



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

JENNIFER COHAN  
SECRETARY

May 9, 2018

Mr. Ted Williams  
Landmark Science & Engineering, Inc.  
200 Continental Drive  
Suite 400  
Newark, DE 19713

Dear Mr. Williams:

The enclosed Traffic Impact Study (TIS) supplemental review letter for the **Glasgow Avenue** (Tax Parcels 11-026.00-076,078, 079, 080, 081, 082, 083, 084, 085, 086, 087, 161, 11-027.00-002, 152) development has been completed under the responsible charge of a registered professional engineer whose firm is authorized to work in the State of Delaware. The review conforms 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. Jerome Heisler, Jr., Reybold Venture Group X, L.L.C.  
Ms. Carolann Wicks ([cawicks@verizon.net](mailto:cawicks@verizon.net))  
Mr. Robert Shaffer, Rummel, Klepper & Kahl, Inc.  
Mr. Andrew Hayes, ForeSite Associates, Inc.  
Ms. Constance C. Holland, Office of State Planning Coordination  
Mr. George Haggerty, New Castle Department of Land Use  
Mr. Owen Robatino, New Castle Department of Land Use  
Mr. Mir Wahed, Johnson, Mirmiran & Thompson, Inc.  
Ms. Joanne Arellano, Johnson, Mirmiran & Thompson, Inc.  
DelDOT Distribution

## DelDOT Distribution

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Will Mobley, Subdivision Manager, Development Coordination



May 8, 2018

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 17A- Glasgow Avenue TIS Updates**

Dear Mr. Brestel:

Johnson, Mirmiran and Thompson (JMT) has completed the additional future build analyses requested by DelDOT for the Glasgow Avenue development. Glasgow Avenue is a large mixed-use development proposed to be located at the southwest corner of the US Route 40 (New Castle Road 32) and Delaware Route 896 (New Castle Road 387) intersection in New Castle County, Delaware. Primary access to this development would be provided along Glasgow Avenue. As the TIS process has extended about three years and the proposed access has changed over time, below is a summary of what has occurred.

In April 2015, DelDOT met with the developer's traffic engineer Landmark Science and Engineering (Landmark) and New Castle County and established a scope of work for a TIS with two full entrances on Glasgow Avenue, to be located between the main and south entrances of Peoples Plaza. The scope also proposed a rights-in only access on US Route 40. Furthermore, it analyzed future build conditions with and without a planned service road, also known as Abbey Road and, hereinafter, the Connector Road, that would connect Glasgow Avenue to George Williams Way on the east side of Delaware Route 896. The alignment of this Connector Road is still unknown. In the condition with the Connector Road, the south site entrance would have connected to it rather than directly to Glasgow Avenue.

In November 2015, Landmark submitted a TIS based on the above scope of work but missing the analysis of future conditions with the Connector Road because DelDOT had not completed the modeling necessary to project those conditions. In April 2016, DelDOT completed the modeling and JMT moved forward with the review.

JMT summarized the results of their review in a September 29, 2016 letter, which DelDOT accepted and sent to Landmark. A copy is included in the Appendix of this letter. The September 29, 2016 letter recommended, among other things, the alignment of the site entrances on Glasgow Avenue opposite the main and south entrances of Peoples Plaza. It also identified the completion of the Connector Road, from the south entrance of Peoples Plaza to George Williams Way, as an essential part of the mitigation necessary for the plan to meet the County's concurrency



requirements. At that time, the developer intended to provide the remaining rights-of-way necessary for the construction of the Connector Road.

In January 2018, the developer informed DelDOT that they could not, presently, obtain all of the necessary rights-of-way. As such, DelDOT requested JMT to conduct additional future build analyses without the provision of the Connector Road. In addition, to evaluate the extent to which the Glasgow Commons committed development contributed to congestion in the area of influence, DelDOT asked JMT to analyze scenarios with and without that development. For each of those scenarios, DelDOT asked that JMT evaluate three options, discussed below. That work is the subject of this letter. The options were as follows:

#### Option 1

- Glasgow Avenue/Main Entrance to Peoples Plaza/Site Entrance A configured as a signalized full movement intersection with two southbound left turn lanes provided along Glasgow Avenue
- Glasgow Avenue/South Entrance to Peoples Plaza/Site Entrance B configured as a right-in/right-out unsignalized intersection
- Glasgow Avenue/North Entrance to Peoples Plaza configured as a right-in/right-out unsignalized intersection.

#### Option 2

- Glasgow Avenue/Main Entrance to Peoples Plaza/Site Entrance A configured as a signalized full movement intersection with two southbound left turn lanes provided along Glasgow Avenue
- Glasgow Avenue/North Entrance to Peoples Plaza configured as a right-in/right-out unsignalized intersection

#### Option 3

- Same as Option 1 except for the provision of a single southbound left turn lane along Glasgow Avenue at the Main Entrance to Peoples Plaza/Site Entrance A
- Rights-in only access along US Route 40 adjacent to the Bruster's Ice Cream site

Option 2 was evaluated as the feasibility of a second access along the southerly limits of the site may not be feasible due to right-of-way constraints. Due to the coordinated signal operation between the eastbound and westbound US Route 40 intersections with Glasgow Avenue, a supplemental analysis using Synchro 9 software was conducted. Tables summarizing the Level of Service (LOS) and 95<sup>th</sup> percentile queue lengths of the analyses based on HCS and Synchro software are included in Appendix A.

Based on our review of the additional future build analyses, we have the following comments and recommendations:



Based on the HCS results, with Options 1 or 2, the Glasgow Avenue/Main Entrance to Peoples Plaza/Site Entrance A signalized intersection would operate at LOS D or better during each peak period. As 569 vehicles are projected to utilize the southbound left turn lane to access the site during the Saturday peak period, dual left turn lanes would be needed to minimize long queues that would extend upon the eastbound US Route 40/Glasgow Avenue intersection. The eastbound US Route 40/Glasgow Avenue intersection is approximately 620 feet north of the Glasgow Avenue/Main Entrance to Peoples Plaza/Site Entrance A intersection. With the provision of dual left turn lanes, a 95<sup>th</sup> percentile queue length of approximately 253 feet during the Saturday peak period is calculated for the southbound left turn which would not impact operations at the Eastbound US Route 40/Glasgow Avenue intersection.

Option 3 considers a shared access between Bruster's Ice Cream and the Glasgow Avenue site. Per the Bruster's Ice Cream record plan, DelDOT will allow one access on US Route 40 to serve Bruster's Ice Cream and an adjacent development. The provision of a rights-in only access along US Route 40 east of Glasgow Avenue would remove the need to provide dual left turn lanes along the southbound Glasgow Avenue approach to the Main Entrance to Peoples Plaza.

With Option 3 the Glasgow Avenue/Main Entrance to Peoples Plaza/Site Entrance A signalized intersection would operate at LOS D or better during each peak period. The calculated 95<sup>th</sup> percentile queue length along the southbound Glasgow Avenue approach would be approximately 283 feet during the Saturday peak period, which could be accommodated within Glasgow Avenue and not impede operations at the Glasgow Avenue intersection with eastbound US Route 40.

Therefore, as adequate right-of-way is available along Glasgow Avenue, it is recommended the improvements associated with Option 1 be implemented. Attached Figure 1 (on Page 9) depicts the recommended layout along Glasgow Avenue.

Due to the coordinated signal operation at the eastbound and westbound US Route 40 intersections with Glasgow Avenue, a supplemental analysis utilizing Synchro software was conducted. With Synchro, under Options 1, 2, or 3, the eastbound US Route 40 intersection with Glasgow Avenue would operate with capacity constraints (LOS F or LOS E) with a maximum delay of approximately 109 seconds/vehicle during the Saturday peak hour, and the westbound US Route 40 intersection with Glasgow Avenue would operate at acceptable LOS D or better. To mitigate the capacity constraints, it is recommended to reconfigure the eastbound US Route 40 intersection with Glasgow Avenue to provide one shared through/left turn lane, two through lanes, and one right turn lane along eastbound US Route 40 and one through lane and two right turn lanes along northbound Glasgow Avenue. The eastbound US Route 40 exclusive left turn lane would be reconfigured as a shared through/left turn lane with this mitigation as only a maximum of 19 vehicles during a peak hour are expected to execute left turning movements. Furthermore, the recommended additional eastbound US Route 40 through lane should be designed to take into account the improvements as part of the DelDOT *US 40 & SR 896 Grade Separated Intersection* project (Contract #T201611901).



With these improvements, the eastbound US Route 40 intersection with Glasgow Avenue would improve to operate at LOS D during the weekday and Saturday peak periods. Attached Figures 2 and 3 (on Pages 10 and 11), depict the existing and recommended lane configurations, respectively, at the eastbound and westbound US Route 40 intersections with Glasgow Avenue.

Approximately 185 feet of storage exists along Glasgow Avenue between the intersections with eastbound US Route 40 and westbound US Route 40. With the recommended improvements, the projected 95<sup>th</sup> percentile queue length along the northbound Glasgow Avenue approach to westbound US Route 40 is approximately 25 feet which can be accommodated within the available storage. Along the southbound Glasgow Avenue approach to eastbound US Route 40, the projected 95<sup>th</sup> percentile queue length is approximately 461 feet which would not be accommodated within the available storage. However, due to the coordinated signal operation between eastbound and westbound US Route 40, queues are expected to be manageable and not impact operations along US Route 40. Furthermore, the US Route 40/SR 896 intersection is approximately 1,000 feet east of the US Route 40/Glasgow Avenue intersection. A SimTraffic simulation during the PM peak hour which contains the highest projected volume along US Route 40 confirmed that the queue lengths from the southbound Glasgow Avenue approach to eastbound US Route 40 would not significantly impact operations at the US Route 40/SR 896 intersection.

Should New Castle 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. It should be noted that the following items apply if the Connector Road is not constructed. If the Connector Road is to be constructed, the recommendations contained within the September 29, 2016 TIS Review Letter prepared by JMT and included in Appendix B should be utilized instead.

1. The developer should provide a bituminous concrete overlay to the existing travel lanes along Glasgow Avenue through the eastbound US Route 40 intersection to the South Entrance to Peoples Plaza, at DelDOT's direction. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer if necessary. Contingent on the timing of the completion of the Glasgow Avenue study, the proposed bituminous concrete overlay along Glasgow Avenue could be combined with a future DelDOT project along Glasgow Avenue.
2. The developer should construct a full movement entrance directly opposite to the Main Entrance to Peoples Plaza (as shown on attached Figure 1 on Page 9), to be consistent with the proposed lane configurations as shown in the table below:



Approach	Current Configuration	Proposed Configuration
Eastbound Main Entrance to Peoples Plaza	One left turn lane and one right turn lane	One left turn lane, one through lane, and one right turn lane
Westbound Site Entrance A	Approach does not exist	One left turn lane, one through lane, and one right turn lane
Northbound Glasgow Avenue	One through lane	One left turn lane, one through lane, and one right turn lane
Southbound Glasgow Avenue	One through lane and one right turn lane	Two left turn lanes, one through lane, and one 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 DelDOT's *Development Coordination Manual* and the updated Auxiliary Lane Warrants from October 23, 2017. The calculated queue lengths from the HCS analysis can be accommodated within the recommended storage lengths.

Approach	Left Turn Lane	Right Turn Lane
Eastbound Main Entrance to Peoples Plaza	280 feet	100 feet
Westbound Site Entrance A	245 feet	220 feet
Northbound Glasgow Avenue	255 feet	190 feet
Southbound Glasgow Avenue	260 feet	*

\*The right turn lane is continuous and extends to the US Route 40 intersection

- The developer should enter into a traffic signal agreement with DelDOT for the Main Entrance to Peoples Plaza/Site Entrance A intersection with Glasgow Avenue. The agreement should include any signal equipment necessary, such as signal heads, signal controller cabinet, pedestrian signals, crosswalks, interconnection, etc. at DelDOT's discretion. The developer will be required to perform a Signal Justification Study prior to the entrance plan approval. The scope of the Signal Justification Study will be identified at a later date at DelDOT's discretion. The developer should coordinate with DelDOT on the implementation and cost of these improvements.
- The developer should modify the full movement intersection of the North Entrance to Peoples Plaza/Glasgow Avenue to a rights-in/rights-out only driveway (as shown on attached Figure 1 on Page 9) consistent with the proposed lane configurations as shown in the table below:



Approach	Current Configuration	Proposed Configuration
Eastbound North Entrance to Peoples Plaza	One shared left/right turn lane	One right turn lane
Northbound Glasgow Avenue	One shared through/left turn lane	One through lane
Southbound Glasgow Avenue	One through lane and one right turn lane	No Change

5. The developer should construct a rights-in/rights-out entrance directly opposite to the South Entrance to Peoples Plaza (as shown on attached Figure 1 on Page 9), to be consistent with the proposed lane configurations as shown in the table below:

Approach	Current Configuration	Proposed Configuration
Eastbound South Entrance to Peoples Plaza	One right turn lane	No Change
Westbound Site Entrance B	Approach does not exist	One right turn lane
Northbound Glasgow Avenue	One left turn lane and one through lane	One left turn lane, one through lane, and one right turn lane
Southbound Glasgow Avenue	One through lane and one right turn lane	No Change

It is recommended that the existing 225 feet storage length be maintained along the northbound Glasgow Avenue left turn lane onto the South Entrance to Peoples Plaza. In addition, the northbound and southbound Glasgow Avenue right turn lanes at the intersection are recommended to provide minimum storage lengths (excluding taper) of 190 feet and 145 feet, respectively. The right turn lane storage lengths are based on the higher values between the HCS analysis results and DelDOT's *Development Coordination Manual* and the updated Auxiliary Lane Warrants from October 23, 2017.

6. The developer should reconfigure the eastbound US Route 40/Glasgow Avenue intersection (as shown on attached Figure 3 on Page 11) to be consistent with the proposed lane configurations as shown in the table below:

Approach	Current Configuration	Proposed Configuration
Eastbound US Route 40	One left turn lane, two through lanes, and one right turn lane	One shared through/left turn lane, two through lanes, and one right turn lane
Northbound Glasgow Avenue	Two through lanes and one right turn lane	One through lane and two right turn lanes
Southbound Glasgow Avenue	One shared through/left turn lane and one through lane	No Change



The design of the additional through lane along eastbound US Route 40 should take into account the improvements proposed as part of the DelDOT *US 40 & SR 896 Grade Separated Intersection* project (Contract #T201611901).

Based on the Synchro analysis results, the recommended minimum storage length (excluding taper) is 520 feet for the eastbound US Route 40 shared through/left turn lane and 480 feet for the northbound Glasgow Avenue right turn lane. The calculated queue lengths from the Synchro analysis can be accommodated within the recommended storage lengths.

7. The developer should enter into a traffic signal agreement with DelDOT for the improvements associated with the eastbound US Route 40 intersection with Glasgow Avenue. The agreement should include any signal timing changes as well as any signal equipment necessary, such as signal heads, signal controller cabinet, pedestrian signals, crosswalks, interconnection, etc. at DelDOT's discretion.
8. The developer should enter into an agreement with DelDOT to contribute right-of-way for the *US 40 & SR 896 Grade Separated Intersection* (Contract #T201611901) project. This project will convert the US Route 40/Delaware Route 896 intersection from an at-grade intersection to a grade-separated intersection. DelDOT is in the process of determining the final preferred layout. The developer should coordinate with DelDOT on the implementation of these improvements.
9. The following bicycle, pedestrian, and transit improvements should be verified with DelDOT's Development Coordination and other pertinent sections regarding inclusion during the plan review process:
  - a. The developer should construct a bike lane and sidewalk consistent with the *Glasgow Avenue Planning Study* along the easterly side of Glasgow Avenue from US Route 40 to the South Entrance to Peoples Plaza that meets current AASHTO and ADA standards. The developer should coordinate with DelDOT's Development Coordination Section during the plan review process to identify the exact location of proposed bike lanes and sidewalks as well as the needed furnishings along the sidewalk.
  - b. All internal streets to be built within this development should include five-foot wide ADA compliant sidewalks on both sides of the roadway set back five feet from the roadway.
  - 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. When right turn lanes are added along Glasgow Avenue, a five-foot wide bike lane should also be provided through the right turn lane in order to facilitate safe and unimpeded bicycle travel.
  - e. ADA compliant curb ramps and marked crosswalks should be provided at the site entrances. The use of diagonal curb ramps is discouraged.



- f. Bike parking should be provided near each building's entrance. Where the building architecture provides for an awning or other overhang, the bike parking should be covered.
- g. Utility covers should be moved outside of any designated bicycle lanes or should be flush with the pavement.
- h. The developer should install five-foot by eight-foot bus pads along both northbound and southbound Glasgow Avenue, adjacent to the Main Entrance to Peoples Plaza (approximately 720 feet south of the Glasgow Avenue intersection with eastbound US Route 40). Crosswalks should be provided to afford safe access between the bus pads and the Glasgow Avenue and Peoples Plaza developments. The developer should coordinate with DART to determine the exact locations for the bus stop as well as the needed amenities (bus pad, shelter, etc.).

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 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 [https://www.deldot.gov//Publications/manuals/de\\_mutcd/index.shtml](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. Mark Buckalew of DelDOT's Traffic Section. Mr. Buckalew can be reached at (302) 894-6353 or by email at [Mark.Buckalew@state.de.us](mailto:Mark.Buckalew@state.de.us).

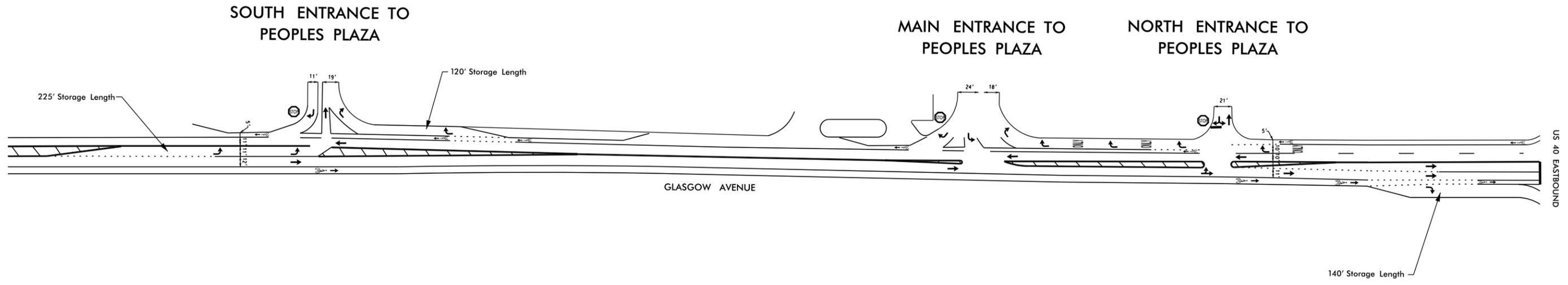
Additional details on our review of the TIS are attached. Please contact me at (302) 266-9600 if you have any questions concerning this review.

Sincerely,  
Johnson, Mirmiran, and Thompson, Inc.

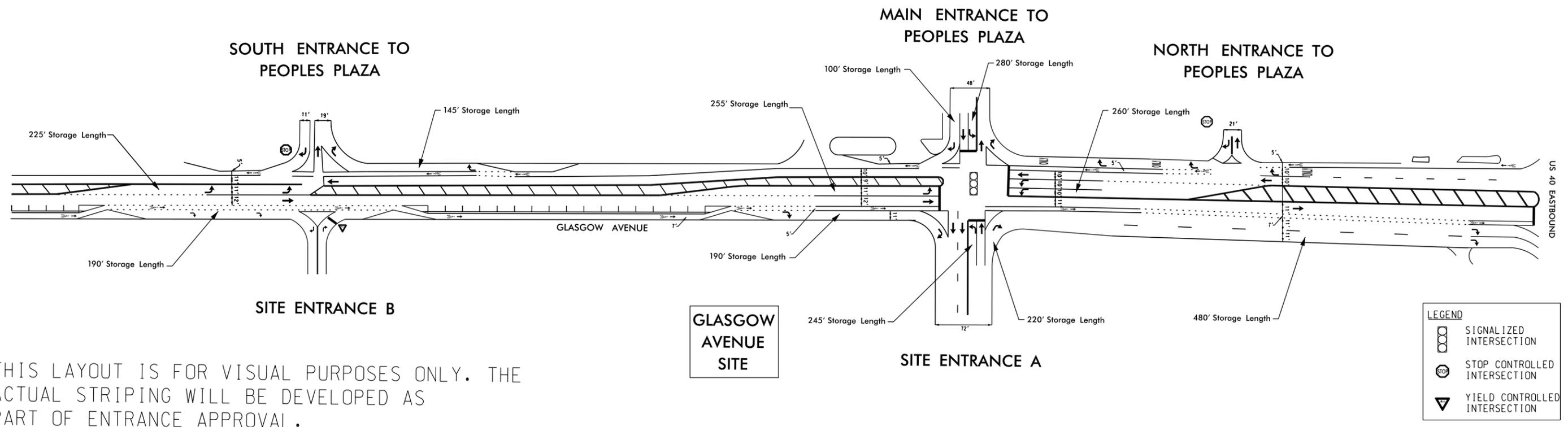
*Mir Wahed*  
Mir Wahed, P.E., PTOE

cc: Joanne Arellano, P.E., PTOE  
Enclosure

# EXISTING CONDITION ALONG GLASGOW AVENUE



# CONCEPTUAL LAYOUT FOR RECOMMENDED LAYOUT WITHOUT CONNECTOR ROAD (OPTION 1)



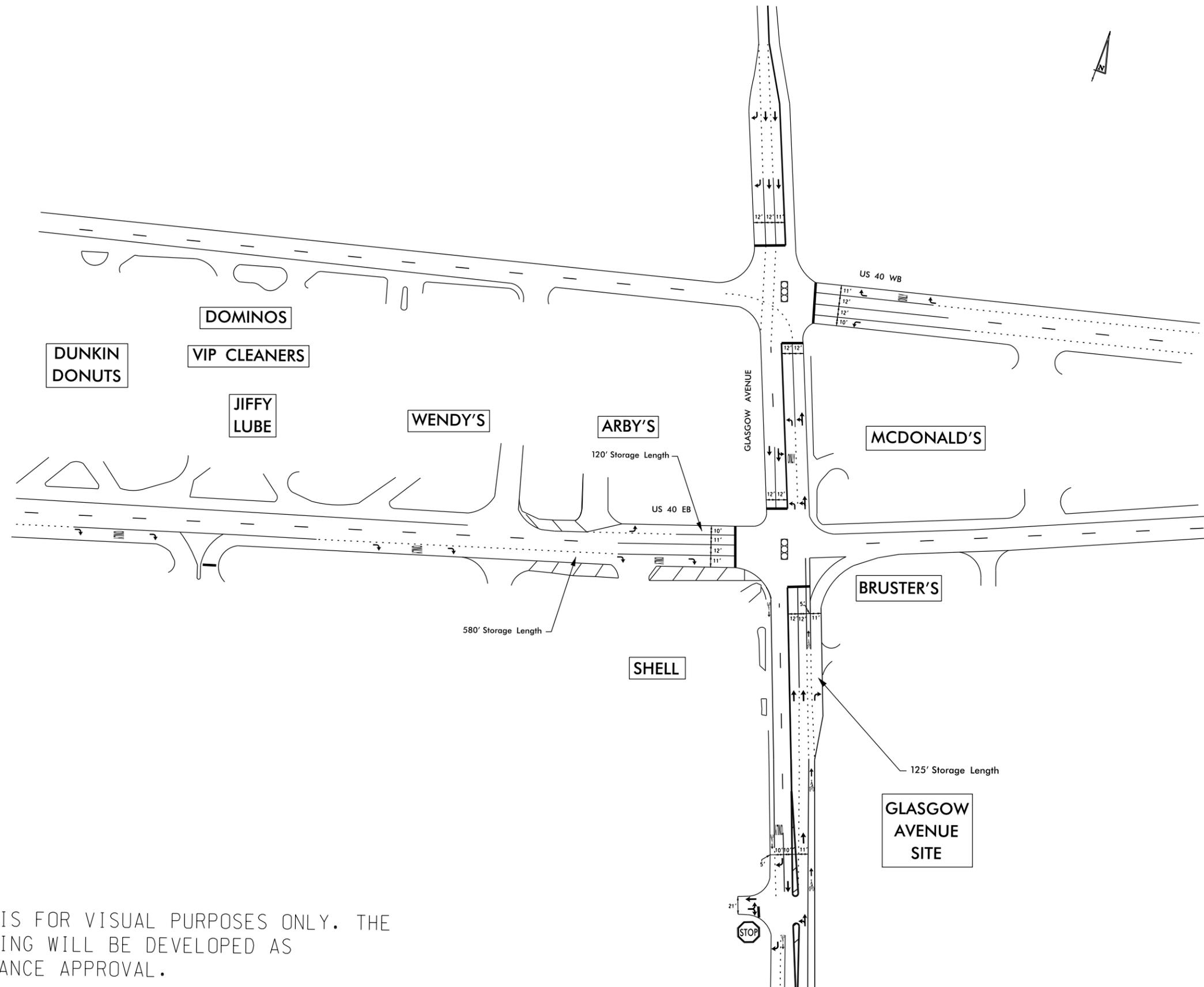
THIS LAYOUT IS FOR VISUAL PURPOSES ONLY. THE ACTUAL STRIPING WILL BE DEVELOPED AS PART OF ENTRANCE APPROVAL.



# EXISTING CONDITION ALONG GLASGOW AVENUE



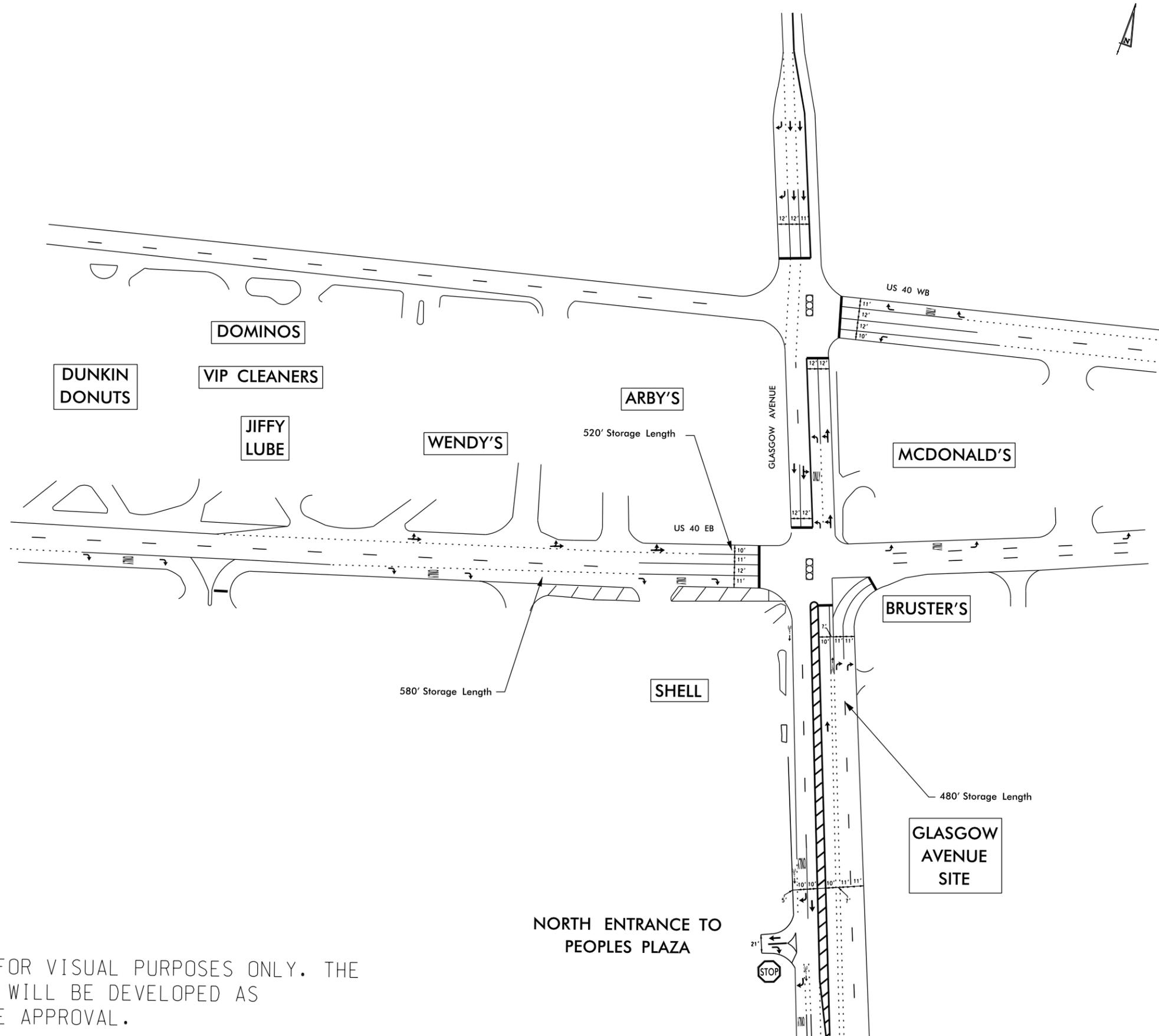
## GLASGOW AVENUE TIS UPDATES NEW CASTLE COUNTY, DELAWARE



THIS LAYOUT IS FOR VISUAL PURPOSES ONLY. THE ACTUAL STRIPING WILL BE DEVELOPED AS PART OF ENTRANCE APPROVAL.

LEGEND	
	SIGNALIZED INTERSECTION
	STOP CONTROLLED INTERSECTION

# CONCEPTUAL LAYOUT – RECOMMENDED IMPROVEMENTS WITHOUT CONNECTOR ROAD (OPTION 1)



THIS LAYOUT IS FOR VISUAL PURPOSES ONLY. THE ACTUAL STRIPING WILL BE DEVELOPED AS PART OF ENTRANCE APPROVAL.

LEGEND	
	SIGNALIZED INTERSECTION
	STOP CONTROLLED INTERSECTION



# APPENDIX



## **Appendix A – Analysis Results**

**Scenario 1 – 2018 Build with Glasgow Commons**  
**HCS Analysis**

Scenario 1 - 2018 Build With Glasgow Commons Development						
Signalized Intersections	EB US Route 40/Glasgow Avenue			WB US Route 40/Glasgow Avenue		
	AM Peak	PM Peak	SAT Peak	AM Peak	PM Peak	SAT Peak
	HCS Intersection Delay(sec) and LOS			HCS Intersection Delay(sec) and LOS		
Cycle Length (sec)	150			150		
Option 1	E (58.1)	F (114.8)	F (89.0)	D (44.9)	D (51.2)	D (51.1)
Option 2	E (58.1)	F (114.8)	F (89.0)	D (44.9)	D (51.2)	D (51.1)
Option 3	E (61.2)	F (122.5)	F (103.3)	C (31.6)	D (41.7)	D (37.4)
Option 1 with US Route 40 Mitigation	D (46.4)	D (55.0)	E (61.9)	D (44.9)	D (53.8)	D (54.8)

**Notes:**

- Option 1 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection and the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection.
- Option 2 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection.
- Option 3 is the same as Option 1 but provides only one southbound left turn lane along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A as well as the provision of a rights-in only access along US Route 40.
- Option 1 with US Route 40 Mitigation includes reconfiguring the eastbound US Route 40 intersection with Glasgow Avenue to provide one shared through/left turn lane, two through lanes, and one right turn lane along eastbound US Route 40, and one through lane and two right turn lanes along northbound Glasgow Avenue.

<b>Scenario 1 - 2018 Build With Glasgow Commons Development</b>			
<b>Signalized Intersection</b>	<b>Glasgow Avenue /Main Entrance to Peoples Plaza/Site Entrance A</b>		
	<b>AM Peak</b>	<b>PM Peak</b>	<b>SAT Peak</b>
	<b>HCS Intersection Delay(sec) and LOS</b>		
Cycle Length (sec)	75		
Option 1	C (28.8)	D (42.9)	D (43.7)
Option 2	C (24.3)	C (31.0)	D (36.8)
Option 3	B (18.3)	D (38.4)	D (41.2)

**Notes:**

- Option 1 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection and the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection.
- Option 2 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Main Plaza/Site Entrance A being configured as a full movement intersection. Two southbound left turn lanes are provided along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A.
- Option 3 is the same as Option 1 but provides only one southbound left turn lane along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A as well as the provision of a rights-in only access along US Route 40.

**Scenario 1 - 2018 Build With Glasgow Commons Development**

Unsignalized Intersections	Glasgow Avenue/Peoples Plaza North Entrance			Glasgow Avenue/Peoples Plaza South Entrance		
	AM Peak	PM Peak	SAT Peak	AM Peak	PM Peak	SAT Peak
	HCS Intersection Delay(sec) and LOS			HCS Intersection Delay(sec) and LOS		
Option 1						
Eastbound Right	B (14.7)	C (19.5)	C (20.5)	B (13.8)	F (127.6)	E (45.7)
Westbound Right				B (13.1)	B (13.1)	C (16.2)
Northbound Left				A (9.3)	B (10.7)	B (10.1)
Option 2						
Eastbound Right	B (14.7)	C (19.5)	C (20.5)	B (13.8)	F (127.6)	E (45.7)
Northbound Left				B (10.8)	B (12.1)	B (11.3)
Option 3						
Eastbound Right	B (13.1)	C (17.3)	C (15.3)	B (13.8)	F (127.6)	E (45.7)
Westbound Right				B (11.9)	B (11.6)	B (13.7)
Northbound Left				B (10.8)	B (12.1)	B (11.3)

**Notes:**

- Option 1 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection and the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection.
- Option 2 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Main Plaza/Site Entrance A being configured as a full movement intersection and the provision of a rights-in only access along US Route 40.
- Option 3 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection, the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection, and the provision of a rights-in only access along US Route 40.

**Scenario 1 - 2018 Build With Glasgow Commons Development**

Signalized Intersection	Lane	Storage	EB US Route 40/Glasgow Avenue		
			AM Peak	PM Peak	SAT Peak
			HCS 95th Percentile Queue (feet)		
Option 1	NBR	150	575	1528	1210
	SBL	185	468	565	593
	SBT	185	410	485	513
Option 2	NBR	150	575	1528	1210
	SBL	185	468	565	593
	SBT	185	410	485	513
Option 3	NBR	150	288	463	520
	SBL	185	108	115	235
	SBT	185	375	430	428
Option 1 with US Route 40 Mitigation	NBR	150	288	495	600
	SBL	185	468	533	593
	SBT	185	410	465	513

**Scenario 1 - 2018 Build With Glasgow Commons Development**

Signalized Intersection	Lane	Storage	WB US Route 40/Glasgow Avenue		
			AM Peak	PM Peak	SAT Peak
			HCS 95th Percentile Queue (feet)		
Option 1	WBT	950	830	815	880
	NBL	180	108	160	203
	SBR	150	178	200	145
Option 2	WBT	950	830	815	880
	NBL	180	108	160	203
	SBR	150	178	200	145
Option 3	WBT	950	388	440	480
	NBL	180	215	300	365
	SBR	150	175	200	145
Option 1 with US Route 40 Mitigation	WBT	950	830	848	880
	NBL	180	108	160	200
	SBR	150	178	200	150

**Scenario 1 - 2018 Build With Glasgow Commons Development**

Signalized Intersection	Lane	Glasgow Avenue /Main Entrance to Peoples Plaza/Site Entrance A		
		AM Peak	PM Peak	SAT Peak
		HCS 95th Percentile Queue (feet)		
Option 1	NBL	235	255	178
	SBL	95	88	253
	EBL	78	280	213
	WBL	60	188	245
Option 2	NBL	95	88	55
	SBL	110	95	235
	EBL	70	170	135
	WBL	53	153	220
Option 3	NBL	33	45	38
	SBL	48	55	283
	EBL	78	158	135
	WBL	60	155	220

**Scenario 1 - 2018 Build With Glasgow Commons Development**

Unsignalized Intersections	Storage	Glasgow Avenue/Peoples Plaza North Entrance			Glasgow Avenue/Peoples Plaza South Entrance		
		AM Peak	PM Peak	SAT Peak	AM Peak	PM Peak	SAT Peak
		HCS 95th Percentile Queue (feet)			HCS 95th Percentile Queue (feet)		
Option 1							
Eastbound Right	-	0	8	3	15	420	205
Westbound Right	-				5	13	30
Northbound Left	225				10	15	15
Option 2							
Eastbound Right	-	0	8	3	15	420	205
Northbound Left	225				40	40	38
Option 3							
Eastbound Right	-	0	5	3	15	420	205
Westbound Right	-				5	10	25
Northbound Left	225				40	40	38

**Scenario 2 – 2018 Build without Glasgow Commons**  
**HCS Analysis**

**Scenario 2 - 2018 Build Without Glasgow Commons Development**

Signalized Intersections	EB US Route 40/Glasgow Avenue			WB US Route 40/Glasgow Avenue		
	AM Peak	PM Peak	SAT Peak	AM Peak	PM Peak	SAT Peak
	HCS Intersection Delay(sec) and LOS			HCS Intersection Delay(sec) and LOS		
Cycle Length (sec)	150			150		
Option 1	E (56.7)	F (112.0)	F (88.3)	D (44.8)	D (51.1)	D (51.0)
Option 2	E (56.7)	F (112.0)	F (88.3)	D (44.8)	D (51.1)	D (51.0)
Option 3	E (58.7)	F (119.2)	F (101.5)	D (44.8)	D (51.1)	D (51.0)
Option 1 with US Route 40 Mitigation	D (46.3)	D (54.8)	E (62.9)	D (42.7)	D (53.8)	D (53.6)

**Notes:**

- Option 1 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection and the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection.
- Option 2 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Main Plaza/Site Entrance A being configured as a full movement intersection.
- Option 3 is the same as Option 1 but provides only one southbound left turn lane along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A as well as the provision of a rights-in only access along US Route 40.
- Option 1 with US Route 40 Mitigation includes reconfiguring the eastbound US Route 40 intersection with Glasgow Avenue to provide one shared through/left turn lane, two through lanes, and one right turn lane along eastbound US Route 40, and one through lane and two right turn lanes along northbound Glasgow Avenue.

<b>Scenario 2 - 2018 Build Without Glasgow Commons Development</b>			
<b>Signalized Intersection</b>	<b>Glasgow Avenue /Main Entrance to Peoples Plaza/Site Entrance A</b>		
	<b>AM Peak</b>	<b>PM Peak</b>	<b>SAT Peak</b>
	<b>HCS Intersection Delay(sec) and LOS</b>		
Cycle Length (sec)	75		
Option 1	C (28.8)	D (42.9)	D (43.7)
Option 2	C (24.3)	C (31.0)	D (36.8)
Option 3	B (18.3)	D (38.4)	D (49.9)

**Notes:**

- Option 1 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection and the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection.
- Option 2 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Main Plaza/Site Entrance A being configured as a full movement intersection. Two southbound left turn lanes are provided along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A.
- Option 3 is the same as Option 1 but provides only one southbound left turn lane along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A as well as the provision of a rights-in only access along US Route 40.

**Scenario 2 - 2018 Build Without Glasgow Commons Development**

Unsignalized Intersections	Glasgow Avenue/Peoples Plaza North Entrance			Glasgow Avenue/Peoples Plaza South Entrance		
	AM Peak	PM Peak	SAT Peak	AM Peak	PM Peak	SAT Peak
	HCS Intersection Delay(sec) and LOS			HCS Intersection Delay(sec) and LOS		
Option 1						
Eastbound Right	B (14.7)	C (19.5)	C (20.5)	B (13.8)	F (127.6)	E (45.7)
Westbound Right				B (13.1)	B (13.1)	C (16.2)
Northbound Left				A (9.3)	B (10.7)	B (10.1)
Option 2						
Eastbound Right	B (14.7)	C (19.5)	C (20.5)	B (13.8)	F (127.6)	E (45.7)
Northbound Left				B (10.8)	B (12.1)	B (11.3)
Option 3						
Eastbound Right	B (13.1)	C (17.3)	C (15.3)	B (13.8)	F (127.6)	E (45.7)
Westbound Right				B (11.9)	B (11.6)	B (13.7)
Northbound Left				B (10.8)	B (12.1)	B (11.3)

**Notes:**

- Option 1 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection and the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection.
- Option 2 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Main Plaza/Site Entrance A being configured as a full movement intersection.
- Option 3 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection, the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection, and the provision of a rights-in only access along US Route 40.

**Scenario 2 - 2018 Build Without Glasgow Commons Development**

Signalized Intersection	Lane	Storage	EB US Route 40/Glasgow Avenue		
			AM Peak	PM Peak	SAT Peak
			HCS 95th Percentile Queue (feet)		
Option 1	NBR	150	575	1528	1210
	SBL	185	468	565	593
	SBT	185	410	485	513
Option 2	NBR	150	575	1528	1210
	SBL	185	468	565	593
	SBT	185	410	485	513
Option 3	NBR	150	575	1528	1210
	SBL	185	470	565	595
	SBT	185	413	488	520
Option 1 with US Route 40 Mitigation	NBR	150	288	495	618
	SBL	185	468	520	578
	SBT	185	410	458	505

**Scenario 2 - 2018 Build Without Glasgow Commons Development**

Signalized Intersection	Lane	Storage	WB US Route 40/Glasgow Avenue		
			AM Peak	PM Peak	SAT Peak
			HCS 95th Percentile Queue (feet)		
Option 1	WBT	950	830	815	880
	NBL	180	108	160	203
	SBR	150	163	168	138
Option 2	WBT	950	830	815	880
	NBL	180	108	160	203
	SBR	150	163	168	138
Option 3	WBT	950	830	815	880
	NBL	180	108	160	203
	SBR	150	163	168	138
Option 1 with US Route 40 Mitigation	WBT	950	798	848	920
	NBL	180	108	160	200
	SBR	150	163	168	138

**Scenario 2 - 2018 Build Without Glasgow Commons Development**

Signalized Intersection	Lane	Glasgow Avenue /Main Entrance to Peoples Plaza/Site Entrance A		
		AM Peak	PM Peak	SAT Peak
		HCS 95th Percentile Queue (feet)		
Option 1	NBL	235	255	178
	SBL	95	88	253
	EBL	78	280	213
	WBL	60	188	245
Option 2	NBL	95	88	55
	SBL	110	95	235
	EBL	70	170	135
	WBL	53	153	220
Option 3	NBL	33	45	38
	SBL	48	55	283
	EBL	78	158	135
	WBL	60	155	220

**Scenario 2 - 2018 Build Without Glasgow Commons Development**

Unsignalized Intersections	Storage	Glasgow Avenue/Peoples Plaza North Entrance			Glasgow Avenue/Peoples Plaza South Entrance		
		AM Peak	PM Peak	SAT Peak	AM Peak	PM Peak	SAT Peak
		HCS 95th Percentile Queue (feet)			HCS 95th Percentile Queue (feet)		
Option 1							
Eastbound Right	-	0	8	3	15	420	205
Westbound Right	-				5	13	30
Northbound Left	225				10	15	15
Option 2							
Eastbound Right	-	0	8	3	15	420	205
Northbound Left	225				40	40	38
Option 3							
Eastbound Right	-	0	5	3	15	420	205
Westbound Right	-				5	10	25
Northbound Left	225				40	40	38

**Scenario 1 – 2018 Build with Glasgow Commons**  
**Synchro Analysis**

Scenario 1 - 2018 Build With Glasgow Commons Development						
Signalized Intersections	EB US Route 40/Glasgow Avenue			WB US Route 40/Glasgow Avenue		
	AM Peak	PM Peak	SAT Peak	AM Peak	PM Peak	SAT Peak
	Synchro Intersection Delay(sec) and LOS			Synchro Intersection Delay(sec) and LOS		
Cycle Length (sec)	150			150		
Option 1	C (33.3)	E (63.9)	E (67.2)	C (34.2)	D (48.1)	D (46.5)
Option 2	C (33.3)	E (63.9)	E (67.2)	C (34.2)	D (48.1)	D (46.5)
Option 3	D (41.6)	F (83.2)	F (108.8)	D (37.5)	D (48.6)	D (49.0)
Option 1 with US Route 40 Mitigation	D (36.9)	D (43.7)	D (54.2)	D (44.8)	D (54.5)	D (53.4)

**Notes:**

- Option 1 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection and the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection.

- Option 2 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Main Plaza/Site Entrance A being configured as a full movement intersection.

- Option 3 is the same as Option 1 but provides only one southbound left turn lane along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A as well as the provision of a rights-in only access along US Route 40.

- Option 1 with US Route 40 Mitigation includes reconfiguring the eastbound US Route 40 intersection with Glasgow Avenue to provide one shared through/left turn lane, two through lanes, and one right turn lane along eastbound US Route 40, and one through lane and two right turn lanes along northbound Glasgow Avenue.

<b>Scenario 1 - 2018 Build With Glasgow Commons Development</b>			
<b>Signalized Intersection</b>	<b>Glasgow Avenue /Main Entrance to Peoples Plaza/Site Entrance A</b>		
	<b>AM Peak</b>	<b>PM Peak</b>	<b>SAT Peak</b>
	<b>Synchro Intersection Delay(sec) and LOS</b>		
Cycle Length (sec)	75		
Option 1	C (25.2)	D (48.3)	D (53.2)
Option 2	B (19.6)	D (36.2)	D (50.4)
Option 3	B (13.3)	C (31.0)	D (44.2)

**Notes:**

- Option 1 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection and the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection.

- Option 2 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Main Plaza/Site Entrance A being configured as a full movement intersection. Two southbound left turn lanes are provided along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A.

- Option 3 is the same as Option 1 but provides only one southbound left turn lane along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A as well as the provision of a rights-in only access along US Route 40.

Scenario 1 - 2018 Build With Glasgow Commons Development					
Signalized Intersection	Lane	Storage	EB US Route 40/Glasgow Avenue		
			AM Peak	PM Peak	SAT Peak
			Synchro 95th Percentile Queue (feet)		
Option 1	NBR	150	231	#740	#825
	SBLT	185	381	#470	#567
Option 2	NBR	150	231	#740	#825
	SBLT	185	381	#470	#567
Option 3	NBR	150	#399	#863	#1061
	SBLT	185	#400	#497	m#565
Option 1 with US Route 40 Mitigation	NBR	150	269	#442	478
	SBLT	185	353	#444	461

**Notes:**

- # denotes 95th percentile volume exceeds capacity, queue may be longer.
- m denotes queue is metered by an upstream signal.

Scenario 1 - 2018 Build With Glasgow Commons Development					
Signalized Intersection	Lane	Storage	WB US Route 40/Glasgow Avenue		
			AM Peak	PM Peak	SAT Peak
			Synchro 95th Percentile Queue (feet)		
Option 1	WBT	950	m477	m411	m332
	NBL	180	7	16	26
	SBR	150	172	#361	208
Option 2	WBT	950	m477	m411	m332
	NBL	180	7	16	26
	SBR	150	172	#361	208
Option 3	WBT	950	m491	m414	m343
	NBL	180	7	16	26
	SBR	150	80	#332	178
Option 1 with US Route 40 Mitigation	WBT	950	m601	m500	m434
	NBL	180	7	15	m25
	SBR	150	130	#317	188

**Notes:**

- # denotes 95th percentile volume exceeds capacity, queue may be longer.
- m denotes queue is metered by an upstream signal.

Scenario 1 - 2018 Build With Glasgow Commons Development				
Signalized Intersection	Lane	Glasgow Avenue /Main Entrance to Peoples Plaza/Site Entrance A		
		AM Peak	PM Peak	SAT Peak
		Synchro 95th Percentile Queue (feet)		
Option 1	NBL	#192	#243	#181
	SBL	96	#109	#248
	EBL	80	#260	#221
	WBL	66	#165	#290
Option 2	NBL	88	#120	#90
	SBL	96	#109	#248
	EBL	79	#241	#181
	WBL	65	#142	#259
Option 3	NBL	34	39	42
	SBL	47	50	#235
	EBL	79	#257	#190
	WBL	65	#162	#203

**Notes:**

- # denotes 95th percentile volume exceeds capacity, queue may be longer.
- m denotes queue is metered by an upstream signal.

**Scenario 2 – 2018 Build without Glasgow Commons**  
**Synchro Analysis**

Scenario 2 - 2018 Build Without Glasgow Commons Development						
Signalized Intersections	EB US Route 40/Glasgow Avenue			WB US Route 40/Glasgow Avenue		
	AM Peak	PM Peak	SAT Peak	AM Peak	PM Peak	SAT Peak
	Synchro Intersection Delay(sec) and LOS			Synchro Intersection Delay(sec) and LOS		
Cycle Length (sec)	150			150		
Option 1	D (35.2)	E (59.8)	E (66.3)	C (34.0)	D (44.3)	D (46.3)
Option 2	D (35.2)	E (59.8)	E (66.3)	C (34.0)	D (44.3)	D (46.3)
Option 3	D (43.5)	F (81.7)	F (107.1)	D (37.4)	D (46.3)	D (48.3)
Option 1 with US Route 40 Mitigation	D (36.5)	D (43.6)	D (54.1)	D (41.5)	D (53.0)	D (53.0)

**Notes:**

- Option 1 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection and the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection.
- Option 2 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Main Plaza/Site Entrance A being configured as a full movement intersection.
- Option 3 is the same as Option 1 but provides only one southbound left turn lane along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A as well as the provision of a rights-in only access along US Route 40.
- Option 1 with US Route 40 Mitigation includes reconfiguring the eastbound US Route 40 intersection with Glasgow Avenue to provide one shared through/left turn lane, two through lanes, and one right turn lane along eastbound US Route 40, and one through lane and two right turn lanes along northbound Glasgow Avenue.

<b>Scenario 2 - 2018 Build Without Glasgow Commons Development</b>			
<b>Signalized Intersection</b>	<b>Glasgow Avenue /Main Entrance to Peoples Plaza/Site Entrance A</b>		
	<b>AM Peak</b>	<b>PM Peak</b>	<b>SAT Peak</b>
	<b>Synchro Intersection Delay(sec) and LOS</b>		
Cycle Length (sec)	75		
Option 1	C (25.2)	D (48.3)	D (53.2)
Option 2	B (19.6)	D (36.2)	D (50.4)
Option 3	B (14.2)	C (28.7)	D (52.6)

**Notes:**

- Option 1 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza/Site Entrance A being configured as a full movement intersection and the Glasgow Avenue intersection with the South Entrance to Peoples Plaza/Site Entrance B being configured as a right-in/right-out intersection.

- Option 2 includes the Glasgow Avenue intersection with the Main Entrance to Peoples Main Plaza/Site Entrance A being configured as a full movement intersection. Two southbound left turn lanes are provided along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A.

- Option 3 is the same as Option 1 but provides only one southbound left turn lane along the Glasgow Avenue approach to the Main Entrance to Peoples Plaza/Site Entrance A as well as the provision of a rights-in only access along US Route 40.

Scenario 2 - 2018 Build Without Glasgow Commons Development					
Signalized Intersection	Lane	Storage	EB US Route 40/Glasgow Avenue		
			AM Peak	PM Peak	SAT Peak
			Synchro 95th Percentile Queue (feet)		
Option 1	NBR	150	221	#729	#825
	SBLT	185	532	#470	#567
Option 2	NBR	150	221	#729	#825
	SBLT	185	532	#470	#567
Option 3	NBR	150	#394	#852	#1061
	SBLT	185	#403	#497	m#565
Option 1 with US Route 40 Mitigation	NBR	150	269	432	478
	SBLT	185	291	302	461

**Notes:**

- # denotes 95th percentile volume exceeds capacity, queue may be longer.
- m denotes queue is metered by an upstream signal.

Scenario 2 - 2018 Build Without Glasgow Commons Development					
Signalized Intersection	Lane	Storage	WB US Route 40/Glasgow Avenue		
			AM Peak	PM Peak	SAT Peak
			Synchro 95th Percentile Queue (feet)		
Option 1	WBT	950	472	643	m344
	NBL	180	7	14	26
	SBR	150	142	139	187
Option 2	WBT	950	472	643	m344
	NBL	180	7	14	26
	SBR	150	142	139	187
Option 3	WBT	950	673	m416	m346
	NBL	180	7	16	26
	SBR	150	142	249	187
Option 1 with US Route 40 Mitigation	WBT	950	578	m511	m446
	NBLT	180	7	15	m25
	SBR	150	106	207	167

**Notes:**

- # denotes 95th percentile volume exceeds capacity, queue may be longer.
- m denotes queue is metered by an upstream signal.

Scenario 2 - 2018 Build Without Glasgow Commons Development				
Signalized Intersection	Lane	Glasgow Avenue /Main Entrance to Peoples Plaza/Site Entrance A		
		AM Peak	PM Peak	SAT Peak
		Synchro 95th Percentile Queue (feet)		
Option 1	NBL	#192	#243	#181
	SBL	96	#109	#248
	EBL	80	#260	#221
	WBL	66	#165	#290
Option 2	NBL	88	#120	#90
	SBL	96	#109	#248
	EBL	79	#241	#181
	WBL	65	#142	#259
Option 3	NBL	34	40	37
	SBL	47	52	#272
	EBL	79	#219	#215
	WBL	65	#154	#231

**Notes:**

- # denotes 95th percentile volume exceeds capacity, queue may be longer.
- m denotes queue is metered by an upstream signal.



**Appendix B – September 29, 2016  
TIS Review Letter**



September 29, 2016

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

RE: Agreement No. 1654  
Project Number T201469011  
Traffic Impact Study Services  
**Task 8A-Glasgow Avenue**

Dear Mr. Brestel:

Johnson, Mirmiran and Thompson (JMT) has completed the review of the Final Traffic Impact Study (TIS) for Glasgow Avenue, prepared by Landmark Science & Engineering. This review was assigned Task Number 8A. Landmark Science & Engineering prepared the report in a manner generally consistent with DelDOT's *Development Coordination Manual*.

The TIS evaluates the impacts of a large mixed-use development that will consist of a 207,500 square foot shopping center, a 5,000 square foot drive-in bank, 72,000 square feet of general office space, 14,200 square feet of medical office space, and a 9,800 square foot high-turnover sit-down restaurant. The subject site is located southwest of the US Route 40 (New Castle Road 32) and Delaware Route 896 (New Castle Road 387) intersection in New Castle County. The site is approximately 30.9 acres of land and is currently split-zoned as CR (Commercial Regional) and S (Suburban). The developer proposes to rezone the S portion of the land to CR.

Of the intersections evaluated in this study to satisfy the New Castle County LOS requirements listed in the Unified Development Code (UDC), only the intersection of eastbound US Route 40 and Glasgow Avenue would not meet the requirements. However, an acceptable improvement to meet the requirements has been identified, and would allow the proposed development to meet concurrency. The LOS and improvement are discussed in more detail later in this document.

Contrary to the May 4, 2015, DelDOT Scoping Meeting Minutes, the developer is proposing three access points along Glasgow Avenue, per the April 14, 2015, Exploratory Sketch Plan included in the TIS. From discussions with DelDOT's Development Coordination Section, two direct access points along Glasgow Avenue were analyzed as part of this review for the future build cases (Case 3), and options were included with (Case 3a) and without (Case 3b) a proposed connector road over Delaware Route 896. For the connector road scenario (Case 3a), three options were analyzed. Option 1 includes the connection tie-in between the Main and South Entrances to Peoples Plaza, Option 2 includes the connection tie-in across from the Main Entrance to Peoples Plaza, while Option 3 includes the connection tie-in across from the South Entrance to Peoples Plaza. Construction is expected to be completed in 2018. Based on discussions with DelDOT's



Development Coordination Section on July 19, 2016, the review letter recommendations are based on the Case 3a – Option 3 scenario, which includes the proposed connector road tie-in across from the South Entrance to Peoples Plaza.

DelDOT currently has three relevant projects within the study area: the *US 40 & SR 896 Grade Separated Intersection* project (Contract #T201611901), the *HEP NCC, US 40 at Glasgow Avenue* project (Contract #T201300101), and a pavement and rehabilitation project along Delaware Route 896, from Delaware Route 71 to I-95 (Contract #T201506103). These projects are described in detail in the supporting documentation that begins on page 13. Additionally, WILMAPCO is conducting a planning study in the area, the Glasgow Avenue Main Street Study, described below.

The Glasgow Avenue Main Street Study is a vision plan created by WILMAPCO, DelDOT, and New Castle County to guide transportation improvements and land use along Glasgow Avenue from Porter Road to US Route 40. The plan envisions a “Main Street” roadway character from US Route 40 to north of Hodgson Vo-Tech High School. This would be established by having two to three story mixed-use development buildings along Glasgow Avenue located adjacent to sidewalks, as well as the provision of parallel on-street parking and buffered bike lanes. From Hodgson Vo-Tech High School, south, the plan envisions more of a residential district where there are houses along a two-lane roadway (one lane in each direction) with sidewalks and/or multi-use paths. A public meeting was held in early 2016 to present the final recommendations that will be developed into a set of corridor design standards that can be incorporated into the *Route 40 Corridor 20-Year Transportation Plan*, the *New Castle County Comprehensive Plan*, and the *Unified Development Code*. Additional information can be found on the WILMAPCO project website at <http://www.wilmapco.org/glasgow/>.

Based on our review of the Traffic Impact Study, we have the following comments and recommendations:

The New Castle County Level of Service (LOS) Standards as stated in Section 40.11.210 of the Unified Development Code (UDC) apply to all signalized, all-way-stop, and roundabout intersections. Based on an evaluation of the intersections that need to meet the UDC criteria per the May 4, 2015, DelDOT scoping meeting minutes, one signalized intersection will require the implementation of physical roadway and/or traffic control improvements:

<b><i>Intersection</i></b>	<b><i>Situations for which deficiencies occur</i></b>
Eastbound US Route 40/Glasgow Avenue	2018 PM without Development (Case 2) 2018 PM and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a) 2018 AM, PM, and SAT without proposed service road connection over Delaware Route 896 and with the Development (Case 3b)

For the eastbound US Route 40/Glasgow Avenue signalized intersection, the northbound Glasgow Avenue approach (right turn lane) queue would significantly impact operations along Glasgow Avenue. Per discussions with the DelDOT Development Coordination Section, improvements were analyzed in order to meet the UDC criteria, which included a signal timing modification of



the northbound and southbound Glasgow Avenue approaches from its current split phase operation to permissive/concurrent phasing. Based on the flowchart criteria outlined in DelDOT’s Traffic Design Manual (Figure IV-10 Guidelines for Determining Left Turn Lane Signal Phasing Treatment), permissive phasing is suggested. With these improvements, this intersection would operate with a LOS C during the Case 3a Scenario. The requirements for this improvement are discussed later in this document.

Additionally, separate from the UDC but based on the LOS evaluation criteria as stated in DelDOT’s *Development Coordination Manual*, movements at the following signalized and stop-controlled intersections exhibit LOS deficiencies without the implementation of physical roadway and/or traffic control improvements:

<b><i>Intersection</i></b>	<b><i>Situations for which deficiencies occur</i></b>
Site Entrance A/Glasgow Avenue	2018 AM, PM, and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a) 2018 AM, PM, and SAT without proposed service road connection over Delaware Route 896 and with the Development (Case 3b)
Site Entrance B/Glasgow Avenue	2018 AM, PM, and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a)
Glasgow Avenue/Main Entrance to Peoples Plaza	2015 PM Existing (Case 1) 2018 PM without Development (Case 2) 2018 PM and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a-Option 1) 2018 AM, PM, and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a-Option 2) 2018 PM and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a-Option 3) 2018 AM, PM, and SAT without proposed service road connection over Delaware Route 896 and with the Development (Case 3b)
Glasgow Avenue/North Entrance to Peoples Plaza	2018 PM without Development (Case 2) 2018 PM, and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a) 2018 AM, PM, and SAT without proposed service road connection over Delaware Route 896 and with the Development (Case 3b)
Glasgow Avenue/South Entrance to Peoples Plaza	2018 PM without Development (Case 2) 2018 PM and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a) 2018 PM and SAT without proposed service road connection over Delaware Route 896 and with the Development (Case 3b)
Glasgow Avenue/Cann Road	2018 PM without Development (Case 2) 2018 PM and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a) 2018 PM and SAT without proposed service road connection over Delaware Route 896 and with the Development (Case 3b)



<b><i>Intersection</i></b>	<b><i>Situations for which deficiencies occur</i></b>
US Route 40/Delaware Route 896	2015 AM, PM, and SAT Existing (Case 1) 2018 AM, PM and SAT without Development (Case 2) 2018 AM, PM, and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a) 2018 AM, PM, and SAT without proposed service road connection over Delaware Route 896 and with the Development (Case 3b)
Glasgow Avenue/Old County Road	2015 PM Existing (Case 1) 2018 AM, PM and SAT without Development (Case 2) 2018 AM, PM, and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a) 2018 AM, PM, and SAT without proposed service road connection over Delaware Route 896 and with the Development (Case 3)
Delaware Route 896/Glasgow Avenue/Porter Road	2015 AM and PM Existing (Case 1) 2018 AM and PM without Development (Case 2) 2018 AM, PM, and SAT with proposed service road connection over Delaware Route 896 and with the Development (Case 3a) 2018 AM, PM, and SAT without proposed service road connection over Delaware Route 896 and with the Development (Case 3b)

A potential Service Road, also known as Abbey Road, which will connect Glasgow Avenue to George Williams Way east of Delaware Route 896 is proposed in conjunction with the *US 40 & SR 896 Grade Separated Intersection* project (Contract #T201611901). The road would pass through lands associated with this development and would provide access to it. As part of this potential Service Road, an overpass is proposed over Delaware Route 896 south of US Route 40. The developer should provide DelDOT with an updated site plan identifying the layout of the potential Service Road. In addition, the developer should provide right-of-way along with design and construction of the potential Service Road connection from Glasgow Avenue to George Williams Way. The developer should also coordinate with the Hodgson Vo-Tech High School regarding additional right of way acquisition needed for this construction. The developer should not be required to build the overpass or to build the road east of Delaware Route 896.

Although the Site Plan included in the TIS shows three access points along Glasgow Avenue, it is recommended that one full movement signalized intersection (Service Road) be constructed opposite the South Entrance to Peoples Plaza, one unsignalized rights-in/rights-out only driveway (Site Entrance A) be constructed opposite the Main Entrance to Peoples Plaza, and one full movement roundabout (Site Entrance B) be constructed along the Service Road (as shown in the Site Map on page 14). This site access is recommended with the potential Service Road over Delaware Route 896 from Glasgow Avenue to US Route 40. A conceptual layout depicting these recommendations is shown on page 12. The developer should provide DelDOT with an updated site plan identifying the proposed site entrance locations.

In addition, the developer has inquired about a rights-in only access along US Route 40 east of Glasgow Avenue. A cursory review of this proposed entrance was examined for feasibility. The consolidation of the Bruster’s Ice Cream driveway access with this development may be a viable option (east of the current Bruster’s driveway location). Per the Bruster’s Ice Cream record plan,



DelDOT will only allow one access on US Route 40 to serve Bruster's Ice Cream and an adjacent development. As such, a shared access may be built. However, analysis of this potential driveway along US Route 40 is contingent on the final design for the *US 40 & SR 896 Grade Separated Intersection* project (Contract #T201611901) along with coordination with the existing Bruster's development. Therefore, if DelDOT concurs that an access serving both Bruster's and Glasgow Avenue can operate safely along US Route 40 after the completion of the *US 40 & SR 896 Grade Separated Intersection* project, then per the Bruster's record plan, the access on US Route 40 would need to be combined.

With the proposed Service Road located opposite the South Entrance to Peoples Plaza, two options were considered at this intersection, a roundabout design and a traffic signal. As a roundabout would have unacceptable levels of service, it is proposed that a traffic signal be installed, at DelDOT's discretion, when the appropriate warrants are met. This proposed intersection would operate with acceptable levels of service (LOS D or better under Case 3a – Option 3 conditions). Two southbound left turn lanes along Glasgow Avenue should be provided at this intersection to accommodate the maximum expected 95<sup>th</sup> percentile queue lengths of 200 feet.

For the unsignalized intersection along Glasgow Avenue at the North Entrance to Peoples Plaza, a crash fatality occurred at this intersection, as a vehicle attempting to turn left from the driveway struck a vehicle traveling south on Glasgow Avenue. As this full access driveway is a safety concern, changing the driveway at this intersection to only allow rights-in/rights-out movements would mitigate these types of crashes as well as consolidate conflicting movements at this location. In addition, as multiple site access points exist, alternative driveways are available for vehicles exiting Peoples Plaza.

Although the intersection of Glasgow Avenue and the Main Entrance to Peoples Plaza would operate at an unacceptable level of service along the eastbound Main Entrance approach, it is recommended that the proposed Glasgow Avenue rights-in/rights-out driveway (Site Entrance A) be added as the westbound approach to this intersection. This is recommended to help minimize the number of access points along the Glasgow Avenue corridor. Furthermore, due to the high volume of vehicles executing eastbound left turning movements at this intersection (221 during the PM peak), an acceleration lane for westbound right turning vehicles from Glasgow Avenue should be provided. This acceleration lane will eliminate the potential conflict between eastbound left turning vehicles and westbound right turning vehicles as well as minimize delays for eastbound left turning vehicles. The acceleration lane should be long enough to transition to the existing right turn lane at the eastbound US Route 40 intersection as depicted on the conceptual layout on page 12.

To mitigate the unacceptable levels of service at the Glasgow Avenue intersection with the Main Entrance to Peoples Plaza and Site Entrance A, two options were also considered, a roundabout design and a traffic signal. Both options, either a roundabout or a traffic signal, would provide acceptable levels of service at this intersection. Although the 95<sup>th</sup> percentile queue lengths along the eastbound approach of the Main Entrance to Peoples Plaza would be approximately 385 feet during the PM and Saturday peak hours, it is recommended this intersection remain unsignalized. However, the developer should provide right-of-way dedication for a potential roundabout at this



location. As these queues are present during the PM and Saturday peak hours, vehicles exiting the Main Entrance to Peoples Plaza can utilize the South Entrance, which is proposed to be a signalized intersection. As the North Entrance to Peoples Plaza is recommended as a rights-in/rights-out only intersection, the developer should provide a 220-foot left turn lane on the northbound Glasgow Avenue approach to the Main Entrance to Peoples Plaza to provide a full movement intersection.

As stated above, in an effort to improve operations along Glasgow Avenue due to the proposed Glasgow Avenue development, and the addition of the Service Road, a number of improvements are necessary at the North Entrance, Main Entrance, and South Entrance to Peoples Plaza. These improvements are illustrated in Figure 1. Signing and striping improvements should be provided per Delaware's Manual on Uniform Traffic Control Devices (DE MUTCD) standards. It is recommended that the developer coordinate with DelDOT's Development Coordination Section regarding the entrance designs along Glasgow Avenue.

The Cann Road unsignalized intersection with Glasgow Avenue would exhibit LOS deficiencies under future conditions with or without the construction of the proposed development. The provision of one left turn lane and one right turn lane on the eastbound approach and a two-way left turn lane along Glasgow Avenue would mitigate the LOS deficiencies during these peak hours. However, it is not recommended that any improvements be implemented by the developer at this intersection, as this deficiency would occur with or without the proposed development. Furthermore, the maximum 95<sup>th</sup> percentile queue length along the eastbound approach is projected to be 195 feet under Case 3 conditions, which could be accommodated along Cann Road without significantly impacting roadway operations.

The US Route 40 signalized intersection with Delaware Route 896 exhibits LOS deficiencies during each of the existing and future peak periods with or without the construction of the proposed development. The future Case 3 scenario exhibits LOS F during all three peak hours examined, with the highest delay being 124.3 seconds during the weekday AM peak hour. Without major improvement, this intersection will continue to experience long delays and excessive queue lengths. However, the *US 40 & SR 896 Grade Separated Intersection* project is expected to address the LOS and queue deficiencies at this intersection, by converting the US Route 40/Delaware Route 896 intersection from an at-grade intersection to a grade-separated intersection where the through traffic along Delaware Route 896 would travel over US Route 40 uninterrupted.

The Glasgow Avenue unsignalized intersection with Old County Road exhibits LOS deficiencies under existing and future conditions. The installation of a single lane roundabout with yield controlled right turn bypass lanes would mitigate the LOS deficiencies. However, it is not recommended that any improvements be implemented by the developer at this intersection, as the deficiencies would occur with or without the proposed development. Furthermore, the maximum 95<sup>th</sup> percentile queue length along the eastbound left turn movement is projected to be 500 feet under Case 3 conditions. Although this queue length is long, it could be accommodated along Old County Road without significantly impacting roadway operations. Further, improvements could be identified in the Glasgow Avenue study when finished that could be implemented in a future project to help reduce the queue length.



The Delaware Route 896 signalized intersection with Glasgow Avenue and Porter Road exhibits LOS deficiencies under existing and future conditions. The modification of the northbound Delaware Route 896 approach to provide two left turn lanes, three through lanes, and one right turn lane, the southbound Delaware Route 896 approach to provide one left turn lane, three through lanes, and one right turn lane, and the westbound approach to provide two left turn lanes, one through lane, and one right turn lane would mitigate the LOS deficiencies. However, it would be unreasonable to assign responsibility to the developer to construct these improvements as construction for the *US Route 301* project has begun and is expected to reduce traffic and improve operations along the Delaware Route 896 corridor. Therefore, we do not recommend any additional improvements be implemented by this developer.

Several improvements contemplated in this letter involve the acquisition of rights-of-way by the developer. Based on our understanding of *Delaware Code Title 2, Section 2308, Development Related Improvements Requiring New Rights-of-way*, the developer would be able to seek DelDOT's assistance in acquiring those rights-of-way if they are unable to obtain them by other means.

Should the 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 provide a bituminous concrete overlay to the existing travel lanes along Glasgow Avenue through the eastbound US Route 40 intersection to the South Entrance to Peoples Plaza, at DelDOT's direction. DelDOT should analyze the existing lanes' pavement section and recommend an overlay thickness to the developer's engineer if necessary. Contingent on the timing of the completion of the Glasgow Avenue study, the proposed bituminous concrete overlay along Glasgow Avenue could be combined with a future DelDOT project along Glasgow Avenue.
2. The developer should enter into an agreement with DelDOT to construct a segment of the proposed Service Road, west of SR 896 to Glasgow Avenue. When complete, the proposed Service Road would provide a connection from Glasgow Avenue to George Williams Way east of SR 896 (as shown in the Site Map on page 14). The Service Road should include eleven-foot travel lanes and five-foot shoulders per DelDOT's *Development Coordination Manual*. The developer should coordinate with DelDOT regarding the alignment (including profile, elevations, and grades) of the Service Road connection.
3. The developer should construct a full movement roundabout along the proposed Service Road along the southern limits of the site (as shown in the Site Map on page 14). This roundabout would provide internal access to the Glasgow Avenue Site north of the proposed Service Road and an additional emergency only access point (police/fire/ambulance) for the Hodgson Vo-Tech High School. Additional internal access driveways from the Glasgow Avenue development to the Service Road will be prohibited. The roundabout design should follow *NCHRP: Report 672 2nd Edition – Roundabouts:*



*An Informational Guide.* The developer should coordinate with DelDOT’s Development Coordination Section regarding this roundabout design. In addition, the developer should coordinate with both DelDOT and the Hodgson Vo-Tech High School on the acceptable location for the proposed roundabout along the proposed Service Road.

- The developer should construct a full movement South Entrance to Peoples Plaza/Service Road connection with Glasgow Avenue (as shown in the Site Map on page 14) to be consistent with the proposed lane configurations as shown in the table below:

<b>Approach</b>	<b>Current Configuration</b>	<b>Proposed Configuration</b>
Eastbound South Entrance to Peoples Plaza	One right turn lane	One left turn lane, one through lane, and one right turn lane
Westbound Service Road	Approach does not exist	One left turn lane, one through lane, and one right turn lane
Northbound Glasgow Avenue	One left turn lane and one through lane	One left turn lane, one through lane, and one right turn lane
Southbound Glasgow Avenue	One through lane and one right turn lane	Two left turn lanes, one through lane, and one right turn lane

In addition, the two receiving lanes on the Service Road eastbound from Glasgow Avenue must merge before the proposed roundabout on the Service Road with Site Entrance B/Emergency Access to Hodgson Vo-Tech High School. The developer should coordinate with both DelDOT and the Hodgson Vo-Tech High School on the acceptable location of the proposed roundabout.

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 DelDOT’s *Development Coordination Manual*.

<b>Approach</b>	<b>Left Turn Lane</b>	<b>Right Turn Lane</b>
Eastbound South Entrance to Peoples Plaza	50 feet	355 feet
Westbound Service Road	240 feet	85 feet
Northbound Glasgow Avenue	220 feet	155 feet
Southbound Glasgow Avenue	200 feet	145 feet



5. The developer should enter into a traffic signal agreement with DelDOT for the South Entrance to Peoples Plaza/Service Road intersection with Glasgow Avenue. The agreement should include any signal equipment necessary, such as signal heads, signal controller cabinet, pedestrian signals, crosswalks, interconnection, etc. at DelDOT’s discretion. The developer will be required to perform a Signal Justification Study prior to the entrance plan approval. The scope of the Signal Justification Study will be identified at a later date at DelDOT’s discretion. The developer should coordinate with DelDOT on the implementation and cost of these improvements.
  
6. The developer should construct a rights-in/rights-out only Site Entrance along Glasgow Avenue directly opposite to the Main Entrance to Peoples Plaza (as shown on the conceptual layout on page 12) to be consistent with the proposed lane configurations as shown in the table below:

<b>Approach</b>	<b>Current Configuration</b>	<b>Proposed Configuration</b>
Westbound Site Entrance A	Approach does not exist	One right turn lane
Eastbound Main Entrance to Peoples Plaza	One left turn lane and one right turn lane	No Change
Northbound Glasgow Avenue	One through lane	One left turn lane, one through lane, and one right turn lane
Southbound Glasgow Avenue	One through lane	No Change

Based on DelDOT’s *Development Coordination Manual*, the recommended minimum storage length (excluding taper) of the separate left turn lane along the northbound Glasgow Avenue approach is 220 feet and the separate right turn lane along the northbound Glasgow Avenue approach is 190 feet. It should be noted that the storage length based on the HCS analysis provides a shorter queue length than what is reported here. In addition, an acceleration lane for the westbound Site Entrance A right turn movement should be provided. This acceleration lane should be separated from the northbound Glasgow Avenue through movement with striping and transition to the existing separate right turn lane at the US Route 40 intersection.

7. The developer should provide right-of-way dedication to DelDOT for a potential roundabout at the Glasgow Avenue and Main Entrance to Peoples Plaza intersection, in anticipation of this option possibly being determined to be feasible at a future date.
  
8. The developer should modify the full movement intersection of the North Entrance to Peoples Plaza/Glasgow Avenue to a rights-in/rights-out only driveway to be consistent with the proposed lane configurations as shown in the table below:



Approach	Current Configuration	Proposed Configuration
Eastbound North Entrance to Peoples Plaza	One shared left/right turn lane	One right turn lane
Northbound Glasgow Avenue	One shared through/left turn lane	One through lane
Southbound Glasgow Avenue	One through lane and one right turn lane	No Change

9. The developer should enter into an agreement with DelDOT to fund an equitable portion of the proposed signal phasing improvements planned at the US Route 40 and Glasgow Avenue intersections. This agreement includes signal phasing changes from split phasing to permissive/concurrent phasing on the Glasgow Avenue approaches at the eastbound US Route 40/Glasgow Avenue intersection while maintaining split phasing on Glasgow Avenue at the westbound US Route 40/Glasgow Avenue intersection. The agreement should also include any signal equipment necessary, such as signal heads, signal controller cabinet, etc. at DelDOT’s discretion.
  
10. The developer should enter into an agreement with DelDOT to contribute right-of-way for the *US 40 & SR 896 Grade Separated Intersection* (Contract #T201611901) project. This project will convert the US Route 40/Delaware Route 896 intersection from an at-grade intersection to a grade-separated intersection. DelDOT is in the process of determining the final preferred layout. The developer should coordinate with DelDOT on the implementation of these improvements.
  
11. The following bicycle, pedestrian, and transit improvements should be included:
  - a. The developer should construct a bike lane and sidewalk consistent with the *Glasgow Avenue Planning Study* along the easterly side of Glasgow Avenue from US Route 40 to the South Entrance to Peoples Plaza that meets current AASHTO and ADA standards. The developer should coordinate with DelDOT’s Development Coordination Section during the plan review process to identify the exact location of proposed bike lanes and sidewalks as well as the needed furnishings along the sidewalk.
  - b. All internal streets to be built within this development should include five-foot wide ADA compliant sidewalks on both sides of the roadway set back five feet from the roadway.
  - 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. When right turn lanes are added along Glasgow Avenue, a five-foot wide bike lane should also be provided through the right turn lane in order to facilitate safe and unimpeded bicycle travel.
  - e. ADA compliant curb ramps and marked crosswalks should be provided at the site entrances. The use of diagonal curb ramps is discouraged.
  - f. Bike parking should be provided near each building’s entrance. Where the building architecture provides for an awning or other overhang, the bike parking should be covered.



- g. Utility covers should be moved outside of any designated bicycle lanes or should be flush with the pavement.
- h. The developer should install five-foot by eight-foot bus pads along both northbound and southbound Glasgow Avenue, adjacent to the Main Entrance to Peoples Plaza (approximately 720 feet south of the Glasgow Avenue intersection with eastbound US Route 40). Crosswalks should be provided to afford safe access between the bus pads and the Glasgow Avenue and Peoples Plaza developments. The developer should coordinate with DART to determine the exact locations for the bus stop as well as the needed amenities (bus pad, shelter, etc.).

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 subdivision review process.

Improvements in this TIS may be considered "significant" under DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines*. These guidelines are available on DelDOT's website at [http://www.deldot.gov/information/pubs\\_forms/manuals/de\\_mutcd/index.shtml](http://www.deldot.gov/information/pubs_forms/manuals/de_mutcd/index.shtml). For any additional information regarding the work zone impact and mitigation procedures during construction please contact Mr. Adam Weiser of DelDOT's Traffic Section. Mr. Weiser can be reached at (302) 659-4073 or by email at [Adam.Weiser@state.de.us](mailto:Adam.Weiser@state.de.us).

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

Sincerely,  
Johnson, Mirmiran, and Thompson, Inc.

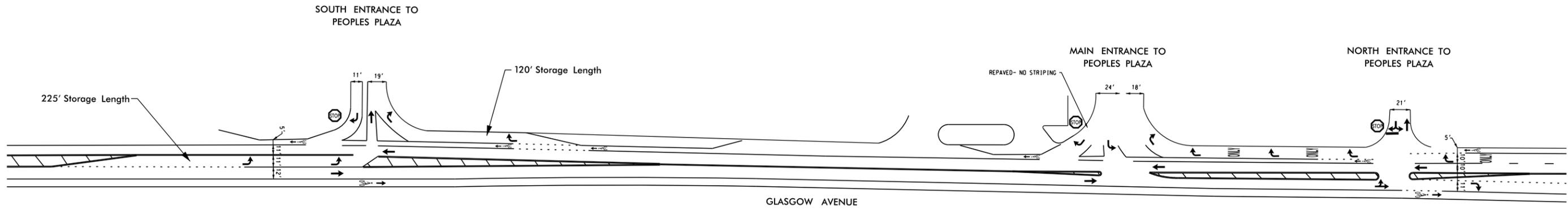
A handwritten signature in black ink that reads 'Mir Wahed'.

Mir Wahed, P.E., PTOE

cc: Joanne Arellano, P.E., PTOE

Enclosure

# EXISTING CONDITION ALONG GLASGOW AVENUE



# CONCEPTUAL LAYOUT FOR MODIFIED ACCESS SCENARIO – PROPOSED CONDITION

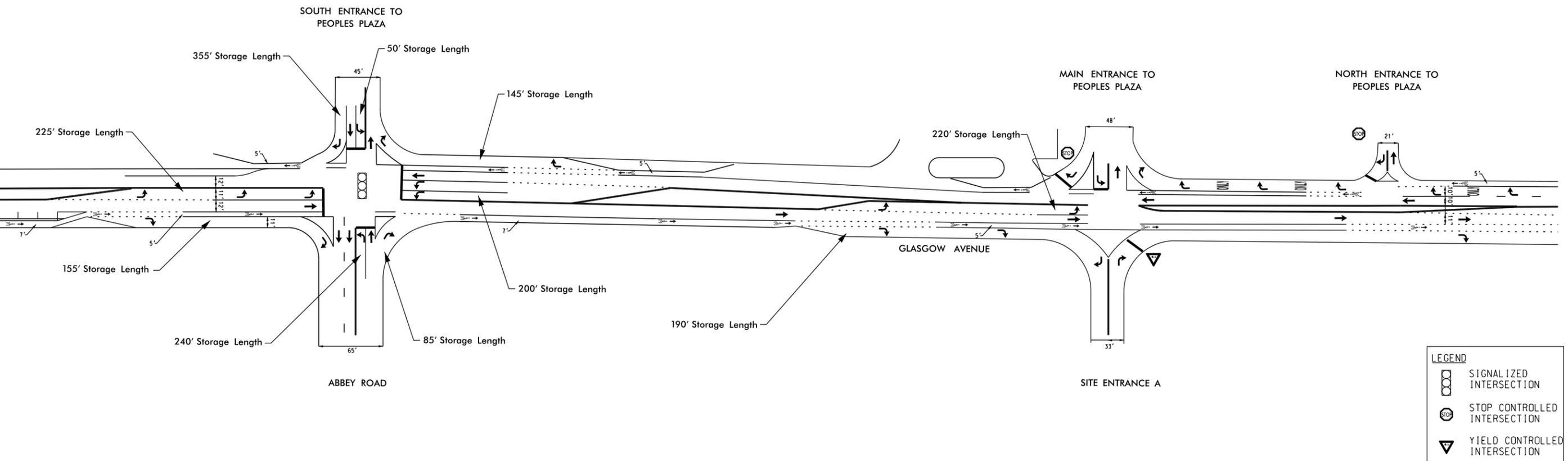


Figure 1  
Page 12

## **General Information**

**Report date:** November 2015

**Prepared by:** Landmark Science & Engineering

**Prepared for:** Reybold Venture Group X, LLC

**Tax Parcels:** 11-026.00-076, 078, 079, 080, 081, 082, 083, 084, 085, 086, 087, 161, 11-027.00-00-002, 152

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

## **Project Description and Background**

**Description:** A large mixed-use development that will consist of 207,500 square feet shopping center, 5,000 square feet drive-in bank, 72,000 square feet general office space, 14,200 square feet medical office space, and 9,800 square feet high-turnover sit-down restaurant.

**Location:** The subject site is located southeast of the US Route 40 (New Castle Road 32) and Glasgow Avenue (Delaware Route Business 896/New Castle Road 387A) intersection in New Castle County.

**Amount of Land to be developed:** Approximately 30.9-acre assemblage of parcels.

**Land Use approval(s) needed:** Rezoning and Entrance Plan.

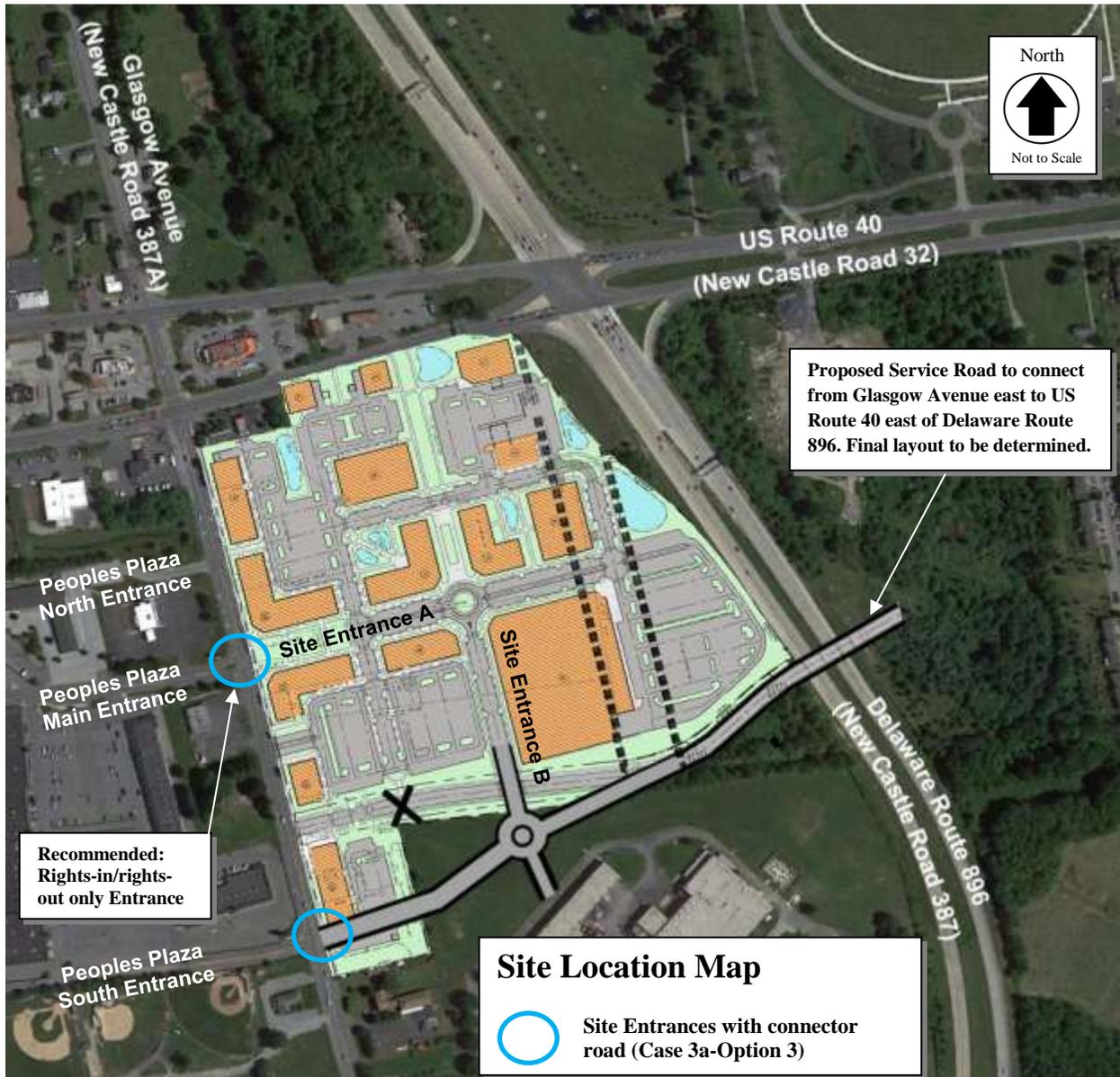
**Proposed completion date:** 2018.

**Proposed access locations:** Two access points are proposed on Glasgow Avenue.

### **Daily Traffic Volumes:**

- 2015 Average Annual Daily Traffic on Glasgow Avenue: 16,760 vehicles per day.

## Site Map



*\*Graphic is an approximation based on the Exploratory Sketch Plan prepared by Foresite Associates, Inc., last revised April 14, 2015.*

## Relevant and On-going Projects

DelDOT currently has three relevant projects within the study area: the *US 40 & SR 896 Grade Separated Intersection* project (Contract #T201611901), the *HEP NCC, US 40 at Glasgow Avenue* project (Contract #T201300101), and the *Glasgow Avenue Main Street Study*.

In June 2004 the Route 40 Steering Committee, which is comprised of representatives from DelDOT, New Castle County, and the Wilmington Area Planning Council (WILMAPCO), as well

as corridor residents, business owners, and other stakeholders voted to approve the *Route 40 Corridor 20-Year Transportation Plan*. The plan details highway, transit, bicycle, and pedestrian improvements that will be needed to address already planned growth and development along US Route 40. DelDOT has completed or made progress on several projects in the plan and conducts an annual monitoring effort to determine when planned projects should be implemented. Additional information can be found on the DelDOT project website at <http://deldot.gov/information/projects/rt40/index.shtml>.

The *US 40 & SR 896 Grade Separated Intersection* project was identified within the *Route 40 Corridor 20-Year Transportation Plan*. This project will convert the US Route 40/Delaware Route 896 intersection from an at-grade intersection to a grade-separated intersection. Improvements to drainage, bike, and pedestrian facilities will also be included. DelDOT is in the process of determining the final preferred layout. Design is expected to be completed in Fiscal Year 2019 and construction is scheduled to begin in Fiscal Year 2021. In addition, a potential connector road (Service Road) that crosses over Delaware Route 896 from Glasgow Avenue to US Route 40 is being considered as part of the design. Therefore, two build cases, with or without the connector road (Case 3a and Case 3b, respectively), was evaluated as part of this traffic review.

DelDOT's 2011 Hazard Elimination Program (HEP) identified one location within the project area. The 2011 HEP Site V is a 0.99-mile corridor located along US Route 40 from 0.02 miles east of Frenchtown Road to 0.26 miles east of Delaware Route 896. The Site V Task I report included a crash summary as well as a review of the US Route 40 intersections with Peoples Plaza, Glasgow Avenue, and Delaware Route 896. Suggested Task I remedial improvements included the trimming of any trees obstructing signage, the installation of Signal Ahead, Turn Lane, Yield, Keep Right, and One Way signs in compliance with the *Delaware Manual on Uniform Traffic Control Devices (DE MUTCD)*, as well as restriping any faded pavement markings. The US Route 40 intersection with Glasgow Avenue was further reviewed under Task II to determine the impacts associated with converting the protected/permissive left turn phasing along the northbound and southbound Glasgow Avenue approaches to protected-only or split phase. Field visits confirm the phasing has been converted to split phasing.

The *HEP NCC, US 40 at Glasgow Avenue* project implements recommendations from the 2011 HEP Site V to provide additional through lanes along each approach to the intersection. The project proposes modification of the northbound Glasgow Avenue approach to eastbound US Route 40 to provide two through lanes and one right turn lane and the eastbound approach to provide one left turn lane, two through lanes, and one right turn lane. Construction was completed in Spring of 2016.

The Glasgow Avenue Main Street Study is a vision plan created by WILMAPCO, DelDOT, and New Castle County to guide transportation improvements and land use along Glasgow Avenue from Porter Road to US Route 40. The plan envisions a "Main Street" roadway character from US Route 40 to north of Hodgson Vo-Tech High School. This would be established by having two to three story mixed-use development buildings along Glasgow Avenue located adjacent to sidewalks, as well as the provision of parallel on-street parking and buffered bike lanes. From Hodgson Vo-Tech High School, south, the plan envisions more of a residential district where there are houses along a two-lane roadway (one lane in each direction) with sidewalks and/or multi-use paths. A public meeting was held in early 2016 to present the final recommendations that will be

developed into a set of corridor design standards that can be incorporated into the *Route 40 Corridor 20-Year Transportation Plan*, the *New Castle County Comprehensive Plan*, and the *Unified Development Code*. Additional information can be found on the WILMAPCO project website at <http://www.wilmapco.org/glasgow/>.

In addition, DelDOT has a pavement rehabilitation and resurfacing project within the project area. The project is along Delaware Route 896 from Delaware Route 71 to I-95 (Contract #T201506103). The scope of work involves milling, patching, replacing, and paving of the concrete sections. The construction is scheduled to be completed by Fall of 2016.

### **Livable Delaware**

*(Source: Delaware Strategies for State Policies and Spending, 2015)*

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

The proposed development is located within the Investment Level 1 area.

### **Investment Level 1**

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

In Level 1 Areas the state's first priority will be for preserving existing facilities and making safety improvements. Level 1 areas will also be the highest priority for context sensitive transportation system capacity enhancements, transit-system enhancements, ADA accessibility, and for closing gaps in the pedestrian system, including the Safe Routes to School projects. Further, Level 1 areas are the first priority for planning projects and studies, bicycle facilities, signal-system enhancements, and the promotion of interconnectivity between neighborhoods and public facilities.

### **Proposed Development's Compatibility with Livable Delaware:**

The proposed campus is located in Investment Level 1 area. According to Livable Delaware, Level 1 focuses on new or expansion of economic development projects located in these areas. Therefore, the proposed development is generally consistent with the 2015 update of the Livable Delaware "Strategies for State Policies and Spending."

**Comprehensive Plans**

*(Source: New Castle County, 2012 Comprehensive Plan)*

**New Castle County Comprehensive Plan:**

The lands of the subject property are situated within New Castle County and zoned as S (Suburban) and CR (Commercial Regional). The developer proposes to rezone the land zoned as S to CR. According to the New Castle County Comprehensive Plan, the future land use of the property would be within the Low Density Residential (1-3 units per acre) and Office/Commercial/Industrial Development Area (OCI) areas.

**Proposed Development's Compatibility with the New Castle County Comprehensive Plan:**

Per the New Castle County Comprehensive Plan, mixed-use development is encouraged in OCI areas. The proposed development would be comprised of retail, restaurant, and office space. As such, the development is generally compatible with the New Castle County Comprehensive Plan.

**Transportation Analysis Zones (TAZ)**

**Transportation Analysis Zones (TAZ) where development would be located: 221**



**Current employment estimate for TAZ: 767 in 2010**

**Future employment estimate for TAZ: 896 in 2040**

**Current Population estimate for TAZ: 2,311 in 2010**

**Future Population estimate for TAZ: 2,136 in 2040**

**Current household estimate for TAZ: 815 in 2010**

**Future household estimate for TAZ: 818 in 2040**

**Relevant committed developments in the TAZ: None.**

**Would the addition of committed developments to current estimates exceed future projections: No.**

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

**Trip Generation**

As per the TIS, the trip generation for the proposed site modifications was determined by using the comparable land use and rates/equations contained in the *Trip Generation, 9<sup>th</sup> Edition: An ITE Informational Report*, published by the Institute of Transportation Engineers (ITE) for ITE Land Use Code 820 (Shopping Center), ITE Land Use Code 912 (Drive-In Bank), ITE Land Use Code 710 (General Office Building), ITE Land Use Code 720 (Medical-Dental Office Building), and ITE Land Use Code 932 (High-Turnover Sit-Down Restaurant).

The peak period trip generation for the proposed development is included in Table 1.

**Table 1**  
TRIP GENERATION OF PROPOSED DEVELOPMENT

Land Use	ADT	AM Peak Hour			PM Peak Hour			SAT Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
207,500 square feet Shopping Center	8,860	151	92	243	469	508	977	731	674	1405
5,000 square feet Drive-In Bank	741	34	26	60	61	61	122	67	65	132
72,000 square feet General Office	1,023	129	18	147	27	132	159	17	14	31
14,200 square feet Medical Office	366	27	7	34	14	36	50	30	22	52
9,800 square feet High-Turnover Sit-Down Restaurant	1,246	58	48	106	58	39	97	73	65	138
Total Trips		399	191	590	629	776	1405	918	840	1758
Internal Capture		0	0	0	71	71	142	0	0	0
Pass-By Trips		0	0	0	205	203	408	0	0	0
<b>Total New Trips</b>	<b>12,236</b>	<b>399</b>	<b>191</b>	<b>590</b>	<b>353</b>	<b>502</b>	<b>855</b>	<b>918</b>	<b>840</b>	<b>1758</b>

## **Overview of TIS**

### **Intersections examined:**

1. Site Entrance A / Glasgow Avenue
2. Site Entrance B (by way of proposed service road) / Glasgow Avenue
3. Glasgow Avenue / Main Entrance to Peoples Plaza
4. Glasgow Avenue / North Entrance to Peoples Plaza
5. Eastbound US Route 40 / Glasgow Avenue
6. Westbound US Route 40 / Glasgow Avenue
7. Glasgow Avenue / South Entrance to Peoples Plaza
8. Glasgow Avenue / Entrance to Hodgson Vo-Tech High School
9. Glasgow Avenue/ Cann Road (New Castle Road 393)
10. Westbound US Route 40 / West Entrance to Peoples Plaza
11. Eastbound US Route 40 / East Entrance to Peoples Plaza
12. US Route 40 / Frenchtown Road Extension (New Castle Road 392A)
13. US Route 40 / Delaware Route 896
14. US Route 40 / LaGrange Avenue / Glasgow Park Entrance
15. Glasgow Avenue / Old County Road (New Castle Road 395)
16. Delaware Route 896 / Glasgow Avenue / Porter Road (New Castle Road 400)

### **Conditions examined:**

1. Case 1 – 2015 Existing conditions
2. Case 2 – 2018 No Build conditions without development
3. Case 3a Option 1 – 2018 Build conditions with development and with proposed service road connection over Delaware Route 896; access is proposed via two full movement (T-intersection) driveways along Glasgow Avenue
4. Case 3a Option 2 - 2018 Build conditions with development and with proposed service road connection over Delaware Route 896; access is proposed via one full movement driveway at the Glasgow Avenue intersection with the Peoples Plaza Main Entrance and one rights-in/rights-out access along Glasgow Avenue
5. Case 3a Option 3 – 2018 conditions with development and with proposed service road connection over Delaware Route 896; access is proposed via one full movement driveway at the Glasgow Avenue intersection with the Peoples Plaza South Entrance and one rights-in/rights-out access along Glasgow Avenue
6. Case 3b – 2018 Build with development and without proposed service road connection over Delaware Route 896; access is proposed via two full movement (T-intersection) driveways along Glasgow Avenue

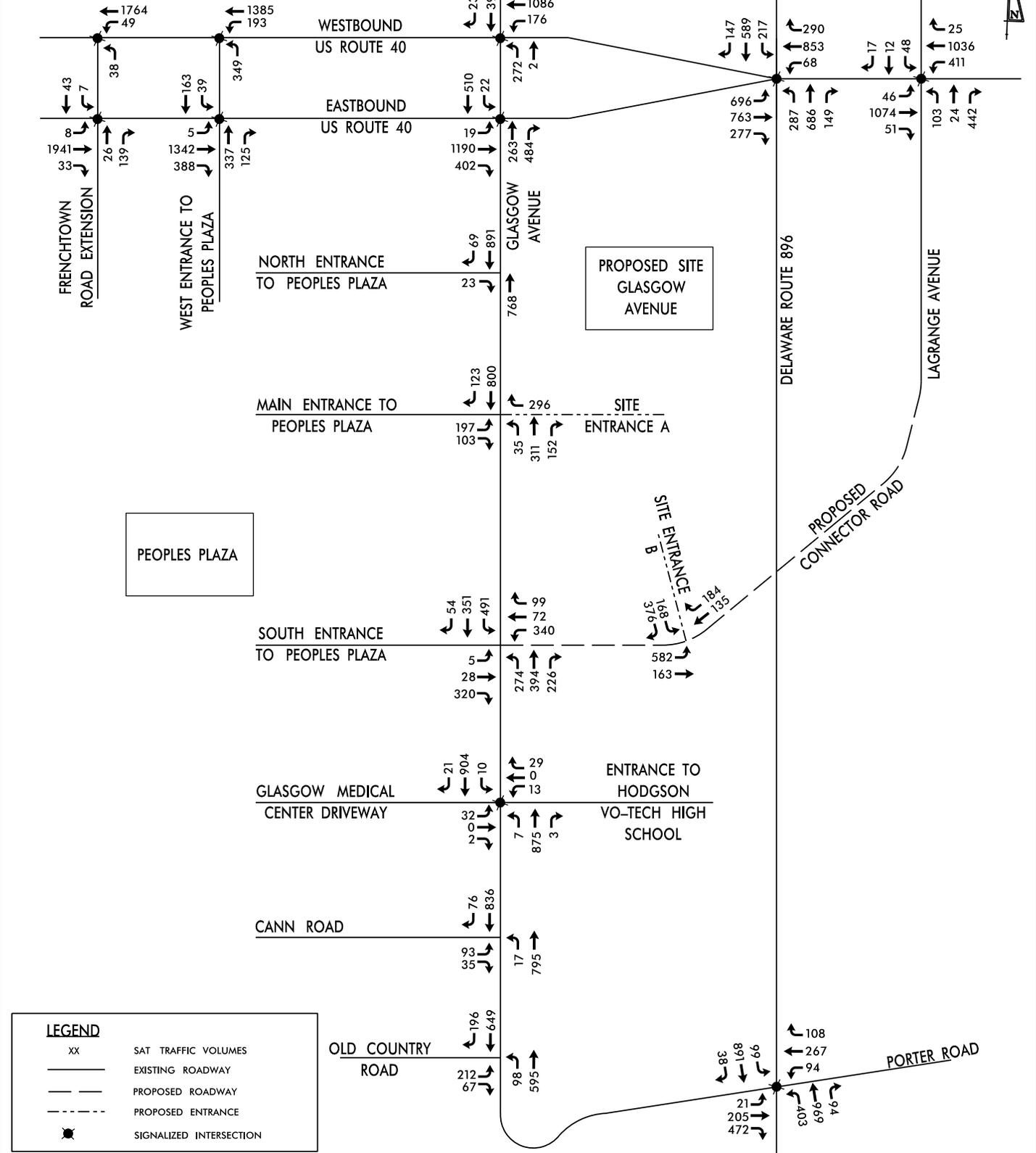
*Note: Contrary to the May 4, 2015 DelDOT Scoping Meeting Minutes, JMT has conducted additional Case 3a analysis (Options 2 and 3) per DelDOT's request.*

Traffic volume figures for Case 3a Option 3 (AM/PM and Saturday) are included in Figures 2 and 3, respectively.



CASE 3A - OPTION 3 - SATURDAY

PEAK HOUR BUILD VOLUMES



GLASGOW AVENUE  
TRAFFIC IMPACT STUDY  
NEW CASTLE COUNTY, DELAWARE

N.T.S

FIGURE 3

SEPTEMBER 2016

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

**Committed Developments considered:**

1. Peoples Plaza (155,694 square feet of commercial/office space)
2. Springside Plaza (248,885 square feet of office space)
3. Glasgow Commons (588,000 square feet of office space and 1,047,139 square feet of warehouse space)
4. LaGrange (32 single-family detached houses and 100 townhouses)
5. Pencader Corporate Center, Parcel 30A (131,468 square feet of office space, 125-room hotel, 21,000 square feet of restaurant space, and a 2,500 square-foot bank with drive-through window)

**Intersection Descriptions**

**1. Site Entrance A / Glasgow Avenue**

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

**Westbound Approach:** (Site Entrance A) proposed one left turn lane and one right turn lane, stop controlled

**Northbound Approach:** (Glasgow Avenue) proposed one through lane and one right turn lane

**Southbound Approach:** (Glasgow Avenue) proposed one left turn lane and one through lane

*Note: The TIS did not contain an analysis at the Site Entrance A/Glasgow Avenue intersection. The configuration mentioned above is based on JMT's analysis results as an unsignalized intersection.*

**2. Site Entrance B (by way of proposed service road) / Glasgow Avenue**

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

**Westbound Approach:** (Site Entrance B) proposed one right turn lane, stop controlled

**Northbound Approach:** (Glasgow Avenue) proposed one through lane and one right turn lane

**Southbound Approach:** (Glasgow Avenue) proposed one through lane

*Note: The TIS did not contain an analysis at the Site Entrance B (by way of proposed service road)/Glasgow Avenue intersection. The configuration mentioned above is based on JMT's analysis results.*

**3. Glasgow Avenue / Main Entrance to Peoples Plaza**

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

**Eastbound Approach:** (Main Entrance to Peoples Plaza) existing one left turn lane and one right turn lane, stop controlled

**Northbound Approach:** (Glasgow Avenue) existing one through lane

**Southbound Approach:** (Glasgow Avenue) existing one through lane and one right turn lane

**4. Glasgow Avenue / North Entrance to Peoples Plaza**

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

**Eastbound Approach:** (North Entrance to Peoples Plaza) existing one shared left turn/right turn lane, stop controlled

**Northbound Approach:** (Glasgow Avenue) existing one shared through/left turn lane

**Southbound Approach:** (Glasgow Avenue) existing one through lane and one right turn lane

**5. Eastbound US Route 40 / Glasgow Avenue**

**Type of Control:** existing signal controlled intersection

**Eastbound Approach:** (US Route 40) existing one shared through/left turn lane, one through lane, and one right turn lane; proposed one left turn lane, two through lanes, and one right turn lane

**Northbound Approach:** (Glasgow Avenue) existing one through lane and one right turn lane; proposed two through lanes and one right turn lane

**Southbound Approach:** (Glasgow Avenue) existing one shared through/ left turn lane and one through lane

*Note: This intersection is being improved a part of the DelDOT HEP NCC, US 40 at Glasgow Avenue project and will be completed prior to the full build out of the proposed development.*

**6. Westbound US Route 40 / Glasgow Avenue**

**Type of Control:** existing signal controlled intersection

**Westbound Approach:** (US Route 40) existing one left turn lane, two through lanes, and one right turn lane

**Southbound Approach:** (Glasgow Avenue) existing two through lanes and one right turn lane

**Northbound Approach:** (Glasgow Avenue) existing one left turn lane and one shared through/left turn lane

**7. Glasgow Avenue / South Entrance to Peoples Plaza**

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

**Eastbound Approach:** (South Entrance to Peoples Plaza) existing one right turn lane, stop controlled

**Northbound Approach:** (Glasgow Avenue) existing one left turn lane and one through lane

**Southbound Approach:** (Glasgow Avenue) existing one through lane and one right turn lane

**8. Glasgow Avenue / Entrance to Hodgson Vo-Tech High School**

**Type of Control:** existing signal controlled intersection

**Eastbound Approach:** (Glasgow Medical Center Driveway) existing one shared through/left turn lane and one right turn lane

**Westbound Approach:** (Entrance to Hodgson Vo-Tech High School) existing one shared through/left turn lane and one right turn lane

**Northbound Approach:** (Glasgow Avenue) existing one left turn lane, one through lane, and one right turn lane

**Southbound Approach:** (Glasgow Avenue) existing one left turn lane, one through lane, and one right turn lane

**9. Glasgow Avenue / Cann Road (New Castle Road 393)**

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

**Eastbound Approach:** (Cann Road) existing one shared left turn/right turn lane, stop controlled

**Northbound Approach:** (Glasgow Avenue) existing one left turn lane and one through lane

**Southbound Approach:** (Glasgow Avenue) existing one through lane and one right turn lane

**10. Westbound US Route 40 / West Entrance to Peoples Plaza**

**Type of Control:** existing signal controlled intersection

**Westbound Approach:** (US Route 40) existing one left lane and two through lanes

**Northbound Approach:** (Median) existing two left turn lanes

**11. Eastbound US Route 40 / East Entrance to Peoples Plaza**

**Type of Control:** existing signal controlled intersection

**Eastbound Approach:** (US Route 40) existing one left turn lane, two through lanes, and one channelized right turn lane

**Northbound Approach:** (Peoples Plaza) existing two through lanes and one channelized right turn lane

**Southbound Approach:** (Median) existing one shared through/left turn lane and one through lane

**12. US Route 40 / Frenchtown Road Extension (New Castle Road 392A)**

**Type of Control:** existing signal controlled intersection

**Eastbound Approach:** (US Route 40) existing one left turn lane, two through lanes, and one right turn lane

**Westbound Approach:** (US Route 40) existing one left turn lane and two through lanes

**Northbound Approach:** (Frenchtown Road Extension) existing two through lanes and one right turn lane

**Northbound Approach:** (Median) existing two left turn lanes

**Southbound Approach:** (Median) existing one shared through/left turn lane and one through lane

*Note: The eastbound and westbound US Route 40 approaches to Frenchtown Road Extension are separated by a large median and operate as two separate signalized intersections.*

### **13. US Route 40 / Delaware Route 896**

**Type of Control:** existing signal controlled intersection

**Eastbound Approach:** (US Route 40) existing two channelized left turn lanes, two through lanes, and one channelized right turn lane

**Westbound Approach:** (US Route 40) existing two channelized left turn lanes, two through lanes, and one channelized right turn lane

**Northbound Approach:** (Delaware Route 896) existing two channelized left turn lanes, three through lanes, and one channelized right turn lane

**Southbound Approach:** (Delaware Route 896) existing two channelized left turn lanes, three through lanes, and one channelized right turn lane

### **14. US Route 40 / LaGrange Avenue / Glasgow Park Entrance**

**Type of Control:** existing signal controlled intersection

**Eastbound Approach:** (US Route 40) existing one left turn lane, two through lanes, and one right turn lane

**Westbound Approach:** (US Route 40) existing one left turn lane, two through lanes, and one right turn lane

**Northbound Approach:** (LaGrange Avenue) existing one left turn lane, one through lane, and one channelized right turn lane

**Southbound Approach:** (Glasgow Park Entrance) existing one left turn lane, one through lane, and one channelized right turn lane

### **15. Glasgow Avenue / Old County Road (New Castle Road 395)**

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

**Eastbound Approach:** (Old County Road) existing one left turn lane, stop controlled, and one channelized right turn lane

**Northbound Approach:** (Glasgow Avenue) existing one left turn lane and one through lane

**Southbound Approach:** (Glasgow Avenue) existing one through lane and one right turn lane

## **16. Delaware Route 896 / Glasgow Avenue / Porter Road (New Castle Road 400)**

**Type of Control:** existing signal controlled intersection

**Eastbound Approach:** (Glasgow Avenue) existing one left turn lane, one through lane, and one channelized right turn lane

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

**Northbound Approach:** (Delaware Route 896) existing one left turn lane, two through lanes, and one right turn lane

**Southbound Approach:** (Delaware Route 896) existing one left turn lane, two through lanes, and one right turn lane

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

**Existing transit service:** Delaware Transit Corporation (DTC) currently provides existing services via DART Routes 40, 41, 42, and 46 which can all be accessed at the Peoples Plaza Park and Ride Location. The additional designated bus stops for DART Routes 40 and 41 that exists within the study area are located along US Route 40 at the intersections of LaGrange Avenue and Glasgow Avenue. A designated bus stop for DART Route 40 also exists along eastbound US Route 40 at its intersection with the Peoples Plaza Entrance. DART Route 40 provides 21 round trips on Monday through Friday from 4:40 a.m. to 11:35 p.m., and 14 round trips on Saturday from 6:14 a.m. to 8:14 p.m. DART Route 41 provides 6 round trips on Monday through Friday from 5:31 a.m. to 8:48 p.m. and does not operate on Saturdays. Additional designated bus stops for DART Routes 42 and 46 exist along US Route 40 at the Frenchtown Road Extension intersection. DART Route 42 provides six round trips on Monday through Friday from 5:45 a.m. to 7:10 a.m. and does not operate on Saturdays. DART Route 46 provides 20 round trips on Monday through Friday from 5:03 a.m. to 10:14 p.m., and provides 14 round trips on Saturdays from 6:20 a.m. to 8:18 p.m. Cecil Transit Route 1/Glasgow and Cecil Transit Route 4/Elkton/Newark can also be accessed at the Peoples Plaza Park and Ride. Cecil Transit Route 1 provides 11 round trips Monday through Saturday from 5:30 a.m. to 6:15 p.m. Cecil Transit Route 4 provides 11 round trips Monday through Friday from 5:30 a.m. to 10:00 p.m., and does not operate on Saturdays.

**Planned transit service:** JMT contacted Mr. Evan Horgan, Service Development Planner at the DTC. In a November 18, 2015 email, Mr. Horgan recommended the installation of 5'x8' bus pads (DelDOT M-9 Standard Construction Detail) along both northbound and southbound Glasgow Avenue, approximately 720 feet south of the Glasgow Avenue intersection with eastbound US Route 40. A crosswalk is also recommended to be installed along Glasgow Avenue between the bus pads.

**Existing bicycle and pedestrian facilities:** According to DelDOT's *New Castle County Bicycle Map*, connector bicycle routes exist within the study area. The connector bicycle route along US Route 40 traverses through five of the project's study intersections (the US Route 40 intersections with Frenchtown Road Extension, Peoples Plaza Entrance, Glasgow Avenue, Delaware Route 896, and LaGrange Avenue). The connector bicycle route along Glasgow Avenue traverses through nine of the project's study intersections (the Glasgow Avenue intersections with Site Entrance A, Site Entrance B, North Entrance to Peoples Plaza, Main Entrance to Peoples Plaza, South Entrance to Glasgow Avenue

September 29, 2016

Peoples Plaza, Entrance to Hodgson Vo-Tech High School, Cann Road, Old County Road, and Delaware Route 896/Porter Road). Pedestrian sidewalks and crosswalks exist at three of the study intersections (the US Route 40 intersection with Frenchtown Road Extension, the US Route 40 intersection with LaGrange Avenue, and the Glasgow Avenue intersection with Hodgson Vo-Tech High School).

**Planned bicycle and pedestrian facilities:** JMT contacted Mr. Anthony Aglio, DelDOT's Bicycle and Pedestrian Coordinator. In a November 24, 2015 email, Mr. Aglio sent a graphic from the *Glasgow Avenue Planning Study* prepared by DelDOT, WILMAPCO, and New Castle County. The graphic contained a draft of bicycle and pedestrian recommendations along Glasgow Avenue. The draft recommendations include the provision of a bike lane with a buffered section and a 13' sidewalk from US Route 40 to Cann Road, and the provision of an eight to ten-foot multi-use path from south of Cann Road to Porter Road.

**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 site frontages, the BLOS with the construction of the proposed development and the provision of 5' bike lanes are summarized below. The BLOS was determined utilizing the calculators published on the LIB website: <http://www.rideillinois.org/blos/blosform.htm>

- Glasgow Avenue – BLOS: C

### **Crash Summary**

The TIS provided a crash summary that indicates a total of 85 crashes over a three-year study period (October 2011 to October 2014) along Glasgow Avenue from Old County Road to US Route 40. The following is a breakdown of the crashes over the three-year study period:

- US Route 40 – 34 crashes
  - 13 of 34 crashes were rear end crashes
  - 9 of 34 crashes were angle crashes
- North Entrance to Peoples Plaza – 4 crashes
- Main Entrance to Peoples Plaza – 5 crashes
- South Entrance to Peoples Plaza – 22 crashes
  - 12 of 22 crashes were angle crashes
- Hodgson Vo-Tech – 4 crashes
- Cann Road – 7 crashes
- Old County Road – 3 crashes
- Unknown Location – 6 crashes

Two of the crashes involved fatalities, which are summarized below:

- One fatality occurred on July 25, 2012 at 3:12 a.m. on Glasgow Avenue in the area south of Cann Road. This incident was a pedestrian crash which involved a person who was lying in the roadway when struck by a vehicle traveling southbound on Glasgow Avenue. The police report noted dark lighting and dry surface conditions.

- The second fatality occurred on July 3, 2014 at 10:31 a.m. at the unsignalized intersection of Glasgow Avenue and the North Entrance to Peoples Plaza. The incident was an angle crash as a vehicle exiting the eastbound North Entrance to Peoples Plaza (attempting to turn left) struck a vehicle traveling southbound on Glasgow Avenue. The police report noted dry surface conditions.

Recommendations from this review includes the following:

- Modification of the North Entrance to Peoples Plaza from a full movement intersection to a rights-in/rights-out only driveway, which would mitigate the fatality and any angle type crashes.
- Modification of the South Entrance to Peoples Plaza to a full movement intersection and a proposed traffic signal with protected only left turn phasing along Glasgow Avenue and protected/permitted left turn phasing along the South Entrance to Peoples Plaza/Service Road. These improvements would mitigate the angle type crashes.

### **Previous Comments**

The following comments noted in the September 14, 2015 DelDOT Preliminary TIS Review were not correctly addressed in the Final TIS submission.

- The TIS did not include the existing 2015 peak hour volumes for the US Route 40 intersection with Frenchtown Manor Road Extension. As such, Landmark Science and Engineering submitted a supplemental analysis to DelDOT on December 1, 2015 containing this intersection and the results are included in this review.
- The TIS did not modify the morning peak hour trip generation volumes for the LaGrange committed development. As such, JMT adjusted the volume diagrams for Cases 2 and 3b.

### **General HCS Analysis Comments**

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

1. The TIS performed analyses using HCS 2010 Version 6.41 whereas JMT used HCS 2010 Version 6.80. As such, some of the results are different between the two analyses.
2. JMT utilized updated volumes during Cases 2 and 3b based on comments received from DelDOT during the Preliminary TIS review that were not addressed in the Final TIS.
3. JMT utilized updated volumes during Case 3a based on results from DelDOT's traffic model.
4. The TIS used a 0.92 peak hour factor at signalized intersections and a 1.00 peak hour factor at unsignalized intersections, and did not input heavy vehicle percentages into the analyses. However, JMT input the peak hour factors and heavy vehicle percentages based on the existing traffic count data within the analyses.
5. 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 TIS maintained the heavy vehicle percentages utilized in their existing cases throughout the future cases.
6. 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 TIS maintained the existing PHF throughout the future cases.
7. JMT analyzed the signalized intersections from US Route 40/Entrance to Peoples Plaza to US Route 40/LaGrange Avenue/Glasgow Park Entrance as corridors which allowed the input of offset data. The TIS did not input offset data as they individually analyzed each of these intersections. This analysis difference could cause discrepancies between the TIS and JMT's level of service results.
8. JMT included passage, yellow, and red times within the signal timing consistent with the DelDOT Timing Plans whereas the TIS did not.
9. JMT utilized Arrival Type 4 along the US Route 40 approaches to each signalized intersection to account for progression along the coordinated corridor whereas the TIS utilized Arrival Type 3.
10. JMT incorporated peak hour pedestrian volumes into the analysis based on the existing traffic count data whereas the TIS did not.

11. For the signalized intersections along US Route 40, the TIS used 100 second signal cycle lengths for each peak period whereas JMT used 150 seconds consistent with the DelDOT Timing Plans.
12. JMT utilized right-turn-on-red volumes based on the existing traffic count data within the signalized intersection analyses and proportionally increased them for future cases. The TIS maintained the existing right-turn-on-red volumes throughout the future cases.
13. JMT, along with discussions with DelDOT's Development Coordination, developed traffic volumes utilizing DelDOT's traffic model for the Case 3a scenarios with the Service Road connection. Case 3a-Option 1 includes two separate full movement T-intersections along Glasgow Avenue between the Main Entrance to Peoples Plaza and the South Entrance to Peoples Plaza. For Case 3a-Option 1, Site Entrance B includes the Service Road connection. Case 3a-Option 2 includes a full movement intersection at the Main Entrance to Peoples Plaza/Site Entrance A with the Service Road connection and a rights-in/rights-out only Site Entrance B north of the South Entrance to Peoples Plaza and south of the Main Entrance to Peoples Plaza. Case 3a-Option 3 includes a full movement intersection at the South Entrance to Peoples Plaza with the Service Road connection and a rights-in/rights-out only Site Entrance A north of the South Entrance to Peoples Plaza and south of the Main Entrance to Peoples Plaza.
14. The items within the LOS tables highlighted in gray indicate the analysis results for the recommendations with the construction of the connector roadway (Case 3a-Option 3). The items highlighted in blue indicate the analysis results for the recommendations without the construction of the connector roadway (Case 3b).

Table 2  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>1</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
Site Entrance A/Glasgow Avenue <sup>2</sup>						
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 1)						
Westbound Site Entrance A Left	-	-	-	E (49.4)	F (160.4)	F (1471.2)
Westbound Site Entrance A Right	-	-	-	B (11.7)	B (13.0)	C (16.5)
Westbound Site Entrance A Approach	-	-	-	C (23.8)	F (60.1)	F (480.9)
Southbound Glasgow Avenue Left	-	-	-	A (9.3)	A (9.0)	B (11.9)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3)						
Westbound Site Entrance A Right	-	-	-	B (11.0)	B (12.2)	B (14.8)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3) with Improvements <sup>3</sup>						
Westbound Site Entrance A Left	-	-	-	B (11.3)	B (12.5)	C (15.3)

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

<sup>2</sup> The TIS did not analyze this Site Entrance in HCS.

<sup>3</sup> Improvements scenario is where the proposed connector road would be opposite the South Entrance to Peoples Plaza. Site Entrance B would be located along the proposed connector road and a traffic signal would be installed at the Glasgow Avenue intersection with the South Entrance to Peoples Plaza. Additionally, a left turn lane would be installed along northbound Glasgow Avenue at the Main Entrance to Peoples Plaza and the North Entrance to Peoples Plaza along Glasgow Avenue would be reconfigured as a rights-in/rights-out only access.

Table 2 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>1</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
Site Entrance A/Glasgow Avenue <sup>2</sup>						
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)						
Westbound Site Entrance A Left	-	-	-	F (105.9)	F (588.7)	F (6874.6)
Westbound Site Entrance A Right	-	-	-	B (11.7)	B (14.4)	C (22.4)
Westbound Site Entrance A Approach	-	-	-	E (47.7)	F (233.2)	F (2626.7)
Southbound Glasgow Avenue Left	-	-	-	A (9.8)	A (9.2)	C (16.4)

Signalized Intersection <sup>1</sup> (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
Site Entrance A/Glasgow Avenue <sup>2</sup>						
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 1) <i>with Signalization</i> <sup>4</sup>	-	-	-	A (7.9)	B (15.5)	B (20.0)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) <i>with Signalization</i> <sup>4</sup>	-	-	-	A (9.6)	B (17.2)	C (26.9)

<sup>4</sup> The Signalization scenario includes the installation of a traffic signal with a 75 second cycle length. One northbound right turn lane and one southbound left turn lane would be added along Glasgow Avenue. The westbound Site Entrance A approach would provide one left turn lane and one right turn lane.

Table 2 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>1</sup> Two-Way Stop Control	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
Site Entrance A/Glasgow Avenue/Main Entrance to Peoples Plaza <sup>2</sup>						
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3) with Mitigation Option 1 <sup>5</sup>						
Eastbound Main Entrance to Peoples Plaza Left	-	-	-	D (31.1)	F (313.2)	F (264.9)
Eastbound Main Entrance to Peoples Plaza Right	-	-	-	C (15.4)	C (20.7)	C (18.6)
Eastbound Main Entrance to Peoples Plaza Approach	-	-	-	C (20.7)	F (186.8)	F (180.4)
Northbound Glasgow Avenue Left	-	-	-	A (9.6)	B (10.3)	B (10.3)

<sup>5</sup> Mitigation Option 1 includes the scenario where the proposed connector road would be opposite the South Entrance to Peoples Plaza. Site Entrance B would be located along the proposed connector road and a traffic signal would be installed at the Glasgow Avenue intersection with the South Entrance to Peoples Plaza. Site Entrance A would be located opposite the Main Entrance to Peoples Plaza and Site Entrance A would be configured as a rights-in/rights-out only access with an acceleration lane. A left turn lane would be installed along northbound Glasgow Avenue at the Main Entrance to Peoples Plaza. Additionally, the North Entrance to Peoples Plaza along Glasgow Avenue would be reconfigured as a rights-in/rights-out only access.

Table 2 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>1</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 1) with Signalization <sup>6</sup>	-	-	-	C (23.2)	C (27.3)	C (28.2)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with Signalization <sup>6</sup>	-	-	-	C (23.1)	C (28.6)	D (37.8)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with Mitigation Option 2 <sup>7</sup>	-	-	-	C (24.3)	C (31.0)	D (36.8)

<sup>6</sup> The Signalization scenario includes the alignment of the Site Entrance opposite the Main Entrance to Peoples Plaza and the installation of a traffic signal. JMT modeled the signal with a 75 second cycle length. One left turn lane, one through lane, and one right turn lane would be provided along the northbound, eastbound, and westbound approaches to the intersection. Two left turn lanes, one through lane, and one right turn lane would be provided along the southbound approach.

<sup>7</sup> The Mitigation Option 2 scenario includes the alignment of the Site Entrance opposite the Main Entrance to Peoples Plaza and the installation of a traffic signal. JMT modeled the signal with a 75 second cycle length. One left turn lane, one through lane, and one right turn lane would be provided along the northbound, eastbound, and westbound approaches to the intersection. Two left turn lanes, one through lane, and one right turn lane would be provided along the southbound approach. This scenario also includes the North Entrance to Peoples Plaza along Glasgow Avenue reconfigured as a rights-in/rights-out only access.

Table 3  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>6</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Site Entrance B/Glasgow Avenue<sup>7</sup></b>						
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 1)						
Westbound Site Entrance B Left	-	-	-	E (41.0)	F (235.8)	F (211.0)
Westbound Site Entrance B Right	-	-	-	B (11.8)	B (11.4)	B (12.7)
Westbound Site Entrance B Approach	-	-	-	D (27.4)	F (140.5)	F (126.3)
Southbound Glasgow Avenue Left	-	-	-	A (8.9)	A (8.9)	A (9.3)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3a-Option 2)						
Westbound Site Entrance B Right	-	-	-	B (11.9)	B (12.4)	B (15.0)

Signalized Intersection <sup>8</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Site Entrance B/Glasgow Avenue<sup>9</sup></b>						
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 1) with Signalization <sup>8</sup>	-	-	-	B (12.5)	B (15.1)	C (20.8)

<sup>6</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>7</sup> The TIS did not analyze this Site Entrance in HCS.

<sup>8</sup> The Signalization scenario includes the installation of a traffic signal with a 75 second cycle length. One northbound right turn lane and one southbound left turn lane would be added along Glasgow Avenue. The westbound Site Entrance B approach would provide one left turn lane and one right turn lane.

Table 4  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>9</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/Main Entrance to Peoples Plaza<sup>10,11,12</sup></b>						
2015 Existing (Case 1)						
Eastbound Peoples Plaza Main Entrance Left	-	-	-	C (24.1)	E (35.9)	C (20.3)
Eastbound Peoples Plaza Main Entrance Right	-	-	-	B (12.9)	B (14.0)	B (10.8)
Eastbound Peoples Plaza Main Entrance Approach	A (7.3)	A (7.5)	A (7.5)	C (19.4)	D (28.1)	C (18.3)
Northbound Glasgow Avenue	B (13.7)	F (*)	C (24.0)	-	-	-
Southbound Glasgow Avenue Through	C (17.5)	F (207.0)	E (43.6)	-	-	-
Southbound Glasgow Avenue Right	A (8.5)	A (8.9)	A (8.8)	-	-	-
Southbound Glasgow Avenue Approach	C (16.5)	F (159.1)	D (33.0)	-	-	-

\*HCS did not generate a result due to excessive delay

<sup>9</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>10</sup> The TIS identified Glasgow Avenue (north/south direction) as the minor street, whereas JMT modeled Peoples Plaza Main Entrance (east/west direction) as the minor street per field conditions.

<sup>11</sup> The TIS analyzed the eastbound Peoples Plaza Main Entrance as a shared through/left lane and right turn lane, whereas JMT analyzed the approach with a separate left and right turn lane per field conditions.

<sup>12</sup> The TIS included the northbound illegal left turn volumes in the analysis, whereas JMT included these volumes in the northbound through volumes.

Table 4 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>11</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/Main Entrance to Peoples Plaza<sup>12,13,14</sup></b>						
2018 without Development (Case 2)						
Eastbound Peoples Plaza Main Entrance Left	-	-	-	C (20.9)	E (40.0)	C (21.5)
Eastbound Peoples Plaza Main Entrance Right	-	-	-	B (12.2)	B (14.4)	B (10.9)
Eastbound Peoples Plaza Main Entrance Approach	A (7.3)	A (7.5)	A (7.5)	C (17.3)	D (30.8)	C (19.2)
Northbound Glasgow Avenue	B (14.0)	F (*)	D (25.5)	-	-	-
Southbound Glasgow Avenue Through	C (18.0)	F (230.2)	E (47.5)	-	-	-
Southbound Glasgow Avenue Right	A (8.5)	A (8.9)	A (8.9)	-	-	-
Southbound Glasgow Avenue Approach	C (16.9)	F (177.6)	E (35.8)	-	-	-
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 1)						
Eastbound Peoples Plaza Main Entrance Left	-	-	-	D (26.0)	F (140.0)	F (281.1)
Eastbound Peoples Plaza Main Entrance Right	-	-	-	C (15.9)	C (23.5)	C (19.8)
Eastbound Peoples Plaza Main Entrance Approach	-	-	-	C (17.1)	F (77.3)	F (172.5)

\*HCS did not generate a result due to excessive delay

Table 4 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>11</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 2)						
Eastbound Peoples Plaza Main Entrance Left	-	-	-	F (143.7)	F (1454.9)	F (*)
Eastbound Peoples Plaza Main Entrance Through	-	-	-	F (65.2)	F (134.0)	F (676.6)
Eastbound Peoples Plaza Main Entrance Right	-	-	-	B (11.8)	B (14.1)	B (10.8)
Eastbound Peoples Plaza Main Entrance Approach	-	-	-	F (56.5)	F (635.6)	F (*)
Westbound Site Entrance A Left	-	-	-	F (837.2)	F (10577.2)	F (*)
Westbound Site Entrance A Through	-	-	-	F (84.4)	F (65.5)	F (520.3)
Westbound Site Entrance A Right	-	-	-	B (10.8)	B (11.7)	B (13.6)
Westbound Site Entrance A Approach	-	-	-	F (445.0)	F (5825.7)	F (*)
Northbound Glasgow Avenue Left	-	-	-	A (8.5)	A (9.1)	A (8.4)
Southbound Glasgow Avenue Left	-	-	-	A (9.3)	A (9.2)	B (12.6)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3)						
Eastbound Peoples Plaza Main Entrance Left	-	-	-	C (23.6)	F (98.8)	F (219.2)
Eastbound Peoples Plaza Main Entrance Right	-	-	-	C (15.4)	C (20.7)	C (18.6)
Eastbound Peoples Plaza Main Entrance Approach	-	-	-	C (16.6)	F (58.9)	F (142.5)

\*HCS did not generate a result due to excessive delay

Table 4 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>11</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3) with Improvements <sup>13</sup>						
Eastbound Peoples Plaza Main Entrance Left	-	-	-	D (34.8)	F (350.4)	F (402.9)
Eastbound Peoples Plaza Main Entrance Right	-	-	-	C (15.4)	C (20.7)	C (18.6)
Eastbound Peoples Plaza Main Entrance Approach	-	-	-	C (21.9)	F (207.9)	F (271.1)
Northbound Glasgow Avenue Left				A (9.6)	B (10.3)	B (10.3)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)						
Eastbound Peoples Plaza Main Entrance Left	-	-	-	E (36.0)	F (321.3)	F (757.4)
Eastbound Peoples Plaza Main Entrance Right	-	-	-	C (15.3)	C (19.2)	C (19.6)
Eastbound Peoples Plaza Main Entrance Approach	A (7.3)	A (7.5)	A (7.5)	D (27.3)	F (213.0)	F (559.3)
Northbound Glasgow Avenue	C (22.1)	F (*)	F (*)	-	-	-
Southbound Glasgow Avenue Through	F (50.1)	F (471.7)	F (568.6)	-	-	-
Southbound Glasgow Avenue Right	A (8.5)	A (8.9)	A (8.9)	-	-	-
Southbound Glasgow Avenue Approach	E (46.9)	F (387.0)	F (487.7)	-	-	-

\*HCS did not generate a result due to excessive delay

<sup>13</sup> Improvements scenario is where the proposed connector road would be opposite the South Entrance to Peoples Plaza. Site Entrance B would be located along the proposed connector road and a traffic signal would be installed at the Glasgow Avenue intersection with the South Entrance to Peoples Plaza. Additionally, a left turn lane would be installed along northbound Glasgow Avenue at the Main Entrance to Peoples Plaza and the North Entrance to Peoples Plaza along Glasgow Avenue would be reconfigured as a rights-in/rights-out only access.

Table 4 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Roundabout <sup>11</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/Main Entrance to Peoples Plaza<sup>14</sup></b>						
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3)						
Eastbound Peoples Plaza Main Entrance Approach	-	-	-	A (9.6)	C (24.7)	C (21.8)
Northbound Glasgow Avenue Approach	-	-	-	A (7.7)	B (11.6)	C (16.2)
Southbound Glasgow Avenue Approach	-	-	-	B (13.2)	C (21.1)	D (25.7)
Overall Intersection	-	-	-	B (11.0)	C (19.0)	C (21.9)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3) with Mitigation Option 3 <sup>15</sup>						
Eastbound Peoples Plaza Main Entrance Approach	-	-	-	B (10.7)	D (35.0)	D (25.5)
Northbound Glasgow Avenue Approach	-	-	-	A (8.5)	B (14.0)	C (19.0)
Southbound Glasgow Avenue Approach	-	-	-	C (16.1)	D (27.4)	D (30.2)
Overall Intersection	-	-	-	B (12.9)	D (25.2)	D (25.6)

<sup>14</sup> The Roundabout scenario includes the modification of the intersection to a one lane roundabout. The analysis was conducted using HCS 2010 Roundabouts 6.80 software.

<sup>15</sup> Mitigation Option 3 includes the modification of the intersection to a one lane roundabout and the reconfiguration of the North Entrance to Peoples Plaza along Glasgow Avenue as a rights-in/rights-out only access. The analysis was conducted using HCS 2010 Roundabouts 6.80 software.

Table 4 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>11</sup> (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 without Development (Case 2) with Signalization <sup>16,17</sup>	-	-	-	A (6.7)	B (13.2)	B (13.7)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 1) with Signalization <sup>18,19</sup>	-	-	-	A (8.5)	B (13.5)	B (12.3)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 2) with Signalization <sup>18,19</sup>	-	-	-	C (23.1)	C (27.6)	D (36.3)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3) with Mitigation Option 4 <sup>18,19,18</sup>	-	-	-	B (11.0)	B (17.4)	B (16.3)

<sup>16</sup> Signalization scenario includes the installation of a traffic signal with a 75 second cycle length.

<sup>17</sup> JMT modeled the eastbound approach with one left turn lane, one through lane, and one right turn lane as side street approaches with only left and/or right movements must be coded with a through movement having a zero volume to be computed properly per McTrans HCS 2010 technical support.

<sup>18</sup> Mitigation Option 4 includes signalization of the intersection and the modification of the northbound Glasgow Avenue approach to provide a left turn lane. The northbound left turn movement would operate with protected/permitted signal phasing.

Table 4 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>11</sup> (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3) with Mitigation Option 5 <sup>18,19,19</sup>	-	-	-	B (11.5)	B (19.3)	B (18.1)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with Signalization <sup>18,19</sup>	-	-	-	A (6.9)	B (13.2)	B (14.2)

<sup>19</sup> Mitigation Option 5 includes the scenario where the proposed connector road would be opposite the South Entrance to Peoples Plaza. Site Entrance B would be located along the proposed connector road and traffic signals would be installed at the Glasgow Avenue intersections with the South Entrance to Peoples Plaza and the Main Entrance to Peoples Plaza. Additionally, the North Entrance to Peoples Plaza along Glasgow Avenue would be reconfigured as a rights-in/rights-out only access.

Table 5  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>20</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/North Entrance to Peoples Plaza<sup>21,22,23</sup></b>						
2015 Existing (Case 1)						
Eastbound Peoples Plaza North Entrance	A (7.2)	A (7.2)	A (7.2)	C (25.0)	D (27.4)	C (19.6)
Northbound Glasgow Avenue Approach	C (15.5)	D (25.9)	C (15.1)	A (1.3)	A (1.0)	A (0.5)
Southbound Glasgow Avenue Through	C (16.1)	D (31.4)	C (15.7)	-	-	-
Southbound Glasgow Avenue Right	A (8.4)	A (8.5)	A (8.5)	-	-	-
Southbound Glasgow Avenue Approach	C (15.5)	D (29.4)	B (15.0)	-	-	-
2018 without Development (Case 2)						
Eastbound Peoples Plaza North Entrance	A (7.3)	A (7.4)	A (7.3)	C (22.3)	F (63.7)	C (23.2)
Northbound Glasgow Avenue Approach	C (19.9)	F (*)	C (20.5)	A (1.6)	A (1.2)	A (0.7)
Southbound Glasgow Avenue Through	C (17.8)	F (104.2)	C (19.9)	-	-	-
Southbound Glasgow Avenue Right	A (8.7)	A (8.6)	A (8.6)	-	-	-
Southbound Glasgow Avenue Approach	C (16.2)	F (92.3)	C (18.1)	-	-	-

\*HCS did not generate a result due to excessive delay

<sup>20</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>21</sup> The TIS identified Glasgow Avenue (north/south direction) as the minor street, whereas JMT modeled Peoples Plaza Main Entrance (east/west direction) as the minor street per field conditions.

<sup>22</sup> The TIS analyzed the eastbound Peoples Plaza North Entrance with a separate left and right turn lane, whereas JMT analyzed the approach with a shared left/right turn lane per field conditions.

<sup>23</sup> The TIS utilized a pedestrian walking speed of 4 ft/sec, whereas JMT utilized a pedestrian walking speed of 3.5 ft/sec.

Table 5 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>22</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/North Entrance to Peoples Plaza</b>						
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 1)						
Eastbound Peoples Plaza North Entrance	-	-	-	D (29.8)	F (131.8)	F (77.4)
Northbound Glasgow Avenue Approach	-	-	-	A (3.9)	A (3.4)	A (3.4)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 2)						
Eastbound Peoples Plaza North Entrance	-	-	-	C (24.8)	F (67.3)	F (59.0)
Northbound Glasgow Avenue Approach	-	-	-	A (1.3)	A (1.0)	A (0.7)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3)						
Eastbound Peoples Plaza North Entrance	-	-	-	C (23.7)	F (71.2)	F (54.9)
Northbound Glasgow Avenue Approach	-	-	-	A (1.7)	A (1.2)	A (0.9)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3) with Mitigation Option 1 <sup>24</sup>						
Eastbound Peoples Plaza North Entrance	-	-	-	B (13.6)	C (18.2)	C (17.4)

\*HCS did not generate a result due to excessive delay

<sup>24</sup> Mitigation Option 1 includes the scenario where the proposed connector road would be opposite the South Entrance to Peoples Plaza. Site Entrance B would be located along the proposed connector road and a traffic signal would be installed at the Glasgow Avenue intersection with the South Entrance to Peoples Plaza. Site Entrance A would be located opposite the Main Entrance to Peoples Plaza and Site Entrance A would be configured as a rights-in/rights-out only access with an acceleration lane. A left turn lane would be installed along northbound Glasgow Avenue at the Main Entrance to Peoples Plaza. Additionally, the North Entrance to Peoples Plaza along Glasgow Avenue would be reconfigured as a rights-in/rights-out only access.

Table 5 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering, Inc.

Unsignalized Intersection <sup>22</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/North Entrance to Peoples Plaza</b>	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) <sup>23,24,25</sup>						
Eastbound Peoples Plaza North Entrance	A (7.3)	A (7.4)	A (7.3)	E (41.3)	F (396.3)	F (373.4)
Northbound Glasgow Avenue Approach	F (262.4)	F (*)	F (*)	A (1.8)	A (1.4)	A (1.4)
Southbound Glasgow Avenue Through	E (47.4)	F (246.7)	F (230.5)	-	-	-
Southbound Glasgow Avenue Right	A (8.7)	A (8.6)	A (8.6)	-	-	-
Southbound Glasgow Avenue Approach	E (42.6)	F (223.4)	F (212.8)	-	-	-
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) <i>with Mitigation Option 2</i> <sup>25</sup>						
Eastbound Peoples Plaza North Entrance	-	-	-	B (14.7)	C (19.5)	C (20.5)

<sup>25</sup> The Mitigation Option 2 scenario includes the alignment of the Site Entrance opposite the Main Entrance to Peoples Plaza and the installation of a traffic signal. This scenario also includes the North Entrance to Peoples Plaza along Glasgow Avenue reconfigured as a rights-in/rights-out only access.

Table 5 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering, Inc.

Signalized Intersection <sup>22</sup> (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 without Development (Case 2) with Signalization <sup>26,27,28</sup>	-	-	-	A (7.3)	B (13.1)	A (8.2)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 1) with Signalization <sup>28,29,30</sup>	-	-	-	A (8.4)	B (15.1)	B (12.0)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 2) with Signalization <sup>28,29,30</sup>	-	-	-	A (8.2)	B (13.1)	B (11.2)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3) with Signalization <sup>28,29,30</sup>				A (8.4)	B (13.0)	B (11.5)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with Signalization <sup>28,29,30</sup>	-	-	-	A (9.5)	B (17.9)	C (21.1)

<sup>26</sup> The Signalization scenario includes the installation of a traffic with a 75 second cycle length.

<sup>27</sup> JMT modeled the eastbound approach with a shared through/left turn/right turn lane as side street approaches with only left and/or right movements must be coded with a through movement having a zero volume to be computed properly per McTrans HCS 2010 technical support.

<sup>28</sup> JMT modeled the northbound approach with one left turn lane and one through lane.

Table 6  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>29</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Eastbound US Route 40/Glasgow Avenue</b> <sup>30,31,32</sup>						
2015 Existing (Case 1)	B (19.0)	C (22.1)	B (18.5)	D (45.1)	D (54.1)	D (43.1)
2018 without Development (Case 2)	B (19.8)	C (28.1)	B (19.7)	D (45.5)	E (75.7)	D (47.7)
2018 without Development (Case 2) with <i>Improvement</i> <sup>33</sup>	-	-	-	D (45.4)	E (75.6)	D (47.6)
2018 without Development (Case 2) with <i>Improvement and Mitigation Option 6</i> <sup>35,34</sup>	-	-	-	D (40.3)	D (53.2)	D (44.4)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)	-	-	-	D (48.4)	E (69.9)	E (55.8)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)	C (22.3)	D (42.9)	D (36.6)	E (60.1)	F (115.2)	F (93.6)

<sup>29</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>30</sup> Although a left turn movement exists along the eastbound US Route 40 approach, JMT did not include that movement in the analysis since unopposed left turn movements off the major street cannot be coded in HCS 2010.

<sup>31</sup> JMT included the eastbound left turn volumes with the through volumes and adjusted the base saturation flow rate using the percent unopposed left turns field to code unopposed left turn movements properly per McTrans HCS 2010 technical support.

<sup>32</sup> The TIS modeled the northbound and southbound approaches to operate concurrently with each other whereas JMT modeled the northbound and southbound approaches to operate as split-phase consistent with field observations.

<sup>33</sup> The improvement scenario includes the DelDOT HEP Improvement project (Contract #T201300101) at the eastbound US Route 40 and Glasgow Avenue intersection to modify the northbound approach to provide two through lanes and one right turn lane and the eastbound approach to provide one left turn lane, two through lanes, and one right turn lane.

<sup>34</sup> The Mitigation Option 6 scenario includes the modification at the eastbound US Route 40/Glasgow Avenue intersection to provide one through lane and two right turn lanes along the northbound approach.

Table 6 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>31</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Eastbound US Route 40/Glasgow Avenue<sup>32,33,34</sup></b>						
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a – Options 1, 2 & 3) with <i>Improvement</i> <sup>35</sup>	-	-	-	D (48.2)	E (71.2)	E (58.5)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with <i>Improvement</i> <sup>35</sup>	-	-	-	E (58.1)	F (114.8)	F (89.0)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a – Options 1, 2 & 3) with <i>Improvement and Mitigation Option 7</i> <sup>35,35</sup>	-	-	-	D (38.9)	D (48.4)	D (49.7)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a – Options 1, 2, & 3) with <i>Improvement and Mitigation Option 8</i> <sup>35,36</sup>	-	-	-	C (26.6)	C (31.8)	C (32.1)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with <i>Improvement and Mitigation Option 7</i> <sup>35,37</sup>	-	-	-	D (45.3)	D (54.8)	E (62.9)

<sup>35</sup> The Mitigation Option 7 scenario includes the modification at the eastbound US Route 40/Glasgow Avenue intersection to provide one left turn lane, three through lanes, and one right turn lane along the eastbound approach and one through lane and two right turn lanes along the northbound approach.

<sup>36</sup> The Mitigation Option 8 scenario includes the modification of the Glasgow Avenue signal phasing at the eastbound US Route 40/Glasgow Avenue intersection from split phasing to permissive/concurrent phasing.

Table 7  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>37</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Westbound US Route 40/Glasgow Avenue</b> <sup>38,39,40,41,42</sup>						
2015 Existing (Case 1)	B (19.2)	C (24.1)	C (20.4)	C (25.8)	D (34.0)	C (22.2)
2018 without Development (Case 2)	B (21.0)	C (25.6)	C (21.8)	C (28.0)	D (36.1)	C (25.1)
2018 without Development (Case 2) with <i>Improvement</i> <sup>43</sup>	-	-	-	C (28.0)	D (36.1)	C (25.1)
2018 without Development (Case 2) with <i>Improvement and Mitigation Option 6</i> <sup>45,44</sup>	-	-	-	C (28.0)	C (33.1)	C (22.2)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)	-	-	-	C (33.2)	D (42.0)	D (39.9)

<sup>37</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>38</sup> The TIS modeled the westbound US Route 40 approach with a left turn lane consistent with existing conditions. However, JMT did not include the westbound left turn lane in the analysis since unopposed left turn movements from the major street cannot be coded in HCS 2010.

<sup>39</sup> JMT included the westbound left turn volumes with the through volumes and adjusted the base saturation flow rate using the percent unopposed left turns field to code unopposed left turn movements properly per McTrans HCS 2010 technical support.

<sup>40</sup> The TIS modeled the southbound Glasgow Avenue approach with one through lane and one right turn lane whereas JMT modeled the approach with two through lanes and one right turn lane consistent with field observations.

<sup>41</sup> The TIS modeled the northbound and southbound approaches to operate concurrently with each other, whereas JMT modeled the northbound and southbound approaches to operate as split-phase consistent with field observations.

<sup>42</sup> JMT utilized right turn on red volumes, whereas the TIS did not for the weekday AM and PM peak hours.

<sup>43</sup> The improvement scenario includes the DelDOT HEP Improvement project (Contract #T201300101) at the eastbound US Route 40 and Glasgow Avenue intersection to modify the northbound approach to provide two through lanes and one right turn lane and the eastbound approach to provide one left turn lane, two through lanes, and one right turn lane.

<sup>44</sup> The Mitigation Option 6 scenario includes the modification at the eastbound US Route 40/Glasgow Avenue intersection to provide one through lane and two right turn lanes along the northbound approach. This scenario was included as the intersections of US Route 40 EB/Glasgow Avenue and US Route 40 WB/Glasgow Avenue operates with one signal controller.

Table 7 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>39</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) <sup>40,41,42,43,44</sup>	C (24.8)	C (30.5)	D (43.5)	D (38.7)	D (49.0)	D (47.0)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a– Options 1, 2 & 3) with <i>Improvement</i> <sup>45</sup>	-	-	-	D (36.1)	D (42.9)	D (41.3)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with <i>Improvement</i> <sup>45</sup>	-	-	-	D (44.9)	D (51.2)	D (51.1)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a– Options 1, 2 & 3) with <i>Improvement and Mitigation Option 7</i> <sup>45,45</sup>	-	-	-	C (32.3)	D (44.1)	D (42.0)

<sup>45</sup> The Mitigation Option 7 scenario includes the modification at the eastbound US Route 40/Glasgow Avenue intersection to provide one left turn lane, three through lanes, and one right turn lane along the eastbound approach and one through lane and two right turn lanes along the northbound approach. This scenario was included as the intersections of US Route 40 EB/Glasgow Avenue and US Route 40 WB/Glasgow Avenue operates with one signal controller.

Table 7 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>39</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a– Options 1, 2 & 3) with <i>Improvement and Mitigation Option 8</i> <sup>45,46</sup>	-	-	-	C (28.8)	D (39.5)	D (36.6)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with <i>Improvement and Mitigation Option 7</i> <sup>45,47</sup>	-	-	-	D (37.8)	D (54.1)	D (53.6)

<sup>46</sup> The Mitigation Option 8 scenario includes the modification of the Glasgow Avenue signal phasing at the eastbound US Route 40/Glasgow Avenue intersection from split phasing to permissive/concurrent phasing.

Table 8  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>47</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2015 Existing (Case 1)						
Eastbound Peoples Plaza South Entrance	-	-	-	B (13.6)	D (26.2)	C (15.2)
Northbound Glasgow Avenue Left	C (20.6)	F (1320.0)	D (29.5)	A (9.8)	B (10.4)	A (9.1)
Northbound Glasgow Avenue Through	B (11.3)	B (10.7)	B (10.4)	-	-	-
Northbound Glasgow Avenue Approach	B (14.4)	F (649.3)	C (20.7)	A (3.3)	A (5.1)	A (4.9)
Southbound Glasgow Avenue Through	B (14.6)	F (55.7)	C (18.2)	-	-	-
Southbound Glasgow Avenue Right	A (8.4)	A (8.5)	A (8.4)	-	-	-
Southbound Glasgow Avenue Approach	B (14.3)	F (51.3)	C (17.2)	-	-	-
2018 without Development (Case 2)						
Eastbound Peoples Plaza South Entrance	-	-	-	B (12.7)	E (47.0)	C (16.9)
Northbound Glasgow Avenue Left	D (30.6)	F (*)	F (50.4)	A (9.8)	B (11.0)	A (9.5)
Northbound Glasgow Avenue Through	B (11.5)	B (10.9)	B (10.5)	-	-	-
Northbound Glasgow Avenue Approach	C (19.4)	F (*)	D (33.1)	A (4.0)	A (5.6)	A (5.4)
Southbound Glasgow Avenue Through	C (15.3)	F (104.5)	C (20.4)	-	-	-
Southbound Glasgow Avenue Right	A (8.4)	B (8.5)	A (8.4)	-	-	-
Southbound Glasgow Avenue Approach	C (15.0)	F (95.7)	C (19.3)	-	-	-

\*HCS did not generate a result due to excessive delay

<sup>47</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>48</sup> The TIS identified Glasgow Avenue (north/south direction) as the minor street, whereas JMT modeled Peoples Plaza South Entrance (east/west direction) as the minor street per field conditions.

Table 8 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>49</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 1)						
Eastbound Peoples Plaza South Entrance	-	-	-	B (14.4)	F (130.5)	E (44.7)
Northbound Glasgow Avenue Left	-	-	-	B (10.7)	B (13.4)	B (12.2)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 2)						
Eastbound Peoples Plaza South Entrance	-	-	-	B (14.4)	F (130.5)	E (44.7)
Northbound Glasgow Avenue Left	-	-	-	B (10.6)	B (13.3)	B (12.1)

Table 8 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>49</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3)						
Eastbound Peoples Plaza South Entrance Through	-	-	-	F (169.2)	F (621.5)	F (1527.8)
Eastbound Peoples Plaza South Entrance Right	-	-	-	B (12.4)	E (37.7)	C (15.7)
Eastbound Peoples Plaza South Entrance Approach	-	-	-	E (40.6)	F (*)	F (*)
Westbound Service Road Left	-	-	-	F (3540.3)	F (*)	F (*)
Westbound Service Road Through	-	-	-	F (920.8)	F (929.4)	F (3550.3)
Westbound Service Road Right	-	-	-	B (10.9)	B (10.5)	B (11.4)
Westbound Service Road Approach	-	-	-	F (2263.5)	F (*)	F (*)
Northbound Glasgow Avenue Left	-	-	-	A (9.7)	B (10.9)	A (9.4)
Southbound Glasgow Avenue Left	-	-	-	A (9.9)	A (9.3)	B (13.1)

\*HCS did not generate a result due to excessive delay

Table 8 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>49</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/South Entrance to Peoples Plaza<sup>50</sup></b>						
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)						
Eastbound Peoples Plaza South Entrance	-	-	-	B (13.8)	F (127.6)	E (45.7)
Northbound Glasgow Avenue Left	F (50.5)	F (*)	F (*)	B (10.2)	B (12.9)	B (11.9)
Northbound Glasgow Avenue Through	B (13.9)	B (13.8)	C (16.3)	-	-	-
Northbound Glasgow Avenue Approach	D (25.9)	F (*)	F (*)	A (3.4)	A (5.4)	A (4.2)
Southbound Glasgow Avenue Through	C (17.7)	F (310.9)	F (113.3)	-	-	-
Southbound Glasgow Avenue Right	A (8.4)	F (8.5)	A (8.4)	-	-	-
Southbound Glasgow Avenue Approach	C (17.4)	F (291.3)	F (107.6)	-	-	-

\*HCS did not generate a result due to excessive delay

Table 8 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Roundabout <sup>49</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/South Entrance to Peoples Plaza<sup>49</sup></b>						
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a–Option 3) with Mitigation Option 9						
Eastbound Peoples Plaza South Entrance	-	-	-	A (8.4)	E (45.5)	C (21.4)
Westbound Service Road	-	-	-	B (12.5)	B (14.4)	D (29.4)
Northbound Glasgow Avenue	-	-	-	C (21.5)	C (18.7)	F (79.2)
Southbound Glasgow Avenue	-	-	-	F (97.1)	F (215.7)	F (347.4)
Overall Intersection	-	-	-	F (50.4)	F (94.9)	F (152.6)

Signalized Intersection <sup>49</sup> (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/South Entrance to Peoples Plaza</b>						
2018 without Development (Case 2) with Signalization <sup>50</sup>	-	-	-	A (7.3)	C (20.4)	B (14.3)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a–Option 1) with Signalization <sup>52</sup>	-	-	-	A (7.6)	C (31.1)	B (18.4)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a–Option 2) with Signalization <sup>52</sup>	-	-	-	A (7.7)	C (31.2)	B (18.5)

<sup>49</sup> Mitigation Option 9 includes the installation of a single lane roundabout with yield controlled right turn bypass lanes. The analysis was conducted using HCS 2010 Roundabouts 6.80 software.

<sup>50</sup> The Signalization scenario includes the installation of a traffic signal with a 75 second cycle length.

Table 8 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>49</sup> (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a–Option 3) with Mitigation Option 10 <sup>52,51</sup>	-	-	-	C (26.7)	D (38.6)	C (33.0)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a–Option 3) with Mitigation Option 1 <sup>52,52</sup>	-	-	-	C (26.8)	D (38.4)	C (33.8)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with Signalization <sup>52</sup>	-	-	-	A (7.5)	C (29.5)	B (18.6)

<sup>51</sup> Mitigation Option 10 includes separate turn lanes on the eastbound and westbound approaches of the South Entrance to the Peoples Plaza/Connector Roadway and the northbound approach of Glasgow Avenue, while the southbound approach of Glasgow Avenue has two left turn lanes, one through lane, and one right turn lane.

<sup>52</sup> Mitigation Option 1 includes the scenario where the proposed connector road would be opposite the South Entrance to Peoples Plaza. Site Entrance B would be located along the proposed connector road and a traffic signal would be installed at the Glasgow Avenue intersection with the South Entrance to Peoples Plaza. Site Entrance A would be located opposite the Main Entrance to Peoples Plaza and Site Entrance A would be configured as a rights-in/rights-out only access with an acceleration lane. A left turn lane would be installed along northbound Glasgow Avenue at the Main Entrance to Peoples Plaza. Additionally, the North Entrance to Peoples Plaza along Glasgow Avenue would be reconfigured as a rights-in/rights-out only access.

Table 9  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>53</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/Entrance to Hodgson Vo-Tech High School<sup>54</sup></b>						
2015 Existing (Case 1)	B (17.1)	B (13.6)	A (5.8)	A (9.8)	B (14.7)	B (10.8)
2018 without Development (Case 2)	B (16.6)	B (14.7)	A (5.8)	A (9.8)	B (19.8)	B (11.8)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)	-	-	-	B (12.3)	C (20.9)	B (14.9)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)	B (16.1)	B (16.6)	A (7.4)	B (11.7)	C (20.4)	B (14.9)

<sup>53</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>54</sup> The TIS utilized protected only left turn phasing on Glasgow Avenue, whereas JMT utilized protected/permitted phasing per existing field conditions.

Table 10  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>55</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/Cann Road (New Castle Road 393)<sup>56,57</sup></b>						
2015 Existing (Case 1)						
Eastbound Cann Road Approach	A (7.3)	A (7.2)	A (7.3)	C (19.3)	D (30.7)	C (21.1)
Northbound Glasgow Avenue Left	B (11.8)	F (71.0)	C (23.6)	A (7.9)	A (9.7)	A (8.6)
Northbound Glasgow Avenue Through	C (18.5)	C (15.3)	C (16.7)	-	-	-
Northbound Glasgow Avenue Approach	C (18.4)	C (18.7)	C (17.0)	A (0.1)	A (0.6)	A (0.4)
Southbound Glasgow Avenue Through	B (11.9)	E (39.8)	C (22.0)	-	-	-
Southbound Glasgow Avenue Right	A (8.3)	A (8.5)	A (8.5)	-	-	-
Southbound Glasgow Avenue Approach	B (11.7)	E (37.0)	C (20.6)	-	-	-
2018 without Development (Case 2)						
Eastbound Cann Road Approach	A (7.3)	A (7.2)	A (7.3)	C (21.2)	E (40.6)	D (25.2)
Northbound Glasgow Avenue Left	B (12.2)	F (*)	D (29.6)	A (7.9)	B (10.3)	A (8.8)
Northbound Glasgow Avenue Through	D (25.1)	C (17.2)	C (19.3)	-	-	-
Northbound Glasgow Avenue Approach	D (25.0)	F (*)	C (19.7)	A (0.1)	A (0.6)	A (0.4)
Southbound Glasgow Avenue Through	B (12.2)	F (74.9)	D (27.3)	-	-	-
Southbound Glasgow Avenue Right	A (8.3)	A (8.5)	A (8.5)	-	-	-
Southbound Glasgow Avenue Approach	B (12.1)	F (69.7)	D (25.4)	-	-	-

\*HCS did not generate a result due to excessive delay

<sup>55</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>56</sup> The TIS analyzed the eastbound approach of Cann Road with a separate left and right turn lane, whereas JMT analyzed this approach with a shared left/right turn lane per existing field conditions.

<sup>57</sup> The TIS identified Glasgow Avenue (north/south direction) as the minor street, whereas JMT modeled Cann Road (east/west direction) as the minor street per field conditions.

Table 10 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>57</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/Cann Road (New Castle Road 393)</b>						
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)						
Eastbound Cann Road Approach	-	-	-	D (31.0)	F (102.0)	F (175.9)
Northbound Glasgow Avenue Left	-	-	-	A (8.2)	B (11.3)	B (10.0)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) <sup>58,59</sup>						
Eastbound Cann Road Approach	A (7.3)	A (7.3)	A (7.3)	D (28.2)	F (87.6)	F (180.8)
Northbound Glasgow Avenue Left	B (13.9)	F (*)	F (*)	A (8.1)	B (11.3)	B (10.1)
Northbound Glasgow Avenue Through	F (55.9)	D (26.4)	F (115.6)	-	-	-
Northbound Glasgow Avenue Approach	F (55.6)	F (*)	F (*)	A (0.0)	A (0.5)	A (0.3)
Southbound Glasgow Avenue Through	B (13.8)	F (172.7)	F (170.1)	-	-	-
Southbound Glasgow Avenue Right	A (8.4)	A (8.6)	A (8.5)	-	-	-
Southbound Glasgow Avenue Approach	B (13.6)	F (160.4)	F (156.7)	-	-	-

\*HCS did not generate a result due to excessive delay

Table 10 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>57</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue/Cann Road (New Castle Road 393)</b>						
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3a–Options 1, 2 & 3) with <i>Mitigation Option 11</i> <sup>58</sup>						
Eastbound Cann Road Left	-	-	-	C (19.3)	D (28.9)	D (32.3)
Eastbound Cann Road Right	-	-	-	B (10.8)	C (19.0)	C (16.2)
Eastbound Cann Road Approach	-	-	-	C (18.1)	D (27.6)	D (27.9)
Northbound Glasgow Avenue Left	-	-	-	A (8.2)	B (11.3)	B (10.0)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with <i>Mitigation Option 11</i> <sup>60</sup>						
Eastbound Cann Road Left	-	-	-	C (18.6)	D (27.9)	D (32.7)
Eastbound Cann Road Right	-	-	-	B (10.5)	C (18.9)	C (16.3)
Eastbound Cann Road Approach	-	-	-	C (17.5)	D (26.6)	D (28.2)
Northbound Glasgow Avenue Left	-	-	-	A (8.1)	B (11.3)	B (10.1)

<sup>58</sup> The Mitigation Option 11 scenario includes the provision of one left turn lane and one right turn lane on the eastbound Cann Road approach and a two-way left-turn lane median type along Glasgow Avenue.

Table 11  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>59</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Westbound US Route 40 / West Entrance to People's Plaza</b> <sup>60,61,62,63,64</sup>						
2015 Existing (Case 1)	-	-	-	A (3.5)	A (7.8)	A (9.2)
2018 without development (Case 2)	-	-	-	A (3.5)	A (9.5)	A (9.2)
2018 with development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)	-	-	-	A (5.2)	B (10.2)	A (10.0)
2018 with development and without proposed service road connection over Delaware Route 896 (Case 3b)	-	-	-	A (5.2)	A (9.5)	A (9.2)

<sup>59</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>60</sup> Based on field observations, the westbound US Route 40 approach provides one left turn lane and two through lanes. However, the TIS modeled the westbound approach with one shared through/left turn lane and one through lane.

<sup>61</sup> JMT did not include the westbound left turn lane in the analysis since unopposed left turn movements from the major street cannot be coded in HCS 2010.

<sup>62</sup> JMT included the westbound left turn volumes with the through volumes and adjusted the base saturation flow rate using the percent unopposed left turns field to code unopposed left turn movements properly per McTrans HCS 2010 technical support.

<sup>63</sup> The TIS modeled the northbound approach with two left turn lanes consistent with existing conditions. However, JMT modeled the northbound approach with one left turn lane and one shared through/left turn lane, as side street approaches with only left and/or right movements must be coded with a through movement having a zero volume to be computed properly per McTrans HCS 2010 technical support.

<sup>64</sup> The TIS modeled with a 1-phase traffic signal whereas JMT modeled with a 2-phase traffic signal, consistent with field observations. Since a 1-phase traffic signal was utilized, HCS did not calculate intersection delay; therefore, no results are provided in the TIS.

Table 12  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>65</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2015 Existing (Case 1)	C (28.2)	C (25.9)	C (25.1)	B (10.4)	B (18.8)	C (22.9)
2018 without Development (Case 2)	C (27.2)	C (26.2)	C (25.0)	B (10.4)	C (20.2)	C (23.0)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)	-	-	-	B (12.3)	C (20.4)	C (23.2)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)	C (23.6)	C (22.3)	C (25.0)	B (12.3)	C (20.2)	C (23.0)

<sup>65</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>66</sup> The TIS modeled the eastbound US Route 40 approach with a left turn lane consistent with existing conditions. However, JMT did not include the eastbound left turn lane in the analysis since unopposed left turn movements from the major street cannot be coded in HCS 2010.

<sup>67</sup> JMT included the eastbound left turn volumes with the through volumes and adjusted the base saturation flow rate using the percent unopposed left turns field to code unopposed left turn movements properly per McTrans HCS 2010 technical support.

<sup>68</sup> The TIS modeled the intersection to operate with a 2-phase traffic signal whereas JMT modeled the intersection with a 3-phase traffic signal, consistent with field observations.

Table 13  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>69</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Westbound US Route 40 / Frenchtown Road Extension (New Castle Road 392A)</b> <sup>70,71,72,73,74</sup>						
2015 Existing (Case 1)	-	-	-	A (0.7)	A (1.0)	A (1.1)
2018 without Development (Case 2)	-	-	-	A (1.4)	A (4.7)	A (1.7)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)	-	-	-	A (1.4)	A (4.6)	A (1.9)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)	-	-	-	A (1.4)	A (4.7)	A (2.0)

<sup>69</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>70</sup> Based on field observations, the westbound US Route 40 approach provides one left turn lane and two through lanes. However, the TIS modeled the westbound approach with one shared through/left turn lane and one through lane.

<sup>71</sup> JMT did not include the westbound left turn lane in the analysis since unopposed left turn movements from the major street cannot be coded in HCS 2010.

<sup>72</sup> JMT included the westbound left turn volumes with the through volumes and adjusted the base saturation flow rate using the percent unopposed left turns field to code unopposed left turn movements properly per McTrans HCS 2010 technical support.

<sup>73</sup> The TIS modeled the northbound approach with two left turn lanes consistent with existing conditions. However, JMT modeled the northbound approach with one left turn lane and one shared through/left turn lane, as side street approaches with only left and/or right movements must be coded with a through movement having a zero volume to be computed properly per McTrans HCS 2010 technical support.

<sup>74</sup> The TIS modeled with a 1-phase traffic signal, whereas JMT modeled with a 2-phase traffic signal consistent with field observations. Since a 1-phase traffic signal was utilized, HCS did not calculate intersection delay, therefore, no results are provided in the TIS.

Table 13 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>71</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Eastbound US Route 40 / Frenchtown Road Extension (New Castle Road 392A)</b> <sup>75,76,77</sup>						
2015 Existing (Case 1)	C (29.0)	C (29.2)	C (29.7)	A (4.3)	A (5.3)	A (6.4)
2018 without Development (Case 2)	C (26.5)	C (28.4)	C (31.2)	B (12.3)	B (18.7)	B (10.1)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)	-	-	-	B (12.2)	B (18.7)	B (10.5)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)	C (26.8)	C (28.9)	D (42.2)	B (12.3)	B (19.7)	B (12.5)

<sup>75</sup> The TIS modeled the eastbound US Route 40 approach with a left turn lane consistent with existing conditions. However, JMT did not include the eastbound left turn lane in the analysis since unopposed left turn movements from the major street cannot be coded in HCS 2010.

<sup>76</sup> JMT included the eastbound left turn volumes with the through volumes and adjusted the base saturation flow rate using the percent unopposed left turns field to code unopposed left turn movements properly per McTrans HCS 2010 technical support.

<sup>77</sup> The TIS modeled the intersection to operate with a 2-phase traffic signal where JMT modeled the intersection with a 3-phase traffic signal

Table 14  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>78</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>US Route 40 / Delaware Route 896<sup>79</sup></b>						
2015 Existing (Case 1)	C (34.2)	D (49.8)	C (32.5)	E (73.9)	E (79.6)	E (55.3)
2018 without Development (Case 2)	D (40.9)	D (53.0)	D (35.3)	F (110.2)	F (90.7)	E (67.3)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)	-	-	-	F (111.0)	F (91.3)	F (93.7)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)	D (52.0)	E (58.7)	E (60.1)	F (124.3)	F (110.0)	F (104.9)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3) with Mitigation Option 12 <sup>80</sup>	-	-	-	D (54.9)	D (52.9)	D (47.9)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with Mitigation Option 12 <sup>82</sup>	-	-	-	E (55.7)	D (54.3)	D (47.2)

<sup>78</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>79</sup> The TIS incorporated the right turn movements into the analyses. However, JMT omitted the right turn movements as they operate as free-flow based on field observations.

<sup>80</sup> The Mitigation Option 12 scenario includes the modification of each approach to provide three left turn lanes, four through lanes, and one channelized free-flow right turn lane.

Table 15  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>81</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>US Route 40 / LaGrange Avenue / Glasgow Park Entrance<sup>82</sup></b>						
2015 Existing (Case 1)	B (16.9)	C (20.3)	B (17.7)	C (22.2)	B (15.5)	B (18.0)
2018 without Development (Case 2)	B (16.5)	C (21.7)	B (18.0)	B (19.3)	B (16.5)	B (18.9)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)	-	-	-	C (22.6)	C (32.5)	D (44.7)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)	B (16.5)	C (22.6)	B (18.5)	B (19.5)	B (16.5)	B (18.9)

<sup>81</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>82</sup> The TIS modeled the northbound and southbound left turn movements to operate as protected only, whereas JMT modeled the movements to operate with protected and permitted phasing, consistent with field observations.

Table 16  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>83</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue / Old County Road<sup>84</sup></b>						
2015 Existing (Case 1)						
Eastbound Old County Road Left	A (7.4)	A (7.4)	A (7.3)	D (32.8)	F (83.1)	D (30.1)
Eastbound Old County Road Right	-	-	-	B (11.0)	C (15.6)	B (11.5)
Eastbound Old County Road Approach	-	-	-	C (20.2)	E (46.1)	C (22.2)
Northbound Glasgow Avenue Left	C (18.4)	F (*)	E (39.4)	A (8.2)	B (10.1)	A (8.9)
Northbound Glasgow Avenue Through	C (20.8)	C (18.0)	C (16.1)	-	-	-
Northbound Glasgow Avenue Approach	C (20.4)	-	C (21.6)	-	-	-
Southbound Glasgow Avenue Through	C (17.1)	F (83.9)	C (23.3)	-	-	-
Southbound Glasgow Avenue Right	A (8.4)	A (8.8)	A (8.6)	-	-	-
Southbound Glasgow Avenue Approach	C (15.9)	F (69.2)	C (20.5)	-	-	-

\*HCS did not generate a result due to excessive delay

<sup>83</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>84</sup> The TIS modeled Old County Road as the major roadway, whereas JMT modeled Glasgow Avenue as the major roadway, consistent with field observations.

Table 16 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>85</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue / Old County Road<sup>86</sup></b>						
2018 without Development (Case 2)						
Eastbound Old County Road Left	A (7.4)	A (7.4)	A (7.4)	E (39.5)	F (176.2)	E (41.9)
Eastbound Old County Road Right	-	-	-	B (11.0)	C (18.0)	B (12.1)
Eastbound Old County Road Approach	-	-	-	C (23.7)	F (90.9)	D (29.7)
Northbound Glasgow Avenue Left	C (22.9)	F (*)	F (138.7)	A (8.2)	B (10.9)	A (9.1)
Northbound Glasgow Avenue Through	E (40.8)	C (23.6)	C (20.4)	-	-	-
Northbound Glasgow Avenue Approach	E (37.8)	-	E (44.2)	-	-	-
Southbound Glasgow Avenue Through	C (19.9)	F (193.7)	E (38.1)	-	-	-
Southbound Glasgow Avenue Right	A (8.4)	A (8.8)	A (8.6)	-	-	-
Southbound Glasgow Avenue Approach	C (18.5)	F (160.8)	D (33.0)	-	-	-

\*HCS did not generate a result due to excessive delay

Table 16 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>85</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)						
Eastbound Old County Road Left	-	-	-	F (151.2)	F (778.1)	F (531.5)
Eastbound Old County Road Right	-	-	-	B (11.4)	C (21.1)	B (14.6)
Eastbound Old County Road Approach	-	-	-	F (91.7)	F (480.0)	F (406.6)
Northbound Glasgow Avenue Left	-	-	-	A (8.5)	B (12.2)	B (10.5)

Table 16 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Unsignalized Intersection <sup>85</sup> Two-Way Stop Control (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)						
Eastbound Old County Road Left	A (7.4)	A (7.4)	A (7.4)	F (96.1)	F (551.2)	F (467.0)
Eastbound Old County Road Right	-	-	-	B (11.7)	C (23.4)	C (15.8)
Eastbound Old County Road Approach	-	-	-	F (52.2)	F (285.5)	F (318.5)
Northbound Glasgow Avenue Left	E (39.6)	F (*)	F (*)	A (8.4)	B (12.2)	B (10.6)
Northbound Glasgow Avenue Through	F (114.5)	E (48.6)	F (150.9)	-	-	-
Northbound Glasgow Avenue Approach	F (104.0)	-	-	-	-	-
Southbound Glasgow Avenue Through	D (27.6)	F (358.7)	F (259.5)	-	-	-
Southbound Glasgow Avenue Right	A (8.4)	A (9.0)	A (8.8)	-	-	-
Southbound Glasgow Avenue Approach	D (25.2)	F (298.6)	F (218.4)	-	-	-

\*HCS did not generate a result due to excessive delay

Table 16 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>85</sup> (T-Intersection)	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue / Old County Road<sup>85,86</sup></b>						
2018 without Development (Case 2) with Signalization	-	-	-	B (11.7)	B (14.5)	B (12.0)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3) with Signalization	-	-	-	B (15.7)	C (31.2)	C (23.6)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with Signalization	-	-	-	B (12.6)	C (21.7)	B (16.1)

<sup>85</sup> The Signalization scenario includes the addition of a three phase traffic signal with a 60 second cycle length.

<sup>86</sup> JMT modeled the eastbound approach with one left turn lane, one through lane, and one right turn lane as side street approaches with only left and/or right movements must be coded with a through movement having a zero volume to be computed properly per McTrans HCS 2010 technical support.

Table 16 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Roundabout <sup>85</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Glasgow Avenue / Old County Road<sup>87,88</sup></b>						
2018 without Development (Case 2)						
Eastbound Old County Road	-	-	-	A (6.3)	B (10.7)	A (7.3)
Northbound Glasgow Avenue	-	-	-	C (15.5)	B (12.4)	B (10.7)
Southbound Glasgow Avenue	-	-	-	A (6.3)	C (16.4)	A (8.9)
Overall Intersection	-	-	-	B (11.1)	B (14.2)	A (9.4)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)						
Eastbound Old County Road	-	-	-	A (7.3)	C (15.2)	B (12.7)
Northbound Glasgow Avenue	-	-	-	D (27.4)	C (19.2)	D (29.1)
Southbound Glasgow Avenue	-	-	-	A (6.5)	C (23.6)	B (13.6)
Overall Intersection	-	-	-	C (16.7)	C (20.8)	C (19.4)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)						
Eastbound Old County Road	-	-	-	A (7.0)	B (13.9)	B (11.6)
Northbound Glasgow Avenue	-	-	-	D (25.7)	C (17.7)	D (30.9)
Southbound Glasgow Avenue	-	-	-	A (7.1)	D (31.6)	C (17.1)
Overall Intersection	-	-	-	C (16.9)	C (24.5)	C (22.1)

<sup>87</sup> This scenario includes the modification of the intersection to a one lane roundabout with yield controlled right turn bypass lanes.

<sup>88</sup> JMT analyzed the roundabout using HCS 2010 Roundabouts 6.80 software.

Table 17  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>89</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Delaware Route 896 / Glasgow Avenue / Porter Road (New Castle Road 400)<sup>90,91,92,93</sup></b>						
2015 Existing (Case 1)	D (39.5)	E (67.3)	D (35.3)	E (71.6)	E (61.3)	D (45.6)
2018 without Development (Case 2)	E (56.7)	F (105.2)	D (38.6)	F (95.9)	F (80.5)	D (48.9)
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3)	-	-	-	F (118.5)	F (95.8)	F (101.9)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b)	E (72.6)	F (154.1)	F (102.9)	F (124.4)	F (105.2)	F (102.2)
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3a-Options 1, 2 & 3) with Mitigation Option 13 <sup>94</sup>	-	-	-	D (51.1)	D (52.4)	D (47.9)

<sup>89</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>90</sup> The TIS modeled the eastbound Glasgow Avenue and the westbound Porter Road approaches to operate as split phase. However, based on field observations JMT modeled the eastbound and westbound approaches to operate concurrently with protected left turn phasing.

<sup>91</sup> The TIS utilized 100 seconds cycle length during the weekday AM peak hour and 130 seconds cycle length during the weekday PM and midday Saturday peak hours. However, JMT utilized 150 seconds cycle length during each peak hour consistent with the DelDOT Timing Plans.

<sup>92</sup> JMT omitted the westbound Porter Road and northbound SR 896 right turn movements from the analysis due to the provision of channelization with an acceleration lane. However, the TIS included these right turn movements in the analysis.

<sup>93</sup> The TIS configured the eastbound Glasgow Avenue and westbound Porter Road approaches with a separate left turn lane, shared through/left turn lane, and a right turn lane. However, based on field observations JMT modeled the eastbound and westbound approaches with one left turn lane, one through lane, and one right turn lane.

<sup>94</sup> Mitigation Option 13 includes the modification of the northbound SR 896 approach to provide two left turn lanes, three through lanes, and one right turn lane, the southbound SR 896 approach to provide one left turn lane, three through lanes, and one right turn lane, and the westbound approach to provide two left turn lanes, one through lane, and one right turn lane.

Table 17 (Continued)  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Signalized Intersection <sup>91</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Delaware Route 896 / Glasgow Avenue / Porter Road (New Castle Road 400)</b>						
2018 with Development and without proposed service road connection over Delaware Route 896 (Case 3b) with Mitigation Option 13 <sup>96</sup>	-	-	-	D (55.0)	D (54.6)	D (49.5)

Table 18  
PEAK HOUR LEVELS OF SERVICE (LOS)  
Based on Final Traffic Impact Study for Glasgow Avenue  
Prepared by Landmark Science and Engineering

Roundabout <sup>95</sup>	LOS per TIS			LOS per JMT		
	Weekday AM	Weekday PM	Midday SAT	Weekday AM	Weekday PM	Midday SAT
<b>Service Road Connector Road/ Site Entrance B<sup>96</sup></b>						
2018 with Development and with proposed service road connection over Delaware Route 896 (Case 3a-Option 3)						
Eastbound Service Road	-	-	-	A (7.7)	A (9.3)	D (30.6)
Westbound Service Road	-	-	-	A (7.7)	A (7.0)	C (18.6)
Southbound Site Entrance B	-	-	-	A (5.2)	A (7.9)	B (13.1)
Overall Intersection	-	-	-	A (7.3)	A (8.4)	C (22.3)

<sup>95</sup> For signalized and unsignalized analyses, the numbers in parentheses following levels of service are average delay per vehicle, measured in seconds.

<sup>96</sup> JMT analyzed this intersection as a single lane roundabout using HCS 2010 Roundabouts 6.80 software.