analysis of future scenarios. The TOA maintained the heavy vehicle percentages utilized in their existing cases throughout the future cases.
2. Per DelDOT's *Development Coordination Manual*, JMT utilized the future PHF of 0.80 for roadways with less than 500 vph, 0.88 for roadways between 500 and 1,000 vph, and 0.92 for roadways with more than 1,000 vph or the existing PHF, whichever was higher. The TOA maintained the existing PHF throughout the future cases.
3. JMT utilized different Case 3 AM volumes in the analysis as the TOA incorrectly utilized the PM Peak Hour Trip Generation when developing the Case 3 AM volumes.
4. JMT utilized pedestrian volumes per hour at signalized locations based on the number of pedestrians traveling in the crosswalk that is crossed by vehicles turning right from the subject approach whereas the TOA did not.

Table 2
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Operational Analysis for Energizer/Playtex Expansion
Prepared by Century Engineering

Unsignalized Intersection ¹ Two-Way Stop Control	LOS per TOA		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Saulsbury Road (Kent Road 156)/ Clara Street/Dover Elks Entrance/ Site Entrance A^{2,3,4}				
Existing (Case 1)				
Eastbound Dover Elks Entrance	C (15.1)	D (32.5)	C (15.2)	C (15.9)
Westbound Clara Street	D (29.0)	F (75.4)	C (19.2)	D (28.0)
Northbound Saulsbury Road Left	A (9.6)	A (9.7)	B (10.1)	A (10.0)
Southbound Saulsbury Road Left	A (9.9)	B (10.4)	B (10.2)	B (11.1)
2017 without development of Energizer/Playtex Expansion (Case 2)				
Eastbound Dover Elks Entrance	F (120.7)	F (84.5)	E (47.3)	E (37.4)
Westbound Clara Street	F (63.6)	F (533.9)	D (33.1)	F (81.1)
Northbound Saulsbury Road Left	B (11.3)	B (11.4)	B (14.0)	B (13.8)
Southbound Saulsbury Road Left	B (11.5)	B (11.9)	B (13.4)	B (14.2)

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

² During the PM peak hour the TOA used a PHF of 0.96 whereas JMT used a PHF of 0.97 consistent with the existing traffic count data.

³ JMT utilized a two-way left-turn lane median type along the northbound and southbound Saulsbury Road approaches consistent with field conditions whereas the TOA did not.

⁴ JMT incorporated upstream signal information into the analysis whereas the TOA did not.

Table 2 (Continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Operational Analysis for Energizer/Playtex Expansion
Prepared by Century Engineering

Unsignalized Intersection ¹ Two-Way Stop Control	LOS per TOA		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Saulsbury Road (Kent Road 156)/ Clara Street/Dover Elks Entrance/ Site Entrance A^{2,3,4}				
2017 without development of Energizer/Playtex Expansion (Case 2) with Modifications ⁵				
Eastbound Dover Elks Entrance	-	-	E (47.3)	E (37.1)
Westbound Clara Street Through/Left	-	-	F (62.1)	F (86.0)
Westbound Clara Street Right	-	-	C (24.5)	D (33.0)
Westbound Clara Street Approach	-	-	D (31.5)	F (51.6)
Northbound Saulsbury Road Left	-	-	B (14.0)	B (13.8)
Southbound Saulsbury Road Left	-	-	B (13.4)	B (14.2)
2017 with development of Energizer/Playtex Expansion (Case 3)				
Eastbound Dover Elks Entrance	F (174.7)	F (115.7)	F (102.1)	F (57.1)
Westbound Clara Street	F (1312.0)	F (2150.0)	F (122.1)	F (368.0)
Northbound Saulsbury Road Left	B (11.3)	B (11.4)	B (14.1)	B (13.8)
Southbound Saulsbury Road Left	B (12.2)	B (12.6)	C (16.0)	C (15.8)
2017 with development of Energizer/Playtex Expansion (Case 3) with Volume Redistribution ⁶				
Eastbound Dover Elks Entrance	-	-	F (99.5)	F (54.9)
Westbound Clara Street	-	-	F (98.7)	F (313.4)
Northbound Saulsbury Road Left	-	-	B (14.2)	B (14.0)
Southbound Saulsbury Road Left	-	-	C (16.0)	C (15.8)

⁵ Modifications scenario includes the provision of one shared through/left turn lane and one right turn lane along the westbound Clara Street approach to the intersection.

⁶ Per DelDOT correspondence, JMT utilized different Case 3 volumes due to redistribution of 25% of exiting site traffic from Clara Street to the Northern Existing Entrance along Saulsbury Road.

Table 2 (Continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Operational Analysis for Energizer/Playtex Expansion
Prepared by Century Engineering

Unsignalized Intersection ¹ Two-Way Stop Control	LOS per TOA		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Saulsbury Road (Kent Road 156)/ Clara Street/Dover Elks Entrance/ Site Entrance A^{2,3,4}				
2017 with development of Energizer/Playtex Expansion (Case 3) with Modifications ⁵				
Eastbound Dover Elks Entrance	F (174.7)	F (115.7)	F (102.1)	F (57.1)
Westbound Clara Street Through/Left	F (1422.0)	F (2310.0)	F (161.6)	F (283.5)
Westbound Clara Street Right	C (24.3)	D (30.5)	D (27.1)	E (38.7)
Westbound Clara Street Approach	F (820.3)	F (1161.0)	F (92.8)	F (160.2)
Northbound Saulsbury Road Left	B (11.3)	B (11.4)	B (14.1)	B (13.8)
Southbound Saulsbury Road Left	B (12.2)	B (12.6)	C (16.0)	C (15.8)
2017 with development of Energizer/Playtex Expansion (Case 3) with Volume Redistribution and Modifications ^{5,6}				
Eastbound Dover Elks Entrance	-	-	F (99.5)	F (54.9)
Westbound Clara Street Through/Left	-	-	F (139.9)	F (250.7)
Westbound Clara Street Right	-	-	D (26.8)	E (37.9)
Westbound Clara Street Approach	-	-	F (77.4)	F (139.7)
Northbound Saulsbury Road Left	-	-	B (14.2)	B (14.0)
Southbound Saulsbury Road Left	-	-	C (16.0)	C (15.8)

Table 2 (Continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Operational Analysis for Energizer/Playtex Expansion
Prepared by Century Engineering

Signalized Intersection ¹	LOS per TOA		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Saulsbury Road (Kent Road 156)/ Clara Street/Dover Elks Entrance/ Site Entrance A				
2017 without development of Energizer/Playtex Expansion (Case 2) with Improvements ^{7,8,9}	-	-	C (34.3)	C (22.1)
2017 with development of Energizer/Playtex Expansion (Case 3) with Improvements ^{7,9,10,11}	F (165.0)	F (83.4)	D (42.1)	C (24.7)
2017 with development of Energizer/Playtex Expansion (Case 3) with Volume Redistribution and Improvements ^{6,7,8,9}	-	-	D (38.4)	C (23.3)
2017 with development of Energizer/Playtex Expansion (Case 3) with Improvements ^{7,10,12}	E (70.5)	D (53.0)	-	-

⁷ Improvements scenario incorporates the modification of the westbound Clara Street approach to provide one shared through/left turn lane and one right turn lane, the modification of the northbound Saulsbury Road approach to provide one left turn lane, one through lane, and one right turn lane, the modification of the southbound Saulsbury Road approach to provide one left turn lane and one shared through/right turn lane, as well as the installation of a traffic signal.

⁸ JMT modeled the signal with a 90 second cycle length during the AM peak hour and a 120 second cycle length during the PM peak hour.

⁹ JMT modeled the signal with concurrent phasing along the eastbound and westbound approaches.

¹⁰ The TOA modeled the signal with split phasing along the eastbound and westbound approaches.

¹¹ The TOA and JMT both modeled the signal with a 90 second cycle length during the AM peak hour and a 120 second cycle length during the PM peak hour.

¹² The TOA developed a second improvement alternative by modeling the signal with a 120 second cycle length during the AM peak hour and a 150 second cycle length during the PM peak hour.

Table 3
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Operational Analysis for Energizer/Playtex Expansion
Prepared by Century Engineering

Unsignalized Intersection ¹³ (T-Intersection)	LOS per TOA		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Walker Road (Kent Road 70)/ Site Entrance B^{14,15}				
2014 Existing (Case 1) ¹⁶				
Westbound Walker Road Left	A (9.3)	A (8.3)	A (9.4)	A (8.3)
Northbound Site Entrance B	B (16.5)	C (17.5)	B (14.7)	B (13.8)
2017 without development of Energizer/Playtex Expansion (Case 2) ¹⁷				
Northbound Site Entrance B	C (15.7)	B (12.0)	B (14.5)	B (11.6)
2017 with development of Energizer/Playtex Expansion (Case 3) ¹⁷				
Northbound Site Entrance B	C (20.1)	B (13.6)	C (15.4)	B (12.9)

¹³ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

¹⁴ JMT utilized a two-way left-turn lane median type along the eastbound and westbound Walker Road approaches consistent with field conditions whereas the TOA did not.

¹⁵ JMT incorporated upstream signal information into the analysis whereas the TOA did not.

¹⁶ JMT modeled the northbound Site Entrance B approach with a shared left turn/right turn lane consistent with field conditions whereas the TOA modeled the approach with a shared through/left turn/right turn lane.

¹⁷ To account for left turn movement restrictions at Site Entrance B, both the TOA and JMT modeled Site Entrance B as right in/right out only in the future cases.

Table 4
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Operational Analysis for Energizer/Playtex Expansion
Prepared by Century Engineering

Unsignalized Intersection ¹⁸ (T-Intersection)	LOS per TOA		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Saulsbury Road/ Northern Existing Entrance¹⁹				
2017 with development of Energizer/Playtex Expansion (Case 3)				
Westbound Northern Existing Entrance	-	-	E (40.3)	E (48.3)
2017 with development of Energizer/Playtex Expansion (Case 3) with Modifications ²⁰				
Westbound Northern Existing Entrance Left	-	-	E (48.4)	F (53.6)
Westbound Northern Existing Entrance Right	-	-	C (22.2)	D (30.4)
Westbound Northern Existing Entrance Approach	-	-	E (39.7)	E (46.6)

¹⁸ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

¹⁹ Per DelDOT correspondence, JMT analyzed the Saulsbury Road/Northern Existing Entrance assuming that 25% of exiting site traffic from Clara Street would utilize the Northern Existing Entrance instead. The TOA did not analyze this intersection.

²⁰ Modifications scenario includes the provision of one left turn lane and one right turn lane along the westbound Northern Existing Entrance approach to the intersection.

Table 4 (Continued)
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Operational Analysis for Energizer/Playtex Expansion
Prepared by Century Engineering

Signalized Intersection ¹⁸ (T-Intersection)	LOS per TOA		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Saulsbury Road/ Northern Existing Entrance ¹⁹				
2017 with development of Energizer/Playtex Expansion (Case 3) with Improvements ^{21,22}	-	-	C (21.9)	B (16.9)

²¹ Improvements scenario incorporates the installation of a traffic signal.

²² JMT modeled the signal with a 90 second cycle length during the AM peak hour and a 120 second cycle length during the PM peak hour.

Table 5
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Operational Analysis for Energizer/Playtex Expansion
Prepared by Century Engineering

Signalized Intersection ²³	LOS per TOA		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Saulsbury Road/Forrest Avenue/ Forest Street (Kent Road 51) ²⁴				
2014 Existing (Case 1)	D (51.5)	E (57.5)	D (50.3)	E (60.1)
2017 without development of Energizer/Playtex Expansion (Case 2)	F (119.8)	F (150.6)	F (111.0)	F (141.4)
2017 without development of Energizer/Playtex Expansion (Case 2) <i>with Improvements</i> ²⁵	-	-	D (41.1)	D (52.0)
2017 with development of Energizer/Playtex Expansion (Case 3)	F (121.3)	F (155.0)	F (116.7)	F (147.6)
2017 with development of Energizer/Playtex Expansion (Case 3) <i>with Improvements</i> ²⁵	-	-	D (42.0)	D (52.5)

²³ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

²⁴ JMT omitted the eastbound Forrest Avenue right turn movement from the analysis due to the provision of channelization with an approximately 200 feet acceleration lane. However, the TOA included the eastbound right turn movement in the analysis.

²⁵ Improvements scenario incorporates the DeIDOT Improvement Project to provide two left turn lanes and two through lanes along the northbound and southbound Saulsbury Road approaches.

Table 6
PEAK HOUR LEVELS OF SERVICE (LOS)
Based on Traffic Operational Analysis for Energizer/Playtex Expansion
Prepared by Century Engineering

Signalized Intersection ²⁶	LOS per TOA		LOS per JMT	
	Weekday AM	Weekday PM	Weekday AM	Weekday PM
Walker Road/Saulsbury Road/ McKee Road (Kent Road 156) ^{27,28}				
2014 Existing (Case 1)	D (41.6)	D (50.5)	C (29.5)	C (32.7)
2017 without development of Energizer/Playtex Expansion (Case 2)	F (91.9)	F (80.1)	E (59.3)	D (54.1)
2017 without development of Energizer/Playtex Expansion (Case 2) <i>with Improvements</i> ²⁹	-	-	D (42.6)	D (42.5)
2017 with development of Energizer/Playtex Expansion (Case 3)	F (96.4)	F (83.1)	E (66.4)	E (57.8)
2017 with development of Energizer/Playtex Expansion (Case 3) <i>with Improvements</i> ²⁹	-	-	D (54.1)	D (52.1)

²⁶ For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

²⁷ JMT included pedestrian volume data during the AM peak hour analysis per the existing traffic counts whereas the TOA did not.

²⁸ The TOA modeled the left turn movements as protected only. However, JMT modeled the left turn movements as protected and permitted consistent with field observations.

²⁹ Improvements scenario includes the provision of two through lanes along the southbound Saulsbury Road approach.