



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

NICOLE MAJESKI
SECRETARY

February 15, 2021

Mr. William Conway
Century Engineering, Inc.
550 South Bay Road
Dover, DE 19901

Dear Mr. Conway:

The enclosed Traffic Operational Analysis (TOA) review letter for the proposed **Cannon Property** (Tax Parcel 533-20.00-20.00) development has been completed under the responsible charge of a registered professional engineer whose firm is authorized to work in the State of Delaware. They have found the TOA to conform to DelDOT's Development Coordination Manual and other accepted practices and procedures for such studies. DelDOT accepts this 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. Stephen Marsh, George, Miles & Buhr, L.L.C.
Ms. Constance C. Holland, Office of State Planning Coordination
Mr. Jamie Whitehouse, Sussex County Planning and Zoning
Mr. Mir Wahed, Johnson, Mirmiran & Thompson, Inc.
Ms. Joanne Arellano, Johnson, Mirmiran & Thompson, Inc.
Mr. Kevin Hickman, Johnson, Mirmiran & Thompson, Inc.
DelDOT Distribution

DelDOT Distribution

Brad Eaby, Deputy Attorney General
J. Marc Coté, Director, Planning
Shanté Hastings, Director, Transportation Solutions (DOTS)
Mark Luszcz, Deputy Director, Traffic, DOTS
Michael Simmons, Assistant Director, Project Development South, DOTS
Todd Sammons, Assistant Director, Development Coordination
T. William Brockenbrough, Jr., County Coordinator, Development Coordination
Peter Haag, Chief Traffic Engineer, Traffic, DOTS
Kerry Yost, Traffic Calming and Subdivision Relations Manager, Traffic, DOTS
Alistair Probert, South District Engineer, South District
Gemez Norwood, South District Public Works Manager, South District
Jared Kauffman, Service Development Planner, Delaware Transit Corporation
Tremica Cherry, Service Development Planner, Delaware Transit Corporation
Anthony Aglio, Planning Supervisor, Statewide & Regional Planning
Wendy Polasko, Subdivision Engineer, Development Coordination
Richard McCabe, Sussex Review Coordinator, Development Coordination
Mark Galipo, Traffic Engineer, Traffic, DOTS
Claudy Joinville, Project Engineer, Development Coordination
Annamaria Furmato, Project Engineer, Development Coordination



February 15, 2021

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

RE: Agreement No. 1774
Project Number T201769002
Traffic Impact Study Services
Task 19A-Cannon Property TOA

Dear Mr. Brestel:

Johnson, Mirmiran and Thompson (JMT) has completed the review of the Traffic Operational Analysis (TOA) for Cannon Property, prepared by Century Engineering dated May 2018. This task was assigned as Task Number 19A. Century Engineering prepared the report in a manner generally consistent with DelDOT's *Development Coordination Manual*.

The TOA evaluates the impacts of a proposed mixed-use development in Sussex County, Delaware, west of Fenwick Island. The development would be comprised of a 6,600 square-foot quality restaurant, a 3,300 square-foot high-turnover sit-down restaurant, and 70 single-family detached houses. The site is located on the northwest corner of the intersection of Delaware Route 54 (Sussex Road 58/Lighthouse Road) with Bennett Avenue. As part of the project, Bennett Avenue would be realigned opposite Monroe Avenue to create a four-legged intersection with Delaware Route 54. Two full access points to the site would be via the Bennett Avenue leg of the realigned intersection. The subject property is on an approximately 125.72-acre assemblage of parcels that are zoned as AR-1 (Agricultural Residential) and no rezoning is proposed. Construction is anticipated to be complete in 2021.

Per the June 2020 Commercial Site Plan Rendering prepared by George, Miles & Buhr, LLC. (GMB), the proposed uses differ from what was included in the TOA. Per the June 2020 plan, a 70-room hotel and a 8,500 square-foot restaurant is proposed on the site. Although the land uses have changed, the trip generation projected in the TOA is higher than the June 2020 plan. As such, the results based on the proposed development in the TOA will be utilized as part of this review. A trip generation comparison between the previously proposed plan and the new plan is included on page 10.

DelDOT's 2012 High Risk Rural Roads Program (HRRRP) included Site 18, which is within the project area. Site 18 is a 0.29 mile section of Delaware Route 54 from 0.12-mile west of Van Buren Avenue to 0.05-mile east of Madison Avenue. The Site 18 report included a crash summary, sight



distance review, and field observations at the Delaware Route 54 intersections with Monroe Avenue, Bennett Avenue, and Jefferson Avenue. The recommendations in the Site 18 report included installing stop lines along the Monroe Avenue, Bennett Avenue, and Jefferson Avenue approaches to Delaware Route 54 as well as replacing the 30-inch STOP (R1-1) signs with 36-inch STOP signs and replacing the street name blades to upper-case/lower-case. Per a site visit, the signage and pavement marking recommendations have been implemented.

Additionally, DelDOT Traffic Section completed the *SR 54 Corridor Study* in December 2020. The corridor study evaluated intersections along Delaware Route 54 from SR 1 to SR 20/Americana Parkway in Sussex County, Delaware. The study reviewed crash history, proposed land development, vehicular speeds, and traffic data (pedestrian, bicycle, and vehicular) within the area. The study also included a corridor analysis of the signalized and unsignalized locations. Within the TOA study area, the recommendations from the *SR 54 Corridor Study* include considering reducing the speed limit along Delaware Route 54 between Madison Avenue and Old Mill Bridge Road to 35 miles per hour and installing a traffic signal at the intersection of Delaware Route 54 with Bennett Avenue.

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 LOS deficiencies occur</i>
Delaware Route 54/Bennett Avenue	2017 Existing Saturday (Case 1) 2021 Saturday without development (Case 2)
Delaware Route 54/Monroe Avenue	2017 Existing Saturday (Case 1) 2021 Saturday without development (Case 2)
Delaware Route 54/Bennett Avenue/Monroe Avenue (With Proposed Realignment)	2021 PM and Saturday with development (Case 3)
Delaware Route 54/Jefferson Avenue	2017 Existing Saturday (Case 1) 2021 Saturday without development (Case 2) 2021 Saturday with development (Case 3)

The unsignalized intersections of Delaware Route 54 with Bennett Avenue and Monroe Avenue exhibit LOS deficiencies under existing and future conditions with or without the proposed development during the Summer Saturday peak period. The deficiencies take place along the northbound Monroe Avenue and southbound Bennett Avenue approaches to Delaware Route 54.

As part of the proposed development, Bennett Avenue would be realigned along Delaware Route 54 to be directly opposite to Monroe Avenue and will form the north leg. The realigned intersection, under two-way stop control, would exhibit LOS deficiencies. Specifically, the northbound Monroe Avenue approach would operate at LOS F (242.8 seconds of delay) during the Saturday peak period and the southbound Bennett Avenue approach would operate at LOS E



(46.7 seconds of delay) and LOS F (549.6 seconds of delay) during the PM and Summer Saturday peak periods, respectively.

The modification of the realigned intersection of Delaware Route 54/Bennett Avenue/Monroe Avenue to be either a roundabout or controlled by a traffic signal would improve the intersection to operate at LOS D or better. However, the installation of a roundabout is not recommended at this location due to the potential additional right-of-way needed at the southerly leg of the intersection to accommodate the roundabout as well as the significantly higher through volumes along the Delaware Route 54 approaches. Per the DelDOT Traffic *SR 54 Corridor Study*, installing a traffic signal at the intersection of Delaware Route 54 and Bennett Avenue should be considered. Therefore, it is recommended that the developer realign the Bennett Avenue approach to Delaware Route 54 to be directly across Monroe Avenue and that the resulting four-legged intersection be signalized. Details regarding the signal warrant evaluation performed as part of this review can be found on Page 10 of this letter.

The unsignalized intersection of Delaware Route 54 with Jefferson Avenue exhibits LOS deficiencies under existing and future conditions with or without the proposed development during the Summer Saturday peak period. The deficiencies occur along the northbound Jefferson Avenue approach with LOS E (40.1 seconds of delay) and LOS F (59.9 and 66.4 seconds of delay) during the Case 1, Case 2, and Case 3 conditions, respectively. The installation of a signal would improve the intersection operation to LOS C. However, the installation of a signal would not meet any of the DE MUTCD volume warrants (Warrant 1, Eight hour; Warrant 2, Four hour; and Warrant 3, Peak hour). Due to the proximity of the Jefferson Avenue intersection to the future signalized Monroe Avenue intersection along Delaware Route 54, it is recommended that the design of this intersection be coordinated with DelDOT’s Project Development South, Development Coordination, and Traffic sections during the early stages of the plan review process.

Should Sussex County 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 realign Bennett Avenue along Delaware Route 54 to be across from Monroe Avenue to create a new four-legged intersection and enter into a traffic signal agreement with DelDOT for the installation of a traffic signal. The intersection should be consistent with the lane configurations shown in the table below.

Approach	Current Configuration	Proposed Configuration
Eastbound Delaware Route 54	One shared left turn/through/right turn lane	One left turn lane and one shared through/right turn lane
Westbound Delaware Route 54	One shared left turn/through/right turn lane	One left turn lane, one through lane, and one right turn lane



Northbound Monroe Avenue	One shared left turn/through/right turn lane	No change
Southbound Bennett Avenue	One shared left turn/through/right turn lane	One shared left turn/through lane and one right turn lane

Based on DelDOT’s *Development Coordination Manual*, the recommended minimum storage lengths (excluding taper) of the separate left turn and right turn lanes along Delaware Route 54 are listed below.

Approach	Left Turn Lane	Right Turn Lane
Eastbound Delaware Route 54	50 feet	N/A
Westbound Delaware Route 54	50 feet	190 feet

The calculated queue lengths from the HCS analysis can be accommodated within the recommended storage lengths. The traffic signal agreement should include pedestrian signals, crosswalks, interconnection, and ITS equipment such as CCTV cameras at DelDOT’s discretion. Signalized pedestrian crossings should be provided along each approach to the intersection.

Prior to Entrance Plan approval, the developer should submit a plan to DelDOT’s Development Coordination section depicting the design of the signalized intersection. The final design of the realigned intersection, including any modifications to the Jefferson Avenue intersection, should be coordinated with DelDOT’s Project Development South, Development Coordination, and Traffic sections during the early stages of the Entrance Plan review process.

2. At DelDOT’s discretion, the developer should provide a bituminous concrete overlay as necessary to address restriping and pavement damage on the Delaware Route 54 existing travel lanes as a result of the realignment of Bennett Avenue from Van Buren Avenue to the limits of the bridge approach east of Madison Avenue.
3. The following bicycle, pedestrian, and transit improvements should be included:
 - a. A minimum fifteen-foot wide permanent easement from the edge of the right-of-way should be dedicated to DelDOT along the Delaware Route 54 site frontage.

- b. Within the easement, the developer should construct a ten-foot wide shared-use path that meets current AASHTO and ADA standards. A minimum five-foot setback should be maintained from the edge of the pavement to the shared-use path. If feasible, the shared-use path should be placed behind utility poles and street trees should be provided within the buffer area. The developer should coordinate with DelDOT's Development Coordination section during the plan review process to identify the exact location of the shared-use path.
- c. All internal roads, including Bennett Avenue, should be provided with sidewalks on both sides.
- d. ADA compliant curb ramps and marked crosswalks should be provided along the Bennett Avenue approach to Delaware Route 54. The use of diagonal curb ramps is discouraged.
- e. Minimum five-foot wide bicycle lanes should be incorporated in the shoulders along both directions of Delaware Route 54 from Madison Avenue to Van Buren Avenue.
- f. When a right turn lane is added along Delaware Route 54, a five-foot wide bicycle lane should be maintained through the right turn lane to facilitate safe and unimpeded bicycle travel.
- g. Utility covers should be moved outside of any designated bicycle lanes and any proposed sidewalks/shared-use paths or should be flush with the pavement.
- h. Bike parking racks should be provided near the restaurant building entrances. Where the building architecture provides for an awning or other overhang, the bike parking should be covered.
- i. The developer should coordinate with DART to provide a bus stop along the Delaware Route 54 site frontage, adjacent to Bennett Avenue. Coordination should include provisions for appropriate amenities (bus pad, shelter, etc.). Sidewalk connecting the subject property to the bus stop should be provided.

Please note that this review generally focuses on capacity and level of service issues; additional safety and operational issues will be further addressed through DelDOT's Plan Review process.

Improvements in this TOA may be considered "significant" under DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DelDOT's website at



https://www.deldot.gov/Publications/manuals/de_mutcd/index.shtml. For any additional information regarding the work zone impact and mitigation procedures during construction please contact Mr. Don Weber, Assistant Director for Traffic Operations and Management. Mr. Weber can be reached at (302) 659-4651 or by email at Don.Weber@delaware.gov.

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 Wahed
Mir Wahed, P.E., PTOE

cc: Joanne Arellano, P.E., PTOE

Enclosure

General Information

Report date: May 2018

Prepared by: Century Engineering

Prepared for: CMF Companies

Tax Parcels: 533-20.00-20.00 and 22.00

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

Project Description and Background

Description: The developer seeks to develop a 6,600 square-foot quality restaurant, a 3,300 square-foot high-turnover sit-down restaurant, and 70 single family detached houses.

Location: The subject site is located on the northwest corner of the intersection of Delaware Route 54 (Lighthouse Road/Sussex Road 58) and Bennett Avenue, west of Fenwick Island.

Amount of Land to be developed: Approximately 125.72-acre assemblage of parcels.

Land Use approval(s) needed: Entrance Plan.

Proposed completion date: 2021.

Proposed access location: One full access is proposed along Delaware Route 54, by way of Bennett Avenue.

Daily Traffic Volumes:

- 2017 Average Annual Daily Traffic on Delaware Route 54: 17,062 vehicles per day.

Site Map



**Graphic is from the Commercial Site Plan Rendering prepared by George, Miles & Buhr, LLC. (GMB) dated June 2020.*

Relevant and On-going Projects

DelDOT does not have any relevant or ongoing capital projects within the study area. However, DelDOT’s 2012 High Risk Rural Roads Program (HRRRP) included Site 18, which is within the project area. Site 18 is a 0.29 mile section of Delaware Route 54 from 0.12-mile west of Van Buren

Avenue to 0.05-mile east of Madison Avenue. The Site 18 report included a crash summary, sight distance review, and field observations at the Delaware Route 54 intersections with Monroe Avenue, Bennett Avenue, and Jefferson Avenue. The recommendations in the Site 18 report included installing stop lines along the Monroe Avenue, Bennett Avenue, and Jefferson Avenue approaches to Delaware Route 54 as well as replacing the 30-inch STOP (R1-1) signs with 36-inch STOP signs and replacing the street name blades to upper-case/lower-case. Per a site visit, the signage and pavement marking recommendations have been implemented.

Additionally, DelDOT Traffic Section completed the *SR 54 Corridor Study* in December 2020. The corridor study evaluated intersections along Delaware Route 54 from SR 1 to SR 20/Americana Parkway in Sussex County, Delaware. The study reviewed crash history, proposed land development, vehicular speeds, and traffic data (pedestrian, bicycle, and vehicular) within the area. The study also included a corridor analysis of the signalized and unsignalized locations. Within the TOA study area, the recommendations from the *SR 54 Corridor Study* include considering reducing the speed limit along Delaware Route 54 between Madison Avenue and Old Mill Bridge Road to 35 miles per hour and installing a traffic signal at the intersection of Delaware Route 54 at Bennett Avenue.

Trip Generation

The trip generation for the proposed development was determined by using the comparable land use and rates/equations contained in the *Trip Generation, 9th Edition: An ITE Informational Report*, published by the Institute of Transportation Engineers (ITE) for ITE Land Use Code 210 (single family detached housing), 931 (quality restaurant) and 932 (high turnover restaurant).

Table 1
Cannon Property Trip Generation from TOA

Land Use	ADT	AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
70 Units Single-Family Detached Housing (ITE Code 210)	756	15	44	59	48	28	76	38	33	71
Internal Capture	-	2	3	5	8	6	14	6	7	13
6,600 Square Feet Quality Restaurant (ITE Code 931)	594	3	2	5	33	16	49	42	29	71
Internal Capture	-	1	1	2	4	4	8	5	3	8
Pass-By Trips	-	0	0	0	13	5	18	16	11	27
3,300 Square Feet High Turnover (Sit-Down) Restaurant (ITE Code 932)	420	20	16	36	20	13	33	24	22	46
Internal Capture	-	2	1	3	2	4	6	2	3	5
Pass-By Trips	-	0	0	0	8	4	12	9	8	17
Total New Trips	1,770	33	57	90	66	34	100	66	52	118

Cannon Property Trip Generation based on June 2020 Site Plan

Land Use	ADT	AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
70 Room Hotel (ITE Code 310)	585	19	14	33	21	21	42	28	22	50
Internal Capture	-	0	0	0	2	4	6	4	4	8
Pass-By Trips	-	0	0	0	0	0	0	0	0	0
8,500 Square Feet Quality Restaurant (ITE Code 931)	713	3	3	6	44	22	66	54	37	91
Internal Capture	-	0	0	0	4	2	6	4	4	8
Pass-By Trips	-	0	0	0	18	9	27	22	15	37
Total New Trips	1,298	22	17	39	41	28	69	52	36	88

Cannon Property New Trip Generation Comparison

Land Use	ADT	AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
TOA	1,770	33	57	90	66	34	100	66	52	118
June 2020 Site Plan	1,298	22	17	39	41	28	69	52	36	88
Difference	472	11	40	51	25	6	31	14	16	30

Overview of TOA

Intersections examined:

1. Delaware Route 54/Bennett Avenue (provide Site Access)
2. Delaware Route 54/Monroe Avenue
3. Delaware Route 54/Jefferson Avenue

Conditions examined:

- Case 1 – 2017 Existing
- Case 2 – 2021 without development
- Case 3 – 2021 with development

Peak hours evaluated: Weekday morning, Weekday evening, and Saturday midday peak hours.

Intersection Descriptions

1. Delaware Route 54/Bennett Avenue (provides Site Access)

Type of Control: Existing two-way stop controlled intersection (T-intersection); proposed to realign Bennett Avenue to form a four-leg, two-way stop controlled intersection with Monroe Avenue

Eastbound Approach: (Delaware Route 54) Existing one shared left tur/through lane; proposed one left turn lane and one shared through/right turn lane.

Westbound Approach: (Delaware Route 54) Existing one shared through/right turn lane; proposed one left turn lane, one through lane, and one right turn lane

Southbound Approach: (Bennett Avenue) Existing one shared left turn/right turn lane, stop controlled; proposed one shared left turn/through lane and one right turn lane, stop controlled

2. **Delaware Route 54/Monroe Avenue**

Type of Control: Existing two-way stop controlled (T-intersection); proposed four-leg intersection with Bennett Avenue and two-way stop controlled

Eastbound Approach: (Delaware Route 54) Existing one shared through/right turn lane; proposed one left turn lane and one shared through/right turn lane

Westbound Approach: (Delaware Route 54) Existing one shared left turn/through lane; proposed one left turn lane, one through lane, and one right turn lane

Northbound Approach: (Monroe Avenue) Existing one shared left turn/right turn lane, stop controlled; proposed one shared left turn/through/right turn lane, stop controlled

3. **Delaware Route 54/Jefferson Avenue**

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

Eastbound Approach: (Delaware Route 54) Existing one shared through/right turn lane

Westbound Approach: (Delaware route 54) Existing one shared left turn/through lane

Northbound Approach: (Jefferson Avenue) Existing one shared left turn/right turn lane, stop controlled

Transit, Pedestrian, and Bicycle Facilities

Existing transit service: Delaware Transit Corporation (DTC) currently does not provide any service in the study area.

Planned transit service: JMT contacted Ms. Tremica Cherry, Transit Planner at the DTC. Per email correspondence on June 21, 2018 from Ms. Cherry, it was recommended that one bus stop pad be installed along Delaware Route 54, between Bennett Avenue and Jefferson Avenue.

Existing bicycle and pedestrian facilities: According to the DelDOT's *Sussex County Bicycle Map*, a Regional Bicycle Route exists within the study area. The Regional Bicycle Route exists along Delaware Route 54 and traverses through all of the project's intersections (Bennett Avenue, Monroe Avenue and Jefferson intersection with Delaware Rout 54). Pedestrian facilities do not exist within the study area.

Planned bicycle and pedestrian facilities: Per email correspondence on June 18, 2018 from Mr. John Fiori, DelDOT's Bicycle Coordinator, the following improvements were recommended:

- A 10 feet-wide shared use path along the Delaware Route 54 site frontage should a pedestrian facility be required by the Subdivision Engineer
- All entrance, roadway, and intersection improvements should incorporate bicycle and pedestrian facilities
- A 15 feet wide right-of-way should be provided along the Delaware Route 54 property frontage

Bicycle Level of Service and Bicycle Compatibility Index: According to the League of Illinois Bicyclists (LIB), Bicycle Level of Service (BLOS) is an emerging 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 the Delaware Route 54 site frontage with 35 miles per hour speed limit, and the provision of an eight-foot bike/shoulder lane, the BLOS with the full build out construction of the proposed development are summarized below. The BLOS was determined utilizing the calculators published on the LIB website:

<http://rideillinois.org/blos/blosform.htm>

- Delaware Route 54 – BLOS: A (below 1.50)

Signal Warrant Evaluation

JMT conducted a signal warrant evaluation for the realigned Bennett Avenue/Monroe Avenue intersection with Delaware Route 54. The evaluation was conducted using traffic volume data; three years collision data; and geometric conditions in accordance with the Delaware Manual on Uniform Traffic Control Devices (DE MUTCD).

Based on the evaluation, Warrants 1 (Eight-hour), 2 (Four-hour), and 3 (Peak Hour) are not met under 2021 conditions with the development. The evaluation is based on the provision of two lanes along the Bennett Avenue approach and one lane along Delaware Route 54. Note, two evaluations adjusting for right turn minor street volumes were conducted with one based on the methodology from NCHRP Report 457 and the other based on the “Pagones Theorem”. Furthermore, the crash warrant (based on both the MUTCD and the IA-19.3 – Alternative Signal Warrant 7) are also not met.

DelDOT Traffic Section also evaluated the Delaware Route 54/Bennett Avenue intersection as part of the *SR 54 Corridor Study*. The corridor study recommended the consideration of installing a traffic signal at the intersection of Delaware Route 54 at Bennett Avenue to accommodate future development growth.

Previous Comments

None.

General HCS Analysis Comments

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

1. For the intersection analyses, the TOA and JMT used HCS7 version 7.3 whereas JMT used HCS7 version 7.5.
2. Per DelDOT's *Development Coordination Manual*, JMT used a heavy vehicle percentage of 3% for each movement in the Case 2 and Case 3 future scenario analyses, 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 whereas the TOA utilized existing heavy vehicle percentages for the future scenario analyses.
3. Per DelDOT's *Development Coordination Manual*, JMT utilized the existing PHF for the Case 1 scenario and a future PHF for Cases 2 and 3 scenarios 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 assumed 0.92 for all existing and future scenarios.
4. JMT utilized updated Cases 1, 2 and 3 volumes. As discussed with DelDOT, the updated volumes were created to address some volume development inconsistencies identified in the TOA report
5. JMT included pedestrian volumes in the analysis whereas the TOA did not.

Table 2
Peak Hour Levels Of Service (LOS)
Based on Traffic Operational Analysis for Cannon Property
Report Dated: May 2018
Prepared by Century Engineering

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ¹	LOS per TOA			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 54/Bennett Avenue (provides Site Access)						
2017 Existing (Case 1) ^{2,3}						
Eastbound Delaware Route 54 Left Turn	A (8.7)	A (9.2)	A (10.0)	A (8.1)	A (9.2)	A (10.0)
Southbound Bennett Avenue Approach	C (15.2)	C (21.5)	F (52.7)	C (16.7)	C (20.5)	E (46.3)
2021 Without development (Case 2)						
Eastbound Delaware Route 54 Left Turn	A (8.9)	A (9.7)	B (10.6)	A (8.2)	A (9.7)	B (10.7)
Southbound Bennett Avenue Approach	C (18.5)	D (27.6)	F (88.4)	C (18.2)	D (26.2)	F (74.7)

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

² The TOA utilized a PHF of 0.80 for the AM peak hour whereas JMT utilized a PHF of 0.79 consistent with existing traffic counts.

³ During the AM peak hour, JMT utilized a heavy vehicle percentage of 0% for the eastbound left turn, southbound left turn, and southbound right turn consistent with the existing traffic counts whereas the TOA did not.

Table 3
Peak Hour Levels Of Service (LOS)
Based on Traffic Operational Analysis for Cannon Property
Report Dated: May 2018
Prepared by Century Engineering

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ¹	LOS per TOA			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 54/Monroe Avenue						
2017 Existing (Case 1) ^{4,5}						
Westbound Delaware Route 54 Left Turn	A (8.1)	A (8.5)	B (10.6)	A (8.5)	A (8.5)	B (10.6)
Northbound Monroe Avenue Approach	B (11.6)	C (16.0)	F (64.0)	B (13.2)	C (16.0)	F (63.5)
2021 Without development (Case 2)						
Westbound Delaware Route 54 Left Turn	A (8.5)	A (8.7)	B (11.4)	A (8.8)	A (8.9)	B (11.4)
Northbound Monroe Avenue Approach	B (13.0)	C (18.8)	F (94.3)	B (14.0)	C (19.0)	F (95.6)

⁴ During the PM peak hour, JMT utilized a heavy vehicle percentage of 0% for the northbound Monroe Avenue approach consistent with existing conditions whereas the TOA did not.

⁵ During the AM peak hour, JMT utilized a PHF of 0.79 consistent with existing conditions whereas the TOA did not.

Table 4
Peak Hour Levels Of Service (LOS)
Based on Traffic Operational Analysis for Cannon Property
Report Dated: May 2018
Prepared by Century Engineering

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TOA			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 54/Bennett Avenue/Monroe Avenue						
2021 With development (Case 3) with Realignment ⁶						
Eastbound Delaware Route 54 Left Turn	A (8.2)	B (10.3)	B (11.6)	A (8.2)	B (10.2)	B (11.4)
Westbound Delaware Route 54 Left Turn	A (8.5)	A (8.7)	B (11.3)	A (8.7)	A (8.8)	B (11.3)
Northbound Monroe Avenue Approach	B (14.0)	D (28.7)	F (348.1)	B (14.5)	D (26.9)	F (242.8)
Southbound Bennett Avenue Left Turn	D (25.2)	F (105.3)	F (2290.9)	D (26.8)	F (75.4)	F (1077.9)
Southbound Bennett Avenue Right Turn	-	-	-	B (10.7)	C (15.5)	C (21.2)
Southbound Bennett Avenue Approach	-	-	-	C (20.6)	E (46.7)	F (549.6)

⁶ JMT and the TOA analyzed the intersection for future conditions as realigned. Based on the May 2018 concept plan, Bennett Avenue will be realigned to form the northerly leg at the Delaware Route 54/Bennett Avenue/Monroe Avenue intersection. JMT modeled the southbound Bennett Avenue Approach with a right turn lane and shared through/left turn lane, the westbound Delaware Route 54 approach with one shared through/left turn lane and one right turn lane, the eastbound Delaware Route 54 approach with one left turn lane and one shared through/right turn lane, and the northbound Monroe Avenue approach with one shared through/left turn/right turn lane. However, the TOA modeled the proposed intersection with one shared through/left turn/right turn lane along all four approaches.

Table 5
Peak Hour Levels Of Service (LOS)
Based on Traffic Operational Analysis for Cannon Property
Report Dated: May 2018
Prepared by Century Engineering

Unsignalized Intersection Two-Way Stop Control ¹	LOS per TOA			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 54/Bennett Avenue/Monroe Avenue						
2021 With development (Case 3) with Realignment and Two-Way Left Turn Lane ⁷						
Eastbound Delaware Route 54 Left Turn	-	-	-	A (8.2)	B (10.2)	B (11.4)
Westbound Delaware Route 54 Left Turn	-	-	-	A (8.7)	A (8.8)	B (11.3)
Northbound Monroe Avenue Approach	-	-	-	B (13.2)	C (17.1)	F (50.1)
Southbound Bennett Avenue Left Turn	-	-	-	C (17.5)	D (25.9)	F (72.9)
Southbound Bennett Avenue Right Turn	-	-	-	B (10.7)	C (15.5)	C (21.2)
Southbound Bennett Avenue Approach	-	-	-	B (14.9)	C (20.9)	E (47.1)

⁷ JMT analyzed the intersection for future conditions as realigned with a two-way left turn lane along Delaware Route 54. Based on the May 2018 concept plan, Bennett Avenue will be realigned to form the northerly leg at the Delaware Route 54/Bennett Avenue/Monroe Avenue intersection. JMT modeled the southbound Bennett Avenue Approach with a right turn lane and shared through/left turn lane, the westbound Delaware Route 54 approach with one two-way left turn lane, one through lane, and one right turn lane, the eastbound Delaware Route 54 approach with one two-way left turn lane and one shared through/right turn lane, and the northbound Monroe Avenue approach with one shared through/left turn/right turn lane.

Table 6
Peak Hour Levels Of Service (LOS)
Based on Traffic Operational Analysis for Cannon Property
Report Dated: May 2018
Prepared by Century Engineering

Roundabout ¹	LOS per TOA			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 54/Bennett Avenue/Monroe Avenue						
2021 With development (Case 3) with Roundabout ⁸						
Eastbound Delaware Route 54 Approach	-	-	-	A (7.7)	A (8.4)	E (44.7)
Westbound Delaware Route 54 Approach	-	-	-	A (5.7)	B (13.1)	C (24.5)
Northbound Monroe Avenue Approach	-	-	-	A (6.2)	A (6.4)	B (10.8)
Southbound Bennett Avenue Approach	-	-	-	A (4.8)	A (7.9)	B (12.3)
Overall Intersection	-	-	-	A (6.7)	B (11.0)	D (34.2)

Signalized Intersection ¹	LOS per TOA			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 54/Bennett Avenue/Monroe Avenue						
2021 With development (Case 3) with Signal ^{9,10}	*	B (13.3)	*	B (18.1)	B (17.9)	D (51.1)

*TOA did not provide results for the AM and Saturday periods

⁸ Roundabout scenario includes the provision of a one-lane roundabout for the Delaware Route 54/Bennett Avenue/Monroe Avenue realigned intersection.

⁹ Signal scenario includes the provision of a signal for the Delaware Route 54/Bennett Avenue/Monroe Avenue realigned intersection. JMT utilized 90 seconds cycle length during the AM peak period and 120 seconds cycle length during the PM and Summer Saturday peak periods consistent with the existing signal timings at the adjacent signalized intersections whereas the TOA did not.

¹⁰ Per *DelDOT's Development Coordination Manual*, JMT used a saturation flow rate of 1,750 pc/h/ln at signalized intersections south of the C&D Canal whereas the TOA maintained the default rate of 1,900 pc/h/ln.

Table 7
Peak Hour Levels Of Service (LOS)
Based on Traffic Operational Analysis for Cannon Property
Report Dated: May 2018
Prepared by Century Engineering

Unsignalized Intersection Two-Way Stop Control (T-Intersection) ¹	LOS per TOA			LOS per JMT		
	Weekday AM	Weekday PM	Summer Saturday Peak	Weekday AM	Weekday PM	Summer Saturday Peak
Delaware Route 54/Jefferson Avenue						
2017 Existing (Case 1) ¹¹						
Westbound Delaware Route 54 Left Turn	A (8.3)	A (8.5)	B (10.7)	A (8.3)	A (8.3)	B (10.7)
Northbound Jefferson Avenue Approach	B (13.6)	C (19.1)	E (38.8)	B (13.6)	C (19.2)	E (40.1)
2021 Without development (Case 2)						
Westbound Delaware Route 54 Left Turn	A (8.7)	A (8.7)	B (11.4)	A (8.7)	A (8.9)	B (11.6)
Northbound Jefferson Avenue Approach	C (15.7)	C (23.5)	F (56.3)	C (15.8)	C (24.0)	F (59.9)
2021 With development (Case 3)						
Westbound Delaware Route 54 Left Turn	A (8.8)	A (8.9)	B (11.6)	A (8.8)	A (8.9)	B (11.8)
Northbound Jefferson Avenue Approach	C (16.6)	D (25.8)	F (61.1)	C (16.7)	D (25.4)	F (66.4)
2021 With development (Case 3) with Two-Way Left Turn Lane ¹²						
Westbound Delaware Route 54 Left Turn	-	-	-	A (8.8)	A (8.9)	B (11.8)
Northbound Jefferson Avenue Approach	-	-	-	B (13.9)	C (16.4)	D (28.0)

¹¹ During the PM peak hour, the TOA used a heavy vehicle percentage of 0% along the westbound left turn whereas JMT used a heavy vehicle percentage of 7% consistent with the existing traffic count data.

¹² JMT analyzed the intersection for future conditions with a two-way left turn lane along Delaware Route 54.

Table 8
Peak Hour Levels Of Service (LOS)
Based on Traffic Operational Analysis for Cannon Property
Report Dated: May 2018
Prepared by Century Engineering

Signalized Intersection ¹	LOS per TOA			LOS per JMT		
	Weekday AM	Weekday PM	Saturday Peak	Weekday AM	Weekday PM	Saturday Peak
Delaware Route 54/Jefferson Avenue						
2021 With development (Case 3) with Improvement ¹³	-	-	-	A (3.5)	A (5.8)	C (22.9)

¹³ Improvement scenario includes the provision of a signal as well as a left turn lane along the westbound Delaware Route 54 approach, and a right turn lane along the eastbound Delaware Route 54 approach at the Delaware Route 54/Jefferson Avenue intersection. JMT utilized 90 seconds cycle length during the AM peak period and 120 seconds cycle length during the PM and Summer Saturday peak periods consistent with the existing signal timings at the adjacent signalized intersections.